TUGAS AKHIR – SF 141501

TELEPORTASI KUANTUM INFORMASI DUA QUBIT MELALUI KEADAAN TERBELIT TIGA QUBIT

Irasani Rahayu
NRP 1113100026

Dosen Pembimbing
Agus Purwanto, D.Sc

DEPARTEMEN FISIKA
Fakultas Matematika dan Ilmu Pengetahuan Alam
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FINAL PROJECT – SF 141501

QUANTUM TELEPORTATION INFORMATION TWO QUBIT TROUGHT THREE QUBIT ENTANGLED STATE

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LEMBAR PENGESAHAN

TELEPORTASI KUANTUM INFORMASI DUA QUBIT MELALUI KEADAAN TERBELIT TIGA QUBIT

TUGAS AKHIR

Diajukan untuk Memenuhi Salah Satu Syarat Memperoleh
Gelar Sarjana Sains
pada
Bidang Studi Fisika Teori
Program Studi S-1 Departemen Fisika
Fakultas Matematika dan Ilmu Pengetahuan Alam
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Surabaya, 24 Juli 2017

KEMENTERIAN RISET, TEKNOLOGI, DAN PENDIDIKAN TINGGI
INSTITUT TEKNOLOGI SEPULUH NOPEMBER
FAKULTAS MATEMATIKA DAN ILMU PENGETAHUAN ALAM
DEPARTEMEN FISIKA

TELEPORTASI KUANTUM INFORMASI DUA QUBIT MELALUI KEADAAN TERBELIT TIGA QUBIT

Penulis : Irasani Rahayu
NRP : 1113100026
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Dosen Pembimbing : Agus Purwanto, D.Sc

Abstrak

Pada tugas akhir ini telah dirumuskan persamaan umum teleportasi keadaan dua qubit melalui keadaan terbelit tiga qubit, dan diketahui keadaan informasi yang dapat dikirim, serta keadaan terbelit yang dipakai. Perumusan digunakan informasi dua qubit sembarang dan dua qubit khusus. Keadaan dua qubit sembarang tidak dapat dikirim dengan keadaan terbelit tiga qubit (GHZ, W dan tiga qubit sembarang). Keadaan informasi dua qubit khusus dapat dikirim dengan keadaan terbelit tiga qubit. Pengiriman semua informasi khusus dua qubit dengan dua suku dapat terkirim. Pengiriman informasi khusus dua qubit dengan tiga suku dapat terkirim jika ada nilai konstanta suku yang sama. Pengiriman informasi khusus dua qubit dengan empat suku dapat terkirim jika hanya ada dua nilai konstanta. Pengiriman informasi khusus dua qubit dengan dua suku keadaan murni terbelit menggunakan keadaan murni terbelit. Pengiriman informasi khusus dua qubit dengan dua suku keadaan *unentangled* menggunakan saluran yang *entangled* sabagian.

Kata kunci : Keterbelitan, Qubit, Pengukuran

QUANTUM TELEPORTATION INFORMATION TWO QUBIT TROUGHT THREE QUBIT ENTANGLED STATE

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Abstract

In this final project, a general equation has been formulated for two qubit teleportation from three qubit entangled state, and the state of information that can be sent, along with entangled state used. The formulization use information from two arbitrary qubit an two special qubit. State information of two qubit arbitrary qubit can not be sent from three qubit entangled state (GHZ, W, three qubit arbitraty). State information of two spacial qubit can be sent using three qubit entangled state. The transmission of all spacial information from two qubit with two part can be achived. The transmission of spacial information from two qubit with three parts can be achived if there are constants of similar part. The transmission of spacial information from two qubit with four parts can be archived if there are two constants. The transmission of spacial information from two qubit with two part ofe pure entangled state use pure entangled. The transmission of spacial information from two qubit with two part of untangled state use partialy entangled state.

Keywords : Etanglement, Qubit, Measurement

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"Teleportasi Kuantum Informasi Dua Qubit Melalui Keadaan Terbelit Tiga Qubit"

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Surabaya, 24 Juli 2017
Penulis

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BAB I
PENDAHULUAN

1.1 Latar Belakang

Teori kuantum mendiskripsikan banyak fenomena yang sebelumnya tidak dapat dijelaskan dalam fisika klasik, seperti radiasi benda hitam dan stabilitas orbital elektron pada atom. Mekanika kuantum menjadi rumusan standart untuk menjelaskan benda dalam skala mikro. Mekanika kuantum menjelaskan bahwa pada saat yang sama tidak mungkin diketahui secara pasti posisi dan momentum suatu partikel secara bersama-sama. Prinsip ini dikenal dengan prinsip ketidakpastian Heinsenberg yang dikemukakan oleh Werner Heisenberg.

Para fisikawan tidak semua setuju mengenai teori fisika kuantum. Salah satunya adalah Enstein yang menolak prinsip ketidakpastian Heinsenberg. Enstein, Boris Podolsky dan Nathan Rosen mengungkapkan permasalahan dalam fisika kuantum tentang keadaan spin partikel yang terbelit, dikenal dengan EPR *paradox* (Einstein, 1935). Spin yang terbelit adalah dua partikel atau lebih dengan keadaan spin diantara *up* dan *down*. Menurut Einstein dkk, apabila dua sistem yang terpisah, maka saat melakukan pengukuran terhadap salah satu sistem tidak mempengaruhi sistem yang lainnya. Fisika kuantum menjelaskan adanya keterbelitan. Keterbelitan merupakan hubungan khusus antar objek yang pengukuran satu objek mempengaruhi objek lainnya meskipun keadaan kedua objek terpisah sangat jauh. Misalkan pelemparan sebuah dadu pada satu waktu. Dadu berperilaku seolah partikel yang terbelit. Lemparan dadu selalu menghasilkan penampakan dua permukaan dadu yang sama. Dadu muncul secara acak namun pasangan terbelitnya selalu muncul dengan permukaan yang sesuai dan sama. Ketika dilakukan pengukuran pada salah satu partikel maka partikel yang lainnya memiliki hasil pengukuran yang berlawanan, hal ini dikenal dengan *anti correlation* keadaan terbelit. Berdasarkan keadaan ini, dua sistem yang terbelit dan dipisahkan sangat jauh

maka pengukuran salah satu sistem akan mempengaruhi sistem yang lain.

Para peneliti teori kuantum yaitu Niels Bohr dkk, menanggapi EPR *paradox.* Niels Bohr dkk menjelasan bahwa pengukuran terhadap salah satu partikel, maka dalam waktu yang sama partikel tersebut akan mengirimkan informasi ke partikel yang lainnya. Hal ini dikarenakan partikel berada pada satu sistem. Pengiriman informasi telah dibuktikan oleh John Bell pada tahun 1964 dan diperoleh keadaan Bell State atau keadaan EPR. Sampai awal tahun 1990-an berdasarkan prinsip ketidak pastian Heinsenberg, para ahli fisika menolak teleportasi. Namun dengan pembuktian pengiriman informasi oleh John Bell menjadi awal pengembangan ilmu kuantum teleportasi. Pada sistem kuantum tidak memungkinkan untuk menyalin suatu informasi. Sedangkan pada pengiriman informasi klasik dapat secara bebas menyalin informasinya. Berdasarkan penelitian Niels Bohr dkk maka akan terjadi pengiriman informasi dari partikel yang satu ke partikel yang lainnya.

Kuantum teleportasi merupakan metode pengiriman objek yang dihancurkan, suatu objek dilebur pada suatu tempat dan disusun kembali secara sempurna di tempat lain. Pada tahun 1993, Charles H. Bennet dkk mengemukakan bahwa memungkinkan mengirim keadaan kuantum dari satu tempat ketempat yang lain tanpa propagasi dari objek fisis terkait dengan ruang yang menghalangi (Bennet, 1933). Hal ini dikenal dengan teleportasi kuantum. Bennet dkk menteleportasi keadaan dengan cara menginteraksikan partikel dengan keadaan EPR. Pada penelitiannya, dirumuskan teleportasi satu qubit informasi menggunakan keadaan terbelit dan pengukuran (*measurement*) dua qubit. Maka pertanyaan yang relevan adalah bagaimana persamaan untuk menteleportasi keadaan informasi dua qubit melalui keadaan terbelit dan pengukuran tiga qubit. Dalam penelitian kali ini akan memperluas konsep Bennet dkk dengan menggunakan informasi dua qubit sembarang dan khusus dengan keadaan terbelit dan pengukuran tiga qubit.

1.2 Perumusan Masalah

Berdasarkan latar belakang di atas, permasalahan yang akan dibahas adalah menganalisa persamaan umum untuk menteleportasi informasi dua qubit melalui keadaan terbelit dan pengukuran tiga qubit.

1.3 Tujuan Penelitian

Tujuan dari penelitian tugas akhir ini adalah:

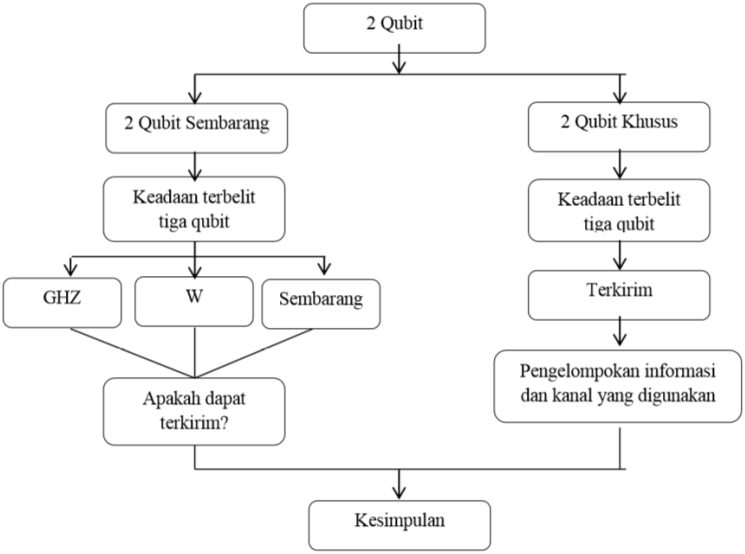
1. Untuk mengetahui persamaan umum teleportasi keadaan qubit dobel melalui keadaan terbelit qubit rangkap tiga
2. Untuk mengetahui keadaan informasi yang dapat dikirim, serta keadaan terbelit yang dipakai.

1.4 Batasan Masalah

Pada penelitian tugas akhir ini, permasalahan hanya dibatasi pada kuantum teleportasi informasi dua qubit dengan keadaan terbelit dan pengukuran tiga qubit.

1.5 Metodologi Penelitian

Penelitian ini merupakan penelitian teoritis yang mengembangkan penelitian yang telah dilakukan Bennet dkk[1] dengan merumuskan pengiriman informasi keadaan dua qubit melalui keadaan terbelit dan pengukuran tiga qubit. Adapun skema kerja penelitian seperti gambar 1.



Gambar 1.1 Skema Penelitian

1.6 Manfaat Penulisan

Penelitian Tugas Akhir ini diharapkan dapat bermanfaat untuk memberikan informasi, pemahaman, persamaan umum untuk menteleportasikan keadaan informasi dua qubit melalui keadaan terbelit dan pengukuran tiga qubit.

BAB II
TINJAUAN PUSTAKA

2.1 Notasi Dirac

Keadaan sistem fisis pada mekanika kuantum dinyatakan oleh vektor keadaan dalam ruang vektor kompleks. Dirac menyederhanakan dengan memperkenalkan notasi vektor ket. Sebagai contoh $|a\rangle$ yang dibaca ket-A. Ruang ket mempunyai pasangan dual yaitu ruang bra. Setiap ket $|a\rangle$ mempunyai bra, yang dituliskan $\langle a|$ dalam ruang bra. Secara umum ruang bra dapat dinyatakan sebagai ruang cermin dari ruang ket.

Perkalian dalam antara bra dan ket dapat dinyatakan sebagai berikut

$$(\langle a|)\bullet(|b\rangle) = \langle a|b\rangle \tag{1}$$

Hasil perkalian persamaan (1) merupakan bilangan kompleks. Postulat pertama mengenai perkalian dalam ini adalah

$$\langle a|b\rangle = \langle b|a\rangle^* \tag{2}$$

Perkalian dalam tidak sama dengan perkalian *scalar* dari dua vektor $\bar{a}$ dan $\bar{b}$ karena $\bar{a}\bullet\bar{b} = \bar{b}\bullet\bar{a}$. Postulat kedua mengenai perkalian dalam adalah

$$\langle a|a\rangle \geq 0 \tag{3}$$

Tanda sama dengan berlaku jika dan hanya jika $|a\rangle$ merupakan vektor nol. $\sqrt{\langle a|a\rangle}$ merupakan *norm* atau besaran dari $|a\rangle$. Perkalian *scalar* dua vektor jika $|a\rangle$ dan $|b\rangle$ dinyatakan orthonormal saat memenuhi

$$\langle a|b\rangle = \langle b|a\rangle = 0 \tag{4}$$

Operator akan selalu bekerja dari kiri suatu ket, seperti berikut ini

$$\alpha\bullet(|a\rangle) = \alpha|a\rangle \tag{5}$$

Dengan α merupakan suatu operator. Apabila dua operator α dan β sama, maka memenuhi persamaan

$$\alpha|a\rangle = \beta|a\rangle \tag{6}$$

Berdasarkan ruang dual, operator α selalu bekerja dari kanan suatu bra.

$$(\langle a|)\bullet\alpha = \langle a|\alpha \tag{7}$$

Pasangan korespondensi dual $\alpha|a\rangle$ yang dipostulatkan adalah $\langle a|\alpha^{\dagger}$. Selain perkalian dalam juga didefinisikan perkalian luar sebagai berikut

$$(|a\rangle)\bullet(\langle b|) = |a\rangle\langle b| \tag{8}$$

(Purwanto, 2014)

2.2 Representasi Matrik

Ruang ket dibungun dari eigen ket dan setiap vektor didalam ruang ket dapat dinyatakan dengan sebagai kombinasi linier dari eigen tersebut. Sehingga ket a dapat dinyatakan sebagai berikut

$$|a\rangle = c'|a'\rangle + c''|a''\rangle + c'''|a'''\rangle + \cdots \tag{9}$$

Ket eigen ortonormal dinyatakan

$$\langle a'|a''\rangle = \delta_{a'a''} \tag{10}$$

Ket eigen membangun basis ruang ket. Vektor ket sembarang $|a\rangle$ dalam ruang ket dapat dinyatakan sebagai kombinasi linier dari kumpulan ket eigen

$$|a\rangle = \sum_{a'} c_{a'}|a'\rangle \tag{11}$$

Berdasarkan sifat orthonormal, maka saat persamaan (11) dikalikan dengan $\langle a"|$ dari sebelah kiri maka diperoleh

$$\begin{aligned}\langle a"|a\rangle &= \sum_{a'} c_{a'} \langle a"|a'\rangle \\ &= \sum_{a'} c_{a'} \delta_{a"a'} \\ &= c_{a"}\end{aligned} \tag{12}$$

Sehingga

$$\begin{aligned}|a\rangle &= \sum_{a'} (\langle a'|a\rangle)|a'\rangle \\ &= \sum_{a'} |a'\rangle(\langle a'|a\rangle) \\ &= \sum_{a'} (|a'\rangle\langle a'|)|a\rangle\end{aligned} \tag{13}$$

Berdasarkan persamaan (12) dan (13) maka diperoleh hubungan kelengkapan (*completeness relation*)

$$\sum_{a'} |a'\rangle\langle a'| = 1 \tag{14}$$

Apabila keadaan $|a\rangle$ ternormalisasi maka terpenuhi

$$\langle a|a\rangle = 1 \tag{15}$$

Berdasarkan hubungan kelengkapan diatas dapat diperoleh

$$\langle a|a\rangle = \langle a|\left(\sum_{a'} |a'\rangle\langle a'|\right)|a\rangle$$

$$= \sum_{a'} \langle a | a' \rangle \langle a' | a \rangle$$

$$= \sum_{a'} \left| \langle a' | a \rangle \right|^2$$

$$= \sum_{a'} |c_{a'}|^2$$

$$= 1 \tag{16}$$

Suatu operator α yang dikalikan dengan persamaan (14) dari kanan dan kiri maka

$$\alpha = \left(\sum_{a'} |a'\rangle \langle a'| \right) \alpha \left(\sum_{a'} |a''\rangle \langle a''| \right)$$

$$= \sum_{a'} \sum_{a''} |a'\rangle (\langle a' | \alpha | a'' \rangle) \langle a''| \tag{17}$$

Bentuk $\langle a' | \alpha | a'' \rangle$ dapat dinyatakan dengan eleman matrik a' adalah baris, dan a'' adalah kolom. Sehingga operator α menjadi

$$\alpha = \begin{pmatrix} \langle a^{(1)} | \alpha | a^{(1)} \rangle & \langle a^{(1)} | \alpha | a^{(2)} \rangle & \cdots & \langle a^{(1)} | \alpha | a^{(n)} \rangle \\ \langle a^{(2)} | \alpha | a^{(1)} \rangle & \langle a^{(2)} | \alpha | a^{(2)} \rangle & \cdots & \langle a^{(2)} | \alpha | a^{(n)} \rangle \\ \vdots & \vdots & \ddots & \vdots \\ \langle a^{(n)} | \alpha | a^{(1)} \rangle & \langle a^{(n)} | \alpha | a^{(2)} \rangle & \cdots & \langle a^{(n)} | \alpha | a^{(n)} \rangle \end{pmatrix} \tag{18}$$

Bentuk $\alpha | a \rangle$ bukan merupakan perkalian konstanta dengan $|a\rangle$, melainkan menghasilkan ket lain yang berada di ruang ket yang sama dan dapat dinyatakan sebagai berikut

$$|\eta\rangle = \alpha |a\rangle \tag{19}$$

Persamaan (19) dikalikan dengan bra $\langle a' |$ dan disisipkan syarat kelengkapan, maka diperoleh

$$\langle a'|\eta\rangle = \langle a'|\alpha|a\rangle$$

$$= \sum_{a''} \langle a'|\alpha|a''\rangle\langle a''|a'\rangle \tag{20}$$

Persamaan (20) merupakan bentuk kaidah perkalian matrik kuadratik α dengan vektor kolom adalah

$$|\eta\rangle = \begin{pmatrix} \langle a^{(1)}|\eta\rangle \\ \langle a^{(2)}|\eta\rangle \\ \langle a^{(3)}|\eta\rangle \\ \vdots \end{pmatrix} \tag{21}$$

Maka,

$$|a\rangle = \begin{pmatrix} \langle a^{(1)}|a\rangle \\ \langle a^{(2)}|a\rangle \\ \langle a^{(3)}|a\rangle \\ \vdots \end{pmatrix} \tag{22}$$

Representasi matrik dari ket adalah matrik kolom, sedangkan operasi pada bra dinyatakan

$$\langle\eta| = \langle a|\alpha \tag{23}$$

Persamaan (23) dikaliakan dengan ket dari kanan dan disisipkan syarat kelengkapan, jadi diperoleh persamaan

$$\langle\eta|a'\rangle = \langle a|\alpha|a'\rangle$$

$$= \sum_{a''} \langle a|\alpha|a''\rangle\langle a''|a'\rangle \tag{24}$$

Hal ini menunjukkan bra memenuhi kaidah vektor baris.

$$\begin{aligned}\langle\eta| &= \left(\langle\eta|a^{(1)}\rangle \quad \langle\eta|a^{(2)}\rangle \quad \langle\eta|a^{(3)}\rangle \quad \cdots\right) \\ &= \left(\langle a^{(1)}|\eta\rangle^* \quad \langle a^{(2)}|\eta\rangle^* \quad \langle a^{(3)}|\eta\rangle^* \quad \cdots\right)\end{aligned} \tag{25}$$

Dasarkan persamaan (25) diketahui bahwa vektor bra adalah sekawan hermite dari vektor ket.

Dua vektor ket $|a\rangle$ dan $|b\rangle$ dikalikan secara langsung atau *direct product* dilambangkan dengan $\otimes$ yang dituliskan sebagai berikut

$$|a\rangle \otimes |b\rangle = |a\rangle|b\rangle = |ab\rangle \tag{26}$$

Vektor ket $|a\rangle = \begin{pmatrix} a^1 \\ a^2 \end{pmatrix}$ dan $|b\rangle = \begin{pmatrix} b^1 \\ b^2 \end{pmatrix}$, sehingga diperoleh

$$|a\rangle \otimes |b\rangle = \begin{pmatrix} a^1|b\rangle \\ a^2|b\rangle \end{pmatrix} = \begin{pmatrix} a^1b^1 \\ a^1b^2 \\ a^2b^1 \\ a^2b^2 \end{pmatrix} \tag{27}$$

Sedangkan untuk perkalian tiga ket

$$|a\rangle \otimes |b\rangle \otimes |c\rangle = |a\rangle|b\rangle|c\rangle = |abc\rangle \tag{28}$$

Vektor ket $|a\rangle = \begin{pmatrix} a^1 \\ a^2 \end{pmatrix}$, $|b\rangle = \begin{pmatrix} b^1 \\ b^2 \end{pmatrix}$ dan $|c\rangle = \begin{pmatrix} c^1 \\ c^2 \end{pmatrix}$, sehingga diperoleh

$$|a\rangle \otimes |b\rangle \otimes |C\rangle = \begin{pmatrix} a^1|b\rangle|c\rangle \\ a^2|b\rangle|c\rangle \end{pmatrix} = \begin{pmatrix} a^1b^1|c\rangle \\ a^1b^2|c\rangle \\ a^2b^1|c\rangle \\ a^2b^2|c\rangle \end{pmatrix} = \begin{pmatrix} a^1b^1c^1 \\ a^1b^1c^2 \\ a^1b^2c^1 \\ a^1b^2c^2 \\ a^2b^1c^1 \\ a^2b^1c^2 \\ a^2b^2c^1 \\ a^2b^2c^2 \end{pmatrix} \quad (29)$$

(Purwanto, 2014)

2.3 Qubit

Quantum teleportasi merupakan bagian dari kuantum informasi. Pada informasi klasik digunakan satuan biner 0 dan 1, yang dikenal dengan *classical bit* atau Cbit. Pada keadaan kuantum digunakan satuan $|0\rangle$ dan $|1\rangle$ yang dikenal dengan *quantum bit* atau qubit. Qubit merupakan sistem kuantum dari keadaan 0 dan 1 yang direpresentasikan oleh keadaan orthonormal $|0\rangle$ dan $|1\rangle$. Keadaan $|0\rangle$ dan $|1\rangle$ adalah keadaan kuantum dua tingkat, dapat diungkapan sebagai basis standart ruang Hilbert dua dimensi

$$|0\rangle = \begin{pmatrix} 1 \\ 0 \end{pmatrix},$$

$$|1\rangle = \begin{pmatrix} 0 \\ 1 \end{pmatrix} \quad (30)$$

Keadaan $|0\rangle$ dan $|1\rangle$ membentuk basis kumputasi, dan keadaan $|\psi\rangle$ ternormalisasi dinyatakan sebagai kombinasi keduanya

$$|\psi\rangle = \alpha|0\rangle + \beta|1\rangle \tag{31}$$

α dan β adalah kuantitas bilangan kompleks yang dibatasi oleh syarat normalisasi sebagai berikut

$$|\alpha|^2 + |\beta|^2 = 1. \tag{32}$$

Qubit $|0\rangle$ dan $|1\rangle$ adalah qubit tunggal. Qubit tunggal mempunyai dua parameter bebas. Qubit ganda dapat diperoleh dengan perkalian langsung antara dua qubit. Bersarkan bentuk persamaan (27) maka qubit ganda dapat dituliskan sebagai berikut

$$|00\rangle = |0\rangle \otimes |0\rangle = \begin{pmatrix} 1 \\ 0 \\ 0 \\ 0 \end{pmatrix}, \; |01\rangle = |0\rangle \otimes |1\rangle = \begin{pmatrix} 0 \\ 1 \\ 0 \\ 0 \end{pmatrix},$$

$$|10\rangle = |1\rangle \otimes |0\rangle = \begin{pmatrix} 0 \\ 0 \\ 1 \\ 0 \end{pmatrix}, \; |11\rangle = |1\rangle \otimes |1\rangle = \begin{pmatrix} 0 \\ 0 \\ 0 \\ 1 \end{pmatrix} \tag{33}$$

Sedangkan untuk qubit tiga adalah perkalian langsung tiga qubit satuan. Berdasarkan persamaan (29) tiga qubit dapat dituliskan sebagai berikut

$$|000\rangle = |0\rangle \otimes |0\rangle \otimes |0\rangle = \begin{pmatrix} 1 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \end{pmatrix}, |001\rangle = |0\rangle \otimes |0\rangle \otimes |1\rangle = \begin{pmatrix} 0 \\ 1 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \end{pmatrix},$$

$$|010\rangle = |0\rangle \otimes |1\rangle \otimes |0\rangle = \begin{pmatrix} 0 \\ 0 \\ 1 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \end{pmatrix}, |011\rangle = |0\rangle \otimes |1\rangle \otimes |1\rangle = \begin{pmatrix} 0 \\ 0 \\ 0 \\ 1 \\ 0 \\ 0 \\ 0 \\ 0 \end{pmatrix}$$

$$|100\rangle = |1\rangle \otimes |0\rangle \otimes |0\rangle = \begin{pmatrix} 0 \\ 0 \\ 0 \\ 0 \\ 1 \\ 0 \\ 0 \\ 0 \end{pmatrix}, |101\rangle = |1\rangle \otimes |0\rangle \otimes |1\rangle = \begin{pmatrix} 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 1 \\ 0 \\ 0 \end{pmatrix},$$

$$|110\rangle = |1\rangle \otimes |1\rangle \otimes |0\rangle = \begin{pmatrix} 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 1 \\ 0 \end{pmatrix}, \quad |111\rangle = |1\rangle \otimes |1\rangle \otimes |1\rangle = \begin{pmatrix} 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 0 \\ 1 \end{pmatrix} \quad (34)$$

Bentuk umum qubit *double* dapat diungkapkan sebagai berikut

$$|\psi\rangle = \alpha|00\rangle + \beta|01\rangle + \gamma|10\rangle + \delta|11\rangle \quad (35)$$

$\alpha, \beta, \gamma, \delta$ adalah kuantitas bilangan kompleks yang memenuhi syarat normalisasi

$$|\alpha|^2 + |\beta|^2 + |\gamma|^2 + |\delta|^2 = 1 \quad (36)$$

Qubit *double* dapat dinyatakan dalam perkalian langsung dua qubit tunggal

$$|\psi\rangle = |\psi_1\rangle \otimes |\psi_2\rangle \quad (37)$$

Secara umum qubit-n

$$|\psi\rangle = \alpha_1 \left|\underset{n}{0\cdots 0}\right\rangle + \alpha_2 \left|\underset{n}{0\cdots 1}\right\rangle + \cdots + \alpha_{2^n} \left|\underset{n}{1\cdots 1}\right\rangle \quad (38)$$

tetapan $\alpha_1, \alpha_2, \cdots, \alpha_{2^n}$ adalah bilangan kompleks yang memenuhi syarat normalisasi

$$|\alpha_1|^2 + |\alpha_2|^2 + \cdots + |\alpha_{2^n}|^2 = 1 \quad (39)$$

Bentuk diatas memiliki $2(2^n\text{-}1)$ derajat kebebasan. Qubit-n dapat dipisahkan dalan n qubit tunggal sebagai berikut

$$|\psi\rangle = |\psi_1\rangle \otimes |\psi_2\rangle \otimes \cdots \otimes |\psi_{2^n}\rangle \quad (40)$$

(Purwanto, 2014)

2.4 Keterbelitan

Keadan umum qubit tunggal dinyatakan pada persamaan (31), keadaan umum sitem dua qubit dinyatakan sebagai berikut

$$|\psi\rangle = c_0|00\rangle + c_1|01\rangle + c_2|10\rangle + c_3|11\rangle \quad (41)$$

Dengan c_0, c_1, c_2, c_3 adalah koefisien yang memenuhi syarat normalisasi.

$$\langle\psi|\psi\rangle = |c_0|^2 + |c_1|^2 + |c_2|^2 + |c_3|^2 = 1 \quad (42)$$

Syarat normalisasi mereduksi delapan parameter menjadi enam parameter bebas. Sehingga, secara umum keadaan dua qubit tidak dapat dipisahkan dalam perkalian langsung dua qubit tunggal.

$$|\psi\rangle = |\varphi_0\rangle \otimes |\varphi_1\rangle \quad (43)$$

Qubit tunggal mempunyai dua parameter bebas maka keadaan dua qubit yang dapat dipisahkan hanya mempunyai 4 parameter bebas.

Keadaan terbelit atau *entangled state* adalah keadaan yang tidak dapat dipisahkan sebagai perkalian dari qubit tunggal. Qubit *dobel* berikut adalah keadaan yang terbelit

$$|\psi\rangle = \frac{1}{\sqrt{2}}\left(|00\rangle + |11\rangle\right)$$
$$|\psi\rangle = \frac{1}{\sqrt{2}}\left(|01\rangle + |10\rangle\right)$$
$$|\psi\rangle = \frac{1}{\sqrt{2}}\left(|00\rangle - |11\rangle\right)$$
$$|\psi\rangle = \frac{1}{\sqrt{2}}\left(|01\rangle - |10\rangle\right) \quad . \tag{44}$$

Keadaan diatas dikenal dengan keadan Bell state atau keadaan pasangan EPR (Einstein, Pedolsky dan Rosen state).

(Saputra, 2013)

Keaadan sebaliknya yaitu keadaan yang tak terbelit atau *disentangled state* merupakan keadaan yang dapat dipisahkan (*sparabel state*). Adapun contoh dari qubit *double* yang tidak terbelit adalah sebagai berikut

$$|\psi\rangle = \frac{1}{\sqrt{2}}\left(|00\rangle + |01\rangle\right)$$
$$|\psi\rangle = \frac{1}{\sqrt{2}}\left(|00\rangle + |10\rangle\right)$$
$$|\psi\rangle = \frac{1}{\sqrt{2}}\left(|01\rangle + |11\rangle\right)$$
$$|\psi\rangle = \frac{1}{\sqrt{2}}\left(|10\rangle + |11\rangle\right) \tag{45}$$

(Nakahara,2008)

2.5 No Cloning Teorem

Menyalin atau meng*copy* suatu informasi sering dilakukan pada pengiriman informasi secara klasik. Keadaan kuantum tadak sama dengan keadaan klasik yang dapat menyalin atau meng*copy* informasi secara langsung. perlu adanya operator

uniter yang mampu meng*clonning* semua keadaan kuantum. Dimisalkan operator uniter tersebut adalah U, dengan setiap keadaan adalah $|\eta\rangle$, maka didefinisikan

$$U|\eta 0\rangle = |\eta\eta\rangle \tag{46}$$

Apabila terdapat keadaan $|\eta\rangle$ dan $|\chi\rangle$ dimana saling *linier independent*, maka $U|\eta 0\rangle = |\eta\eta\rangle$ dan $U|\chi 0\rangle = |\chi\chi\rangle$. Hasil kombinasi dari keadaan $|\eta\rangle$ dan $|\chi\rangle$ dimana

$$|\psi\rangle = \frac{1}{\sqrt{2}}(|\eta\rangle + |\chi\rangle) \tag{47}$$

Maka diperoleh

$$\begin{aligned} U|\psi 0\rangle &= \frac{1}{\sqrt{2}}(|\eta 0\rangle + |\chi 0\rangle) \\ &= \frac{1}{\sqrt{2}}(|\eta\eta\rangle + |\chi\chi\rangle) \end{aligned} \tag{48}$$

Berdasarkan definisi persamaan (46) dan keadaan (47) maka diperoleh persamaan

$$\begin{aligned} U|\psi 0\rangle &= |\psi\psi\rangle \\ &= \frac{1}{\sqrt{2}}(|\eta\eta\rangle + |\eta\chi\rangle + |\chi\eta\rangle + |\chi\chi\rangle) \end{aligned} \tag{49}$$

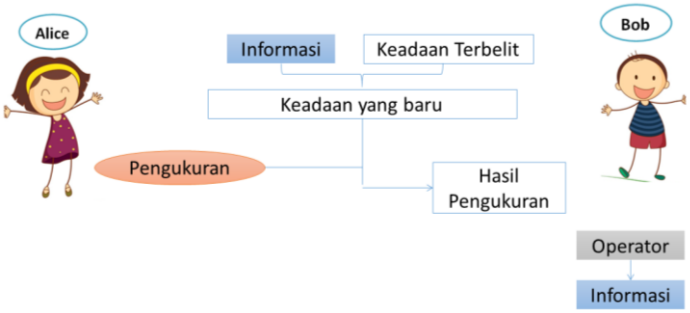
Suatu operator yang sama, pada keadaaan yang sama akan menghasilkan nilai yang sama. Namun, pada persamaan (48) dan (49) menunjukkan hasil yang berbeda. Hal ini menunjukkan

bahwa tidak dapat meng*copy* suatu keadaan kuantum, yang dikenal dengan *No Clonning Teorem.* (Nielsen, 2000)

2.6 Teleportasi Kuantum

Teleportasi kuantum memiliki tujuan mentransmisikan keadaan kuantum dengan menggunakan kuantum bit, sehingga penerima menghasilkan keadaan sama persis dengan keadaan qubit aslinya. Qubit itu sendiri tidak dikirim tapi informasi yang diperlukan untuk menghasilkan keadaan kuantum di transmisikan. Keadaan asli dihancurkan sehingga teleportasi kuantum tidak bertentangan dengan teorema *No Cloning***.**

Komunikasi kuantum menghubungkan pengirim yang beri nama Alice ke penerima yang diberi nama Bob. Alice dan Bob terpisah sangat jauh, dimana secara bersama mereka menghasilkan pasangan EPR. Masing masing membawa satu qubit pasangan EPR saat terpisah. Alice memiliki misi untuk mengantarkan qubit, namun Bob tidak mengetahui keadaan qubit. Langkah yang dilakukan adalah Alice berinteraksi dengan qubit dan pasangan EPR, kemudian mengukur dua qubit yang dimiliki. Sehingga diperoleh hasil yang nantinya Alice mengirim Informasi ke Bob. Bob melakukan operasi yang bergantung dari pesan klasik Alice. Teleportasi selesai ketika Alice sudah mentransmiskan hasil pengukuran ke Bob melalui komunikasi klasik. Teleportasi tidak dapat menyampaikan informasi tanpa melakukan komunikasi klasik. Saluran klasik dibatasi oleh kecepatan cahaya, jadi teleportasi kuantum tidak dapat dicapai lebih cepat dari kecepatan cahaya.



Gambar 2.1 Simulasi Pengiriman

Tahun 1993, Bennet dkk memperlihatkan skema untuk menteleportasikan keadaan satu qubit dengan memanfaatkan keterbelitan EPR.

$$|\psi\rangle = \frac{1}{\sqrt{2}}(|01\rangle - |10\rangle) \tag{50}$$

Persamaa (52) berada dalam ruang H_{ab} yang merupakan *cross product* dari H_b dan H_c. kemudian partikel dalam H_b diserahkan ke *observer* Alice dan partikel H_c diserahkan pada Bob. Keadaan satu qubit yang akan dikirimkan adalah

$$|\chi\rangle = a|0\rangle + b|1\rangle \tag{51}$$

Keadaan diatas berada pada ruang H_a. Partikel diserahkan pada alice dan berinteraksi dengan partikel yang dibawa, sehingga diperoleh keadaan yang baru.

$$\begin{aligned} |\Psi\rangle &= |\chi\rangle \otimes |\psi\rangle \\ &= (a|0\rangle + b|1\rangle) \otimes (\frac{1}{\sqrt{2}}(|01\rangle - |10\rangle)) \\ &= \frac{1}{\sqrt{2}}\big(a(|001\rangle - |010\rangle) + (b|101\rangle - |110\rangle)\big) \end{aligned} \tag{52}$$

Pengiriman suatu keadaan perlu dihancurkan terlebih dahulu karena sesuai *No Clonning Teorem*, bahwa tidak dapat meng*copy* suatu keadaan. Proses penghancuran dilakukan dengan pengukuran terhadap partikel yang dibawa Alice. Pengukuran dilakukan dengan keadaan EPR.

$$|\Pi\rangle = \frac{1}{\sqrt{2}}\left(|00\rangle + |11\rangle\right) \tag{53}$$

$$|\Pi\rangle = \frac{1}{\sqrt{2}}\left(|01\rangle + |10\rangle\right) \tag{54}$$

$$|\Pi\rangle = \frac{1}{\sqrt{2}}\left(|00\rangle - |11\rangle\right) \tag{55}$$

$$|\Pi\rangle = \frac{1}{\sqrt{2}}\left(|01\rangle - |10\rangle\right) \tag{56}$$

Pengukuran dengan persamaan (53) diperoleh

$$\begin{aligned}
&(\langle\Pi| \otimes I)|\Psi\rangle = \left(\frac{1}{\sqrt{2}}\left(\langle 00| + \langle 11|\right) \otimes I\right) \\
&\left(\frac{1}{\sqrt{2}}\left(a(|001\rangle - |010\rangle) + (b|101\rangle - |110\rangle)\right)\right) \\
&= \frac{1}{2}\left(a\left(\langle 00| + \langle 11|\right) \otimes I(|001\rangle - |010\rangle) + b\left(\langle 00| + \langle 11|\right) \otimes I\,|101\rangle - |110\rangle)\right) \\
&= \frac{1}{2}\left(a|1\rangle - b|0\rangle\right)
\end{aligned} \tag{57}$$

Pengukuran dengan persamaan (54) diperoleh

$$(\langle\Pi|\otimes I)|\Psi\rangle=\left(\frac{1}{\sqrt{2}}\left(\langle 01|+\langle 10|\right)\otimes I\right)$$
$$\left(\frac{1}{\sqrt{2}}\left(a(|001\rangle-|010\rangle)+(b|101\rangle-|110\rangle)\right)\right)$$
$$=\frac{1}{2}\left(a\left(\langle 01|+\langle 10|\right)\otimes I(|001\rangle-|010\rangle)+b\left(\langle 01|+\langle 10|\right)\otimes I|101\rangle-|110\rangle)\right)$$
$$=\frac{1}{2}\left(-a|0\rangle+b|1\rangle\right)$$

(58)

Pengukuran dengan persamaan (55) diperoleh

$$(\langle\Pi|\otimes I)|\Psi\rangle=\left(\frac{1}{\sqrt{2}}\left(\langle 00|-\langle 11|\right)\otimes I\right)$$
$$\left(\frac{1}{\sqrt{2}}\left(a(|001\rangle-|010\rangle)+(b|101\rangle-|110\rangle)\right)\right)$$
$$=\frac{1}{2}\left(a\left(\langle 00|-\langle 11|\right)\otimes I(|001\rangle-|010\rangle)+b\left(\langle 00|-\langle 11|\right)\otimes I|101\rangle-|110\rangle)\right)$$
$$=\frac{1}{2}\left(a|1\rangle+b|0\rangle\right)$$

(59)

Pengukuran dengan persamaan (56) diperoleh

$$(\langle\Pi|\otimes I)|\Psi\rangle=\left(\frac{1}{\sqrt{2}}\left(\langle 01|-\langle 10|\right)\otimes I\right)$$
$$\left(\frac{1}{\sqrt{2}}\left(a(|001\rangle-|010\rangle)+(b|101\rangle-|110\rangle)\right)\right)$$
$$=\frac{1}{2}\left(a\left(\langle 01|-\langle 10|\right)\otimes I(|001\rangle-|010\rangle)+b\left(\langle 01|-\langle 10|\right)\otimes I|101\rangle-|110\rangle)\right)$$
$$=\frac{1}{2}\left(-a|0\rangle-b|1\rangle\right)$$

(60)

Masing–masing hasil pengukuran memiliki keadaan yang berbeda dengan keadaan yang dikirimkan. Sehingga Alice melakukan

komunikasi dengan Bob agar Bob melakukan transformasi uniter. Hal ini bertujuan agar keadaan yang dikirimkan sesuai dengan keadaan yang diterima Bob. Operasi yang dilakukan oleh Bob diantaranya adalah operator *I* dan matrik Pauli. Matrik Pauli yang digunakan adalah

$$I = \begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix} \tag{61}$$

$$\sigma_x = \begin{pmatrix} 0 & 1 \\ 1 & 0 \end{pmatrix} \tag{62}$$

$$\sigma_y = \begin{pmatrix} 0 & -i \\ i & 0 \end{pmatrix} \tag{63}$$

$$\sigma_z = \begin{pmatrix} 1 & 0 \\ 0 & -1 \end{pmatrix} \tag{64}$$

Setelah Bob menerima informasi klasik dari Alice dan telah melakukan operasi maka informasi yang dikirim oleh Alice dapat terkirim. Pada persamaan (61) , bob melakukan operasi ($-i2\sigma_y$), persamaan (62), Bob melakukan operasi $-2\sigma_z$, persamaan (63), Bob melakukan operasi $2\sigma_x$, dan persamaan (64), Bob melakukan operasi -2I. (Bennet, 1993)

BAB III
INFORMASI DUA QUBIT SEMBARANG MELALUI KEADAAN TERBELIT TIGA QUBIT

Bennett dkk, telah merumuskan teleportasi kuantum informasi satu qubit dengan memanfaatkan keterbelitan EPR. Apabila informasi yang dikirim adalah dua qubit sembarang seperti berikut

$$|\chi\rangle = x_0|00\rangle + x_1|01\rangle + x_2|10\rangle + x_3|11\rangle \quad (65)$$

Keadaan terbelit yang digunakan adalah qubit rangkap tiga sembarang

$$\begin{aligned}|\varphi\rangle = {} & c_0|000\rangle + c_1|001\rangle + c_2|010\rangle + c_3|011\rangle \\ & + c_4|100\rangle + c_5|101\rangle + c_6|110\rangle + c_7|111\rangle \end{aligned} \quad (66)$$

Pengukuran yang digunakan adalah

$$\begin{aligned}|\Pi\rangle = {} & m_0|000\rangle + m_1|001\rangle + m_2|010\rangle + m_3|011\rangle \\ & + m_4|100\rangle + m_5|101\rangle + m_6|110\rangle + m_7|111\rangle \end{aligned} \quad (67)$$

Maka keadaan sistem menjadi

$$\begin{aligned}|\Psi\rangle &= |\chi\rangle \otimes |\varphi\rangle \\ &= (x_0|00\rangle + x_1|01\rangle + x_2|10\rangle + x_3|11\rangle) \otimes (c_0|000\rangle + c_1|001\rangle \\ &+ c_2|010\rangle + c_3|011\rangle + c_4|100\rangle + c_5|101\rangle + c_6|110\rangle + c_7|111\rangle) \\ &= x_0c_0|00000\rangle + x_0c_1|00001\rangle + x_0c_2|00010\rangle + x_0c_3|00011\rangle \\ &+ x_0c_4|00100\rangle + x_0c_5|00101\rangle + x_0c_6|00110\rangle + x_0c_7|00111\rangle \\ &+ x_1c_0|01000\rangle + x_1c_1|01001\rangle + x_1c_2|01010\rangle + x_1c_3|01011\rangle \\ &+ x_1c_4|01100\rangle + x_1c_5|01101\rangle + x_1c_6|01110\rangle + x_1c_7|01111\rangle \\ &+ x_2c_0|10000\rangle + x_2c_1|10001\rangle + x_2c_2|10010\rangle + x_2c_3|10011\rangle \\ &+ x_2c_4|10100\rangle + x_2c_5|10101\rangle + x_2c_6|10110\rangle + x_2c_7|10111\rangle \\ &+ x_3c_0|11000\rangle + x_3c_1|11001\rangle + x_3c_2|11010\rangle + x_3c_3|11011\rangle \\ &+ x_3c_4|11100\rangle + x_3c_5|11101\rangle + x_3c_6|11110\rangle + x_3c_7|11111\rangle \end{aligned} \quad (68)$$

Kemudian dilakukan pengukuran

$$
\begin{aligned}
&(\langle\Pi| \otimes I)|\Psi\rangle = ((m_0\langle 000| + m_1\langle 001| + m_2\langle 010| + m_3\langle 011| \\
&+m_4\langle 100| + m_5\langle 101| + m_6\langle 110| + m_7\langle 111|) \otimes I) \\
&(x_0c_0|00000\rangle + x_0c_1|00001\rangle + x_0c_2|00010\rangle + x_0c_3|00011\rangle \\
&+x_0c_4|00100\rangle + x_0c_5|00101\rangle + x_0c_6|00110\rangle + x_0c_7|00111\rangle \\
&+x_1c_0|01000\rangle + x_1c_1|01001\rangle + x_1c_2|01010\rangle + x_1c_3|01011\rangle \\
&+x_1c_4|01100\rangle + x_1c_5|01101\rangle + x_1c_6|01110\rangle + x_1c_7|01111\rangle \\
&+x_2c_0|10000\rangle + x_2c_1|10001\rangle + x_2c_2|10010\rangle + x_2c_3|10011\rangle \\
&+x_2c_4|10100\rangle + x_2c_5|10101\rangle + x_2c_6|10110\rangle + x_2c_7|10111\rangle \\
&+x_3c_0|11000\rangle + x_3c_1|11001\rangle + x_3c_2|11010\rangle + x_3c_3|11011\rangle \\
&+x_3c_4|11100\rangle + x_3c_5|11101\rangle + x_3c_6|11110\rangle + x_3c_7|11111\rangle) \\
&= m_0x_0(c_0|00\rangle + c_1|01\rangle + c_2|10\rangle + c_3|11\rangle) \\
&+m_1x_0(c_4|00\rangle + c_5|01\rangle + c_6|10\rangle + c_7|11\rangle) \\
&+m_2x_1(c_0|00\rangle + c_1|01\rangle + c_2|10\rangle + c_3|11\rangle) \\
&+m_3x_1(c_4|00\rangle + c_5|01\rangle + c_6|10\rangle + c_7|11\rangle) \\
&+m_4x_2(c_0|00\rangle + c_1|01\rangle + c_2|10\rangle + c_3|11\rangle) \\
&+m_5x_2(c_4|00\rangle + c_5|01\rangle + c_6|10\rangle + c_7|11\rangle) \\
&+m_6x_3(c_4|00\rangle + c_6|01\rangle + c_5|10\rangle + c_7|11\rangle) \\
&+m_7x_3(c_4|00\rangle + c_5|01\rangle + c_6|10\rangle + c_7|11\rangle) \\
&= (m_0x_0 + m_2x_1 + m_4x_2 + m_6x_3)(c_0|00\rangle + c_1|01\rangle + c_2|10\rangle + c_3|11\rangle) \\
&+(m_1x_0 + m_3x_1 + m_5x_2 + m_7x_3)(c_4|00\rangle + c_5|01\rangle + c_6|10\rangle + c_7|11\rangle)
\end{aligned}
\tag{69}
$$

3.1 Pengiriman Keadaan Terbelit GHZ

Pengiriman informasi dua qubit sembarang dengan menggunakan keadaan terbelit tiga qubit GHZ digunakan persamaan (69). Sebagai contoh keadaan yang akan dikirimkan adalah

$$\begin{aligned} &|\varphi\rangle = \frac{1}{\sqrt{2}}(|000\rangle + |111\rangle) \\ &c_0 = c_7 = \frac{1}{\sqrt{2}} \\ &c_1 = c_2 = c_3 = c_4 = c_5 = c_6 = 0 \end{aligned} \tag{70}$$

Maka hasil pengukuran menjadi

$$\begin{aligned} &(\langle\Pi| \otimes I)|\Psi\rangle \\ &= (m_0 x_0 + m_2 x_1 + m_4 x_2 + m_6 x_3)\frac{1}{\sqrt{2}}|00\rangle \\ &+(m_1 x_0 + m_3 x_1 + m_5 x_2 + m_7 x_3)\frac{1}{\sqrt{2}}|11\rangle \end{aligned} \tag{71}$$

Apabila dilakukan pengukuran menggunakan keadaan GHZ, maka hasil pengukuran menjadi

$$(\langle\Pi| \otimes I)|\Psi\rangle = \frac{1}{2}(x_0|00\rangle + x_3|11\rangle) \tag{72}$$

Sehingga keadaan terbelit tersebut tidak dapat menteleportasi keadaan

$$|\chi\rangle = x_0|00\rangle + x_1|01\rangle + x_2|10\rangle + x_3|11\rangle \tag{73}$$

Berdasarkan keadaan diatas dapat disimpulkan bahwa informasi dua qubit sembarang tidak mungkin dapat dikirim dengan keadaan terbelit tiga qubit GHZ.

3.2 Pengiriman Keadaan Terbelit W

Pengiriman informasi dua qubit sembarang dengan menggunakan keadaan terbelit tiga qubit W digunakan persamaan (69). Sebagai contoh keadaan yang akan dikirimkan adalah

$$\begin{aligned} &|\varphi\rangle = \frac{1}{\sqrt{3}}(|100\rangle + |010\rangle + |001\rangle) \\ &c_1 = c_2 = c_4 = \frac{1}{\sqrt{3}} \\ &c_0 = c_3 = c_5 = c_6 = c_7 = 0 \end{aligned} \tag{74}$$

Maka hasil pengukuran menjadi

$$\begin{aligned} &(\langle \Pi| \otimes I)|\Psi\rangle \\ &= (m_0 x_0 + m_2 x_1 + m_4 x_2 + m_6 x_3)\frac{1}{\sqrt{3}}(|01\rangle + |10\rangle) \\ &+(m_1 x_0 + m_3 x_1 + m_5 x_2 + m_7 x_3)\frac{1}{\sqrt{3}}|00\rangle \end{aligned} \tag{75}$$

Sehingga keadaan terbelit tersebut tidak dapat menteleportasi keadaan

$$|\chi\rangle = x_0|00\rangle + x_1|01\rangle + x_2|10\rangle + x_3|11\rangle \tag{76}$$

Berdasarkan keadaan diatas dapat disimpulkan bahwa informasi dua qubit sembarang tidak mungkin dapat dikirimkan dengan keadaan terbelit tiga qubit W.

3.3 Pengiriman Keadan Terbelit Sembarang

Pengiriman informasi dua qubit sembarang dengan menggunakan keadaan terbelit tiga qubit sembarang digunakan persamaan (69). Sebagai contoh keadaan yang akan dikirimkan adalah

Tabel 1 Pengukuran Informasi Dua Sembarang

$\|\varphi\rangle = 1/2(\|000\rangle + \|001\rangle + \|010\rangle + \|111\rangle$ $c_0 = c_1 = c_2 = c_7 = 1/2$ $c_3 = c_4 = c_5 = c_6 = 0$ Maka hasil pengukuran menjadi $(\langle\Pi\| \otimes I)\|\Psi\rangle$ $= (m_0x_0 + m_2x_1 + m_4x_2 + m_6x_3)\frac{1}{2}(\|00\rangle + \|01\rangle + \|10\rangle)$ $+(m_1x_0 + m_3x_1 + m_5x_2 + m_7x_3)\frac{1}{2}\|11\rangle$ Sehingga keadaan terbelit tersebut tidak dapat menteleportasi keadaan $\|\chi\rangle = x_0\|00\rangle + x_1\|01\rangle + x_2\|10\rangle + x_3\|11\rangle$
$\|\varphi\rangle = 1/2(\|000\rangle + \|001\rangle + \|011\rangle + \|110\rangle)$ $c_0 = c_1 = c_6 = c_3 = 1/2$ $c_2 = c_4 = c_5 = c_7 = 0$ Maka hasil pengukuran menjadi $(\langle\Pi\| \otimes I)\|\Psi\rangle$ $= (m_0x_0 + m_2x_1 + m_4x_2 + m_6x_3)\frac{1}{2}(\|00\rangle + \|01\rangle + \|11\rangle)$ $+(m_1x_0 + m_3x_1 + m_5x_2 + m_7x_3)\frac{1}{2}\|10\rangle$ Sehingga keadaan terbelit tersebut tidak dapat menteleportasi keadaan $\|\chi\rangle = x_0\|00\rangle + x_1\|01\rangle + x_2\|10\rangle + x_3\|11\rangle$

$|\varphi\rangle = 1/2(|000\rangle + |001\rangle + |110\rangle + |111\rangle)$

$c_0 = c_1 = c_6 = c_7 = 1/2$

$c_2 = c_4 = c_5 = c_3 = 0$

Maka hasil pengukuran menjadi

$(\langle\Pi| \otimes I)|\Psi\rangle$

$= (m_0x_0 + m_2x_1 + m_4x_2 + m_6x_3)\frac{1}{2}(|00\rangle + |01\rangle)$

$+(m_1x_0 + m_3x_1 + m_5x_2 + m_7x_3)\frac{1}{2}(|10\rangle + |11\rangle)$

Sehingga keadaan terbelit tersebut tidak dapat menteleportasi keadaan

$|\chi\rangle = x_0|00\rangle + x_1|01\rangle + x_2|10\rangle + x_3|11\rangle$

$|\varphi\rangle = 1/2(|000\rangle + |010\rangle + |011\rangle + |101\rangle)$

$c_0 = c_5 = c_2 = c_3 = 1/2$

$c_1 = c_4 = c_6 = c_7 = 0$

Maka hasil pengukuran menjadi

$(\langle\Pi| \otimes I)|\Psi\rangle$

$= (m_0x_0 + m_2x_1 + m_4x_2 + m_6x_3)\frac{1}{2}(|00\rangle + |10\rangle + |11\rangle)$

$+(m_1x_0 + m_3x_1 + m_5x_2 + m_7x_3)\frac{1}{2}(|01\rangle)$

Sehingga keadaan terbelit tersebut tidak dapat menteleportasi keadaan

$|\chi\rangle = x_0|00\rangle + x_1|01\rangle + x_2|10\rangle + x_3|11\rangle$

$|\varphi\rangle = 1/2(|000\rangle + |010\rangle + |101\rangle + |111\rangle)$

$c_0 = c_5 = c_2 = c_7 = 1/2$

$c_1 = c_4 = c_6 = c_3 = 0$

Maka hasil pengukuran menjadi

$(\langle\Pi| \otimes I)|\Psi\rangle$

$= (m_0x_0 + m_2x_1 + m_4x_2 + m_6x_3)\frac{1}{2}(|00\rangle + |10\rangle)$

$+(m_1x_0 + m_3x_1 + m_5x_2 + m_7x_3)\frac{1}{2}(|01\rangle + |11\rangle)$

Sehingga keadaan terbelit tersebut tidak dapat menteleportasi keadaan

$|\chi\rangle = x_0|00\rangle + x_1|01\rangle + x_2|10\rangle + x_3|11\rangle$

$|\varphi\rangle = 1/2(|000\rangle + |011\rangle + |101\rangle + |110\rangle)$

$c_0 = c_5 = c_6 = c_3 = 1/2$

$c_1 = c_4 = c_7 = c_2 = 0$

Maka hasil pengukuran menjadi

$(\langle\Pi| \otimes I)|\Psi\rangle$

$= (m_0x_0 + m_2x_1 + m_4x_2 + m_6x_3)\frac{1}{2}(|00\rangle + |11\rangle)$

$+(m_1x_0 + m_3x_1 + m_5x_2 + m_7x_3)\frac{1}{2}(|01\rangle + |10\rangle)$

Sehingga keadaan terbelit tersebut tidak dapat menteleportasi keadaan

$|\chi\rangle = x_0|00\rangle + x_1|01\rangle + x_2|10\rangle + x_3|11\rangle$

$|\varphi\rangle = 1/2(|000\rangle + |101\rangle + |110\rangle + |111\rangle)$

$c_0 = c_5 = c_6 = c_7 = 1/2$

$c_1 = c_4 = c_3 = c_2 = 0$

Maka hasil pengukuran menjadi

$$(\langle\Pi| \otimes I)|\Psi\rangle$$

$$= (m_0x_0 + m_2x_1 + m_4x_2 + m_6x_3)\frac{1}{2}(|00\rangle)$$

$$+(m_1x_0 + m_3x_1 + m_5x_2 + m_7x_3)\frac{1}{2}(|01\rangle + |10\rangle + |11\rangle)$$

Sehingga keadaan terbelit tersebut tidak dapat menteleportasi keadaan

$|\chi\rangle = x_0|00\rangle + x_1|01\rangle + x_2|10\rangle + x_3|11\rangle$

$|\varphi\rangle = \frac{1}{\sqrt{5}}(|000\rangle + |001\rangle + |010\rangle + |011\rangle + |100\rangle)$

$c_0 = c_1 = c_2 = c_3 = c_4 = \frac{1}{\sqrt{5}}$

$c_5 = c_6 = c_7 = 0$

Maka hasil pengukuran menjadi

$$(\langle\Pi| \otimes I)|\Psi\rangle$$

$$= (m_0x_0 + m_2x_1 + m_4x_2 + m_6x_3)\frac{1}{\sqrt{5}}(|00\rangle + |01\rangle + |10\rangle + |11\rangle)$$

$$+(m_1x_0 + m_3x_1 + m_5x_2 + m_7x_3)\frac{1}{\sqrt{5}}(|00\rangle)$$

Sehingga keadaan terbelit tersebut tidak dapat menteleportasi keadaan

$|\chi\rangle = x_0|00\rangle + x_1|01\rangle + x_2|10\rangle + x_3|11\rangle$

$|\varphi\rangle = \frac{1}{\sqrt{5}}(|000\rangle + |001\rangle + |010\rangle + |011\rangle + |101\rangle)$

$c_0 = c_1 = c_2 = c_3 = c_5 = \frac{1}{\sqrt{5}}$

$c_4 = c_6 = c_7 = 0$

Maka hasil pengukuran menjadi

$(\langle\Pi| \otimes I)|\Psi\rangle$

$= (m_0x_0 + m_2x_1 + m_4x_2 + m_6x_3)\frac{1}{\sqrt{5}}(|00\rangle + |01\rangle + |10\rangle + |11\rangle)$

$+(m_1x_0 + m_3x_1 + m_5x_2 + m_7x_3)\frac{1}{\sqrt{5}}(|01\rangle)$

Sehingga keadaaa terbelit tersebut tidak dapat menteleportasi keadaan

$|\chi\rangle = x_0|00\rangle + x_1|01\rangle + x_2|10\rangle + x_3|11\rangle$

$|\varphi\rangle = \frac{1}{\sqrt{6}}(|000\rangle + |001\rangle + |010\rangle + |011\rangle + |100\rangle + |101\rangle)$

$c_0 = c_1 = c_2 = c_3 = c_4 = c_5 = \frac{1}{\sqrt{6}}$

$c_6 = c_7 = 0$

Maka hasil pengukuran menjadi

$(\langle\Pi|\otimes I)|\Psi\rangle$

$= (m_0x_0 + m_2x_1 + m_4x_2 + m_6x_3)\frac{1}{\sqrt{6}}(|00\rangle + |01\rangle + |10\rangle + |11\rangle)$

$+(m_1x_0 + m_3x_1 + m_5x_2 + m_7x_3)\frac{1}{\sqrt{6}}(|00\rangle + |01\rangle)$

Sehingga keadaan terbelit tersebut tidak dapat menteleportasi keadaan

$|\chi\rangle = x_0|00\rangle + x_1|01\rangle + x_2|10\rangle + x_3|11\rangle$

$|\varphi\rangle = \frac{1}{\sqrt{6}}(|000\rangle + |001\rangle + |010\rangle + |011\rangle + |100\rangle + |110\rangle)$

$c_0 = c_1 = c_2 = c_3 = c_4 = c_6 = \frac{1}{\sqrt{6}}$

$c_5 = c_7 = 0$

Maka hasil pengukuran menjadi

$(\langle\Pi|\otimes I)|\Psi\rangle$

$= (m_0x_0 + m_2x_1 + m_4x_2 + m_6x_3)\frac{1}{\sqrt{6}}(|00\rangle + |01\rangle + |10\rangle + |11\rangle)$

$+(m_1x_0 + m_3x_1 + m_5x_2 + m_7x_3)\frac{1}{\sqrt{6}}(|00\rangle + |10\rangle)$

Sehingga keadaan terbelit tersebut tidak dapat menteleportasi keadaan

$|\chi\rangle = x_0|00\rangle + x_1|01\rangle + x_2|10\rangle + x_3|11\rangle$

$$|\varphi\rangle = \frac{1}{\sqrt{7}}(|000\rangle + |001\rangle + |010\rangle + |011\rangle + |100\rangle + |101\rangle + |110\rangle)$$

$$c_0 = c_1 = c_2 = c_3 = c_4 = c_5 = c_6 = \frac{1}{\sqrt{7}}$$

$$c_7 = 0$$

Maka hasil pengukuran menjadi

$$(\langle \Pi | \otimes I)|\Psi\rangle$$

$$= (m_0 x_0 + m_2 x_1 + m_4 x_2 + m_6 x_3)\frac{1}{\sqrt{7}}(|00\rangle + |01\rangle + |10\rangle + |11\rangle)$$

$$+(m_1 x_0 + m_3 x_1 + m_5 x_2 + m_7 x_3)\frac{1}{\sqrt{7}}(|00\rangle + |01\rangle + |10\rangle)$$

Sehingga keadan terbelit tersebut tidak dapat menteleportasi keadaan

$$|\chi\rangle = x_0|00\rangle + x_1|01\rangle + x_2|10\rangle + x_3|11\rangle$$

Berdasarkan keadaan ini, informasi qubit sembarang tidak dapat dikirim dengan menggunakan keadaan terbelit tiga qubit sembarang. Sehingga pada pengiriman keadaan qubit dobel, yang memungkinkan dapat terkirim adalah informasi keadaan khusus yang akan dijelaskan pada Bab IV.

”halaman ini sengaja dikosongkan”

BAB IV
INFORMASI DUA QUBIT KHUSUS MELALUI KEADAAN TERBELIT TIGA QUBIT

Informasi dua qubit terdiri dari empat suku, dengan konstanta suku x_0, x_1, x_2 dan x_3.

$$|\chi\rangle = \underbrace{x_0|00\rangle}_{suku\,1} + x_1|01\rangle + \underbrace{x_2|10\rangle}_{suku\,3} + x_3|11\rangle \quad (77)$$

4.1 Informasi Dua Qubit Dua Suku

4.1.1 Bell State

Informasi khusus untuk keadaan dua qubit terdiri dari beberapa bentuk, diantaranya adalah keadaan Bell *State*. Salah satu contoh dari informasi khusus yang akan dikirimkan adalah

$$|\chi\rangle = x_0|00\rangle + x_1|11\rangle \quad (78)$$

Keadaan terbelit yang digunakan

$$\begin{aligned}|\varphi\rangle = {} & c_0|000\rangle + c_1|001\rangle + c_2|010\rangle + c_3|011\rangle \\ & + c_4|100\rangle + c_5|101\rangle + c_6|110\rangle + c_7|111\rangle\end{aligned} \quad (79)$$

Pengukuran yang digunakan

$$\begin{aligned}|\Pi\rangle = {} & m_0|000\rangle + m_1|001\rangle + m_2|010\rangle + m_3|011\rangle \\ & + m_4|100\rangle + m_5|101\rangle + m_6|110\rangle + m_7|111\rangle\end{aligned} \quad (80)$$

Kemudian dilakukan pengukuran

$$\begin{aligned}&(\langle\Pi|\otimes I)|\Psi\rangle = \\ &(m_0x_0 + m_6x_1)(c_0|00\rangle + c_1|01\rangle + c_2|10\rangle + c_3|11\rangle) \\ &+(m_1x_0 + m_7x_1)(c_4|00\rangle + c_5|01\rangle + c_6|10\rangle + c_7|11\rangle)\end{aligned} \quad (81)$$

Tabel 2 Pengukuran Informasi Keadaan Bell *State* 1

Keadaan Terbelit	Keadaan Alice	Keadaan Bob	Operator
$\|\varphi\rangle = \frac{1}{\sqrt{2}}(\|000\rangle + \|111\rangle)$	$\|\Pi\rangle = \frac{1}{\sqrt{2}}(\|000\rangle + \|111\rangle)$	$\frac{1}{2}(x_0\|00\rangle + x_1\|11\rangle)$	$2I$
	$\|\Pi\rangle = \frac{1}{\sqrt{2}}(\|000\rangle - \|111\rangle)$	$\frac{1}{2}(x_0\|00\rangle - x_1\|11\rangle)$	$2\sigma_z \otimes I$
$\|\varphi\rangle = \frac{1}{\sqrt{2}}(\|011\rangle + \|100\rangle)$	$\|\Pi\rangle = \frac{1}{\sqrt{2}}(\|001\rangle + \|110\rangle)$	$\frac{1}{2}(x_0\|00\rangle + x_1\|11\rangle)$	$2I$
	$\|\Pi\rangle = \frac{1}{\sqrt{2}}(\|001\rangle - \|110\rangle)$	$\frac{1}{2}(x_0\|00\rangle - x_1\|11\rangle)$	$2\sigma_z \otimes I$
$\|\varphi\rangle = \frac{1}{\sqrt{2}}(\|000\rangle - \|111\rangle)$	$\|\Pi\rangle = \frac{1}{\sqrt{2}}(\|000\rangle + \|111\rangle)$	$\frac{1}{2}(x_0\|00\rangle - x_1\|11\rangle)$	$2\sigma_z \otimes I$
	$\|\Pi\rangle = \frac{1}{\sqrt{2}}(\|000\rangle - \|111\rangle)$	$\frac{1}{2}(x_0\|00\rangle + x_1\|11\rangle)$	$2I$
$\|\varphi\rangle = \frac{1}{\sqrt{2}}(\|011\rangle - \|100\rangle)$	$\|\Pi\rangle = \frac{1}{\sqrt{2}}(\|001\rangle + \|110\rangle)$	$\frac{1}{2}(x_0\|00\rangle - x_1\|11\rangle)$	$2\sigma_z \otimes I$
	$\|\Pi\rangle = \frac{1}{\sqrt{2}}(\|001\rangle - \|110\rangle)$	$\frac{1}{2}(x_0\|00\rangle + x_1\|11\rangle)$	$2I$

Informasi lainnya adalah

$$|\chi\rangle = x_0|01\rangle + x_1|10\rangle \tag{82}$$

Keadaan terbelit yang digunakan

$$\begin{aligned}|\varphi\rangle = {} & c_0|000\rangle + c_1|001\rangle + c_2|010\rangle + c_3|011\rangle \\ & + c_4|100\rangle + c_5|101\rangle + c_6|110\rangle + c_7|111\rangle\end{aligned} \tag{83}$$

Pengukuran yang digunakan

$$\begin{aligned}|\Pi\rangle = {} & m_0|000\rangle + m_1|001\rangle + m_2|010\rangle + m_3|011\rangle \\ & + m_4|100\rangle + m_5|101\rangle + m_6|110\rangle + m_7|111\rangle\end{aligned} \tag{84}$$

Kemudian dilakukan pengukuran

$$\begin{aligned}&(\langle\Pi| \otimes I)|\Psi\rangle = \\ &(m_2x_0 + m_4x_1)(c_0|00\rangle + c_1|01\rangle + c_2|10\rangle + c_3|11\rangle) \\ &+(m_3x_0 + m_5x_1)(c_4|00\rangle + c_5|01\rangle + c_6|10\rangle + c_7|11\rangle)\end{aligned} \tag{85}$$

Tabel 3 Pengukuran Keadaan Bell *State* 2

Keadaan Terbelit	Keadaan Alice	Keadaan Bob	Operator
$\|\varphi\rangle = \frac{1}{\sqrt{2}}(\|001\rangle + \|110\rangle)$	$\|\Pi\rangle = \frac{1}{\sqrt{2}}(\|010\rangle + \|101\rangle)$	$\frac{1}{2}(x_0\|01\rangle + x_1\|10\rangle)$	$2I$
	$\|\Pi\rangle = \frac{1}{\sqrt{2}}(-\|010\rangle + \|101\rangle)$	$\frac{1}{2}(-x_0\|01\rangle + x_1\|10\rangle)$	$2I \otimes \sigma_z$
	$\|\Pi\rangle = \frac{1}{\sqrt{2}}(\|010\rangle - \|101\rangle)$	$\frac{1}{2}(x_0\|01\rangle - x_1\|10\rangle)$	$2\sigma_z \otimes I$
$\|\varphi\rangle = \frac{1}{\sqrt{2}}(\|010\rangle + \|101\rangle)$	$\|\Pi\rangle = \frac{1}{\sqrt{2}}(\|011\rangle + \|100\rangle)$	$\frac{1}{2}(x_0\|01\rangle + x_1\|10\rangle)$	$2I$
	$\|\Pi\rangle = \frac{1}{\sqrt{2}}(-\|011\rangle + \|100\rangle)$	$\frac{1}{2}(-x_0\|01\rangle + x_1\|10\rangle)$	$2I \otimes \sigma_z$
	$\|\Pi\rangle = \frac{1}{\sqrt{2}}(\|011\rangle - \|100\rangle)$	$\frac{1}{2}(x_0\|01\rangle - x_1\|10\rangle)$	$2\sigma_z \otimes I$

Informasi lainnya

$$|\chi\rangle = x_0|00\rangle - x_1|11\rangle \tag{86}$$

Keadaan terbelit yang digunakan

$$\begin{aligned}|\varphi\rangle = {} & c_0|000\rangle + c_1|001\rangle + c_2|010\rangle + c_3|011\rangle \\ & + c_4|100\rangle + c_5|101\rangle + c_6|110\rangle + c_7|111\rangle\end{aligned} \tag{87}$$

Pengukuran yang digunakan

$$\begin{aligned}|\Pi\rangle = {} & m_0|000\rangle + m_1|001\rangle + m_2|010\rangle + m_3|011\rangle \\ & + m_4|100\rangle + m_5|101\rangle + m_6|110\rangle + m_7|111\rangle\end{aligned} \tag{88}$$

Kemudian dilakukan pengukuran

$$\begin{aligned}&(\langle\Pi| \otimes I)|\Psi\rangle = \\ &(m_0x_0 - m_6x_1)(c_0|00\rangle + c_1|01\rangle + c_2|10\rangle + c_3|11\rangle) \\ &+(m_1x_0 - m_7x_1)(c_4|00\rangle + c_5|01\rangle + c_6|10\rangle + c_7|11\rangle)\end{aligned} \tag{89}$$

Tabel 4 Pengukuran Keadaan Bell *State* 3

Keadaan Terbelit	Keadaan Alice	Keadaan Bob	Operator
$\|\varphi\rangle = \frac{1}{\sqrt{2}}(\|000\rangle + \|111\rangle)$	$\|\Pi\rangle = \frac{1}{\sqrt{2}}(\|000\rangle + \|111\rangle)$	$\frac{1}{2}(x_0\|00\rangle + x_1\|11\rangle)$	$2\sigma_z \otimes I$
	$\|\Pi\rangle = \frac{1}{\sqrt{2}}(\|000\rangle - \|111\rangle)$	$\frac{1}{2}(x_0\|00\rangle - x_1\|11\rangle)$	$2I$
$\|\varphi\rangle = \frac{1}{\sqrt{2}}(\|011\rangle + \|100\rangle)$	$\|\Pi\rangle = \frac{1}{\sqrt{2}}(\|001\rangle + \|110\rangle)$	$\frac{1}{2}(x_0\|00\rangle + x_1\|11\rangle)$	$2\sigma_z \otimes I$
	$\|\Pi\rangle = \frac{1}{\sqrt{2}}(\|001\rangle - \|110\rangle)$	$\frac{1}{2}(x_0\|00\rangle - x_1\|11\rangle)$	$2I$
$\|\varphi\rangle = \frac{1}{\sqrt{2}}(\|000\rangle - \|111\rangle)$	$\|\Pi\rangle = \frac{1}{\sqrt{2}}(\|000\rangle + \|111\rangle)$	$\frac{1}{2}(x_0\|00\rangle - x_1\|11\rangle)$	$2I$
	$\|\Pi\rangle = \frac{1}{\sqrt{2}}(\|000\rangle - \|111\rangle)$	$\frac{1}{2}(x_0\|00\rangle + x_1\|11\rangle)$	$2\sigma_z \otimes I$
$\|\varphi\rangle = \frac{1}{\sqrt{2}}(\|011\rangle - \|100\rangle)$	$\|\Pi\rangle = \frac{1}{\sqrt{2}}(\|001\rangle + \|110\rangle)$	$\frac{1}{2}(x_0\|00\rangle - x_1\|11\rangle)$	$2I$
	$\|\Pi\rangle = \frac{1}{\sqrt{2}}(\|001\rangle - \|110\rangle)$	$\frac{1}{2}(x_0\|00\rangle + x_1\|11\rangle)$	$2\sigma_z \otimes I$

Informasi lainnya adalah

$$|\chi\rangle = x_0|01\rangle - x_1|10\rangle \tag{90}$$

Keadaan terbelit yang digunakan

$$\begin{aligned}|\varphi\rangle = {} & c_0|000\rangle + c_1|001\rangle + c_2|010\rangle + c_3|011\rangle \\ & + c_4|100\rangle + c_5|101\rangle + c_6|110\rangle + c_7|111\rangle\end{aligned} \tag{91}$$

Pengukuran yang digunakan

$$\begin{aligned}|\Pi\rangle = {} & m_0|000\rangle + m_1|001\rangle + m_2|010\rangle + m_3|011\rangle \\ & + m_4|100\rangle + m_5|101\rangle + m_6|110\rangle + m_7|111\rangle\end{aligned} \tag{92}$$

Kemudian dilakukan pengukuran

$$(\langle\Pi|\otimes I)|\Psi\rangle =$$
$$(m_2x_0 - m_4x_1)(c_0|00\rangle + c_1|01\rangle + c_2|10\rangle + c_3|11\rangle)$$
$$+(m_3x_0 - m_5x_1)(c_4|00\rangle + c_5|01\rangle + c_6|10\rangle + c_7|11\rangle) \quad (93)$$

Tabel 5 Pengukuran Keadaan Bell *State* 5

Keadaan Terbelit	Keadaan Alice	Keadaan Bob	Operator
$\|\varphi\rangle = \frac{1}{\sqrt{2}}(\|001\rangle + \|110\rangle)$	$\|\Pi\rangle = \frac{1}{\sqrt{2}}(\|010\rangle + \|101\rangle)$	$\frac{1}{2}(x_0\|01\rangle + x_1\|10\rangle)$	$2\sigma_z \otimes I$
	$\|\Pi\rangle = \frac{1}{\sqrt{2}}(-\|010\rangle + \|101\rangle)$	$\frac{1}{2}(-x_0\|01\rangle + x_1\|10\rangle)$	$-2I \otimes \sigma_z$
	$\|\Pi\rangle = \frac{1}{\sqrt{2}}(\|010\rangle - \|101\rangle)$	$\frac{1}{2}(x_0\|01\rangle - x_1\|10\rangle)$	$2I$
$\|\varphi\rangle = \frac{1}{\sqrt{2}}(\|010\rangle + \|101\rangle)$	$\|\Pi\rangle = \frac{1}{\sqrt{2}}(\|011\rangle + \|100\rangle)$	$\frac{1}{2}(x_0\|01\rangle + x_1\|10\rangle)$	$2\sigma_z \otimes I$
	$\|\Pi\rangle = \frac{1}{\sqrt{2}}(-\|011\rangle + \|100\rangle)$	$\frac{1}{2}(-x_0\|01\rangle + x_1\|10\rangle)$	$-2I \otimes \sigma_z$
	$\|\Pi\rangle = \frac{1}{\sqrt{2}}(\|011\rangle - \|100\rangle)$	$\frac{1}{2}(x_0\|01\rangle - x_1\|10\rangle)$	$2I$

4.1.2 *Unentangled state*

Apabila digunakan keadaan informasi yang *unentangled* sperti berikut,

$$|\chi\rangle = x_0|00\rangle + x_1|01\rangle \quad (94)$$

Keadaan terbelit yang digunakan

$$|\varphi\rangle = c_0|000\rangle + c_1|001\rangle + c_2|010\rangle + c_3|011\rangle$$
$$+c_4|100\rangle + c_5|101\rangle + c_6|110\rangle + c_7|111\rangle \quad (95)$$

Pengukuran yang digunakan

$$|\Pi\rangle = m_0|000\rangle + m_1|001\rangle + m_2|010\rangle + m_3|011\rangle$$
$$+m_4|100\rangle + m_5|101\rangle + m_6|110\rangle + m_7|111\rangle \quad (96)$$

Kemudian dilakukan pengukuran

$$(\langle \Pi | \otimes I) | \Psi \rangle =$$
$$(m_0 x_0 + m_2 x_1)(c_0 |00\rangle + c_1 |01\rangle + c_2 |10\rangle + c_3 |11\rangle)$$
$$+(m_1 x_0 + m_3 x_1)(c_4 |00\rangle + c_5 |01\rangle + c_6 |10\rangle + c_7 |11\rangle) \quad (97)$$

Tabel 6 Pengukuran Informasi *Unentangled* 1

Keadaan Terbelit	Keadaan Alice	Keadaan Bob	Operator
$\|\varphi\rangle = \frac{1}{\sqrt{2}}(\|000\rangle + \|101\rangle)$	$\|\Pi\rangle = \frac{1}{\sqrt{2}}(\|000\rangle + \|011\rangle)$	$\frac{1}{2}(x_0 \|00\rangle + x_1 \|01\rangle)$	$2I$
	$\|\Pi\rangle = \frac{1}{\sqrt{2}}(\|001\rangle + \|010\rangle)$	$\frac{1}{2}(x_1 \|00\rangle + x_0 \|01\rangle)$	$2I \otimes \sigma_x$
	$\|\Pi\rangle = \frac{1}{\sqrt{2}}(\|000\rangle - \|011\rangle)$	$\frac{1}{2}(x_0 \|00\rangle - x_1 \|01\rangle)$	$2I \otimes \sigma_z$
$\|\varphi\rangle = \frac{1}{\sqrt{2}}(\|001\rangle + \|100\rangle)$	$\|\Pi\rangle = \frac{1}{\sqrt{2}}(\|000\rangle + \|011\rangle)$	$\frac{1}{2}(x_1 \|00\rangle + x_0 \|01\rangle)$	$2I \otimes \sigma_x$
	$\|\Pi\rangle = \frac{1}{\sqrt{2}}(\|001\rangle + \|010\rangle)$	$\frac{1}{2}(x_0 \|00\rangle + x_1 \|01\rangle)$	$2I$
	$\|\Pi\rangle = \frac{1}{\sqrt{2}}(\|001\rangle - \|010\rangle)$	$\frac{1}{2}(x_0 \|00\rangle - x_1 \|01\rangle)$	$2I \otimes \sigma_z$

Dan informasi

$$|\chi\rangle = x_0 |00\rangle + x_1 |10\rangle \quad (98)$$

Keadaan terbelit yang digunakan

$$|\varphi\rangle = c_0 |000\rangle + c_1 |001\rangle + c_2 |010\rangle + c_3 |011\rangle$$
$$+c_4 |100\rangle + c_5 |101\rangle + c_6 |110\rangle + c_7 |111\rangle \quad (99)$$

Pengukuran yang digunakan

$$|\Pi\rangle = m_0 |000\rangle + m_1 |001\rangle + m_2 |010\rangle + m_3 |011\rangle$$
$$+m_4 |100\rangle + m_5 |101\rangle + m_6 |110\rangle + m_7 |111\rangle \quad (100)$$

Kemudian dilakukan pengukuran

$$(\langle\Pi|\otimes I)|\Psi\rangle =$$
$$(m_0x_0 + m_4x_1)(c_0|00\rangle + c_1|01\rangle + c_2|10\rangle + c_3|11\rangle)$$
$$+(m_1x_0 + m_5x_1)(c_4|00\rangle + c_5|01\rangle + c_6|10\rangle + c_7|11\rangle) \quad (101)$$

Tabel 7 Pengukuran Informasi *Unentangled* 2

Keadaan Terbelit	Keadaan Alice	Keadaan Bob	Operator
$\|\varphi\rangle = \frac{1}{\sqrt{2}}(\|000\rangle + \|110\rangle)$	$\|\Pi\rangle = \frac{1}{\sqrt{2}}(\|000\rangle + \|101\rangle)$	$\frac{1}{2}(x_0\|00\rangle + x_1\|10\rangle)$	$2I$
	$\|\Pi\rangle = \frac{1}{\sqrt{2}}(\|001\rangle + \|100\rangle)$	$\frac{1}{2}(x_1\|00\rangle + x_0\|10\rangle)$	$2\sigma_x \otimes \sigma_z$
	$\|\Pi\rangle = \frac{1}{\sqrt{2}}(\|000\rangle - \|101\rangle)$	$\frac{1}{2}(x_0\|00\rangle - x_1\|10\rangle)$	$2\sigma_z \otimes I$
$\|\varphi\rangle = \frac{1}{\sqrt{2}}(\|010\rangle + \|100\rangle)$	$\|\Pi\rangle = \frac{1}{\sqrt{2}}(\|000\rangle + \|101\rangle)$	$\frac{1}{2}(x_1\|00\rangle + x_0\|10\rangle)$	$2\sigma_x \otimes \sigma_z$
	$\|\Pi\rangle = \frac{1}{\sqrt{2}}(\|001\rangle + \|100\rangle)$	$\frac{1}{2}(x_0\|00\rangle + x_1\|10\rangle)$	$2I$
	$\|\Pi\rangle = \frac{1}{\sqrt{2}}(\|001\rangle - \|100\rangle)$	$\frac{1}{2}(x_0\|00\rangle - x_1\|10\rangle)$	$2\sigma_z \otimes I$

4.1.3 Informasi Dua Qubit Khusus

Informasi khusus lainnya adalah

$$|\chi\rangle = 0,8|00\rangle + 0,6|01\rangle \quad (102)$$

Keadaan terbelit yang digunakan

$$|\varphi\rangle = c_0|000\rangle + c_1|001\rangle + c_2|010\rangle + c_3|011\rangle$$
$$+c_4|100\rangle + c_5|101\rangle + c_6|110\rangle + c_7|111\rangle \quad (103)$$

Pengukuran yang digunakan

$$|\Pi\rangle = m_0|000\rangle + m_1|001\rangle + m_2|010\rangle + m_3|011\rangle$$
$$+m_4|100\rangle + m_5|101\rangle + m_6|110\rangle + m_7|111\rangle \quad (104)$$

Kemudian dilakukan pengukuran

$$(\langle \Pi | \otimes I)|\Psi\rangle =$$
$$(0,8m_0 + 0,6m_2)(c_0|00\rangle + c_1|01\rangle + c_2|10\rangle + c_3|11\rangle)$$
$$+(0,8m_1 + 0,6m_3(c_4|00\rangle + c_5|01\rangle + c_6|10\rangle + c_7|11\rangle) \quad (105)$$

Tabel 8 Pengukuran Informasi Dua Qubit Khusus 1

Keadaan Terbelit	Keadaan Alice	Keadaan Bob	Operator
$\|\varphi\rangle = \frac{1}{\sqrt{2}}(\|000\rangle + \|101\rangle)$	$\|\Pi\rangle = \frac{1}{\sqrt{2}}(\|000\rangle + \|011\rangle)$	$\frac{1}{2}(0,8\|00\rangle + 0,6\|01\rangle)$	$2I$
	$\|\Pi\rangle = \frac{1}{\sqrt{2}}(\|001\rangle + \|010\rangle)$	$\frac{1}{2}(0,6\|00\rangle + 0,8\|01\rangle)$	$2I \otimes \sigma_x$
	$\|\Pi\rangle = \frac{1}{\sqrt{2}}(\|000\rangle - \|011\rangle)$	$\frac{1}{2}(0,8\|00\rangle - 0,6\|01\rangle)$	$2I \otimes \sigma_z$
$\|\varphi\rangle = \frac{1}{\sqrt{2}}(\|001\rangle + \|100\rangle)$	$\|\Pi\rangle = \frac{1}{\sqrt{2}}(\|000\rangle + \|011\rangle)$	$\frac{1}{2}(0,6\|00\rangle + 0,8\|01\rangle)$	$2I \otimes \sigma_x$
	$\|\Pi\rangle = \frac{1}{\sqrt{2}}(\|001\rangle + \|010\rangle)$	$\frac{1}{2}(0,8\|00\rangle + 0,6\|01\rangle)$	$2I$
	$\|\Pi\rangle = \frac{1}{\sqrt{2}}(\|001\rangle - \|010\rangle)$	$\frac{1}{2}(0,8\|00\rangle - 0,6\|01\rangle)$	$2I \otimes \sigma_z$

Informasi lainnya adalah

$$|\chi\rangle = \frac{1}{\sqrt{1+n^2}}(|00\rangle + n|11\rangle) \quad (106)$$

Keadaan terbelit yang digunakan

$$|\varphi\rangle = c_0|000\rangle + c_1|001\rangle + c_2|010\rangle + c_3|011\rangle$$
$$+c_4|100\rangle + c_5|101\rangle + c_6|110\rangle + c_7|111\rangle \quad (107)$$

Pengukuran yang digunakan

$$\begin{aligned}|\Pi\rangle = \quad & m_0|000\rangle + m_1|001\rangle + m_2|010\rangle + m_3|011\rangle \\ & + m_4|100\rangle + m_5|101\rangle + m_6|110\rangle + m_7|111\rangle \end{aligned} \quad (108)$$

Kemudian dilakukan pengukuran

$$(\langle\Pi|\otimes I)|\Psi\rangle =$$

$$(m_0 \frac{1}{\sqrt{1+n^2}} + m_6 \frac{n}{\sqrt{1+n^2}})(c_0|00\rangle + c_1|01\rangle + c_2|10\rangle + c_3|11\rangle)$$

$$+(m_1 \frac{1}{\sqrt{1+n^2}} + m_7 \frac{n}{\sqrt{1+n^2}})(c_4|00\rangle + c_5|01\rangle + c_6|10\rangle + c_7|11\rangle)$$

(109)

Tabel 9 Pengukuran Informasi Dua Qubit Khusus 2

Keadaan Terbelit	Keadaan Alice	Keadaan Bob	Operator
$\|\varphi\rangle = \frac{1}{\sqrt{2}}(\|000\rangle + \|111\rangle)$	$\|\Pi\rangle = \frac{1}{\sqrt{2}}(\|000\rangle + \|111\rangle)$	$\frac{1}{\sqrt{1+n^2}}(\|00\rangle + n\|11\rangle)$	$2I$
	$\|\Pi\rangle = \frac{1}{\sqrt{2}}(\|000\rangle - \|111\rangle)$	$\frac{1}{\sqrt{1+n^2}}(\|00\rangle - n\|11\rangle)$	$2\sigma_z \otimes I$
$\|\varphi\rangle = \frac{1}{\sqrt{2}}(\|011\rangle + \|100\rangle)$	$\|\Pi\rangle = \frac{1}{\sqrt{2}}(\|001\rangle + \|110\rangle)$	$\frac{1}{\sqrt{1+n^2}}(\|00\rangle + n\|11\rangle)$	$2I$
	$\|\Pi\rangle = \frac{1}{\sqrt{2}}(\|001\rangle - \|110\rangle)$	$\frac{1}{\sqrt{1+n^2}}(\|00\rangle - n\|11\rangle)$	$2\sigma_z \otimes I$
$\|\varphi\rangle = \frac{1}{\sqrt{2}}(\|000\rangle - \|111\rangle)$	$\|\Pi\rangle = \frac{1}{\sqrt{2}}(\|000\rangle + \|111\rangle)$	$\frac{1}{\sqrt{1+n^2}}(\|00\rangle - n\|11\rangle)$	$2\sigma_z \otimes I$
	$\|\Pi\rangle = \frac{1}{\sqrt{2}}(\|000\rangle - \|111\rangle)$	$\frac{1}{\sqrt{1+n^2}}(\|00\rangle + n\|11\rangle)$	$2I$
$\|\varphi\rangle = \frac{1}{\sqrt{2}}(\|011\rangle - \|100\rangle)$	$\|\Pi\rangle = \frac{1}{\sqrt{2}}(\|001\rangle + \|110\rangle)$	$\frac{1}{\sqrt{1+n^2}}(\|00\rangle - n\|11\rangle)$	$2\sigma_z \otimes I$
	$\|\Pi\rangle = \frac{1}{\sqrt{2}}(\|001\rangle - \|110\rangle)$	$\frac{1}{\sqrt{1+n^2}}(\|00\rangle + n\|11\rangle)$	$2I$

4.1.4 Pengiriman Informasi Khusus

Berdasarkan sub bab (4.1.1), (4.1.2), (4.1.3), keadaan yang dapat dikirimkan adalah informasi khusus.

Tabel 10 Informasi Khusus dan Keadaan Terbelitnya

Informasi	Keadaan informasi	Keadaan Terbellit	Keadaan
$\|\chi\rangle = x_0\|00\rangle + x_1\|11\rangle$	Murni terbelit	$\|\varphi\rangle = \frac{1}{\sqrt{2}}(\|000\rangle + \|111\rangle)$	Muni terbelit
		$\|\varphi\rangle = \frac{1}{\sqrt{2}}(\|011\rangle + \|100\rangle)$	Murni terbelit
		$\|\varphi\rangle = \frac{1}{\sqrt{2}}(\|000\rangle - \|111\rangle)$	Muni terbelit
		$\|\varphi\rangle = \frac{1}{\sqrt{2}}(\|011\rangle - \|100\rangle)$	Muni terbelit
$\|\chi\rangle = x_0\|01\rangle + x_1\|10\rangle$	Murni terbelit	$\|\varphi\rangle = \frac{1}{\sqrt{2}}(\|001\rangle + \|110\rangle)$	Murni terbelit
		$\|\varphi\rangle = \frac{1}{\sqrt{2}}(\|010\rangle + \|101\rangle)$	Murni terbelit
$\|\chi\rangle = x_0\|00\rangle - x_1\|11\rangle$	Murni terbelit	$\|\varphi\rangle = \frac{1}{\sqrt{2}}(\|000\rangle + \|111\rangle)$	Muni terbelit
		$\|\varphi\rangle = \frac{1}{\sqrt{2}}(\|011\rangle + \|100\rangle)$	Murni terbelit
		$\|\varphi\rangle = \frac{1}{\sqrt{2}}(\|000\rangle - \|111\rangle)$	Muni terbelit
		$\|\varphi\rangle = \frac{1}{\sqrt{2}}(\|011\rangle - \|100\rangle)$	Muni terbelit
$\|\chi\rangle = x_0\|01\rangle - x_1\|10\rangle$	Murni terbelit	$\|\varphi\rangle = \frac{1}{\sqrt{2}}(\|001\rangle + \|110\rangle)$	Murni terbelit
		$\|\varphi\rangle = \frac{1}{\sqrt{2}}(\|010\rangle + \|101\rangle)$	Murni terbelit
$\|\chi\rangle = x_0\|00\rangle + x_1\|01\rangle$	*unentangled*	$\|\varphi\rangle = \frac{1}{\sqrt{2}}(\|000\rangle + \|101\rangle)$	*Entangled* sebagian
		$\|\varphi\rangle = \frac{1}{\sqrt{2}}(\|001\rangle + \|100\rangle)$	*Entangled* sebagian

$\|\chi\rangle = x_0\|00\rangle + x_1\|10\rangle$	*unentangled*	$\|\varphi\rangle = \frac{1}{\sqrt{2}}(\|000\rangle + \|110\rangle)$	*Entangled* sebagian
		$\|\varphi\rangle = \frac{1}{\sqrt{2}}(\|010\rangle + \|100\rangle)$	*Entangled* sebagian
$\|\chi\rangle = 0,8\|00\rangle + 0,6\|01\rangle$	*unentangled*	$\|\varphi\rangle = \frac{1}{\sqrt{2}}(\|000\rangle + \|101\rangle)$	*Entangled* sebagian
		$\|\varphi\rangle = \frac{1}{\sqrt{2}}(\|001\rangle + \|100\rangle)$	*Entangled* sebagian
$\|\chi\rangle = \frac{1}{\sqrt{1+n^2}}(\|00\rangle + n\|11\rangle)$	Murni terbelit	$\|\varphi\rangle = \frac{1}{\sqrt{2}}(\|000\rangle + \|111\rangle)$	Muni terbelit
		$\|\varphi\rangle = \frac{1}{\sqrt{2}}(\|011\rangle + \|100\rangle)$	Murni terbelit
		$\|\varphi\rangle = \frac{1}{\sqrt{2}}(\|000\rangle - \|111\rangle)$	Muni terbelit
		$\|\varphi\rangle = \frac{1}{\sqrt{2}}(\|011\rangle - \|100\rangle)$	Muni terbelit

4.2 Informasi Dua Qubit Tiga Suku

Informasi dua qubit dengan tiga suku, salah satu contohnya adalah

$$|\chi\rangle = \underbrace{x_0|00\rangle}_{suku1} + \underbrace{x_1|01\rangle}_{suku2} + \underbrace{x_2|10\rangle}_{suku3} \tag{110}$$

Keadaan terbelit yang digunakan

$$\begin{aligned}|\varphi\rangle = {} & c_0|000\rangle + c_1|001\rangle + c_2|010\rangle + c_3|011\rangle \\ & + c_4|100\rangle + c_5|101\rangle + c_6|110\rangle + c_7|111\rangle\end{aligned} \tag{111}$$

Pengukuran yang digunakan

$$\begin{aligned}|\Pi\rangle = {} & m_0|000\rangle + m_1|001\rangle + m_2|010\rangle + m_3|011\rangle \\ & + m_4|100\rangle + m_5|101\rangle + m_6|110\rangle + m_7|111\rangle\end{aligned} \tag{112}$$

Sehingga diperoleh hasil pengukuran adalah

$$
\begin{aligned}
&(\langle\Pi|\otimes I)|\Psi\rangle \\
&=(m_0x_0+m_2x_1+m_4x_2)(c_0|00\rangle+c_1|01\rangle+c_2|10\rangle+c_3|11\rangle) \\
&+(m_1x_0+m_3x_1+m_5x_2)(c_4|00\rangle+c_5|01\rangle+c_6|10\rangle+c_7|11\rangle)
\end{aligned} \tag{113}
$$

Berdasarkan persamaan diatas tidak ada keadaan terbelit yang mampu untuk mengirim. Semua keadaaan informasi dua qubit dengan tiga suku yang masing masing konstanta berbeda, maka informasi tidak ada yang dapat terkirim. Namun, saat kontanta masing masing suku ada yang sama maka perumusannya menjadi seperti berikut ini

$$
|\chi\rangle=\underbrace{x_0|00\rangle}_{suku1}+\underbrace{x_0|01\rangle}_{suku2}+\underbrace{x_2|10\rangle}_{suku3} \tag{114}
$$

Keadaan terbelit yang digunakan

$$
\begin{aligned}
|\varphi\rangle=c_0|000\rangle+c_1|001\rangle+c_2|010\rangle+c_3|011\rangle \\
+c_4|100\rangle+c_5|101\rangle+c_6|110\rangle+c_7|111\rangle
\end{aligned} \tag{115}
$$

Pengukuran yang digunakan

$$
\begin{aligned}
|\Pi\rangle= \; & m_0|000\rangle+m_1|001\rangle+m_2|010\rangle+m_3|011\rangle \\
&+m_4|100\rangle+m_5|101\rangle+m_6|110\rangle+m_7|111\rangle
\end{aligned} \tag{116}
$$

Sehingga diperoleh hasil pengukuran bentuk umumnya adalah

$$
\begin{aligned}
&(\langle\Pi|\otimes I)|\Psi\rangle \\
&=((m_0+m_2)x_0+m_4x_2)(c_0|00\rangle+c_1|01\rangle+c_2|10\rangle+c_3|11\rangle) \\
&+((m_1+m_3)x_0+m_5x_2)(c_4|00\rangle+c_5|01\rangle+c_6|10\rangle+c_7|11\rangle)
\end{aligned} \tag{117}
$$

Tabel 11 Pengukuran Tiga Suku

Maka saat digunakan keadaan terbelit $\|\varphi\rangle=\sqrt{\frac{1}{3}}(\|000\rangle+\|001\rangle+\|110\rangle)$ Pengukuran yang digunakan adalah $\|\Pi\rangle=\sqrt{\frac{2}{3}}(\frac{1}{2}\|000\rangle+\frac{1}{2}\|010\rangle+\|101\rangle)$

Hasil pengukuran $(\langle\Pi\vert\otimes I)\vert\Psi\rangle=\frac{\sqrt{2}}{3}(x_0(\vert 00\rangle+\vert 01\rangle)+x_2\vert 10\rangle)$ Agar informasi dapat terkirim maka Bob harus melakukan operator $\frac{3}{\sqrt{2}}I$
Maka saat digunakan kaeadaan terbelit $\vert\varphi\rangle=\sqrt{\frac{1}{3}}(\vert 010\rangle+\vert 100\rangle+\vert 101\rangle)$ Pengukuran yang digunakan adalah $\vert\Pi\rangle=\sqrt{\frac{2}{3}}(\frac{1}{2}\vert 001\rangle+\frac{1}{2}\vert 011\rangle+\vert 110\rangle)$ Hasil pengukuran $(\langle\Pi\vert\otimes I)\vert\Psi\rangle=\frac{\sqrt{2}}{3}(x_0(\vert 00\rangle+\vert 01\rangle)+x_2\vert 10\rangle)$ Agar informasi dapat terkirim maka Bob harus melakukan operator $\frac{3}{\sqrt{2}}I$

4.3 Informasi Dua Qubit Empat Suku

Informasi dua qubit dengan empat suku, salah satu contohnya adalah

$$\vert\chi\rangle=\underbrace{x_0\vert 00\rangle}_{suku1}+\underbrace{x_1\vert 01\rangle}_{suku2}+\underbrace{x_2\vert 10\rangle}_{suku3}+\underbrace{x_3\vert 11\rangle}_{suku4} \quad (118)$$

Keadaan terbelit yang digunakan adalah qubit rangkap tiga sembarang

$$\vert\varphi\rangle=c_0\vert 000\rangle+c_1\vert 001\rangle+c_2\vert 010\rangle+c_3\vert 011\rangle$$
$$+c_4\vert 100\rangle+c_5\vert 101\rangle+c_6\vert 110\rangle+c_7\vert 111\rangle \quad (119)$$

Pengukuran yang digunakan adalah

$$\begin{aligned}|\Pi\rangle = \quad & m_0|000\rangle + m_1|001\rangle + m_2|010\rangle + m_3|011\rangle \\ & + m_4|100\rangle + m_5|101\rangle + m_6|110\rangle + m_7|111\rangle\end{aligned} \tag{120}$$

Berdasarkan Bab III maka tidak terdapat keadaan terbelit yang dapat mengirimkan keadaan informasi dua qubit dengan empat suku masing masing memiliki konstanta yang berbeda.

Informasi khusus yang akan dikirimkan adalah informasi dua qubit dengan ada dua nilai konstanta yang sama.

$$|\chi\rangle = x_0|00\rangle + x_1|01\rangle + x_2|10\rangle + x_2|11\rangle \tag{121}$$

Keadaan terbelit yang digunakan

$$\begin{aligned}|\varphi\rangle = & c_0|000\rangle + c_1|001\rangle + c_2|010\rangle + c_3|011\rangle \\ & + c_4|100\rangle + c_5|101\rangle + c_6|110\rangle + c_7|111\rangle\end{aligned} \tag{122}$$

Pengukuran yang digunakan adalah

$$\begin{aligned}|\Pi\rangle = \quad & m_0|000\rangle + m_1|001\rangle + m_2|010\rangle + m_3|011\rangle \\ & + m_4|100\rangle + m_5|101\rangle + m_6|110\rangle + m_7|111\rangle\end{aligned} \tag{123}$$

Kemudian dilakukan pengukuran

$$\begin{aligned}&(\langle\Pi|\otimes I)|\Psi\rangle = \\ &(m_0x_0 + m_2x_1 + (m_4 + m_6)x_2)(c_0|00\rangle + c_1|01\rangle + c_2|10\rangle + c_3|11\rangle) \\ &+(m_1x_0 + m_3x_1 + (m_5 + m_7)x_2)(c_4|00\rangle + c_5|01\rangle + c_6|10\rangle + c_7|11\rangle)\end{aligned} \tag{124}$$

Berdasarkan bentuk diatas dapat diketahui bahwa tidak ada saluran yang dapat mengirimkan informasinya.

Informasi khusus yang akan dikirimkan adalah informasi dua qubit dengan ada tiga nilai konstanta yang sama.

$$|\chi\rangle = x_0|00\rangle + x_1|01\rangle + x_1|10\rangle + x_1|11\rangle \tag{125}$$

Keadaan terbelit yang digunakan

$$\begin{aligned}|\varphi\rangle = & c_0|000\rangle + c_1|001\rangle + c_2|010\rangle + c_3|011\rangle \\ & + c_4|100\rangle + c_5|101\rangle + c_6|110\rangle + c_7|111\rangle\end{aligned} \tag{126}$$

Pengukuran yang digunakan adalah

$$|\Pi\rangle = m_0|000\rangle + m_1|001\rangle + m_2|010\rangle + m_3|011\rangle + m_4|100\rangle + m_5|101\rangle + m_6|110\rangle + m_7|111\rangle \quad (127)$$

Kemudian dilakukan pengukuran

$$(\langle\Pi|\otimes I)|\Psi\rangle =$$

$$(m_0x_0 + (m_4 + m_6 + m_2)x_1)(c_0|00\rangle + c_1|01\rangle + c_2|10\rangle + c_3|11\rangle)$$

$$+(m_1x_0 + (m_5 + m_7 + m_3)x_1)(c_4|00\rangle + c_5|01\rangle + c_6|10\rangle + c_7|11\rangle) \quad (128)$$

Berdasarkan bentuk diatas, terdapat keadaan terbelit yang dapat mengirimkan informasinya seperti yang ditunjukkan pada tabel berikut

Tabel 12 Pengukuran Empat Suku

Maka saat digunakan keadaan terbelit $\|\varphi\rangle = \frac{1}{2}(\|000\rangle + \|011\rangle + \|101\rangle + \|111\rangle)$ Pengukuran yang digunakan adalah $\|\Pi\rangle = \sqrt{\frac{3}{4}}(\|000\rangle + \frac{1}{3}(\|011\rangle + \|101\rangle + \|111\rangle))$ Hasil pengukuran $(\langle\Pi\|\otimes I)\|\Psi\rangle = \sqrt{3}(x_0\|00\rangle + x_1\|01\rangle + x_1\|10\rangle + x_1\|11\rangle)$ Agar informasi dapat terkirim maka Bob harus melakukan operator $\frac{1}{\sqrt{3}}I$
Maka saat digunakan keadaan terbelit $\|\varphi\rangle = \frac{1}{2}(\|000\rangle + \|011\rangle + \|101\rangle + \|111\rangle)$ Pengukuran yang digunakan adalah $\|\Pi\rangle = \sqrt{\frac{3}{4}}(\|001\rangle + \frac{1}{3}(\|010\rangle + \|100\rangle + \|110\rangle))$ Hasil pengukuran $(\langle\Pi\|\otimes I)\|\Psi\rangle = \sqrt{3}(x_0\|00\rangle + x_1\|01\rangle + x_1\|10\rangle + x_1\|11\rangle)$ Agar informasi dapat terkirim maka Bob harus melakukan operator $\frac{1}{\sqrt{3}}I$

Informasi khusus yang akan dikirimkan adalah informasi dua qubit empat suku dengan dua nilai konstanta seperti,

$$|\chi\rangle = x_0(|00\rangle + |11\rangle) + x_1(|01\rangle + |10\rangle) \tag{129}$$

Keadaan terbelit yang digunakan

$$\begin{aligned}|\varphi\rangle = {} & c_0|000\rangle + c_1|001\rangle + c_2|010\rangle + c_3|011\rangle \\ & + c_4|100\rangle + c_5|101\rangle + c_6|110\rangle + c_7|111\rangle\end{aligned} \tag{130}$$

Pengukuran yang digunakan

$$\begin{aligned}|\Pi\rangle = {} & m_0|000\rangle + m_1|001\rangle + m_2|010\rangle + m_3|011\rangle \\ & + m_4|100\rangle + m_5|101\rangle + m_6|110\rangle + m_7|111\rangle\end{aligned} \tag{131}$$

Kemudian dilakukan pengukuran

$$\begin{aligned}&(\langle\Pi| \otimes I)|\Psi\rangle = \\ &((m_0 + m_6)x_0 + (m_2 + m_4)x_1)(c_0|00\rangle + c_1|01\rangle + c_2|10\rangle + c_3|11\rangle) \\ &+((m_1 + m_7x_0 + (m_3 + m_5)x_1)(c_4|00\rangle + c_5|01\rangle + c_6|10\rangle + c_7|11\rangle)\end{aligned} \tag{132}$$

Tabel 13 Pengukuran Informasi Khusus Keadaan Terbelit 1

Keadaan Terbelit	Keadaan Alice	Keadaan Bob	Operator
$\|\varphi\rangle = \frac{1}{2}(\|000\rangle + \|011\rangle + \|101\rangle + \|110\rangle)$	$\|\Pi\rangle = \frac{1}{\sqrt{2}}(\|000\rangle + \|011\rangle)$	$\frac{1}{2\sqrt{2}}(x_0(\|00\rangle + \|11\rangle) + x_1(\|01\rangle + \|10\rangle))$	$2\sqrt{2}I$
	$\|\Pi\rangle = \frac{1}{2}(\|000\rangle + \|010\rangle + \|011\rangle - \|100\rangle)$	$\frac{1}{4}(x_0(\|00\rangle + \|11\rangle) + x_1(\|01\rangle + \|10\rangle))$	$4I$
	$\|\Pi\rangle = \frac{1}{2}(\|000\rangle - \|010\rangle + \|011\rangle + \|100\rangle)$	$\frac{1}{4}(x_0(\|00\rangle + \|11\rangle) + x_1(\|01\rangle + \|10\rangle))$	$4I$
	$\|\Pi\rangle = \frac{1}{2}(\|000\rangle + \|001\rangle + \|011\rangle - \|111\rangle)$	$\frac{1}{4}(x_0(\|00\rangle + \|11\rangle) + x_1(\|01\rangle + \|10\rangle))$	$4I$
	$\|\Pi\rangle = \frac{1}{2}(\|000\rangle - \|001\rangle + \|011\rangle + \|111\rangle)$	$\frac{1}{4}(x_0(\|00\rangle + \|11\rangle) + x_1(\|01\rangle + \|10\rangle))$	$4I$
	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(\|000\rangle + \|001\rangle + \|010\rangle + \|011\rangle - \|100\rangle - \|111\rangle)$	$\frac{1}{2\sqrt{6}}(x_0(\|00\rangle + \|11\rangle) + x_1(\|01\rangle + \|10\rangle))$	$2\sqrt{6}I$
	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(\|000\rangle - \|001\rangle + \|010\rangle - \|011\rangle + \|100\rangle + \|111\rangle)$	$\frac{1}{2\sqrt{6}}(x_0(\|00\rangle + \|11\rangle) + x_1(\|01\rangle + \|10\rangle))$	$2\sqrt{6}I$
	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(\|000\rangle + \|001\rangle - \|010\rangle + \|011\rangle + \|100\rangle - \|111\rangle)$	$\frac{1}{2\sqrt{6}}(x_0(\|00\rangle + \|11\rangle) + x_1(\|01\rangle + \|10\rangle))$	$2\sqrt{6}I$
	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(\|000\rangle - \|001\rangle - \|010\rangle + \|011\rangle + \|100\rangle + \|111\rangle)$	$\frac{1}{2\sqrt{6}}(x_0(\|00\rangle + \|11\rangle) + x_1(\|01\rangle + \|10\rangle))$	$2\sqrt{6}I$
	$\|\Pi\rangle = \frac{1}{\sqrt{2}}(\|101\rangle + \|110\rangle)$	$\frac{1}{2\sqrt{2}}(x_0(\|00\rangle + \|11\rangle) + x_1(\|01\rangle + \|10\rangle))$	$2\sqrt{2}I$
	$\|\Pi\rangle = \frac{1}{2}(\|010\rangle - \|100\rangle + \|101\rangle + \|110\rangle)$	$\frac{1}{4}(x_0(\|00\rangle + \|11\rangle) + x_1(\|01\rangle + \|10\rangle))$	$4I$
	$\|\Pi\rangle = \frac{1}{2}(-\|010\rangle + \|100\rangle + \|101\rangle + \|110\rangle)$	$\frac{1}{4}(x_0(\|00\rangle + \|11\rangle) + x_1(\|01\rangle + \|10\rangle))$	$4I$

	$\|\Pi\rangle = \frac{1}{2}(\|001\rangle + \|101\rangle + \|110\rangle - \|111\rangle)$	$\frac{1}{4}(x_0(\|00\rangle + \|11\rangle) + x_1(\|01\rangle + \|10\rangle))$	$4I$
	$\|\Pi\rangle = \frac{1}{2}(-\|001\rangle + \|101\rangle + \|110\rangle + \|111\rangle)$	$\frac{1}{4}(x_0(\|00\rangle + \|11\rangle) + x_1(\|01\rangle + \|10\rangle))$	$4I$
	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(\|001\rangle + \|010\rangle - \|100\rangle + \|101\rangle + \|110\rangle - \|111\rangle)$	$\frac{1}{2\sqrt{6}}(x_0(\|00\rangle + \|11\rangle) + x_1(\|01\rangle + \|10\rangle))$	$2\sqrt{6}I$
	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(-\|001\rangle + \|010\rangle + \|100\rangle - \|101\rangle + \|110\rangle + \|111\rangle)$	$\frac{1}{2\sqrt{6}}(x_0(\|00\rangle + \|11\rangle) + x_1(\|01\rangle + \|10\rangle))$	$2\sqrt{6}I$
	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(\|001\rangle - \|010\rangle + \|100\rangle + \|101\rangle + \|110\rangle - \|111\rangle)$	$\frac{1}{2\sqrt{6}}(x_0(\|00\rangle + \|11\rangle) + x_1(\|01\rangle + \|10\rangle))$	$2\sqrt{6}I$
	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(-\|001\rangle - \|010\rangle + \|100\rangle + \|101\rangle + \|110\rangle + \|111\rangle)$	$\frac{1}{2\sqrt{6}}(x_0(\|00\rangle + \|11\rangle) + x_1(\|01\rangle + \|10\rangle))$	$2\sqrt{6}I$
	$\|\Pi\rangle = \frac{1}{\sqrt{2}}(\|000\rangle + \|101\rangle)$	$\frac{1}{2\sqrt{2}}(x_0(\|00\rangle + \|11\rangle) + x_1(\|01\rangle + \|10\rangle))$	$2\sqrt{2}I$
	$\|\Pi\rangle = \frac{1}{2}(\|000\rangle + \|010\rangle - \|100\rangle + \|101\rangle)$	$\frac{1}{4}(x_0(\|00\rangle + \|11\rangle) + x_1(\|01\rangle + \|10\rangle))$	$4I$
	$\|\Pi\rangle = \frac{1}{2}(\|000\rangle - \|010\rangle + \|100\rangle + \|101\rangle)$	$\frac{1}{4}(x_0(\|00\rangle + \|11\rangle) + x_1(\|01\rangle + \|10\rangle))$	$4I$
	$\|\Pi\rangle = \frac{1}{2}(\|000\rangle + \|001\rangle + \|101\rangle - \|111\rangle)$	$\frac{1}{4}(x_0(\|00\rangle + \|11\rangle) + x_1(\|01\rangle + \|10\rangle))$	$4I$
	$\|\Pi\rangle = \frac{1}{2}(\|000\rangle - \|001\rangle + \|101\rangle + \|111\rangle)$	$\frac{1}{4}(x_0(\|00\rangle + \|11\rangle) + x_1(\|01\rangle + \|10\rangle))$	$4I$
	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(\|000\rangle + \|001\rangle + \|010\rangle - \|100\rangle + \|101\rangle - \|111\rangle)$	$\frac{1}{2\sqrt{6}}(x_0(\|00\rangle + \|11\rangle) + x_1(\|01\rangle + \|10\rangle))$	$2\sqrt{6}I$
	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(\|000\rangle - \|001\rangle + \|010\rangle - \|100\rangle + \|101\rangle + \|111\rangle)$	$\frac{1}{2\sqrt{6}}(x_0(\|00\rangle + \|11\rangle) + x_1(\|01\rangle + \|10\rangle))$	$2\sqrt{6}I$

	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(\|000\rangle + \|001\rangle - \|010\rangle + \|100\rangle + \|101\rangle - \|111\rangle)$	$\frac{1}{2\sqrt{6}}(x_0(\|00\rangle + \|11\rangle) + x_1(\|01\rangle + \|10\rangle))$	$2\sqrt{6}I$
	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(\|000\rangle - \|001\rangle - \|010\rangle + \|100\rangle + \|101\rangle + \|111\rangle)$	$\frac{1}{2\sqrt{6}}(x_0(\|00\rangle + \|11\rangle) + x_1(\|01\rangle + \|10\rangle))$	$2\sqrt{6}I$
	$\|\Pi\rangle = \frac{1}{\sqrt{2}}(\|011\rangle + \|110\rangle)$	$\frac{1}{2\sqrt{2}}(x_0(\|00\rangle + \|11\rangle) + x_1(\|01\rangle + \|10\rangle))$	$2\sqrt{2}I$
	$\|\Pi\rangle = \frac{1}{2}(\|010\rangle + \|011\rangle - \|100\rangle + \|110\rangle)$	$\frac{1}{4}(x_0(\|00\rangle + \|11\rangle) + x_1(\|01\rangle + \|10\rangle))$	$4I$
	$\|\Pi\rangle = \frac{1}{2}(-\|010\rangle + \|011\rangle + \|100\rangle + \|110\rangle)$	$\frac{1}{4}(x_0(\|00\rangle + \|11\rangle) + x_1(\|01\rangle + \|10\rangle))$	$4I$
	$\|\Pi\rangle = \frac{1}{2}(\|001\rangle + \|011\rangle + \|110\rangle - \|111\rangle)$	$\frac{1}{4}(x_0(\|00\rangle + \|11\rangle) + x_1(\|01\rangle + \|10\rangle))$	$4I$
	$\|\Pi\rangle = \frac{1}{2}(-\|001\rangle + \|011\rangle + \|110\rangle + \|111\rangle)$	$\frac{1}{4}(x_0(\|00\rangle + \|11\rangle) + x_1(\|01\rangle + \|10\rangle))$	$4I$
	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(\|001\rangle + \|010\rangle + \|011\rangle - \|100\rangle + \|110\rangle - \|111\rangle)$	$\frac{1}{2\sqrt{6}}(x_0(\|00\rangle + \|11\rangle) + x_1(\|01\rangle + \|10\rangle))$	$2\sqrt{6}I$
	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(-\|001\rangle + \|010\rangle + \|011\rangle - \|100\rangle + \|110\rangle + \|111\rangle)$	$\frac{1}{2\sqrt{6}}(x_0(\|00\rangle + \|11\rangle) + x_1(\|01\rangle + \|10\rangle))$	$2\sqrt{6}I$
	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(\|001\rangle - \|010\rangle + \|011\rangle + \|100\rangle + \|110\rangle - \|111\rangle)$	$\frac{1}{2\sqrt{6}}(x_0(\|00\rangle + \|11\rangle) + x_1(\|01\rangle + \|10\rangle))$	$2\sqrt{6}I$
	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(-\|001\rangle - \|010\rangle + \|011\rangle + \|100\rangle + \|110\rangle + \|111\rangle)$	$\frac{1}{2\sqrt{6}}(x_0(\|00\rangle + \|11\rangle) + x_1(\|01\rangle + \|10\rangle))$	$2\sqrt{6}I$
	$\|\Pi\rangle = \frac{1}{2}(\|000\rangle + \|011\rangle + \|101\rangle + \|110\rangle)$	$\frac{1}{2}(x_0(\|00\rangle + \|11\rangle) + x_1(\|01\rangle + \|10\rangle))$	$2I$
	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(\|000\rangle + \|010\rangle + \|011\rangle - \|100\rangle + \|101\rangle + \|110\rangle)$	$\frac{1}{\sqrt{6}}(x_0(\|00\rangle + \|11\rangle) + x_1(\|01\rangle + \|10\rangle))$	$\sqrt{6}I$

	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(\|000\rangle - \|010\rangle + \|011\rangle + \|100\rangle + \|101\rangle + \|110\rangle)$	$\frac{1}{\sqrt{6}}(x_0(\|00\rangle + \|11\rangle) + x_1(\|01\rangle + \|10\rangle))$	$\sqrt{6}I$
	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(\|000\rangle + \|001\rangle + \|011\rangle + \|101\rangle + \|110\rangle - \|111\rangle)$	$\frac{1}{\sqrt{6}}(x_0(\|00\rangle + \|11\rangle) + x_1(\|01\rangle + \|10\rangle))$	$\sqrt{6}I$
	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(\|000\rangle - \|001\rangle + \|011\rangle + \|101\rangle + \|110\rangle + \|111\rangle)$	$\frac{1}{\sqrt{6}}(x_0(\|00\rangle + \|11\rangle) + x_1(\|01\rangle + \|10\rangle))$	$\sqrt{6}I$
	$\|\Pi\rangle = \|000\rangle + \|001\rangle + \|010\rangle + \|011\rangle - \|100\rangle + \|101\rangle + \|110\rangle - \|111\rangle$	$x_0(\|00\rangle + \|11\rangle) + x_1(\|01\rangle + \|10\rangle)$	I
	$\|\Pi\rangle = \|000\rangle - \|001\rangle + \|010\rangle + \|011\rangle - \|100\rangle + \|101\rangle + \|110\rangle + \|111\rangle$	$x_0(\|00\rangle + \|11\rangle) + x_1(\|01\rangle + \|10\rangle)$	I
	$\|\Pi\rangle = \|000\rangle + \|001\rangle - \|010\rangle + \|011\rangle + \|100\rangle + \|101\rangle + \|110\rangle - \|111\rangle$	$x_0(\|00\rangle + \|11\rangle) + x_1(\|01\rangle + \|10\rangle)$	I
	$\|\Pi\rangle = \|000\rangle - \|001\rangle - \|010\rangle + \|011\rangle + \|100\rangle + \|101\rangle + \|110\rangle + \|111\rangle$	$x_0(\|00\rangle + \|11\rangle) + x_1(\|01\rangle + \|10\rangle)$	I
	$\|\Pi\rangle = \frac{1}{\sqrt{2}}(\|001\rangle + \|010\rangle)$	$\frac{1}{2\sqrt{2}}(x_1(\|00\rangle + \|11\rangle) + x_0(\|01\rangle + \|10\rangle))$	$2\sqrt{2}\sigma_x$
	$\|\Pi\rangle = \frac{1}{2}(\|000\rangle + \|001\rangle + \|010\rangle - \|110\rangle)$	$\frac{1}{4}(x_1(\|00\rangle + \|11\rangle) + x_0(\|01\rangle + \|10\rangle))$	$4\sigma_x$
	$\|\Pi\rangle = \frac{1}{2}(-\|000\rangle + \|001\rangle + \|010\rangle + \|110\rangle)$	$\frac{1}{4}(x_1(\|00\rangle + \|11\rangle) + x_0(\|01\rangle + \|10\rangle))$	$4\sigma_x$
	$\|\Pi\rangle = \frac{1}{2}(\|001\rangle + \|010\rangle + \|011\rangle - \|101\rangle)$	$\frac{1}{4}(x_1(\|00\rangle + \|11\rangle) + x_0(\|01\rangle + \|10\rangle))$	$4\sigma_x$
	$\|\Pi\rangle = \frac{1}{2}(\|001\rangle + \|010\rangle - \|011\rangle + \|101\rangle)$	$\frac{1}{4}(x_1(\|00\rangle + \|11\rangle) + x_0(\|01\rangle + \|10\rangle))$	$4\sigma_x$

	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(\|000\rangle + \|001\rangle + \|010\rangle + \|011\rangle - \|101\rangle - \|110\rangle)$	$\frac{1}{2\sqrt{6}}(x_1(\|00\rangle + \|11\rangle) + x_0(\|01\rangle + \|10\rangle))$	$2\sqrt{6}\sigma_x$
	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(\|000\rangle + \|001\rangle + \|010\rangle - \|011\rangle + \|101\rangle - \|110\rangle)$	$\frac{1}{2\sqrt{6}}(x_1(\|00\rangle + \|11\rangle) + x_0(\|01\rangle + \|10\rangle))$	$2\sqrt{6}\sigma_x$
	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(-\|000\rangle + \|001\rangle + \|010\rangle + \|011\rangle - \|101\rangle + \|110\rangle)$	$\frac{1}{2\sqrt{6}}(x_1(\|00\rangle + \|11\rangle) + x_0(\|01\rangle + \|10\rangle))$	$2\sqrt{6}\sigma_x$
	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(-\|000\rangle + \|001\rangle + \|010\rangle - \|011\rangle + \|101\rangle + \|110\rangle)$	$\frac{1}{2\sqrt{6}}(x_1(\|00\rangle + \|11\rangle) + x_0(\|01\rangle + \|10\rangle))$	$2\sqrt{6}\sigma_x$
	$\|\Pi\rangle = \frac{1}{\sqrt{2}}(\|010\rangle + \|111\rangle)$	$\frac{1}{2\sqrt{2}}(x_1(\|00\rangle + \|11\rangle) + x_0(\|01\rangle + \|10\rangle))$	$2\sqrt{2}\sigma_x$
	$\|\Pi\rangle = \frac{1}{2}(\|000\rangle + \|010\rangle - \|110\rangle + \|111\rangle)$	$\frac{1}{4}(x_1(\|00\rangle + \|11\rangle) + x_0(\|01\rangle + \|10\rangle))$	$4\sigma_x$
	$\|\Pi\rangle = \frac{1}{2}(-\|000\rangle + \|010\rangle + \|110\rangle + \|111\rangle)$	$\frac{1}{4}(x_1(\|00\rangle + \|11\rangle) + x_0(\|01\rangle + \|10\rangle))$	$4\sigma_x$
	$\|\Pi\rangle = \frac{1}{2}(\|010\rangle + \|011\rangle - \|101\rangle + \|111\rangle)$	$\frac{1}{4}(x_1(\|00\rangle + \|11\rangle) + x_0(\|01\rangle + \|10\rangle))$	$4\sigma_x$
	$\|\Pi\rangle = \frac{1}{2}(\|010\rangle - \|011\rangle + \|101\rangle + \|111\rangle)$	$\frac{1}{4}(x_1(\|00\rangle + \|11\rangle) + x_0(\|01\rangle + \|10\rangle))$	$4\sigma_x$
	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(\|000\rangle + \|010\rangle + \|011\rangle - \|101\rangle - \|110\rangle + \|111\rangle)$	$\frac{1}{2\sqrt{6}}(x_1(\|00\rangle + \|11\rangle) + x_0(\|01\rangle + \|10\rangle))$	$2\sqrt{6}\sigma_x$
	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(\|000\rangle + \|010\rangle - \|011\rangle + \|101\rangle - \|110\rangle + \|111\rangle)$	$\frac{1}{2\sqrt{6}}(x_1(\|00\rangle + \|11\rangle) + x_0(\|01\rangle + \|10\rangle))$	$2\sqrt{6}\sigma_x$
	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(-\|000\rangle + \|010\rangle + \|011\rangle - \|101\rangle + \|110\rangle + \|111\rangle)$	$\frac{1}{2\sqrt{6}}(x_1(\|00\rangle + \|11\rangle) + x_0(\|01\rangle + \|10\rangle))$	$2\sqrt{6}\sigma_x$
	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(-\|000\rangle + \|010\rangle - \|011\rangle + \|101\rangle + \|110\rangle + \|111\rangle)$	$\frac{1}{2\sqrt{6}}(x_1(\|00\rangle + \|11\rangle) + x_0(\|01\rangle + \|10\rangle))$	$2\sqrt{6}\sigma_x$

	$\|\Pi\rangle = \frac{1}{\sqrt{2}}(\|001\rangle + \|100\rangle)$	$\frac{1}{2\sqrt{2}}(x_1(\|00\rangle + \|11\rangle) + x_0(\|01\rangle + \|10\rangle))$	$2\sqrt{2}\sigma_x$
	$\|\Pi\rangle = \frac{1}{2}(\|000\rangle + \|001\rangle + \|100\rangle - \|110\rangle)$	$\frac{1}{4}(x_1(\|00\rangle + \|11\rangle) + x_0(\|01\rangle + \|10\rangle))$	$4\sigma_x$
	$\|\Pi\rangle = \frac{1}{2}(-\|000\rangle + \|001\rangle + \|100\rangle + \|110\rangle)$	$\frac{1}{4}(x_1(\|00\rangle + \|11\rangle) + x_0(\|01\rangle + \|10\rangle))$	$4\sigma_x$
	$\|\Pi\rangle = \frac{1}{2}(\|001\rangle + \|011\rangle + \|100\rangle - \|101\rangle)$	$\frac{1}{4}(x_1(\|00\rangle + \|11\rangle) + x_0(\|01\rangle + \|10\rangle))$	$4\sigma_x$
	$\|\Pi\rangle = \frac{1}{2}(\|001\rangle - \|011\rangle + \|100\rangle + \|101\rangle)$	$\frac{1}{4}(x_1(\|00\rangle + \|11\rangle) + x_0(\|01\rangle + \|10\rangle))$	$4\sigma_x$
	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(\|000\rangle + \|001\rangle + \|011\rangle + \|100\rangle - \|101\rangle - \|110\rangle)$	$\frac{1}{2\sqrt{6}}(x_1(\|00\rangle + \|11\rangle) + x_0(\|01\rangle + \|10\rangle))$	$2\sqrt{6}\sigma_x$
	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(\|000\rangle + \|001\rangle - \|011\rangle + \|100\rangle + \|101\rangle - \|110\rangle)$	$\frac{1}{2\sqrt{6}}(x_1(\|00\rangle + \|11\rangle) + x_0(\|01\rangle + \|10\rangle))$	$2\sqrt{6}\sigma_x$
	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(-\|000\rangle + \|001\rangle + \|011\rangle + \|100\rangle - \|101\rangle + \|110\rangle)$	$\frac{1}{2\sqrt{6}}(x_1(\|00\rangle + \|11\rangle) + x_0(\|01\rangle + \|10\rangle))$	$2\sqrt{6}\sigma_x$
	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(-\|000\rangle + \|001\rangle - \|011\rangle + \|100\rangle + \|101\rangle + \|110\rangle)$	$\frac{1}{2\sqrt{6}}(x_1(\|00\rangle + \|11\rangle) + x_0(\|01\rangle + \|10\rangle))$	$2\sqrt{6}\sigma_x$
	$\|\Pi\rangle = \frac{1}{\sqrt{2}}(\|100\rangle + \|111\rangle)$	$\frac{1}{2\sqrt{2}}(x_1(\|00\rangle + \|11\rangle) + x_0(\|01\rangle + \|10\rangle))$	$2\sqrt{2}\sigma_x$
	$\|\Pi\rangle = \frac{1}{2}(\|000\rangle + \|100\rangle - \|110\rangle + \|111\rangle)$	$\frac{1}{4}(x_1(\|00\rangle + \|11\rangle) + x_0(\|01\rangle + \|10\rangle))$	$4\sigma_x$

	$\|\Pi\rangle = \frac{1}{2}(-\|000\rangle + \|100\rangle + \|110\rangle + \|111\rangle)$	$\frac{1}{4}(x_1(\|00\rangle + \|11\rangle) + x_0(\|01\rangle + \|10\rangle))$	$4\sigma_x$
	$\|\Pi\rangle = \frac{1}{2}(\|011\rangle + \|100\rangle - \|101\rangle + \|111\rangle)$	$\frac{1}{4}(x_1(\|00\rangle + \|11\rangle) + x_0(\|01\rangle + \|10\rangle))$	$4\sigma_x$
	$\|\Pi\rangle = \frac{1}{2}(-\|011\rangle + \|100\rangle + \|101\rangle + \|111\rangle)$	$\frac{1}{4}(x_1(\|00\rangle + \|11\rangle) + x_0(\|01\rangle + \|10\rangle))$	$4\sigma_x$
	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(\|000\rangle + \|011\rangle + \|100\rangle - \|101\rangle - \|110\rangle + \|111\rangle)$	$\frac{1}{2\sqrt{6}}(x_1(\|00\rangle + \|11\rangle) + x_0(\|01\rangle + \|10\rangle))$	$2\sqrt{6}\sigma_x$
	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(\|000\rangle - \|011\rangle + \|100\rangle + \|101\rangle - \|110\rangle + \|111\rangle)$	$\frac{1}{2\sqrt{6}}(x_1(\|00\rangle + \|11\rangle) + x_0(\|01\rangle + \|10\rangle))$	$2\sqrt{6}\sigma_x$
	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(-\|000\rangle - \|011\rangle + \|100\rangle - \|101\rangle + \|110\rangle + \|111\rangle)$	$\frac{1}{2\sqrt{6}}(x_1(\|00\rangle + \|11\rangle) + x_0(\|01\rangle + \|10\rangle))$	$2\sqrt{6}\sigma_x$
	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(-\|000\rangle - \|011\rangle + \|100\rangle + \|101\rangle + \|110\rangle + \|111\rangle)$	$\frac{1}{2\sqrt{6}}(x_1(\|00\rangle + \|11\rangle) + x_0(\|01\rangle + \|10\rangle))$	$2\sqrt{6}\sigma_x$
	$\|\Pi\rangle = \frac{1}{2}(\|001\rangle + \|010\rangle + \|100\rangle + \|111\rangle)$	$\frac{1}{2}(x_1(\|00\rangle + \|11\rangle) + x_0(\|01\rangle + \|10\rangle))$	$2\sigma_x$
	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(\|000\rangle + \|001\rangle + \|010\rangle + \|100\rangle - \|110\rangle + \|111\rangle)$	$\frac{1}{\sqrt{6}}(x_1(\|00\rangle + \|11\rangle) + x_0(\|01\rangle + \|10\rangle))$	$\sqrt{6}\sigma_x$
	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(-\|000\rangle + \|001\rangle + \|010\rangle + \|100\rangle + \|110\rangle + \|111\rangle)$	$\frac{1}{\sqrt{6}}(x_1(\|00\rangle + \|11\rangle) + x_0(\|01\rangle + \|10\rangle))$	$\sqrt{6}\sigma_x$
	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(\|001\rangle + \|010\rangle + \|011\rangle + \|100\rangle - \|101\rangle + \|111\rangle)$	$\frac{1}{\sqrt{6}}(x_1(\|00\rangle + \|11\rangle) + x_0(\|01\rangle + \|10\rangle))$	$\sqrt{6}\sigma_x$
	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(\|001\rangle + \|010\rangle - \|011\rangle + \|100\rangle + \|101\rangle + \|111\rangle)$	$\frac{1}{\sqrt{6}}(x_1(\|00\rangle + \|11\rangle) + x_0(\|01\rangle + \|10\rangle))$	$\sqrt{6}\sigma_x$

	$\|\Pi\rangle = \|000\rangle + \|001\rangle + \|010\rangle + \|011\rangle + \|100\rangle - \|101\rangle - \|110\rangle + \|111\rangle$	$x_1(\|00\rangle + \|11\rangle) + x_0(\|01\rangle + \|10\rangle)$	σ_x
	$\|\Pi\rangle = \|000\rangle + \|001\rangle + \|010\rangle - \|011\rangle + \|100\rangle + \|101\rangle - \|110\rangle + \|111\rangle$	$x_1(\|00\rangle + \|11\rangle) + x_0(\|01\rangle + \|10\rangle)$	σ_x
	$\|\Pi\rangle = -\|000\rangle + \|001\rangle + \|010\rangle + \|011\rangle + \|100\rangle - \|101\rangle + \|110\rangle + \|111\rangle$	$x_1(\|00\rangle + \|11\rangle) + x_0(\|01\rangle + \|10\rangle)$	σ_x
	$\|\Pi\rangle = -\|000\rangle + \|001\rangle + \|010\rangle - \|011\rangle + \|100\rangle + \|101\rangle + \|110\rangle + \|111\rangle$	$x_1(\|00\rangle + \|11\rangle) + x_0(\|01\rangle + \|10\rangle)$	σ_x

Tabel 14 Pengukuran Informasi Khusus Keadaan Terbelit 2

Keadaan Terbelit	Keadaan Alice	Keadaan Bob	Operator
$\|\varphi\rangle = \frac{1}{2}(\|001\rangle + \|010\rangle + \|100\rangle + \|111\rangle)$	$\|\Pi\rangle = \frac{1}{\sqrt{2}}(\|001\rangle + \|010\rangle)$	$\frac{1}{2\sqrt{2}}(x_0(\|00\rangle + \|11\rangle) + x_1(\|01\rangle + \|10\rangle))$	$2\sqrt{2}I$
	$\|\Pi\rangle = \frac{1}{2}(\|000\rangle + \|001\rangle + \|010\rangle - \|110\rangle)$	$\frac{1}{4}(x_0(\|00\rangle + \|11\rangle) + x_1(\|01\rangle + \|10\rangle))$	$4I$
	$\|\Pi\rangle = \frac{1}{2}(-\|000\rangle + \|001\rangle + \|010\rangle + \|110\rangle)$	$\frac{1}{4}(x_0(\|00\rangle + \|11\rangle) + x_1(\|01\rangle + \|10\rangle))$	$4I$
	$\|\Pi\rangle = \frac{1}{2}(\|001\rangle + \|010\rangle + \|011\rangle - \|101\rangle)$	$\frac{1}{4}(x_0(\|00\rangle + \|11\rangle) + x_1(\|01\rangle + \|10\rangle))$	$4I$
	$\|\Pi\rangle = \frac{1}{2}(\|001\rangle + \|010\rangle - \|011\rangle + \|101\rangle)$	$\frac{1}{4}(x_0(\|00\rangle + \|11\rangle) + x_1(\|01\rangle + \|10\rangle))$	$4I$
	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(\|000\rangle + \|001\rangle + \|010\rangle + \|011\rangle - \|101\rangle - \|110\rangle)$	$\frac{1}{2\sqrt{6}}(x_0(\|00\rangle + \|11\rangle) + x_1(\|01\rangle + \|10\rangle))$	$2\sqrt{6}I$

	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(\|000\rangle + \|001\rangle + \|010\rangle - \|011\rangle + \|101\rangle - \|110\rangle)$	$\frac{1}{2\sqrt{6}}(x_0(\|00\rangle + \|11\rangle) + x_1(\|01\rangle + \|10\rangle))$	$2\sqrt{6}I$
	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(-\|000\rangle + \|001\rangle + \|010\rangle + \|011\rangle - \|101\rangle + \|110\rangle)$	$\frac{1}{2\sqrt{6}}(x_0(\|00\rangle + \|11\rangle) + x_1(\|01\rangle + \|10\rangle))$	$2\sqrt{6}I$
	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(-\|000\rangle + \|001\rangle + \|010\rangle - \|011\rangle + \|101\rangle + \|110\rangle)$	$\frac{1}{2\sqrt{6}}(x_0(\|00\rangle + \|11\rangle) + x_1(\|01\rangle + \|10\rangle))$	$2\sqrt{6}I$
	$\|\Pi\rangle = \frac{1}{\sqrt{2}}(\|010\rangle + \|111\rangle)$	$\frac{1}{2\sqrt{2}}(x_0(\|00\rangle + \|11\rangle) + x_1(\|01\rangle + \|10\rangle))$	$2\sqrt{2}I$
	$\|\Pi\rangle = \frac{1}{2}(\|000\rangle + \|010\rangle - \|110\rangle + \|111\rangle)$	$\frac{1}{4}(x_0(\|00\rangle + \|11\rangle) + x_1(\|01\rangle + \|10\rangle))$	$4I$
	$\|\Pi\rangle = \frac{1}{2}(-\|000\rangle + \|010\rangle + \|110\rangle + \|111\rangle)$	$\frac{1}{4}(x_0(\|00\rangle + \|11\rangle) + x_1(\|01\rangle + \|10\rangle))$	$4I$
	$\|\Pi\rangle = \frac{1}{2}(\|010\rangle + \|011\rangle - \|101\rangle + \|111\rangle)$	$\frac{1}{4}(x_0(\|00\rangle + \|11\rangle) + x_1(\|01\rangle + \|10\rangle))$	$4I$
	$\|\Pi\rangle = \frac{1}{2}(\|010\rangle - \|011\rangle + \|101\rangle + \|111\rangle)$	$\frac{1}{4}(x_0(\|00\rangle + \|11\rangle) + x_1(\|01\rangle + \|10\rangle))$	$4I$
	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(\|000\rangle + \|010\rangle + \|011\rangle - \|101\rangle - \|110\rangle + \|111\rangle)$	$\frac{1}{2\sqrt{6}}(x_0(\|00\rangle + \|11\rangle) + x_1(\|01\rangle + \|10\rangle))$	$2\sqrt{6}I$
	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(\|000\rangle + \|010\rangle - \|011\rangle + \|101\rangle - \|110\rangle + \|111\rangle)$	$\frac{1}{2\sqrt{6}}(x_0(\|00\rangle + \|11\rangle) + x_1(\|01\rangle + \|10\rangle))$	$2\sqrt{6}I$
	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(-\|000\rangle + \|010\rangle + \|011\rangle - \|101\rangle + \|110\rangle + \|111\rangle)$	$\frac{1}{2\sqrt{6}}(x_0(\|00\rangle + \|11\rangle) + x_1(\|01\rangle + \|10\rangle))$	$2\sqrt{6}I$

	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(-\|000\rangle + \|010\rangle - \|011\rangle + \|101\rangle + \|110\rangle + \|111\rangle)$	$\frac{1}{2\sqrt{6}}(x_0(\|00\rangle + \|11\rangle) + x_1(\|01\rangle + \|10\rangle))$	$2\sqrt{6}I$
	$\|\Pi\rangle = \frac{1}{\sqrt{2}}(\|001\rangle + \|100\rangle)$	$\frac{1}{2\sqrt{2}}(x_0(\|00\rangle + \|11\rangle) + x_1(\|01\rangle + \|10\rangle))$	$2\sqrt{2}I$
	$\|\Pi\rangle = \frac{1}{2}(\|000\rangle + \|001\rangle + \|100\rangle - \|110\rangle)$	$\frac{1}{4}(x_0(\|00\rangle + \|11\rangle) + x_1(\|01\rangle + \|10\rangle))$	$4I$
	$\|\Pi\rangle = \frac{1}{2}(-\|000\rangle + \|001\rangle + \|100\rangle + \|110\rangle)$	$\frac{1}{4}(x_0(\|00\rangle + \|11\rangle) + x_1(\|01\rangle + \|10\rangle))$	$4I$
	$\|\Pi\rangle = \frac{1}{2}(\|001\rangle + \|011\rangle + \|100\rangle - \|101\rangle)$	$\frac{1}{4}(x_0(\|00\rangle + \|11\rangle) + x_1(\|01\rangle + \|10\rangle))$	$4I$
	$\|\Pi\rangle = \frac{1}{2}(\|001\rangle - \|011\rangle + \|100\rangle + \|101\rangle)$	$\frac{1}{4}(x_0(\|00\rangle + \|11\rangle) + x_1(\|01\rangle + \|10\rangle))$	$4I$
	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(\|000\rangle + \|001\rangle + \|011\rangle + \|100\rangle - \|101\rangle - \|110\rangle)$	$\frac{1}{2\sqrt{6}}(x_0(\|00\rangle + \|11\rangle) + x_1(\|01\rangle + \|10\rangle))$	$2\sqrt{6}I$
	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(\|000\rangle + \|001\rangle - \|011\rangle + \|100\rangle + \|101\rangle - \|110\rangle)$	$\frac{1}{2\sqrt{6}}(x_0(\|00\rangle + \|11\rangle) + x_1(\|01\rangle + \|10\rangle))$	$2\sqrt{6}I$
	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(-\|000\rangle + \|001\rangle + \|011\rangle + \|100\rangle - \|101\rangle + \|110\rangle)$	$\frac{1}{2\sqrt{6}}(x_0(\|00\rangle + \|11\rangle) + x_1(\|01\rangle + \|10\rangle))$	$2\sqrt{6}I$
	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(-\|000\rangle + \|001\rangle - \|011\rangle + \|100\rangle + \|101\rangle + \|110\rangle)$	$\frac{1}{2\sqrt{6}}(x_0(\|00\rangle + \|11\rangle) + x_1(\|01\rangle + \|10\rangle))$	$2\sqrt{6}I$
	$\|\Pi\rangle = \frac{1}{\sqrt{2}}(\|100\rangle + \|111\rangle)$	$\frac{1}{2\sqrt{2}}(x_0(\|00\rangle + \|11\rangle) + x_1(\|01\rangle + \|10\rangle))$	$2\sqrt{2}I$

	$\|\Pi\rangle = \frac{1}{2}(\|000\rangle + \|100\rangle - \|110\rangle + \|111\rangle)$	$\frac{1}{4}(x_0(\|00\rangle + \|11\rangle) + x_1(\|01\rangle + \|10\rangle))$	$4I$
	$\|\Pi\rangle = \frac{1}{2}(-\|000\rangle + \|100\rangle + \|110\rangle + \|111\rangle)$	$\frac{1}{4}(x_0(\|00\rangle + \|11\rangle) + x_1(\|01\rangle + \|10\rangle))$	$4I$
	$\|\Pi\rangle = \frac{1}{2}(\|011\rangle + \|100\rangle - \|101\rangle + \|111\rangle)$	$\frac{1}{4}(x_0(\|00\rangle + \|11\rangle) + x_1(\|01\rangle + \|10\rangle))$	$4I$
	$\|\Pi\rangle = \frac{1}{2}(-\|011\rangle + \|100\rangle + \|101\rangle + \|111\rangle)$	$\frac{1}{4}(x_0(\|00\rangle + \|11\rangle) + x_1(\|01\rangle + \|10\rangle))$	$4I$
	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(\|000\rangle + \|011\rangle + \|100\rangle - \|101\rangle - \|110\rangle + \|111\rangle)$	$\frac{1}{2\sqrt{6}}(x_0(\|00\rangle + \|11\rangle) + x_1(\|01\rangle + \|10\rangle))$	$2\sqrt{6}I$
	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(\|000\rangle - \|011\rangle + \|100\rangle + \|101\rangle - \|110\rangle + \|111\rangle)$	$\frac{1}{2\sqrt{6}}(x_0(\|00\rangle + \|11\rangle) + x_1(\|01\rangle + \|10\rangle))$	$2\sqrt{6}I$
	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(-\|000\rangle - \|011\rangle + \|100\rangle - \|101\rangle + \|110\rangle + \|111\rangle)$	$\frac{1}{2\sqrt{6}}(x_0(\|00\rangle + \|11\rangle) + x_1(\|01\rangle + \|10\rangle))$	$2\sqrt{6}I$
	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(-\|000\rangle - \|011\rangle + \|100\rangle + \|101\rangle + \|110\rangle + \|111\rangle)$	$\frac{1}{2\sqrt{6}}(x_0(\|00\rangle + \|11\rangle) + x_1(\|01\rangle + \|10\rangle))$	$2\sqrt{6}I$
	$\|\Pi\rangle = \frac{1}{2}(\|001\rangle + \|010\rangle + \|100\rangle + \|111\rangle)$	$\frac{1}{4}(x_0(\|00\rangle + \|11\rangle) + x_1(\|01\rangle + \|10\rangle))$	$4I$
	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(\|000\rangle + \|001\rangle + \|010\rangle + \|100\rangle - \|110\rangle + \|111\rangle)$	$\frac{1}{\sqrt{6}}(x_0(\|00\rangle + \|11\rangle) + x_1(\|01\rangle + \|10\rangle))$	$\sqrt{6}I$
	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(-\|000\rangle + \|001\rangle + \|010\rangle + \|100\rangle + \|110\rangle + \|111\rangle)$	$\frac{1}{\sqrt{6}}(x_0(\|00\rangle + \|11\rangle) + x_1(\|01\rangle + \|10\rangle))$	$\sqrt{6}I$
	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(\|001\rangle + \|010\rangle + \|011\rangle + \|100\rangle - \|101\rangle + \|111\rangle)$	$\frac{1}{\sqrt{6}}(x_0(\|00\rangle + \|11\rangle) + x_1(\|01\rangle + \|10\rangle))$	$\sqrt{6}I$

	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(\|001\rangle + \|010\rangle - \|011\rangle + \|100\rangle + \|101\rangle + \|111\rangle)$	$\frac{1}{\sqrt{6}}(x_0(\|00\rangle + \|11\rangle) + x_1(\|01\rangle + \|10\rangle))$	$\sqrt{6}I$
	$\|\Pi\rangle = \|000\rangle + \|001\rangle + \|010\rangle + \|011\rangle + \|100\rangle - \|101\rangle - \|110\rangle + \|111\rangle$	$x_0(\|00\rangle + \|11\rangle) + x_1(\|01\rangle + \|10\rangle)$	I
	$\|\Pi\rangle = \|000\rangle + \|001\rangle + \|010\rangle - \|011\rangle + \|100\rangle + \|101\rangle - \|110\rangle + \|111\rangle$	$x_0(\|00\rangle + \|11\rangle) + x_1(\|01\rangle + \|10\rangle)$	I
	$\|\Pi\rangle = -\|000\rangle + \|001\rangle + \|010\rangle + \|011\rangle + \|100\rangle - \|101\rangle + \|110\rangle + \|111\rangle$	$x_0(\|00\rangle + \|11\rangle) + x_1(\|01\rangle + \|10\rangle)$	I
	$\|\Pi\rangle = -\|000\rangle + \|001\rangle + \|010\rangle - \|011\rangle + \|100\rangle + \|101\rangle + \|110\rangle + \|111\rangle$	$x_0(\|00\rangle + \|11\rangle) + x_1(\|01\rangle + \|10\rangle)$	I
	$\|\Pi\rangle = \frac{1}{\sqrt{2}}(\|000\rangle + \|011\rangle)$	$\frac{1}{2\sqrt{2}}(x_1(\|00\rangle + \|11\rangle) + x_0(\|01\rangle + \|10\rangle))$	$2\sqrt{2}\sigma_x$
	$\|\Pi\rangle = \frac{1}{2}(\|000\rangle + \|010\rangle + \|011\rangle - \|100\rangle)$	$\frac{1}{4}(x_1(\|00\rangle + \|11\rangle) + x_0(\|01\rangle + \|10\rangle))$	$4\sigma_x$
	$\|\Pi\rangle = \frac{1}{2}(\|000\rangle - \|010\rangle + \|011\rangle + \|100\rangle)$	$\frac{1}{4}(x_1(\|00\rangle + \|11\rangle) + x_0(\|01\rangle + \|10\rangle))$	$4\sigma_x$
	$\|\Pi\rangle = \frac{1}{2}(\|000\rangle + \|001\rangle + \|011\rangle - \|111\rangle)$	$\frac{1}{4}(x_1(\|00\rangle + \|11\rangle) + x_0(\|01\rangle + \|10\rangle))$	$4\sigma_x$
	$\|\Pi\rangle = \frac{1}{2}(\|000\rangle - \|001\rangle + \|011\rangle + \|111\rangle)$	$\frac{1}{4}(x_1(\|00\rangle + \|11\rangle) + x_0(\|01\rangle + \|10\rangle))$	$4\sigma_x$
	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(\|000\rangle + \|001\rangle + \|010\rangle + \|011\rangle - \|100\rangle - \|111\rangle)$	$\frac{1}{2\sqrt{6}}(x_1(\|00\rangle + \|11\rangle) + x_0(\|01\rangle + \|10\rangle))$	$2\sqrt{6}\sigma_x$
	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(\|000\rangle - \|001\rangle + \|010\rangle - \|011\rangle + \|100\rangle + \|111\rangle)$	$\frac{1}{2\sqrt{6}}(x_1(\|00\rangle + \|11\rangle) + x_0(\|01\rangle + \|10\rangle))$	$2\sqrt{6}\sigma_x$
	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(\|000\rangle + \|001\rangle - \|010\rangle + \|011\rangle + \|100\rangle - \|111\rangle)$	$\frac{1}{2\sqrt{6}}(x_1(\|00\rangle + \|11\rangle) + x_0(\|01\rangle + \|10\rangle))$	$2\sqrt{6}\sigma_x$

	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(\|000\rangle - \|001\rangle - \|010\rangle + \|011\rangle + \|100\rangle + \|111\rangle)$	$\frac{1}{2\sqrt{6}}(x_1(\|00\rangle + \|11\rangle) + x_0(\|01\rangle + \|10\rangle))$	$2\sqrt{6}\sigma_x$
	$\|\Pi\rangle = \frac{1}{\sqrt{2}}(\|101\rangle + \|110\rangle)$	$\frac{1}{2\sqrt{2}}(x_1(\|00\rangle + \|11\rangle) + x_0(\|01\rangle + \|10\rangle))$	$2\sqrt{2}\sigma_x$
	$\|\Pi\rangle = \frac{1}{2}(\|010\rangle - \|100\rangle + \|101\rangle + \|110\rangle)$	$\frac{1}{4}(x_1(\|00\rangle + \|11\rangle) + x_0(\|01\rangle + \|10\rangle))$	$4\sigma_x$
	$\|\Pi\rangle = \frac{1}{2}(-\|010\rangle + \|100\rangle + \|101\rangle + \|110\rangle)$	$\frac{1}{4}(x_1(\|00\rangle + \|11\rangle) + x_0(\|01\rangle + \|10\rangle))$	$4\sigma_x$
	$\|\Pi\rangle = \frac{1}{2}(\|001\rangle + \|101\rangle + \|110\rangle - \|111\rangle)$	$\frac{1}{4}(x_1(\|00\rangle + \|11\rangle) + x_0(\|01\rangle + \|10\rangle))$	$4\sigma_x$
	$\|\Pi\rangle = \frac{1}{2}(-\|001\rangle + \|101\rangle + \|110\rangle + \|111\rangle)$	$\frac{1}{4}(x_1(\|00\rangle + \|11\rangle) + x_0(\|01\rangle + \|10\rangle))$	$4\sigma_x$
	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(\|001\rangle + \|010\rangle - \|100\rangle + \|101\rangle + \|110\rangle - \|111\rangle)$	$\frac{1}{2\sqrt{6}}(x_1(\|00\rangle + \|11\rangle) + x_0(\|01\rangle + \|10\rangle))$	$2\sqrt{6}\sigma_x$
	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(-\|001\rangle + \|010\rangle + \|100\rangle - \|101\rangle + \|110\rangle + \|111\rangle)$	$\frac{1}{2\sqrt{6}}(x_1(\|00\rangle + \|11\rangle) + x_0(\|01\rangle + \|10\rangle))$	$2\sqrt{6}\sigma_x$
	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(\|001\rangle - \|010\rangle + \|100\rangle + \|101\rangle + \|110\rangle - \|111\rangle)$	$\frac{1}{2\sqrt{6}}(x_1(\|00\rangle + \|11\rangle) + x_0(\|01\rangle + \|10\rangle))$	$2\sqrt{6}\sigma_x$
	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(-\|001\rangle - \|010\rangle + \|100\rangle + \|101\rangle + \|110\rangle + \|111\rangle)$	$\frac{1}{2\sqrt{6}}(x_1(\|00\rangle + \|11\rangle) + x_0(\|01\rangle + \|10\rangle))$	$2\sqrt{6}\sigma_x$
	$\|\Pi\rangle = \frac{1}{\sqrt{2}}(\|000\rangle + \|101\rangle)$	$\frac{1}{2\sqrt{2}}(x_1(\|00\rangle + \|11\rangle) + x_0(\|01\rangle + \|10\rangle))$	$2\sqrt{2}\sigma_x$
	$\|\Pi\rangle = \frac{1}{2}(\|000\rangle + \|010\rangle - \|100\rangle + \|101\rangle)$	$\frac{1}{4}(x_1(\|00\rangle + \|11\rangle) + x_0(\|01\rangle + \|10\rangle))$	$4\sigma_x$

	$\|\Pi\rangle = \frac{1}{2}(\|000\rangle - \|010\rangle + \|100\rangle + \|101\rangle)$	$\frac{1}{4}(x_1(\|00\rangle + \|11\rangle) + x_0(\|01\rangle + \|10\rangle))$	$4\sigma_x$
	$\|\Pi\rangle = \frac{1}{2}(\|000\rangle + \|001\rangle + \|101\rangle - \|111\rangle)$	$\frac{1}{4}(x_1(\|00\rangle + \|11\rangle) + x_0(\|01\rangle + \|10\rangle))$	$4\sigma_x$
	$\|\Pi\rangle = \frac{1}{2}(\|000\rangle - \|001\rangle + \|101\rangle + \|111\rangle)$	$\frac{1}{4}(x_1(\|00\rangle + \|11\rangle) + x_0(\|01\rangle + \|10\rangle))$	$4\sigma_x$
	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(\|000\rangle + \|001\rangle + \|010\rangle - \|100\rangle + \|101\rangle - \|111\rangle)$	$\frac{1}{2\sqrt{6}}(x_1(\|00\rangle + \|11\rangle) + x_0(\|01\rangle + \|10\rangle))$	$2\sqrt{6}\sigma_x$
	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(\|000\rangle - \|001\rangle + \|010\rangle - \|100\rangle + \|101\rangle + \|111\rangle)$	$\frac{1}{2\sqrt{6}}(x_1(\|00\rangle + \|11\rangle) + x_0(\|01\rangle + \|10\rangle))$	$2\sqrt{6}\sigma_x$
	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(\|000\rangle + \|001\rangle - \|010\rangle + \|100\rangle + \|101\rangle - \|111\rangle)$	$\frac{1}{2\sqrt{6}}(x_1(\|00\rangle + \|11\rangle) + x_0(\|01\rangle + \|10\rangle))$	$2\sqrt{6}\sigma_x$
	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(\|000\rangle - \|001\rangle - \|010\rangle + \|100\rangle + \|101\rangle + \|111\rangle)$	$\frac{1}{2\sqrt{6}}(x_1(\|00\rangle + \|11\rangle) + x_0(\|01\rangle + \|10\rangle))$	$2\sqrt{6}\sigma_x$
	$\|\Pi\rangle = \frac{1}{\sqrt{2}}(\|011\rangle + \|110\rangle)$	$\frac{1}{2\sqrt{2}}(x_1(\|00\rangle + \|11\rangle) + x_0(\|01\rangle + \|10\rangle))$	$2\sqrt{2}\sigma_x$
	$\|\Pi\rangle = \frac{1}{2}(\|010\rangle + \|011\rangle - \|100\rangle + \|110\rangle)$	$\frac{1}{4}(x_1(\|00\rangle + \|11\rangle) + x_0(\|01\rangle + \|10\rangle))$	$4\sigma_x$
	$\|\Pi\rangle = \frac{1}{2}(-\|010\rangle + \|011\rangle + \|100\rangle + \|110\rangle)$	$\frac{1}{4}(x_1(\|00\rangle + \|11\rangle) + x_0(\|01\rangle + \|10\rangle))$	$4\sigma_x$
	$\|\Pi\rangle = \frac{1}{2}(\|001\rangle + \|011\rangle + \|110\rangle - \|111\rangle)$	$\frac{1}{4}(x_1(\|00\rangle + \|11\rangle) + x_0(\|01\rangle + \|10\rangle))$	$4\sigma_x$
	$\|\Pi\rangle = \frac{1}{2}(-\|001\rangle + \|011\rangle + \|110\rangle + \|111\rangle)$	$\frac{1}{4}(x_1(\|00\rangle + \|11\rangle) + x_0(\|01\rangle + \|10\rangle))$	$4\sigma_x$

	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(\|001\rangle + \|010\rangle + \|011\rangle - \|100\rangle + \|110\rangle - \|111\rangle)$	$\frac{1}{2\sqrt{6}}(x_1(\|00\rangle + \|11\rangle) + x_0(\|01\rangle + \|10\rangle))$	$2\sqrt{6}\sigma_x$
	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(-\|001\rangle + \|010\rangle + \|011\rangle - \|100\rangle + \|110\rangle + \|111\rangle)$	$\frac{1}{2\sqrt{6}}(x_1(\|00\rangle + \|11\rangle) + x_0(\|01\rangle + \|10\rangle))$	$2\sqrt{6}\sigma_x$
	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(\|001\rangle - \|010\rangle + \|011\rangle + \|100\rangle + \|110\rangle - \|111\rangle)$	$\frac{1}{2\sqrt{6}}(x_1(\|00\rangle + \|11\rangle) + x_0(\|01\rangle + \|10\rangle))$	$2\sqrt{6}\sigma_x$
	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(-\|001\rangle - \|010\rangle + \|011\rangle + \|100\rangle + \|110\rangle + \|111\rangle)$	$\frac{1}{2\sqrt{6}}(x_1(\|00\rangle + \|11\rangle) + x_0(\|01\rangle + \|10\rangle))$	$2\sqrt{6}\sigma_x$
	$\|\Pi\rangle = \frac{1}{2}(\|000\rangle + \|011\rangle + \|101\rangle + \|110\rangle)$	$\frac{1}{2}(x_1(\|00\rangle + \|11\rangle) + x_0(\|01\rangle + \|10\rangle))$	$2\sigma_x$
	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(\|000\rangle + \|010\rangle + \|011\rangle - \|100\rangle + \|101\rangle + \|110\rangle)$	$\frac{1}{\sqrt{6}}(x_1(\|00\rangle + \|11\rangle) + x_0(\|01\rangle + \|10\rangle))$	$\sqrt{6}\sigma_x$
	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(\|000\rangle - \|010\rangle + \|011\rangle + \|100\rangle + \|101\rangle + \|110\rangle)$	$\frac{1}{\sqrt{6}}(x_1(\|00\rangle + \|11\rangle) + x_0(\|01\rangle + \|10\rangle))$	$\sqrt{6}\sigma_x$
	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(\|000\rangle + \|001\rangle + \|011\rangle + \|101\rangle + \|110\rangle - \|111\rangle)$	$\frac{1}{\sqrt{6}}(x_1(\|00\rangle + \|11\rangle) + x_0(\|01\rangle + \|10\rangle))$	$\sqrt{6}\sigma_x$
	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(\|000\rangle - \|001\rangle + \|011\rangle + \|101\rangle + \|110\rangle + \|111\rangle)$	$\frac{1}{\sqrt{6}}(x_1(\|00\rangle + \|11\rangle) + x_0(\|01\rangle + \|10\rangle))$	$\sqrt{6}\sigma_x$
	$\|\Pi\rangle = \|000\rangle + \|001\rangle + \|010\rangle + \|011\rangle - \|100\rangle + \|101\rangle + \|110\rangle - \|111\rangle$	$x_1(\|00\rangle + \|11\rangle) + x_0(\|01\rangle + \|10\rangle)$	σ_x
	$\|\Pi\rangle = \|000\rangle - \|001\rangle + \|010\rangle + \|011\rangle - \|100\rangle + \|101\rangle + \|110\rangle + \|111\rangle$	$x_1(\|00\rangle + \|11\rangle) + x_0(\|01\rangle + \|10\rangle)$	σ_x
	$\|\Pi\rangle = \|000\rangle + \|001\rangle - \|010\rangle + \|011\rangle + \|100\rangle + \|101\rangle + \|110\rangle - \|111\rangle$	$x_1(\|00\rangle + \|11\rangle) + x_0(\|01\rangle + \|10\rangle)$	σ_x
	$\|\Pi\rangle = \|000\rangle - \|001\rangle - \|010\rangle + \|011\rangle + \|100\rangle + \|101\rangle + \|110\rangle + \|111\rangle$	$x_1(\|00\rangle + \|11\rangle) + x_0(\|01\rangle + \|10\rangle)$	σ_x

Tabel 15 Pengukuran Informasi Khusus Keaadaan Terbelit 3

Keadaan Terbelit	Keadaan Alice	Keadaan Bob	Operator
$\|\varphi\rangle = \frac{1}{2}(\|000\rangle - \|011\rangle + \|101\rangle - \|110\rangle)$	$\|\Pi\rangle = \frac{1}{\sqrt{2}}(\|000\rangle + \|011\rangle)$	$\frac{1}{2\sqrt{2}}(x_0(\|00\rangle - \|11\rangle) + x_1(\|01\rangle - \|10\rangle))$	$2\sqrt{2}\sigma_z \otimes I$
	$\|\Pi\rangle = \frac{1}{2}(\|000\rangle + \|010\rangle + \|011\rangle - \|100\rangle)$	$\frac{1}{4}(x_0(\|00\rangle - \|11\rangle) + x_1(\|01\rangle - \|10\rangle))$	$4\sigma_z \otimes I$
	$\|\Pi\rangle = \frac{1}{2}(\|000\rangle - \|010\rangle + \|011\rangle + \|100\rangle)$	$\frac{1}{4}(x_0(\|00\rangle - \|11\rangle) + x_1(\|01\rangle - \|10\rangle))$	$4\sigma_z \otimes I$
	$\|\Pi\rangle = \frac{1}{2}(\|000\rangle + \|001\rangle + \|011\rangle - \|111\rangle)$	$\frac{1}{4}(x_0(\|00\rangle - \|11\rangle) + x_1(\|01\rangle - \|10\rangle))$	$4\sigma_z \otimes I$
	$\|\Pi\rangle = \frac{1}{2}(\|000\rangle - \|001\rangle + \|011\rangle + \|111\rangle)$	$\frac{1}{4}(x_0(\|00\rangle - \|11\rangle) + x_1(\|01\rangle - \|10\rangle))$	$4\sigma_z \otimes I$
	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(\|000\rangle + \|001\rangle + \|010\rangle + \|011\rangle - \|100\rangle - \|111\rangle)$	$\frac{1}{2\sqrt{6}}(x_0(\|00\rangle - \|11\rangle) + x_1(\|01\rangle - \|10\rangle))$	$2\sqrt{6}\sigma_z \otimes I$
	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(\|000\rangle - \|001\rangle + \|010\rangle - \|011\rangle + \|100\rangle + \|111\rangle)$	$\frac{1}{2\sqrt{6}}(x_0(\|00\rangle - \|11\rangle) + x_1(\|01\rangle - \|10\rangle))$	$2\sqrt{6}\sigma_z \otimes I$
	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(\|000\rangle + \|001\rangle - \|010\rangle + \|011\rangle + \|100\rangle - \|111\rangle)$	$\frac{1}{2\sqrt{6}}(x_0(\|00\rangle - \|11\rangle) + x_1(\|01\rangle - \|10\rangle))$	$2\sqrt{6}\sigma_z \otimes I$
	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(\|000\rangle - \|001\rangle - \|010\rangle + \|011\rangle + \|100\rangle + \|111\rangle)$	$\frac{1}{2\sqrt{6}}(x_0(\|00\rangle - \|11\rangle) + x_1(\|01\rangle - \|10\rangle))$	$2\sqrt{6}\sigma_z \otimes I$

	$\|\Pi\rangle = \frac{1}{\sqrt{2}}(\|101\rangle + \|110\rangle)$	$\frac{1}{2\sqrt{6}}(x_0(\|00\rangle - \|11\rangle) + x_1(\|01\rangle - \|10\rangle))$	$2\sqrt{6}\sigma_z \otimes I$
	$\|\Pi\rangle = \frac{1}{2}(\|010\rangle - \|100\rangle + \|101\rangle + \|110\rangle)$	$\frac{1}{4}(x_0(\|00\rangle - \|11\rangle) + x_1(\|01\rangle - \|10\rangle))$	$4\sigma_z \otimes I$
	$\|\Pi\rangle = \frac{1}{2}(-\|010\rangle + \|100\rangle + \|101\rangle + \|110\rangle)$	$\frac{1}{4}(x_0(\|00\rangle - \|11\rangle) + x_1(\|01\rangle - \|10\rangle))$	$4\sigma_z \otimes I$
	$\|\Pi\rangle = \frac{1}{2}(\|001\rangle + \|101\rangle + \|110\rangle - \|111\rangle)$	$\frac{1}{4}(x_0(\|00\rangle - \|11\rangle) + x_1(\|01\rangle - \|10\rangle))$	$4\sigma_z \otimes I$
	$\|\Pi\rangle = \frac{1}{2}(-\|001\rangle + \|101\rangle + \|110\rangle + \|111\rangle)$	$\frac{1}{4}(x_0(\|00\rangle - \|11\rangle) + x_1(\|01\rangle - \|10\rangle))$	$4\sigma_z \otimes I$
	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(\|001\rangle + \|010\rangle - \|100\rangle + \|101\rangle + \|110\rangle - \|111\rangle)$	$\frac{1}{2\sqrt{6}}(x_0(\|00\rangle - \|11\rangle) + x_1(\|01\rangle - \|10\rangle))$	$2\sqrt{6}\sigma_z \otimes I$
	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(-\|001\rangle + \|010\rangle + \|100\rangle - \|101\rangle + \|110\rangle + \|111\rangle)$	$\frac{1}{2\sqrt{6}}(x_0(\|00\rangle - \|11\rangle) + x_1(\|01\rangle - \|10\rangle))$	$2\sqrt{6}\sigma_z \otimes I$
	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(\|001\rangle - \|010\rangle + \|100\rangle + \|101\rangle + \|110\rangle - \|111\rangle)$	$\frac{1}{2\sqrt{6}}(x_0(\|00\rangle - \|11\rangle) + x_1(\|01\rangle - \|10\rangle))$	$2\sqrt{6}\sigma_z \otimes I$
	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(-\|001\rangle - \|010\rangle + \|100\rangle + \|101\rangle + \|110\rangle + \|111\rangle)$	$\frac{1}{2\sqrt{6}}(x_0(\|00\rangle - \|11\rangle) + x_1(\|01\rangle - \|10\rangle))$	$2\sqrt{6}\sigma_z \otimes I$
	$\|\Pi\rangle = \frac{1}{\sqrt{2}}(\|000\rangle + \|101\rangle)$	$\frac{1}{2\sqrt{2}}(x_0(\|00\rangle - \|11\rangle) + x_1(\|01\rangle - \|10\rangle))$	$2\sqrt{2}\sigma_z \otimes I$
	$\|\Pi\rangle = \frac{1}{2}(\|000\rangle + \|010\rangle - \|100\rangle + \|101\rangle)$	$\frac{1}{4}(x_0(\|00\rangle - \|11\rangle) + x_1(\|01\rangle - \|10\rangle))$	$4\sigma_z \otimes I$

	$\|\Pi\rangle = \frac{1}{2}(\|000\rangle - \|010\rangle + \|100\rangle + \|101\rangle)$	$\frac{1}{4}(x_0(\|00\rangle - \|11\rangle) + x_1(\|01\rangle - \|10\rangle))$	$4\sigma_z \otimes I$
	$\|\Pi\rangle = \frac{1}{2}(\|000\rangle + \|001\rangle + \|101\rangle - \|111\rangle)$	$\frac{1}{4}(x_0(\|00\rangle - \|11\rangle) + x_1(\|01\rangle - \|10\rangle))$	$4\sigma_z \otimes I$
	$\|\Pi\rangle = \frac{1}{2}(\|000\rangle - \|001\rangle + \|101\rangle + \|111\rangle)$	$\frac{1}{4}(x_0(\|00\rangle - \|11\rangle) + x_1(\|01\rangle - \|10\rangle))$	$4\sigma_z \otimes I$
	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(\|000\rangle + \|001\rangle + \|010\rangle - \|100\rangle + \|101\rangle - \|111\rangle)$	$\frac{1}{2\sqrt{6}}(x_0(\|00\rangle - \|11\rangle) + x_1(\|01\rangle - \|10\rangle))$	$2\sqrt{6}\sigma_z \otimes I$
	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(\|000\rangle - \|001\rangle + \|010\rangle - \|100\rangle + \|101\rangle + \|111\rangle)$	$\frac{1}{2\sqrt{6}}(x_0(\|00\rangle - \|11\rangle) + x_1(\|01\rangle - \|10\rangle))$	$2\sqrt{6}\sigma_z \otimes I$
	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(\|000\rangle + \|001\rangle - \|010\rangle + \|100\rangle + \|101\rangle - \|111\rangle)$	$\frac{1}{2\sqrt{6}}(x_0(\|00\rangle - \|11\rangle) + x_1(\|01\rangle - \|10\rangle))$	$2\sqrt{6}\sigma_z \otimes I$
	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(\|000\rangle - \|001\rangle - \|010\rangle + \|100\rangle + \|101\rangle + \|111\rangle)$	$\frac{1}{2\sqrt{6}}(x_0(\|00\rangle - \|11\rangle) + x_1(\|01\rangle - \|10\rangle))$	$2\sqrt{6}\sigma_z \otimes I$
	$\|\Pi\rangle = \frac{1}{\sqrt{2}}(\|011\rangle + \|110\rangle)$	$\frac{1}{2\sqrt{2}}(x_0(\|00\rangle - \|11\rangle) + x_1(\|01\rangle - \|10\rangle))$	$2\sqrt{2}\sigma_z \otimes I$
	$\|\Pi\rangle = \frac{1}{2}(\|010\rangle + \|011\rangle - \|100\rangle + \|110\rangle)$	$\frac{1}{4}(x_0(\|00\rangle - \|11\rangle) + x_1(\|01\rangle - \|10\rangle))$	$4\sigma_z \otimes I$
	$\|\Pi\rangle = \frac{1}{2}(-\|010\rangle + \|011\rangle + \|100\rangle + \|110\rangle)$	$\frac{1}{4}(x_0(\|00\rangle - \|11\rangle) + x_1(\|01\rangle - \|10\rangle))$	$4\sigma_z \otimes I$

	$\|\Pi\rangle = \frac{1}{2}(\|001\rangle + \|011\rangle + \|110\rangle - \|111\rangle)$	$\frac{1}{4}(x_0(\|00\rangle - \|11\rangle) + x_1(\|01\rangle - \|10\rangle))$	$4\sigma_z \otimes I$
	$\|\Pi\rangle = \frac{1}{2}(-\|001\rangle + \|011\rangle + \|110\rangle + \|111\rangle)$	$\frac{1}{4}(x_0(\|00\rangle - \|11\rangle) + x_1(\|01\rangle - \|10\rangle))$	$4\sigma_z \otimes I$
	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(\|001\rangle + \|010\rangle + \|011\rangle - \|100\rangle + \|110\rangle - \|111\rangle)$	$\frac{1}{2\sqrt{6}}(x_0(\|00\rangle - \|11\rangle) + x_1(\|01\rangle - \|10\rangle))$	$2\sqrt{6}\sigma_z \otimes I$
	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(-\|001\rangle + \|010\rangle + \|011\rangle - \|100\rangle + \|110\rangle + \|111\rangle)$	$\frac{1}{2\sqrt{6}}(x_0(\|00\rangle - \|11\rangle) + x_1(\|01\rangle - \|10\rangle))$	$2\sqrt{6}\sigma_z \otimes I$
	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(\|001\rangle - \|010\rangle + \|011\rangle + \|100\rangle + \|110\rangle - \|111\rangle)$	$\frac{1}{2\sqrt{6}}(x_0(\|00\rangle - \|11\rangle) + x_1(\|01\rangle - \|10\rangle))$	$2\sqrt{6}\sigma_z \otimes I$
	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(-\|001\rangle - \|010\rangle + \|011\rangle + \|100\rangle + \|110\rangle + \|111\rangle)$	$\frac{1}{2\sqrt{6}}(x_0(\|00\rangle - \|11\rangle) + x_1(\|01\rangle - \|10\rangle))$	$2\sqrt{6}\sigma_z \otimes I$
	$\|\Pi\rangle = \frac{1}{2}(\|000\rangle + \|011\rangle + \|101\rangle + \|110\rangle)$	$\frac{1}{2}(x_0(\|00\rangle - \|11\rangle) + x_1(\|01\rangle - \|10\rangle))$	$2\sigma_z \otimes I$
	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(\|000\rangle + \|010\rangle + \|011\rangle - \|100\rangle + \|101\rangle + \|110\rangle)$	$\frac{1}{\sqrt{6}}(x_0(\|00\rangle - \|11\rangle) + x_1(\|01\rangle - \|10\rangle))$	$\sqrt{6}\sigma_z \otimes I$
	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(\|000\rangle - \|010\rangle + \|011\rangle + \|100\rangle + \|101\rangle + \|110\rangle)$	$\frac{1}{\sqrt{6}}(x_0(\|00\rangle - \|11\rangle) + x_1(\|01\rangle - \|10\rangle))$	$\sqrt{6}\sigma_z \otimes I$
	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(\|000\rangle + \|001\rangle + \|011\rangle + \|101\rangle + \|110\rangle - \|111\rangle)$	$\frac{1}{\sqrt{6}}(x_0(\|00\rangle - \|11\rangle) + x_1(\|01\rangle - \|10\rangle))$	$\sqrt{6}\sigma_z \otimes I$

	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(\|000\rangle - \|001\rangle + \|011\rangle + \|101\rangle + \|110\rangle + \|111\rangle)$	$\frac{1}{\sqrt{6}}(x_0(\|00\rangle - \|11\rangle) + x_1(\|01\rangle - \|10\rangle))$	$\sqrt{6}\sigma_z \otimes I$
	$\|\Pi\rangle = \|000\rangle + \|001\rangle + \|010\rangle + \|011\rangle - \|100\rangle + \|101\rangle + \|110\rangle - \|111\rangle$	$x_0(\|00\rangle - \|11\rangle) + x_1(\|01\rangle - \|10\rangle)$	$\sigma_z \otimes I$
	$\|\Pi\rangle = \|000\rangle - \|001\rangle + \|010\rangle + \|011\rangle - \|100\rangle + \|101\rangle + \|110\rangle + \|111\rangle$	$x_0(\|00\rangle - \|11\rangle) + x_1(\|01\rangle - \|10\rangle)$	$\sigma_z \otimes I$
	$\|\Pi\rangle = \|000\rangle + \|001\rangle - \|010\rangle + \|011\rangle + \|100\rangle + \|101\rangle + \|110\rangle - \|111\rangle$	$x_0(\|00\rangle - \|11\rangle) + x_1(\|01\rangle - \|10\rangle)$	$\sigma_z \otimes I$
	$\|\Pi\rangle = \|000\rangle - \|001\rangle - \|010\rangle + \|011\rangle + \|100\rangle + \|101\rangle + \|110\rangle + \|111\rangle$	$x_0(\|00\rangle - \|11\rangle) + x_1(\|01\rangle - \|10\rangle)$	$\sigma_z \otimes I$
	$\|\Pi\rangle = \frac{1}{\sqrt{2}}(\|001\rangle + \|010\rangle)$	$\frac{1}{2\sqrt{2}}(x_1(\|00\rangle - \|11\rangle) + x_0(\|01\rangle - \|10\rangle))$	$2\sqrt{2}\sigma_z \otimes \sigma_x$
	$\|\Pi\rangle = \frac{1}{2}(\|000\rangle + \|001\rangle + \|010\rangle - \|110\rangle)$	$\frac{1}{4}(x_1(\|00\rangle - \|11\rangle) + x_0(\|01\rangle - \|10\rangle))$	$4\sigma_z \otimes \sigma_x$
	$\|\Pi\rangle = \frac{1}{2}(-\|000\rangle + \|001\rangle + \|010\rangle + \|110\rangle)$	$\frac{1}{4}(x_1(\|00\rangle - \|11\rangle) + x_0(\|01\rangle - \|10\rangle))$	$4\sigma_z \otimes \sigma_x$
	$\|\Pi\rangle = \frac{1}{2}(\|001\rangle + \|010\rangle + \|011\rangle - \|101\rangle)$	$\frac{1}{4}(x_1(\|00\rangle - \|11\rangle) + x_0(\|01\rangle - \|10\rangle))$	$4\sigma_z \otimes \sigma_x$

	$\|\Pi\rangle = \frac{1}{2}(\|001\rangle + \|010\rangle - \|011\rangle + \|101\rangle)$	$\frac{1}{4}(x_1(\|00\rangle - \|11\rangle) + x_0(\|01\rangle - \|10\rangle))$	$4\sigma_z \otimes \sigma_x$
	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(\|000\rangle + \|001\rangle + \|010\rangle + \|011\rangle - \|101\rangle - \|110\rangle)$	$\frac{1}{2\sqrt{6}}(x_1(\|00\rangle - \|11\rangle) + x_0(\|01\rangle - \|10\rangle))$	$2\sqrt{6}\sigma_z \otimes \sigma_x$
	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(\|000\rangle + \|001\rangle + \|010\rangle - \|011\rangle + \|101\rangle - \|110\rangle)$	$\frac{1}{2\sqrt{6}}(x_1(\|00\rangle - \|11\rangle) + x_0(\|01\rangle - \|10\rangle))$	$2\sqrt{6}\sigma_z \otimes \sigma_x$
	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(-\|000\rangle + \|001\rangle + \|010\rangle + \|011\rangle - \|101\rangle + \|110\rangle)$	$\frac{1}{2\sqrt{6}}(x_1(\|00\rangle - \|11\rangle) + x_0(\|01\rangle - \|10\rangle))$	$2\sqrt{6}\sigma_z \otimes \sigma_x$
	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(-\|000\rangle + \|001\rangle + \|010\rangle - \|011\rangle + \|101\rangle + \|110\rangle)$	$\frac{1}{2\sqrt{6}}(x_1(\|00\rangle - \|11\rangle) + x_0(\|01\rangle - \|10\rangle))$	$2\sqrt{6}\sigma_z \otimes \sigma_x$
	$\|\Pi\rangle = \frac{1}{\sqrt{2}}(\|010\rangle + \|111\rangle)$	$\frac{1}{2\sqrt{2}}(x_1(\|00\rangle - \|11\rangle) + x_0(\|01\rangle - \|10\rangle))$	$2\sqrt{2}\sigma_z \otimes \sigma_x$
	$\|\Pi\rangle = \frac{1}{2}(\|000\rangle + \|010\rangle - \|110\rangle + \|111\rangle)$	$\frac{1}{4}(x_1(\|00\rangle - \|11\rangle) + x_0(\|01\rangle - \|10\rangle))$	$4\sigma_z \otimes \sigma_x$
	$\|\Pi\rangle = \frac{1}{2}(-\|000\rangle + \|010\rangle + \|110\rangle + \|111\rangle)$	$\frac{1}{4}(x_1(\|00\rangle - \|11\rangle) + x_0(\|01\rangle - \|10\rangle))$	$4\sigma_z \otimes \sigma_x$
	$\|\Pi\rangle = \frac{1}{2}(\|010\rangle + \|011\rangle - \|101\rangle + \|111\rangle)$	$\frac{1}{4}(x_1(\|00\rangle - \|11\rangle) + x_0(\|01\rangle - \|10\rangle))$	$4\sigma_z \otimes \sigma_x$

	$\|\Pi\rangle = \frac{1}{2}(\|010\rangle - \|011\rangle + \|101\rangle + \|111\rangle)$	$\frac{1}{4}(x_1(\|00\rangle - \|11\rangle) + x_0(\|01\rangle - \|10\rangle))$	$4\sigma_z \otimes \sigma_x$
	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(\|000\rangle + \|010\rangle + \|011\rangle - \|101\rangle - \|110\rangle + \|111\rangle)$	$\frac{1}{2\sqrt{6}}(x_1(\|00\rangle - \|11\rangle) + x_0(\|01\rangle - \|10\rangle))$	$2\sqrt{6}\sigma_z \otimes \sigma_x$
	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(\|000\rangle + \|010\rangle - \|011\rangle + \|101\rangle - \|110\rangle + \|111\rangle)$	$\frac{1}{2\sqrt{6}}(x_1(\|00\rangle - \|11\rangle) + x_0(\|01\rangle - \|10\rangle))$	$2\sqrt{6}\sigma_z \otimes \sigma_x$
	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(-\|000\rangle + \|010\rangle + \|011\rangle - \|101\rangle + \|110\rangle + \|111\rangle)$	$\frac{1}{2\sqrt{6}}(x_1(\|00\rangle - \|11\rangle) + x_0(\|01\rangle - \|10\rangle))$	$2\sqrt{6}\sigma_z \otimes \sigma_x$
	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(-\|000\rangle + \|010\rangle - \|011\rangle + \|101\rangle + \|110\rangle + \|111\rangle)$	$\frac{1}{2\sqrt{6}}(x_1(\|00\rangle - \|11\rangle) + x_0(\|01\rangle - \|10\rangle))$	$2\sqrt{6}\sigma_z \otimes \sigma_x$
	$\|\Pi\rangle = \frac{1}{\sqrt{2}}(\|001\rangle + \|100\rangle)$	$\frac{1}{2\sqrt{2}}(x_1(\|00\rangle - \|11\rangle) + x_0(\|01\rangle - \|10\rangle))$	$2\sqrt{2}\sigma_z \otimes \sigma_x$
	$\|\Pi\rangle = \frac{1}{2}(\|000\rangle + \|001\rangle + \|100\rangle - \|110\rangle)$	$\frac{1}{4}(x_1(\|00\rangle - \|11\rangle) + x_0(\|01\rangle - \|10\rangle))$	$4\sigma_z \otimes \sigma_x$
	$\|\Pi\rangle = \frac{1}{2}(-\|000\rangle + \|001\rangle + \|100\rangle + \|110\rangle)$	$\frac{1}{4}(x_1(\|00\rangle - \|11\rangle) + x_0(\|01\rangle - \|10\rangle))$	$4\sigma_z \otimes \sigma_x$
	$\|\Pi\rangle = \frac{1}{2}(\|001\rangle + \|011\rangle + \|100\rangle - \|101\rangle)$	$\frac{1}{4}(x_1(\|00\rangle - \|11\rangle) + x_0(\|01\rangle - \|10\rangle))$	$4\sigma_z \otimes \sigma_x$

	$\|\Pi\rangle = \frac{1}{2}(\|001\rangle - \|011\rangle + \|100\rangle + \|101\rangle)$	$\frac{1}{4}(x_1(\|00\rangle - \|11\rangle) + x_0(\|01\rangle - \|10\rangle))$	$4\sigma_z \otimes \sigma_x$
	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(\|000\rangle + \|001\rangle + \|011\rangle + \|100\rangle - \|101\rangle - \|110\rangle)$	$\frac{1}{2\sqrt{6}}(x_1(\|00\rangle - \|11\rangle) + x_0(\|01\rangle - \|10\rangle))$	$2\sqrt{6}\sigma_z \otimes \sigma_x$
	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(\|000\rangle + \|001\rangle - \|011\rangle + \|100\rangle + \|101\rangle - \|110\rangle)$	$\frac{1}{2\sqrt{6}}(x_1(\|00\rangle - \|11\rangle) + x_0(\|01\rangle - \|10\rangle))$	$2\sqrt{6}\sigma_z \otimes \sigma_x$
	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(-\|000\rangle + \|001\rangle + \|011\rangle + \|100\rangle - \|101\rangle + \|110\rangle)$	$\frac{1}{2\sqrt{6}}(x_1(\|00\rangle - \|11\rangle) + x_0(\|01\rangle - \|10\rangle))$	$2\sqrt{6}\sigma_z \otimes \sigma_x$
	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(-\|000\rangle + \|001\rangle - \|011\rangle + \|100\rangle + \|101\rangle + \|110\rangle)$	$\frac{1}{2\sqrt{6}}(x_1(\|00\rangle - \|11\rangle) + x_0(\|01\rangle - \|10\rangle))$	$2\sqrt{6}\sigma_z \otimes \sigma_x$
	$\|\Pi\rangle = \frac{1}{\sqrt{2}}(\|100\rangle + \|111\rangle)$	$\frac{1}{2\sqrt{2}}(x_1(\|00\rangle - \|11\rangle) + x_0(\|01\rangle - \|10\rangle))$	$2\sqrt{2}\sigma_z \otimes \sigma_x$
	$\|\Pi\rangle = \frac{1}{2}(\|000\rangle + \|100\rangle - \|110\rangle + \|111\rangle)$	$\frac{1}{4}(x_1(\|00\rangle - \|11\rangle) + x_0(\|01\rangle - \|10\rangle))$	$4\sigma_z \otimes \sigma_x$
	$\|\Pi\rangle = \frac{1}{2}(-\|000\rangle + \|100\rangle + \|110\rangle + \|111\rangle)$	$\frac{1}{4}(x_1(\|00\rangle - \|11\rangle) + x_0(\|01\rangle - \|10\rangle))$	$4\sigma_z \otimes \sigma_x$
	$\|\Pi\rangle = \frac{1}{2}(\|011\rangle + \|100\rangle - \|101\rangle + \|111\rangle)$	$\frac{1}{4}(x_1(\|00\rangle - \|11\rangle) + x_0(\|01\rangle - \|10\rangle))$	$4\sigma_z \otimes \sigma_x$

	$\|\Pi\rangle = \frac{1}{2}(-\|011\rangle + \|100\rangle + \|101\rangle + \|111\rangle)$	$\frac{1}{4}(x_1(\|00\rangle - \|11\rangle) + x_0(\|01\rangle - \|10\rangle))$	$4\sigma_z \otimes \sigma_x$
	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(\|000\rangle + \|011\rangle + \|100\rangle - \|101\rangle - \|110\rangle + \|111\rangle)$	$\frac{1}{2\sqrt{6}}(x_1(\|00\rangle - \|11\rangle) + x_0(\|01\rangle - \|10\rangle))$	$2\sqrt{6}\sigma_z \otimes \sigma_x$
	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(\|000\rangle - \|011\rangle + \|100\rangle + \|101\rangle - \|110\rangle + \|111\rangle)$	$\frac{1}{2\sqrt{6}}(x_1(\|00\rangle - \|11\rangle) + x_0(\|01\rangle - \|10\rangle))$	$2\sqrt{6}\sigma_z \otimes \sigma_x$
	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(-\|000\rangle - \|011\rangle + \|100\rangle - \|101\rangle + \|110\rangle + \|111\rangle)$	$\frac{1}{2\sqrt{6}}(x_1(\|00\rangle - \|11\rangle) + x_0(\|01\rangle - \|10\rangle))$	$2\sqrt{6}\sigma_z \otimes \sigma_x$
	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(-\|000\rangle - \|011\rangle + \|100\rangle + \|101\rangle + \|110\rangle + \|111\rangle)$	$\frac{1}{2\sqrt{6}}(x_1(\|00\rangle - \|11\rangle) + x_0(\|01\rangle - \|10\rangle))$	$2\sqrt{6}\sigma_z \otimes \sigma_x$
	$\|\Pi\rangle = \frac{1}{2}(\|001\rangle + \|010\rangle + \|100\rangle + \|111\rangle)$	$\frac{1}{2}(x_1(\|00\rangle - \|11\rangle) + x_0(\|01\rangle - \|10\rangle))$	$\sigma_z \otimes \sigma_x$
	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(\|000\rangle + \|001\rangle + \|010\rangle + \|100\rangle - \|110\rangle + \|111\rangle)$	$\frac{1}{\sqrt{6}}(x_1(\|00\rangle - \|11\rangle) + x_0(\|01\rangle - \|10\rangle))$	$\sqrt{6}\sigma_z \otimes \sigma_x$
	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(-\|000\rangle + \|001\rangle + \|010\rangle + \|100\rangle + \|110\rangle + \|111\rangle)$	$\frac{1}{\sqrt{6}}(x_1(\|00\rangle - \|11\rangle) + x_0(\|01\rangle - \|10\rangle))$	$\sqrt{6}\sigma_z \otimes \sigma_x$

	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(\|001\rangle + \|010\rangle + \|011\rangle + \|100\rangle - \|101\rangle + \|111\rangle)$	$\frac{1}{\sqrt{6}}(x_1(\|00\rangle - \|11\rangle) + x_0(\|01\rangle - \|10\rangle))$	$\sqrt{6}\sigma_z \otimes \sigma_x$
	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(\|001\rangle + \|010\rangle - \|011\rangle + \|100\rangle + \|101\rangle + \|111\rangle)$	$\frac{1}{\sqrt{6}}(x_1(\|00\rangle - \|11\rangle) + x_0(\|01\rangle - \|10\rangle))$	$\sqrt{6}\sigma_z \otimes \sigma_x$
	$\|\Pi\rangle = \|000\rangle + \|001\rangle + \|010\rangle + \|011\rangle + \|100\rangle - \|101\rangle - \|110\rangle + \|111\rangle$	$(x_1(\|00\rangle - \|11\rangle) + x_0(\|01\rangle - \|10\rangle))$	$\sigma_z \otimes \sigma_x$
	$\|\Pi\rangle = \|000\rangle + \|001\rangle + \|010\rangle - \|011\rangle + \|100\rangle + \|101\rangle - \|110\rangle + \|111\rangle$	$(x_1(\|00\rangle - \|11\rangle) + x_0(\|01\rangle - \|10\rangle))$	$\sigma_z \otimes \sigma_x$
	$\|\Pi\rangle = -\|000\rangle + \|001\rangle + \|010\rangle + \|011\rangle + \|100\rangle - \|101\rangle + \|110\rangle + \|111\rangle$	$(x_1(\|00\rangle - \|11\rangle) + x_0(\|01\rangle - \|10\rangle))$	$\sigma_z \otimes \sigma_x$
	$\|\Pi\rangle = -\|000\rangle + \|001\rangle + \|010\rangle - \|011\rangle + \|100\rangle + \|101\rangle + \|110\rangle + \|111\rangle$	$(x_1(\|00\rangle - \|11\rangle) + x_0(\|01\rangle - \|10\rangle))$	$\sigma_z \otimes \sigma_x$

Tabel 16 Pengukuran Informasi Khusus Keadan Terbelit 4

Keadaan Terbelit	Keadaan Alice	Keadaan Bob	Operator
$\|\varphi\rangle = \frac{1}{2}(\|000\rangle - \|011\rangle - \|101\rangle + \|110\rangle)$	$\|\Pi\rangle = \frac{1}{\sqrt{2}}(\|000\rangle + \|011\rangle)$	$\frac{1}{2\sqrt{2}}(x_0(\|00\rangle - \|11\rangle) + x_1(-\|01\rangle + \|10\rangle))$	$2\sqrt{2}I \otimes \sigma_z$

	$\|\Pi\rangle = \frac{1}{2}(\|000\rangle + \|010\rangle + \|011\rangle - \|100\rangle)$	$\frac{1}{4}(x_0(\|00\rangle - \|11\rangle) + x_1(-\|01\rangle + \|10\rangle))$	$4I \otimes \sigma_z$
	$\|\Pi\rangle = \frac{1}{2}(\|000\rangle - \|010\rangle + \|011\rangle + \|100\rangle)$	$\frac{1}{4}(x_0(\|00\rangle - \|11\rangle) + x_1(-\|01\rangle + \|10\rangle))$	$4I \otimes \sigma_z$
	$\|\Pi\rangle = \frac{1}{2}(\|000\rangle + \|001\rangle + \|011\rangle - \|111\rangle)$	$\frac{1}{4}(x_0(\|00\rangle - \|11\rangle) + x_1(-\|01\rangle + \|10\rangle))$	$4I \otimes \sigma_z$
	$\|\Pi\rangle = \frac{1}{2}(\|000\rangle - \|001\rangle + \|011\rangle + \|111\rangle)$	$\frac{1}{4}(x_0(\|00\rangle - \|11\rangle) + x_1(-\|01\rangle + \|10\rangle))$	$4I \otimes \sigma_z$
	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(\|000\rangle + \|001\rangle + \|010\rangle + \|011\rangle - \|100\rangle - \|111\rangle)$	$\frac{1}{2\sqrt{6}}(x_0(\|00\rangle - \|11\rangle) + x_1(-\|01\rangle + \|10\rangle))$	$2\sqrt{6}I \otimes \sigma_z$
	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(\|000\rangle - \|001\rangle + \|010\rangle - \|011\rangle + \|100\rangle + \|111\rangle)$	$\frac{1}{2\sqrt{6}}(x_0(\|00\rangle - \|11\rangle) + x_1(-\|01\rangle + \|10\rangle))$	$2\sqrt{6}I \otimes \sigma_z$
	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(\|000\rangle + \|001\rangle - \|010\rangle + \|011\rangle + \|100\rangle - \|111\rangle)$	$\frac{1}{2\sqrt{6}}(x_0(\|00\rangle - \|11\rangle) + x_1(-\|01\rangle + \|10\rangle))$	$2\sqrt{6}I \otimes \sigma_z$
	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(\|000\rangle - \|001\rangle - \|010\rangle + \|011\rangle + \|100\rangle + \|111\rangle)$	$\frac{1}{2\sqrt{6}}(x_0(\|00\rangle - \|11\rangle) + x_1(-\|01\rangle + \|10\rangle))$	$2\sqrt{6}I \otimes \sigma_z$

	$\|\Pi\rangle = \frac{1}{\sqrt{2}}(\|101\rangle + \|110\rangle)$	$\frac{1}{2\sqrt{2}}(x_0(\|00\rangle - \|11\rangle) + x_1(-\|01\rangle + \|10\rangle))$	$2\sqrt{2}I \otimes \sigma_z$
	$\|\Pi\rangle = \frac{1}{2}(\|010\rangle - \|100\rangle + \|101\rangle + \|110\rangle)$	$\frac{1}{4}(x_0(\|00\rangle - \|11\rangle) + x_1(-\|01\rangle + \|10\rangle))$	$4I \otimes \sigma_z$
	$\|\Pi\rangle = \frac{1}{2}(-\|010\rangle + \|100\rangle + \|101\rangle + \|110\rangle)$	$\frac{1}{4}(x_0(\|00\rangle - \|11\rangle) + x_1(-\|01\rangle + \|10\rangle))$	$4I \otimes \sigma_z$
	$\|\Pi\rangle = \frac{1}{2}(\|001\rangle + \|101\rangle + \|110\rangle - \|111\rangle)$	$\frac{1}{4}(x_0(\|00\rangle - \|11\rangle) + x_1(-\|01\rangle + \|10\rangle))$	$4I \otimes \sigma_z$
	$\|\Pi\rangle = \frac{1}{2}(-\|001\rangle + \|101\rangle + \|110\rangle + \|111\rangle)$	$\frac{1}{4}(x_0(\|00\rangle - \|11\rangle) + x_1(-\|01\rangle + \|10\rangle))$	$4I \otimes \sigma_z$
	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(\|001\rangle + \|010\rangle - \|100\rangle + \|101\rangle + \|110\rangle - \|111\rangle)$	$\frac{1}{2\sqrt{6}}(x_0(\|00\rangle - \|11\rangle) + x_1(-\|01\rangle + \|10\rangle))$	$2\sqrt{6}I \otimes \sigma_z$
	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(-\|001\rangle + \|010\rangle + \|100\rangle - \|101\rangle + \|110\rangle + \|111\rangle)$	$\frac{1}{2\sqrt{6}}(x_0(\|00\rangle - \|11\rangle) + x_1(-\|01\rangle + \|10\rangle))$	$2\sqrt{6}I \otimes \sigma_z$
	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(\|001\rangle - \|010\rangle + \|100\rangle + \|101\rangle + \|110\rangle - \|111\rangle)$	$\frac{1}{2\sqrt{6}}(x_0(\|00\rangle - \|11\rangle) + x_1(-\|01\rangle + \|10\rangle))$	$2\sqrt{6}I \otimes \sigma_z$
	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(-\|001\rangle - \|010\rangle + \|100\rangle + \|101\rangle + \|110\rangle + \|111\rangle)$	$\frac{1}{2\sqrt{6}}(x_0(\|00\rangle - \|11\rangle) + x_1(-\|01\rangle + \|10\rangle))$	$2\sqrt{6}I \otimes \sigma_z$

	$\|\Pi\rangle = \frac{1}{\sqrt{2}}(\|000\rangle + \|101\rangle)$	$\frac{1}{2\sqrt{2}}(x_0(\|00\rangle - \|11\rangle) + x_1(-\|01\rangle + \|10\rangle))$	$2\sqrt{2}I \otimes \sigma_z$
	$\|\Pi\rangle = \frac{1}{2}(\|000\rangle + \|010\rangle - \|100\rangle + \|101\rangle)$	$\frac{1}{4}(x_0(\|00\rangle - \|11\rangle) + x_1(-\|01\rangle + \|10\rangle))$	$4I \otimes \sigma_z$
	$\|\Pi\rangle = \frac{1}{2}(\|000\rangle - \|010\rangle + \|100\rangle + \|101\rangle)$	$\frac{1}{4}(x_0(\|00\rangle - \|11\rangle) + x_1(-\|01\rangle + \|10\rangle))$	$4I \otimes \sigma_z$
	$\|\Pi\rangle = \frac{1}{2}(\|000\rangle + \|001\rangle + \|101\rangle - \|111\rangle)$	$\frac{1}{4}(x_0(\|00\rangle - \|11\rangle) + x_1(-\|01\rangle + \|10\rangle))$	$4I \otimes \sigma_z$
	$\|\Pi\rangle = \frac{1}{2}(\|000\rangle - \|001\rangle + \|101\rangle + \|111\rangle)$	$\frac{1}{4}(x_0(\|00\rangle - \|11\rangle) + x_1(-\|01\rangle + \|10\rangle))$	$4I \otimes \sigma_z$
	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(\|000\rangle + \|001\rangle + \|010\rangle - \|100\rangle + \|101\rangle - \|111\rangle)$	$\frac{1}{2\sqrt{6}}(x_0(\|00\rangle - \|11\rangle) + x_1(-\|01\rangle + \|10\rangle))$	$2\sqrt{6}I \otimes \sigma_z$
	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(\|000\rangle - \|001\rangle + \|010\rangle - \|100\rangle + \|101\rangle + \|111\rangle)$	$\frac{1}{2\sqrt{6}}(x_0(\|00\rangle - \|11\rangle) + x_1(-\|01\rangle + \|10\rangle))$	$2\sqrt{6}I \otimes \sigma_z$
	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(\|000\rangle + \|001\rangle - \|010\rangle + \|100\rangle + \|101\rangle - \|111\rangle)$	$\frac{1}{2\sqrt{6}}(x_0(\|00\rangle - \|11\rangle) + x_1(-\|01\rangle + \|10\rangle))$	$2\sqrt{6}I \otimes \sigma_z$

	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(\|000\rangle - \|001\rangle - \|010\rangle + \|100\rangle + \|101\rangle + \|111\rangle)$	$\frac{1}{2\sqrt{6}}(x_0(\|00\rangle - \|11\rangle) + x_1(-\|01\rangle + \|10\rangle))$	$2\sqrt{6}I \otimes \sigma_z$
	$\|\Pi\rangle = \frac{1}{\sqrt{2}}(\|011\rangle + \|110\rangle)$	$\frac{1}{2\sqrt{2}}(x_0(\|00\rangle - \|11\rangle) + x_1(-\|01\rangle + \|10\rangle))$	$2\sqrt{2}I \otimes \sigma_z$
	$\|\Pi\rangle = \frac{1}{2}(\|010\rangle + \|011\rangle - \|100\rangle + \|110\rangle)$	$\frac{1}{4}(x_0(\|00\rangle - \|11\rangle) + x_1(-\|01\rangle + \|10\rangle))$	$4I \otimes \sigma_z$
	$\|\Pi\rangle = \frac{1}{2}(-\|010\rangle + \|011\rangle + \|100\rangle + \|110\rangle)$	$\frac{1}{4}(x_0(\|00\rangle - \|11\rangle) + x_1(-\|01\rangle + \|10\rangle))$	$4I \otimes \sigma_z$
	$\|\Pi\rangle = \frac{1}{2}(\|001\rangle + \|011\rangle + \|110\rangle - \|111\rangle)$	$\frac{1}{4}(x_0(\|00\rangle - \|11\rangle) + x_1(-\|01\rangle + \|10\rangle))$	$4I \otimes \sigma_z$
	$\|\Pi\rangle = \frac{1}{2}(-\|001\rangle + \|011\rangle + \|110\rangle + \|111\rangle)$	$\frac{1}{4}(x_0(\|00\rangle - \|11\rangle) + x_1(-\|01\rangle + \|10\rangle))$	$4I \otimes \sigma_z$
	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(\|001\rangle + \|010\rangle + \|011\rangle - \|100\rangle + \|110\rangle - \|111\rangle)$	$\frac{1}{2\sqrt{6}}(x_0(\|00\rangle - \|11\rangle) + x_1(-\|01\rangle + \|10\rangle)$	$2\sqrt{6}I \otimes \sigma_z$
	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(-\|001\rangle + \|010\rangle + \|011\rangle - \|100\rangle + \|110\rangle + \|111\rangle)$	$\frac{1}{2\sqrt{6}}(x_0(\|00\rangle - \|11\rangle) + x_1(-\|01\rangle + \|10\rangle)$	$2\sqrt{6}I \otimes \sigma_z$

	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(\|001\rangle - \|010\rangle + \|011\rangle + \|100\rangle + \|110\rangle - \|111\rangle)$	$\frac{1}{2\sqrt{6}}(x_0(\|00\rangle - \|11\rangle) + x_1(-\|01\rangle + \|10\rangle)$	$2\sqrt{6}I \otimes \sigma_z$
	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(-\|001\rangle - \|010\rangle + \|011\rangle + \|100\rangle + \|110\rangle + \|111\rangle)$	$\frac{1}{2\sqrt{6}}(x_0(\|00\rangle - \|11\rangle) + x_1(-\|01\rangle + \|10\rangle)$	$2\sqrt{6}I \otimes \sigma_z$
	$\|\Pi\rangle = \frac{1}{2}(\|000\rangle + \|011\rangle + \|101\rangle + \|110\rangle)$	$\frac{1}{2}(x_0(\|00\rangle - \|11\rangle) + x_1(-\|01\rangle + \|10\rangle))$	$2I \otimes \sigma_z$
	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(\|000\rangle + \|010\rangle + \|011\rangle - \|100\rangle + \|101\rangle + \|110\rangle)$	$\frac{1}{\sqrt{6}}(x_0(\|00\rangle - \|11\rangle) + x_1(-\|01\rangle + \|10\rangle))$	$\sqrt{6}I \otimes \sigma_z$
	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(\|000\rangle - \|010\rangle + \|011\rangle + \|100\rangle + \|101\rangle + \|110\rangle)$	$\frac{1}{\sqrt{6}}(x_0(\|00\rangle - \|11\rangle) + x_1(-\|01\rangle + \|10\rangle))$	$\sqrt{6}I \otimes \sigma_z$
	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(\|000\rangle + \|001\rangle + \|011\rangle + \|101\rangle + \|110\rangle - \|111\rangle)$	$\frac{1}{\sqrt{6}}(x_0(\|00\rangle - \|11\rangle) + x_1(-\|01\rangle + \|10\rangle))$	$\sqrt{6}I \otimes \sigma_z$
	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(\|000\rangle - \|001\rangle + \|011\rangle + \|101\rangle + \|110\rangle + \|111\rangle)$	$\frac{1}{\sqrt{6}}(x_0(\|00\rangle - \|11\rangle) + x_1(-\|01\rangle + \|10\rangle))$	$\sqrt{6}I \otimes \sigma_z$
	$\|\Pi\rangle = \|000\rangle + \|001\rangle + \|010\rangle + \|011\rangle - \|100\rangle + \|101\rangle + \|110\rangle - \|111\rangle$	$x_0(\|00\rangle - \|11\rangle) + x_1(-\|01\rangle + \|10\rangle)$	$I \otimes \sigma_z$
	$\|\Pi\rangle = \|000\rangle - \|001\rangle + \|010\rangle + \|011\rangle - \|100\rangle + \|101\rangle + \|110\rangle + \|111\rangle$	$x_0(\|00\rangle - \|11\rangle) + x_1(-\|01\rangle + \|10\rangle)$	$I \otimes \sigma_z$

	$\|\Pi\rangle = \|000\rangle + \|001\rangle - \|010\rangle + \|011\rangle + \|100\rangle + \|101\rangle + \|110\rangle - \|111\rangle$	$x_0(\|00\rangle - \|11\rangle) + x_1(-\|01\rangle + \|10\rangle)$	$I \otimes \sigma_z$
	$\|\Pi\rangle = \|000\rangle - \|001\rangle - \|010\rangle + \|011\rangle + \|100\rangle + \|101\rangle + \|110\rangle + \|111\rangle$	$x_0(\|00\rangle - \|11\rangle) + x_1(-\|01\rangle + \|10\rangle)$	$I \otimes \sigma_z$
	$\|\Pi\rangle = \frac{1}{\sqrt{2}}(\|001\rangle + \|010\rangle)$	$\frac{1}{2\sqrt{2}}(x_0(\|00\rangle - \|11\rangle) + x_1(-\|01\rangle + \|10\rangle))$	$2\sqrt{2}\sigma_x \otimes \sigma_z$
	$\|\Pi\rangle = \frac{1}{2}(\|000\rangle + \|001\rangle + \|010\rangle - \|110\rangle)$	$\frac{1}{4}(x_0(\|00\rangle - \|11\rangle) + x_1(-\|01\rangle + \|10\rangle))$	$4\sigma_x \otimes \sigma_z$
	$\|\Pi\rangle = \frac{1}{2}(-\|000\rangle + \|001\rangle + \|010\rangle + \|110\rangle)$	$\frac{1}{4}(x_0(\|00\rangle - \|11\rangle) + x_1(-\|01\rangle + \|10\rangle))$	$4\sigma_x \otimes \sigma_z$
	$\|\Pi\rangle = \frac{1}{2}(\|001\rangle + \|010\rangle + \|011\rangle - \|101\rangle)$	$\frac{1}{4}(x_0(\|00\rangle - \|11\rangle) + x_1(-\|01\rangle + \|10\rangle))$	$4\sigma_x \otimes \sigma_z$
	$\|\Pi\rangle = \frac{1}{2}(\|001\rangle + \|010\rangle - \|011\rangle + \|101\rangle)$	$\frac{1}{4}(x_0(\|00\rangle - \|11\rangle) + x_1(-\|01\rangle + \|10\rangle))$	$4\sigma_x \otimes \sigma_z$
	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(\|000\rangle + \|001\rangle + \|010\rangle + \|011\rangle - \|101\rangle - \|110\rangle)$	$\frac{1}{2\sqrt{6}}(x_0(\|00\rangle - \|11\rangle) + x_1(-\|01\rangle + \|10\rangle))$	$2\sqrt{6}\sigma_x \otimes \sigma_z$
	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(\|000\rangle + \|001\rangle + \|010\rangle - \|011\rangle + \|101\rangle - \|110\rangle)$	$\frac{1}{2\sqrt{6}}(x_0(\|00\rangle - \|11\rangle) + x_1(-\|01\rangle + \|10\rangle))$	$2\sqrt{6}\sigma_x \otimes \sigma_z$

	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(-\|000\rangle + \|001\rangle + \|010\rangle + \|011\rangle - \|101\rangle + \|110\rangle)$	$\frac{1}{2\sqrt{6}}(x_0(\|00\rangle - \|11\rangle) + x_1(-\|01\rangle + \|10\rangle))$	$2\sqrt{6}\sigma_x \otimes \sigma_z$
	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(-\|000\rangle + \|001\rangle + \|010\rangle - \|011\rangle + \|101\rangle + \|110\rangle)$	$\frac{1}{2\sqrt{6}}(x_0(\|00\rangle - \|11\rangle) + x_1(-\|01\rangle + \|10\rangle))$	$2\sqrt{6}\sigma_x \otimes \sigma_z$
	$\|\Pi\rangle = \frac{1}{\sqrt{2}}(\|010\rangle + \|111\rangle)$	$\frac{1}{2\sqrt{2}}(x_0(\|00\rangle - \|11\rangle) + x_1(-\|01\rangle + \|10\rangle))$	$2\sqrt{2}\sigma_x \otimes \sigma_z$
	$\|\Pi\rangle = \frac{1}{2}(\|000\rangle + \|010\rangle - \|110\rangle + \|111\rangle)$	$\frac{1}{4}(x_0(\|00\rangle - \|11\rangle) + x_1(-\|01\rangle + \|10\rangle))$	$4\sigma_x \otimes \sigma_z$
	$\|\Pi\rangle = \frac{1}{2}(-\|000\rangle + \|010\rangle + \|110\rangle + \|111\rangle)$	$\frac{1}{4}(x_0(\|00\rangle - \|11\rangle) + x_1(-\|01\rangle + \|10\rangle))$	$4\sigma_x \otimes \sigma_z$
	$\|\Pi\rangle = \frac{1}{2}(\|010\rangle + \|011\rangle - \|101\rangle + \|111\rangle)$	$\frac{1}{4}(x_0(\|00\rangle - \|11\rangle) + x_1(-\|01\rangle + \|10\rangle))$	$4\sigma_x \otimes \sigma_z$
	$\|\Pi\rangle = \frac{1}{2}(\|010\rangle - \|011\rangle + \|101\rangle + \|111\rangle)$	$\frac{1}{4}(x_0(\|00\rangle - \|11\rangle) + x_1(-\|01\rangle + \|10\rangle))$	$4\sigma_x \otimes \sigma_z$
	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(\|000\rangle + \|010\rangle + \|011\rangle - \|101\rangle - \|110\rangle + \|111\rangle)$	$\frac{1}{2\sqrt{6}}(x_0(\|00\rangle - \|11\rangle) + x_1(-\|01\rangle + \|10\rangle))$	$2\sqrt{6}\sigma_x \otimes \sigma_z$
	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(\|000\rangle + \|010\rangle - \|011\rangle + \|101\rangle - \|110\rangle + \|111\rangle)$	$\frac{1}{2\sqrt{6}}(x_0(\|00\rangle - \|11\rangle) + x_1(-\|01\rangle + \|10\rangle))$	$2\sqrt{6}\sigma_x \otimes \sigma_z$

	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(-\|000\rangle + \|010\rangle + \|011\rangle - \|101\rangle + \|110\rangle + \|111\rangle)$	$\frac{1}{2\sqrt{6}}(x_0(\|00\rangle - \|11\rangle) + x_1(-\|01\rangle + \|10\rangle))$	$2\sqrt{6}\sigma_x \otimes \sigma_z$
	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(-\|000\rangle + \|010\rangle - \|011\rangle + \|101\rangle + \|110\rangle + \|111\rangle)$	$\frac{1}{2\sqrt{6}}(x_0(\|00\rangle - \|11\rangle) + x_1(-\|01\rangle + \|10\rangle))$	$2\sqrt{6}\sigma_x \otimes \sigma_z$
	$\|\Pi\rangle = \frac{1}{\sqrt{2}}(\|001\rangle + \|100\rangle)$	$\frac{1}{2\sqrt{2}}(x_0(\|00\rangle - \|11\rangle) + x_1(-\|01\rangle + \|10\rangle))$	$2\sqrt{2}\sigma_x \otimes \sigma_z$
	$\|\Pi\rangle = \frac{1}{2}(\|000\rangle + \|001\rangle + \|100\rangle - \|110\rangle)$	$\frac{1}{4}(x_0(\|00\rangle - \|11\rangle) + x_1(-\|01\rangle + \|10\rangle))$	$4\sigma_x \otimes \sigma_z$
	$\|\Pi\rangle = \frac{1}{2}(-\|000\rangle + \|001\rangle + \|100\rangle + \|110\rangle)$	$\frac{1}{4}(x_0(\|00\rangle - \|11\rangle) + x_1(-\|01\rangle + \|10\rangle))$	$4\sigma_x \otimes \sigma_z$
	$\|\Pi\rangle = \frac{1}{2}(\|001\rangle + \|011\rangle + \|100\rangle - \|101\rangle)$	$\frac{1}{4}(x_0(\|00\rangle - \|11\rangle) + x_1(-\|01\rangle + \|10\rangle))$	$4\sigma_x \otimes \sigma_z$
	$\|\Pi\rangle = \frac{1}{2}(\|001\rangle - \|011\rangle + \|100\rangle + \|101\rangle)$	$\frac{1}{4}(x_0(\|00\rangle - \|11\rangle) + x_1(-\|01\rangle + \|10\rangle))$	$4\sigma_x \otimes \sigma_z$
	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(\|000\rangle + \|001\rangle + \|011\rangle + \|100\rangle - \|101\rangle - \|110\rangle)$	$\frac{1}{2\sqrt{6}}(x_0(\|00\rangle - \|11\rangle) + x_1(-\|01\rangle + \|10\rangle))$	$2\sqrt{6}\sigma_x \otimes \sigma_z$
	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(\|000\rangle + \|001\rangle - \|011\rangle + \|100\rangle + \|101\rangle - \|110\rangle)$	$\frac{1}{2\sqrt{6}}(x_0(\|00\rangle - \|11\rangle) + x_1(-\|01\rangle + \|10\rangle))$	$2\sqrt{6}\sigma_x \otimes \sigma_z$

	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(-\|000\rangle + \|001\rangle + \|011\rangle + \|100\rangle - \|101\rangle + \|110\rangle)$	$\frac{1}{2\sqrt{6}}(x_0(\|00\rangle - \|11\rangle) + x_1(-\|01\rangle + \|10\rangle))$	$2\sqrt{6}\sigma_x \otimes \sigma_z$
	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(-\|000\rangle + \|001\rangle - \|011\rangle + \|100\rangle + \|101\rangle + \|110\rangle)$	$\frac{1}{2\sqrt{6}}(x_0(\|00\rangle - \|11\rangle) + x_1(-\|01\rangle + \|10\rangle))$	$2\sqrt{6}\sigma_x \otimes \sigma_z$
	$\|\Pi\rangle = \frac{1}{\sqrt{2}}(\|100\rangle + \|111\rangle)$	$\frac{1}{2\sqrt{2}}(x_0(\|00\rangle - \|11\rangle) + x_1(-\|01\rangle + \|10\rangle))$	$2\sqrt{2}\sigma_x \otimes \sigma_z$
	$\|\Pi\rangle = \frac{1}{2}(\|000\rangle + \|100\rangle - \|110\rangle + \|111\rangle)$	$\frac{1}{4}(x_0(\|00\rangle - \|11\rangle) + x_1(-\|01\rangle + \|10\rangle))$	$4\sigma_x \otimes \sigma_z$
	$\|\Pi\rangle = \frac{1}{2}(-\|000\rangle + \|100\rangle + \|110\rangle + \|111\rangle)$	$\frac{1}{4}(x_0(\|00\rangle - \|11\rangle) + x_1(-\|01\rangle + \|10\rangle))$	$4\sigma_x \otimes \sigma_z$
	$\|\Pi\rangle = \frac{1}{2}(\|011\rangle + \|100\rangle - \|101\rangle + \|111\rangle)$	$\frac{1}{4}(x_0(\|00\rangle - \|11\rangle) + x_1(-\|01\rangle + \|10\rangle))$	$4\sigma_x \otimes \sigma_z$
	$\|\Pi\rangle = \frac{1}{2}(-\|011\rangle + \|100\rangle + \|101\rangle + \|111\rangle)$	$\frac{1}{4}(x_0(\|00\rangle - \|11\rangle) + x_1(-\|01\rangle + \|10\rangle))$	$4\sigma_x \otimes \sigma_z$
	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(\|000\rangle + \|011\rangle + \|100\rangle - \|101\rangle - \|110\rangle + \|111\rangle)$	$\frac{1}{2\sqrt{6}}(x_0(\|00\rangle - \|11\rangle) + x_1(-\|01\rangle + \|10\rangle))$	$2\sqrt{6}\sigma_x \otimes \sigma_z$
	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(\|000\rangle - \|011\rangle + \|100\rangle + \|101\rangle - \|110\rangle + \|111\rangle)$	$\frac{1}{2\sqrt{6}}(x_0(\|00\rangle - \|11\rangle) + x_1(-\|01\rangle + \|10\rangle))$	$2\sqrt{6}\sigma_x \otimes \sigma_z$

	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(-\|000\rangle - \|011\rangle + \|100\rangle - \|101\rangle + \|110\rangle + \|111\rangle)$	$\frac{1}{2\sqrt{6}}(x_0(\|00\rangle - \|11\rangle) + x_1(-\|01\rangle + \|10\rangle))$	$2\sqrt{6}\sigma_x \otimes \sigma_z$
	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(-\|000\rangle - \|011\rangle + \|100\rangle + \|101\rangle + \|110\rangle + \|111\rangle)$	$\frac{1}{2\sqrt{6}}(x_0(\|00\rangle - \|11\rangle) + x_1(-\|01\rangle + \|10\rangle))$	$2\sqrt{6}\sigma_x \otimes \sigma_z$
	$\|\Pi\rangle = \frac{1}{2}(\|001\rangle + \|010\rangle + \|100\rangle + \|111\rangle)$	$\frac{1}{2}(x_0(\|00\rangle - \|11\rangle) + x_1(-\|01\rangle + \|10\rangle))$	$2\sigma_x \otimes \sigma_z$
	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(\|000\rangle + \|001\rangle + \|010\rangle + \|100\rangle - \|110\rangle + \|111\rangle)$	$\frac{1}{\sqrt{6}}(x_0(\|00\rangle - \|11\rangle) + x_1(-\|01\rangle + \|10\rangle))$	$\sqrt{6}\sigma_x \otimes \sigma_z$
	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(-\|000\rangle + \|001\rangle + \|010\rangle + \|100\rangle + \|110\rangle + \|111\rangle)$	$\frac{1}{\sqrt{6}}(x_0(\|00\rangle - \|11\rangle) + x_1(-\|01\rangle + \|10\rangle))$	$\sqrt{6}\sigma_x \otimes \sigma_z$
	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(\|001\rangle + \|010\rangle + \|011\rangle + \|100\rangle - \|101\rangle + \|111\rangle)$	$\frac{1}{\sqrt{6}}(x_0(\|00\rangle - \|11\rangle) + x_1(-\|01\rangle + \|10\rangle))$	$\sqrt{6}\sigma_x \otimes \sigma_z$
	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(\|001\rangle + \|010\rangle - \|011\rangle + \|100\rangle + \|101\rangle + \|111\rangle)$	$\frac{1}{\sqrt{6}}(x_0(\|00\rangle - \|11\rangle) + x_1(-\|01\rangle + \|10\rangle))$	$\sqrt{6}\sigma_x \otimes \sigma_z$
	$\|\Pi\rangle = \|000\rangle + \|001\rangle + \|010\rangle + \|011\rangle + \|100\rangle - \|101\rangle - \|110\rangle + \|111\rangle$	$x_0(\|00\rangle - \|11\rangle) + x_1(-\|01\rangle + \|10\rangle)$	$\sigma_x \otimes \sigma_z$
	$\|\Pi\rangle = \|000\rangle + \|001\rangle + \|010\rangle - \|011\rangle + \|100\rangle + \|101\rangle - \|110\rangle + \|111\rangle$	$x_0(\|00\rangle - \|11\rangle) + x_1(-\|01\rangle + \|10\rangle)$	$\sigma_x \otimes \sigma_z$

	$\|\Pi\rangle = -\|000\rangle + \|001\rangle + \|010\rangle + \|011\rangle + \|100\rangle - \|101\rangle + \|110\rangle + \|111\rangle$	$x_0(\|00\rangle - \|11\rangle) + x_1(-\|01\rangle + \|10\rangle)$	$\sigma_x \otimes \sigma_z$
	$\|\Pi\rangle = -\|000\rangle + \|001\rangle + \|010\rangle - \|011\rangle + \|100\rangle + \|101\rangle + \|110\rangle + \|111\rangle$	$x_0(\|00\rangle - \|11\rangle) + x_1(-\|01\rangle + \|10\rangle)$	$\sigma_x \otimes \sigma_z$

Tabel 17 Pengukuran Informasi Khusus Keadaan Terbelit 5

Keadaan Terbelit	Keadaan Alice	Keadaan Bob	Operator
$\|\varphi\rangle = \frac{1}{2}(-\|001\rangle + \|010\rangle + \|100\rangle - \|111\rangle)$	$\|\Pi\rangle = \frac{1}{\sqrt{2}}(\|001\rangle + \|010\rangle)$	$\frac{1}{2\sqrt{2}}(x_1(\|00\rangle - \|11\rangle) + x_0(-\|01\rangle + \|10\rangle))$	$2\sqrt{2}I \otimes \sigma_z$
	$\|\Pi\rangle = \frac{1}{2}(\|000\rangle + \|001\rangle + \|010\rangle - \|110\rangle)$	$\frac{1}{4}(x_1(\|00\rangle - \|11\rangle) + x_0(-\|01\rangle + \|10\rangle))$	$4I \otimes \sigma_z$
	$\|\Pi\rangle = \frac{1}{2}(-\|000\rangle + \|001\rangle + \|010\rangle + \|110\rangle)$	$\frac{1}{4}(x_1(\|00\rangle - \|11\rangle) + x_0(-\|01\rangle + \|10\rangle))$	$4I \otimes \sigma_z$
	$\|\Pi\rangle = \frac{1}{2}(\|001\rangle + \|010\rangle + \|011\rangle - \|101\rangle)$	$\frac{1}{4}(x_1(\|00\rangle - \|11\rangle) + x_0(-\|01\rangle + \|10\rangle))$	$4I \otimes \sigma_z$
	$\|\Pi\rangle = \frac{1}{2}(\|001\rangle + \|010\rangle - \|011\rangle + \|101\rangle)$	$\frac{1}{4}(x_1(\|00\rangle - \|11\rangle) + x_0(-\|01\rangle + \|10\rangle))$	$4I \otimes \sigma_z$

	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(\|000\rangle + \|001\rangle + \|010\rangle + \|011\rangle - \|101\rangle - \|110\rangle)$	$\frac{1}{2\sqrt{6}}(x_1(\|00\rangle - \|11\rangle) + x_0(-\|01\rangle + \|10\rangle))$	$2\sqrt{6}I \otimes \sigma_z$
	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(\|000\rangle + \|001\rangle + \|010\rangle - \|011\rangle + \|101\rangle - \|110\rangle)$	$\frac{1}{2\sqrt{6}}(x_1(\|00\rangle - \|11\rangle) + x_0(-\|01\rangle + \|10\rangle))$	$2\sqrt{6}I \otimes \sigma_z$
	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(-\|000\rangle + \|001\rangle + \|010\rangle + \|011\rangle - \|101\rangle + \|110\rangle)$	$\frac{1}{2\sqrt{6}}(x_1(\|00\rangle - \|11\rangle) + x_0(-\|01\rangle + \|10\rangle))$	$2\sqrt{6}I \otimes \sigma_z$
	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(-\|000\rangle + \|001\rangle + \|010\rangle - \|011\rangle + \|101\rangle + \|110\rangle)$	$\frac{1}{2\sqrt{6}}(x_1(\|00\rangle - \|11\rangle) + x_0(-\|01\rangle + \|10\rangle))$	$2\sqrt{6}I \otimes \sigma_z$
	$\|\Pi\rangle = \frac{1}{\sqrt{2}}(\|010\rangle + \|111\rangle)$	$\frac{1}{2\sqrt{2}}(x_1(\|00\rangle - \|11\rangle) + x_0(-\|01\rangle + \|10\rangle))$	$2\sqrt{2}I \otimes \sigma_z$
	$\|\Pi\rangle = \frac{1}{2}(\|000\rangle + \|010\rangle - \|110\rangle + \|111\rangle)$	$\frac{1}{4}(x_1(\|00\rangle - \|11\rangle) + x_0(-\|01\rangle + \|10\rangle))$	$4I \otimes \sigma_z$
	$\|\Pi\rangle = \frac{1}{2}(-\|000\rangle + \|010\rangle + \|110\rangle + \|111\rangle)$	$\frac{1}{4}(x_1(\|00\rangle - \|11\rangle) + x_0(-\|01\rangle + \|10\rangle))$	$4I \otimes \sigma_z$
	$\|\Pi\rangle = \frac{1}{2}(\|010\rangle + \|011\rangle - \|101\rangle + \|111\rangle)$	$\frac{1}{4}(x_1(\|00\rangle - \|11\rangle) + x_0(-\|01\rangle + \|10\rangle))$	$4I \otimes \sigma_z$

	$\|\Pi\rangle = \frac{1}{2}(\|010\rangle - \|011\rangle + \|101\rangle + \|111\rangle)$	$\frac{1}{4}(x_1(\|00\rangle - \|11\rangle) + x_0(-\|01\rangle + \|10\rangle))$	$4I \otimes \sigma_z$
	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(\|000\rangle + \|010\rangle + \|011\rangle - \|101\rangle - \|110\rangle + \|111\rangle)$	$\frac{1}{2\sqrt{6}}(x_1(\|00\rangle - \|11\rangle) + x_0(-\|01\rangle + \|10\rangle))$	$2\sqrt{6}I \otimes \sigma_z$
	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(\|000\rangle + \|010\rangle - \|011\rangle + \|101\rangle - \|110\rangle + \|111\rangle)$	$\frac{1}{2\sqrt{6}}(x_1(\|00\rangle - \|11\rangle) + x_0(-\|01\rangle + \|10\rangle))$	$2\sqrt{6}I \otimes \sigma_z$
	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(-\|000\rangle + \|010\rangle + \|011\rangle - \|101\rangle + \|110\rangle + \|111\rangle)$	$\frac{1}{2\sqrt{6}}(x_1(\|00\rangle - \|11\rangle) + x_0(-\|01\rangle + \|10\rangle))$	$2\sqrt{6}I \otimes \sigma_z$
	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(-\|000\rangle + \|010\rangle - \|011\rangle + \|101\rangle + \|110\rangle + \|111\rangle)$	$\frac{1}{2\sqrt{6}}(x_1(\|00\rangle - \|11\rangle) + x_0(-\|01\rangle + \|10\rangle))$	$2\sqrt{6}I \otimes \sigma_z$
	$\|\Pi\rangle = \frac{1}{\sqrt{2}}(\|001\rangle + \|100\rangle)$	$\frac{1}{2\sqrt{2}}(x_1(\|00\rangle - \|11\rangle) + x_0(-\|01\rangle + \|10\rangle))$	$2\sqrt{2}I \otimes \sigma_z$
	$\|\Pi\rangle = \frac{1}{2}(\|000\rangle + \|001\rangle + \|100\rangle - \|110\rangle)$	$\frac{1}{4}(x_1(\|00\rangle - \|11\rangle) + x_0(-\|01\rangle + \|10\rangle))$	$4I \otimes \sigma_z$
	$\|\Pi\rangle = \frac{1}{2}(-\|000\rangle + \|001\rangle + \|100\rangle + \|110\rangle)$	$\frac{1}{4}(x_1(\|00\rangle - \|11\rangle) + x_0(-\|01\rangle + \|10\rangle))$	$4I \otimes \sigma_z$

	$\|\Pi\rangle = \frac{1}{2}(\|001\rangle + \|011\rangle + \|100\rangle - \|101\rangle)$	$\frac{1}{4}(x_1(\|00\rangle - \|11\rangle) + x_0(-\|01\rangle + \|10\rangle))$	$4I \otimes \sigma_z$
	$\|\Pi\rangle = \frac{1}{2}(\|001\rangle - \|011\rangle + \|100\rangle + \|101\rangle)$	$\frac{1}{4}(x_1(\|00\rangle - \|11\rangle) + x_0(-\|01\rangle + \|10\rangle))$	$4I \otimes \sigma_z$
	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(\|000\rangle + \|001\rangle + \|011\rangle + \|100\rangle - \|101\rangle - \|110\rangle)$	$\frac{1}{2\sqrt{6}}(x_1(\|00\rangle - \|11\rangle) + x_0(-\|01\rangle + \|10\rangle))$	$2\sqrt{6}I \otimes \sigma_z$
	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(\|000\rangle + \|001\rangle - \|011\rangle + \|100\rangle + \|101\rangle - \|110\rangle)$	$\frac{1}{2\sqrt{6}}(x_1(\|00\rangle - \|11\rangle) + x_0(-\|01\rangle + \|10\rangle))$	$2\sqrt{6}I \otimes \sigma_z$
	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(-\|000\rangle + \|001\rangle + \|011\rangle + \|100\rangle - \|101\rangle + \|110\rangle)$	$\frac{1}{2\sqrt{6}}(x_1(\|00\rangle - \|11\rangle) + x_0(-\|01\rangle + \|10\rangle))$	$2\sqrt{6}I \otimes \sigma_z$
	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(-\|000\rangle + \|001\rangle - \|011\rangle + \|100\rangle + \|101\rangle + \|110\rangle)$	$\frac{1}{2\sqrt{6}}(x_1(\|00\rangle - \|11\rangle) + x_0(-\|01\rangle + \|10\rangle))$	$2\sqrt{6}I \otimes \sigma_z$
	$\|\Pi\rangle = \frac{1}{\sqrt{2}}(\|100\rangle + \|111\rangle)$	$\frac{1}{2\sqrt{2}}(x_1(\|00\rangle - \|11\rangle) + x_0(-\|01\rangle + \|10\rangle))$	$2\sqrt{2}I \otimes \sigma_z$
	$\|\Pi\rangle = \frac{1}{2}(\|000\rangle + \|100\rangle - \|110\rangle + \|111\rangle)$	$\frac{1}{4}(x_1(\|00\rangle - \|11\rangle) + x_0(-\|01\rangle + \|10\rangle))$	$4I \otimes \sigma_z$

	$\|\Pi\rangle = \frac{1}{2}(-\|000\rangle + \|100\rangle + \|110\rangle + \|111\rangle)$	$\frac{1}{4}(x_1(\|00\rangle - \|11\rangle) + x_0(-\|01\rangle + \|10\rangle))$	$4I \otimes \sigma_z$
	$\|\Pi\rangle = \frac{1}{2}(\|011\rangle + \|100\rangle - \|101\rangle + \|111\rangle)$	$\frac{1}{4}(x_1(\|00\rangle - \|11\rangle) + x_0(-\|01\rangle + \|10\rangle))$	$4I \otimes \sigma_z$
	$\|\Pi\rangle = \frac{1}{2}(-\|011\rangle + \|100\rangle + \|101\rangle + \|111\rangle)$	$\frac{1}{4}(x_1(\|00\rangle - \|11\rangle) + x_0(-\|01\rangle + \|10\rangle))$	$4I \otimes \sigma_z$
	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(\|000\rangle + \|011\rangle + \|100\rangle - \|101\rangle - \|110\rangle + \|111\rangle)$	$\frac{1}{2\sqrt{6}}(x_1(\|00\rangle - \|11\rangle) + x_0(-\|01\rangle + \|10\rangle))$	$2\sqrt{6}I \otimes \sigma_z$
	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(\|000\rangle - \|011\rangle + \|100\rangle + \|101\rangle - \|110\rangle + \|111\rangle)$	$\frac{1}{2\sqrt{6}}(x_1(\|00\rangle - \|11\rangle) + x_0(-\|01\rangle + \|10\rangle))$	$2\sqrt{6}I \otimes \sigma_z$
	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(-\|000\rangle - \|011\rangle + \|100\rangle - \|101\rangle + \|110\rangle + \|111\rangle)$	$\frac{1}{2\sqrt{6}}(x_1(\|00\rangle - \|11\rangle) + x_0(-\|01\rangle + \|10\rangle))$	$2\sqrt{6}I \otimes \sigma_z$
	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(-\|000\rangle - \|011\rangle + \|100\rangle + \|101\rangle + \|110\rangle + \|111\rangle)$	$\frac{1}{2\sqrt{6}}(x_1(\|00\rangle - \|11\rangle) + x_0(-\|01\rangle + \|10\rangle))$	$2\sqrt{6}I \otimes \sigma_z$
	$\|\Pi\rangle = \frac{1}{2}(\|001\rangle + \|010\rangle + \|100\rangle + \|111\rangle)$	$\frac{1}{2}(x_1(\|00\rangle - \|11\rangle) + x_0(-\|01\rangle + \|10\rangle))$	$2I \otimes \sigma_z$

	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(\|000\rangle + \|001\rangle + \|010\rangle + \|100\rangle - \|110\rangle + \|111\rangle)$	$\frac{1}{\sqrt{6}}(x_1(\|00\rangle - \|11\rangle) + x_0(-\|01\rangle + \|10\rangle))$	$\sqrt{6}I \otimes \sigma_z$
	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(-\|000\rangle + \|001\rangle + \|010\rangle + \|100\rangle + \|110\rangle + \|111\rangle)$	$\frac{1}{\sqrt{6}}(x_1(\|00\rangle - \|11\rangle) + x_0(-\|01\rangle + \|10\rangle))$	$\sqrt{6}I \otimes \sigma_z$
	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(\|001\rangle + \|010\rangle + \|011\rangle + \|100\rangle - \|101\rangle + \|111\rangle)$	$\frac{1}{\sqrt{6}}(x_1(\|00\rangle - \|11\rangle) + x_0(-\|01\rangle + \|10\rangle))$	$\sqrt{6}I \otimes \sigma_z$
	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(\|001\rangle + \|010\rangle - \|011\rangle + \|100\rangle + \|101\rangle + \|111\rangle)$	$\frac{1}{\sqrt{6}}(x_1(\|00\rangle - \|11\rangle) + x_0(-\|01\rangle + \|10\rangle))$	$\sqrt{6}I \otimes \sigma_z$
	$\|\Pi\rangle = \|000\rangle + \|001\rangle + \|010\rangle + \|011\rangle + \|100\rangle - \|101\rangle - \|110\rangle + \|111\rangle$	$x_1(\|00\rangle - \|11\rangle) + x_0(-\|01\rangle + \|10\rangle)$	$I \otimes \sigma_z$
	$\|\Pi\rangle = \|000\rangle + \|001\rangle + \|010\rangle - \|011\rangle + \|100\rangle + \|101\rangle - \|110\rangle + \|111\rangle$	$x_1(\|00\rangle - \|11\rangle) + x_0(-\|01\rangle + \|10\rangle)$	$I \otimes \sigma_z$
	$\|\Pi\rangle = -\|000\rangle + \|001\rangle + \|010\rangle + \|011\rangle + \|100\rangle - \|101\rangle + \|110\rangle + \|111\rangle$	$x_1(\|00\rangle - \|11\rangle) + x_0(-\|01\rangle + \|10\rangle)$	$I \otimes \sigma_z$
	$\|\Pi\rangle = -\|000\rangle + \|001\rangle + \|010\rangle - \|011\rangle + \|100\rangle + \|101\rangle + \|110\rangle + \|111\rangle$	$x_1(\|00\rangle - \|11\rangle) + x_0(-\|01\rangle + \|10\rangle)$	$I \otimes \sigma_z$
	$\|\Pi\rangle = \frac{1}{\sqrt{2}}(\|000\rangle + \|011\rangle)$	$\frac{1}{2\sqrt{2}}(x_0(\|00\rangle - \|11\rangle) + x_1(-\|01\rangle + \|10\rangle))$	$2\sqrt{2}\sigma_x \otimes \sigma_z$
	$\|\Pi\rangle = \frac{1}{2}(\|000\rangle + \|010\rangle + \|011\rangle - \|100\rangle)$	$\frac{1}{4}(x_0(\|00\rangle - \|11\rangle) + x_1(-\|01\rangle + \|10\rangle))$	$4\sigma_x \otimes \sigma_z$

	$\|\Pi\rangle = \frac{1}{2}(\|000\rangle - \|010\rangle + \|011\rangle + \|100\rangle)$	$\frac{1}{4}(x_0(\|00\rangle - \|11\rangle) + x_1(-\|01\rangle + \|10\rangle))$	$4\sigma_x \otimes \sigma_z$
	$\|\Pi\rangle = \frac{1}{2}(\|000\rangle + \|001\rangle + \|011\rangle - \|111\rangle)$	$\frac{1}{4}(x_0(\|00\rangle - \|11\rangle) + x_1(-\|01\rangle + \|10\rangle))$	$4\sigma_x \otimes \sigma_z$
	$\|\Pi\rangle = \frac{1}{2}(\|000\rangle - \|001\rangle + \|011\rangle + \|111\rangle)$	$\frac{1}{4}(x_0(\|00\rangle - \|11\rangle) + x_1(-\|01\rangle + \|10\rangle))$	$4\sigma_x \otimes \sigma_z$
	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(\|000\rangle + \|001\rangle + \|010\rangle + \|011\rangle - \|100\rangle - \|111\rangle)$	$\frac{1}{2\sqrt{6}}(x_0(\|00\rangle - \|11\rangle) + x_1(-\|01\rangle + \|10\rangle))$	$2\sqrt{6}\sigma_x \otimes \sigma_z$
	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(\|000\rangle - \|001\rangle + \|010\rangle - \|011\rangle + \|100\rangle + \|111\rangle)$	$\frac{1}{2\sqrt{6}}(x_0(\|00\rangle - \|11\rangle) + x_1(-\|01\rangle + \|10\rangle))$	$2\sqrt{6}\sigma_x \otimes \sigma_z$
	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(\|000\rangle + \|001\rangle - \|010\rangle + \|011\rangle + \|100\rangle - \|111\rangle)$	$\frac{1}{2\sqrt{6}}(x_0(\|00\rangle - \|11\rangle) + x_1(-\|01\rangle + \|10\rangle))$	$2\sqrt{6}\sigma_x \otimes \sigma_z$
	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(\|000\rangle - \|001\rangle - \|010\rangle + \|011\rangle + \|100\rangle + \|111\rangle)$	$\frac{1}{2\sqrt{6}}(x_0(\|00\rangle - \|11\rangle) + x_1(-\|01\rangle + \|10\rangle))$	$2\sqrt{6}\sigma_x \otimes \sigma_z$
	$\|\Pi\rangle = \frac{1}{\sqrt{2}}(\|101\rangle + \|110\rangle)$	$\frac{1}{2\sqrt{2}}(x_0(\|00\rangle - \|11\rangle) + x_1(-\|01\rangle + \|10\rangle))$	$2\sqrt{2}\sigma_x \otimes \sigma_z$
	$\|\Pi\rangle = \frac{1}{2}(\|010\rangle - \|100\rangle + \|101\rangle + \|110\rangle)$	$\frac{1}{4}(x_0(\|00\rangle - \|11\rangle) + x_1(-\|01\rangle + \|10\rangle))$	$4\sigma_x \otimes \sigma_z$

	$\|\Pi\rangle = \frac{1}{2}(-\|010\rangle + \|100\rangle + \|101\rangle + \|110\rangle)$	$\frac{1}{4}(x_0(\|00\rangle - \|11\rangle) + x_1(-\|01\rangle + \|10\rangle))$	$4\sigma_x \otimes \sigma_z$
	$\|\Pi\rangle = \frac{1}{2}(\|001\rangle + \|101\rangle + \|110\rangle - \|111\rangle)$	$\frac{1}{4}(x_0(\|00\rangle - \|11\rangle) + x_1(-\|01\rangle + \|10\rangle))$	$4\sigma_x \otimes \sigma_z$
	$\|\Pi\rangle = \frac{1}{2}(-\|001\rangle + \|101\rangle + \|110\rangle + \|111\rangle)$	$\frac{1}{4}(x_0(\|00\rangle - \|11\rangle) + x_1(-\|01\rangle + \|10\rangle))$	$4\sigma_x \otimes \sigma_z$
	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(\|001\rangle + \|010\rangle - \|100\rangle + \|101\rangle + \|110\rangle - \|111\rangle)$	$\frac{1}{2\sqrt{6}}(x_0(\|00\rangle - \|11\rangle) + x_1(-\|01\rangle + \|10\rangle))$	$2\sqrt{6}\sigma_x \otimes \sigma_z$
	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(-\|001\rangle + \|010\rangle + \|100\rangle - \|101\rangle + \|110\rangle + \|111\rangle)$	$\frac{1}{2\sqrt{6}}(x_0(\|00\rangle - \|11\rangle) + x_1(-\|01\rangle + \|10\rangle))$	$2\sqrt{6}\sigma_x \otimes \sigma_z$
	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(\|001\rangle - \|010\rangle + \|100\rangle + \|101\rangle + \|110\rangle - \|111\rangle)$	$\frac{1}{2\sqrt{6}}(x_0(\|00\rangle - \|11\rangle) + x_1(-\|01\rangle + \|10\rangle))$	$2\sqrt{6}\sigma_x \otimes \sigma_z$
	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(-\|001\rangle - \|010\rangle + \|100\rangle + \|101\rangle + \|110\rangle + \|111\rangle)$	$\frac{1}{2\sqrt{6}}(x_0(\|00\rangle - \|11\rangle) + x_1(-\|01\rangle + \|10\rangle))$	$2\sqrt{6}\sigma_x \otimes \sigma_z$
	$\|\Pi\rangle = \frac{1}{\sqrt{2}}(\|000\rangle + \|101\rangle)$	$\frac{1}{2\sqrt{2}}(x_0(\|00\rangle - \|11\rangle) + x_1(-\|01\rangle + \|10\rangle))$	$2\sqrt{2}\sigma_x \otimes \sigma_z$
	$\|\Pi\rangle = \frac{1}{2}(\|000\rangle + \|010\rangle - \|100\rangle + \|101\rangle)$	$\frac{1}{4}(x_0(\|00\rangle - \|11\rangle) + x_1(-\|01\rangle + \|10\rangle))$	$4\sigma_x \otimes \sigma_z$

	$\|\Pi\rangle = \frac{1}{2}(\|000\rangle - \|010\rangle + \|100\rangle + \|101\rangle)$	$\frac{1}{4}(x_0(\|00\rangle - \|11\rangle) + x_1(-\|01\rangle + \|10\rangle))$	$4\sigma_x \otimes \sigma_z$
	$\|\Pi\rangle = \frac{1}{2}(\|000\rangle + \|001\rangle + \|101\rangle - \|111\rangle)$	$\frac{1}{4}(x_0(\|00\rangle - \|11\rangle) + x_1(-\|01\rangle + \|10\rangle))$	$4\sigma_x \otimes \sigma_z$
	$\|\Pi\rangle = \frac{1}{2}(\|000\rangle - \|001\rangle + \|101\rangle + \|111\rangle)$	$\frac{1}{4}(x_0(\|00\rangle - \|11\rangle) + x_1(-\|01\rangle + \|10\rangle))$	$4\sigma_x \otimes \sigma_z$
	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(\|000\rangle + \|001\rangle + \|010\rangle - \|100\rangle + \|101\rangle - \|111\rangle)$	$\frac{1}{2\sqrt{6}}(x_0(\|00\rangle - \|11\rangle) + x_1(-\|01\rangle + \|10\rangle))$	$2\sqrt{6}\sigma_x \otimes \sigma_z$
	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(\|000\rangle - \|001\rangle + \|010\rangle - \|100\rangle + \|101\rangle + \|111\rangle)$	$\frac{1}{2\sqrt{6}}(x_0(\|00\rangle - \|11\rangle) + x_1(-\|01\rangle + \|10\rangle))$	$2\sqrt{6}\sigma_x \otimes \sigma_z$
	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(\|000\rangle + \|001\rangle - \|010\rangle + \|100\rangle + \|101\rangle - \|111\rangle)$	$\frac{1}{2\sqrt{6}}(x_0(\|00\rangle - \|11\rangle) + x_1(-\|01\rangle + \|10\rangle))$	$2\sqrt{6}\sigma_x \otimes \sigma_z$
	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(\|000\rangle - \|001\rangle - \|010\rangle + \|100\rangle + \|101\rangle + \|111\rangle)$	$\frac{1}{2\sqrt{6}}(x_0(\|00\rangle - \|11\rangle) + x_1(-\|01\rangle + \|10\rangle))$	$2\sqrt{6}\sigma_x \otimes \sigma_z$
	$\|\Pi\rangle = \frac{1}{\sqrt{2}}(\|011\rangle + \|110\rangle)$	$\frac{1}{2\sqrt{2}}(x_0(\|00\rangle - \|11\rangle) + x_1(-\|01\rangle + \|10\rangle))$	$2\sqrt{2}\sigma_x \otimes \sigma_z$
	$\|\Pi\rangle = \frac{1}{2}(\|010\rangle + \|011\rangle - \|100\rangle + \|110\rangle)$	$\frac{1}{4}(x_0(\|00\rangle - \|11\rangle) + x_1(-\|01\rangle + \|10\rangle))$	$4\sigma_x \otimes \sigma_z$

	$\|\Pi\rangle = \frac{1}{2}(-\|010\rangle + \|011\rangle + \|100\rangle + \|110\rangle)$	$\frac{1}{4}(x_0(\|00\rangle - \|11\rangle) + x_1(-\|01\rangle + \|10\rangle))$	$4\sigma_x \otimes \sigma_z$
	$\|\Pi\rangle = \frac{1}{2}(\|001\rangle + \|011\rangle + \|110\rangle - \|111\rangle)$	$\frac{1}{4}(x_0(\|00\rangle - \|11\rangle) + x_1(-\|01\rangle + \|10\rangle))$	$4\sigma_x \otimes \sigma_z$
	$\|\Pi\rangle = \frac{1}{2}(-\|001\rangle + \|011\rangle + \|110\rangle + \|111\rangle)$	$\frac{1}{4}(x_0(\|00\rangle - \|11\rangle) + x_1(-\|01\rangle + \|10\rangle))$	$4\sigma_x \otimes \sigma_z$
	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(\|001\rangle + \|010\rangle + \|011\rangle - \|100\rangle + \|110\rangle - \|111\rangle)$	$\frac{1}{2\sqrt{6}}(x_0(\|00\rangle - \|11\rangle) + x_1(-\|01\rangle + \|10\rangle))$	$2\sqrt{6}\sigma_x \otimes \sigma_z$
	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(-\|001\rangle + \|010\rangle + \|011\rangle - \|100\rangle + \|110\rangle + \|111\rangle)$	$\frac{1}{2\sqrt{6}}(x_0(\|00\rangle - \|11\rangle) + x_1(-\|01\rangle + \|10\rangle))$	$2\sqrt{6}\sigma_x \otimes \sigma_z$
	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(\|001\rangle - \|010\rangle + \|011\rangle + \|100\rangle + \|110\rangle - \|111\rangle)$	$\frac{1}{2\sqrt{6}}(x_0(\|00\rangle - \|11\rangle) + x_1(-\|01\rangle + \|10\rangle))$	$2\sqrt{6}\sigma_x \otimes \sigma_z$
	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(-\|001\rangle - \|010\rangle + \|011\rangle + \|100\rangle + \|110\rangle + \|111\rangle)$	$\frac{1}{2\sqrt{6}}(x_0(\|00\rangle - \|11\rangle) + x_1(-\|01\rangle + \|10\rangle))$	$2\sqrt{6}\sigma_x \otimes \sigma_z$
	$\|\Pi\rangle = \frac{1}{2}(\|000\rangle + \|011\rangle + \|101\rangle + \|110\rangle)$	$\frac{1}{2}(x_0(\|00\rangle - \|11\rangle) + x_1(-\|01\rangle + \|10\rangle))$	$2\sigma_x \otimes \sigma_z$

	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(\|000\rangle + \|010\rangle + \|011\rangle - \|100\rangle + \|101\rangle + \|110\rangle)$	$\frac{1}{\sqrt{6}}(x_0(\|00\rangle - \|11\rangle) + x_1(-\|01\rangle + \|10\rangle))$	$\sqrt{6}\sigma_x \otimes \sigma_z$
	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(\|000\rangle - \|010\rangle + \|011\rangle + \|100\rangle + \|101\rangle + \|110\rangle)$	$\frac{1}{\sqrt{6}}(x_0(\|00\rangle - \|11\rangle) + x_1(-\|01\rangle + \|10\rangle))$	$\sqrt{6}\sigma_x \otimes \sigma_z$
	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(\|000\rangle + \|001\rangle + \|011\rangle + \|101\rangle + \|110\rangle - \|111\rangle)$	$\frac{1}{\sqrt{6}}(x_0(\|00\rangle - \|11\rangle) + x_1(-\|01\rangle + \|10\rangle))$	$\sqrt{6}\sigma_x \otimes \sigma_z$
	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(\|000\rangle - \|001\rangle + \|011\rangle + \|101\rangle + \|110\rangle + \|111\rangle)$	$\frac{1}{\sqrt{6}}(x_0(\|00\rangle - \|11\rangle) + x_1(-\|01\rangle + \|10\rangle))$	$\sqrt{6}\sigma_x \otimes \sigma_z$
	$\|\Pi\rangle = \|000\rangle + \|001\rangle + \|010\rangle + \|011\rangle - \|100\rangle + \|101\rangle + \|110\rangle - \|111\rangle$	$x_0(\|00\rangle - \|11\rangle) + x_1(-\|01\rangle + \|10\rangle)$	$\sigma_x \otimes \sigma_z$
	$\|\Pi\rangle = \|000\rangle - \|001\rangle + \|010\rangle + \|011\rangle - \|100\rangle + \|101\rangle + \|110\rangle + \|111\rangle$	$x_0(\|00\rangle - \|11\rangle) + x_1(-\|01\rangle + \|10\rangle)$	$\sigma_x \otimes \sigma_z$
	$\|\Pi\rangle = \|000\rangle + \|001\rangle - \|010\rangle + \|011\rangle + \|100\rangle + \|101\rangle + \|110\rangle - \|111\rangle$	$x_0(\|00\rangle - \|11\rangle) + x_1(-\|01\rangle + \|10\rangle)$	$\sigma_x \otimes \sigma_z$
	$\|\Pi\rangle = \|000\rangle - \|001\rangle - \|010\rangle + \|011\rangle + \|100\rangle + \|101\rangle + \|110\rangle + \|111\rangle$	$x_0(\|00\rangle - \|11\rangle) + x_1(-\|01\rangle + \|10\rangle)$	$\sigma_x \otimes \sigma_z$

Tabel 18 Pengukuran Informasi Khusus Keadaan Terbelit 6

Keadaan Terbelit	Keadaan Alice	Keadaan Bob	Operator
$\|\varphi\rangle = \frac{1}{2}(\|001\rangle - \|010\rangle + \|100\rangle - \|111\rangle)$	$\|\Pi\rangle = \frac{1}{\sqrt{2}}(\|001\rangle + \|010\rangle)$	$\frac{1}{2\sqrt{2}}(x_0(\|00\rangle - \|11\rangle) + x_0(\|01\rangle - \|10\rangle))$	$2\sqrt{2}\sigma_z \otimes I$
	$\|\Pi\rangle = \frac{1}{2}(\|000\rangle + \|001\rangle + \|010\rangle - \|110\rangle)$	$\frac{1}{4}(x_0(\|00\rangle - \|11\rangle) + x_0(\|01\rangle - \|10\rangle))$	$4\sigma_z \otimes I$
	$\|\Pi\rangle = \frac{1}{2}(-\|000\rangle + \|001\rangle + \|010\rangle + \|110\rangle)$	$\frac{1}{4}(x_0(\|00\rangle - \|11\rangle) + x_0(\|01\rangle - \|10\rangle))$	$4\sigma_z \otimes I$
	$\|\Pi\rangle = \frac{1}{2}(\|001\rangle + \|010\rangle + \|011\rangle - \|101\rangle)$	$\frac{1}{4}(x_0(\|00\rangle - \|11\rangle) + x_0(\|01\rangle - \|10\rangle))$	$4\sigma_z \otimes I$
	$\|\Pi\rangle = \frac{1}{2}(\|001\rangle + \|010\rangle - \|011\rangle + \|101\rangle)$	$\frac{1}{4}(x_0(\|00\rangle - \|11\rangle) + x_0(\|01\rangle - \|10\rangle))$	$4\sigma_z \otimes I$
	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(\|000\rangle + \|001\rangle + \|010\rangle + \|011\rangle - \|101\rangle - \|110\rangle)$	$\frac{1}{2\sqrt{6}}(x_0(\|00\rangle - \|11\rangle) + x_0(\|01\rangle - \|10\rangle))$	$2\sqrt{6}\sigma_z \otimes I$
	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(\|000\rangle + \|001\rangle + \|010\rangle - \|011\rangle + \|101\rangle - \|110\rangle)$	$\frac{1}{2\sqrt{6}}(x_0(\|00\rangle - \|11\rangle) + x_0(\|01\rangle - \|10\rangle))$	$2\sqrt{6}\sigma_z \otimes I$
	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(-\|000\rangle + \|001\rangle + \|010\rangle + \|011\rangle - \|101\rangle + \|110\rangle)$	$\frac{1}{2\sqrt{6}}(x_0(\|00\rangle - \|11\rangle) + x_0(\|01\rangle - \|10\rangle))$	$2\sqrt{6}\sigma_z \otimes I$
	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(-\|000\rangle + \|001\rangle + \|010\rangle - \|011\rangle + \|101\rangle + \|110\rangle)$	$\frac{1}{2\sqrt{6}}(x_0(\|00\rangle - \|11\rangle) + x_0(\|01\rangle - \|10\rangle))$	$2\sqrt{6}\sigma_z \otimes I$
	$\|\Pi\rangle = \frac{1}{\sqrt{2}}(\|010\rangle + \|111\rangle)$	$\frac{1}{2\sqrt{2}}(x_0(\|00\rangle - \|11\rangle) + x_0(\|01\rangle - \|10\rangle))$	$2\sqrt{6}\sigma_z \otimes I$

	$\|\Pi\rangle = \frac{1}{2}(\|000\rangle + \|010\rangle - \|110\rangle + \|111\rangle)$	$\frac{1}{4}(x_0(\|00\rangle - \|11\rangle) + x_0(\|01\rangle - \|10\rangle))$	$4\sigma_z \otimes I$
	$\|\Pi\rangle = \frac{1}{2}(-\|000\rangle + \|010\rangle + \|110\rangle + \|111\rangle)$	$\frac{1}{4}(x_0(\|00\rangle - \|11\rangle) + x_0(\|01\rangle - \|10\rangle))$	$4\sigma_z \otimes I$
	$\|\Pi\rangle = \frac{1}{2}(\|010\rangle + \|011\rangle - \|101\rangle + \|111\rangle)$	$\frac{1}{4}(x_0(\|00\rangle - \|11\rangle) + x_0(\|01\rangle - \|10\rangle))$	$4\sigma_z \otimes I$
	$\|\Pi\rangle = \frac{1}{2}(\|010\rangle - \|011\rangle + \|101\rangle + \|111\rangle)$	$\frac{1}{4}(x_0(\|00\rangle - \|11\rangle) + x_0(\|01\rangle - \|10\rangle))$	$4\sigma_z \otimes I$
	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(\|000\rangle + \|010\rangle + \|011\rangle - \|101\rangle - \|110\rangle + \|111\rangle)$	$\frac{1}{2\sqrt{6}}(x_0(\|00\rangle - \|11\rangle) + x_0(\|01\rangle - \|10\rangle))$	$2\sqrt{6}\sigma_z \otimes I$
	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(\|000\rangle + \|010\rangle - \|011\rangle + \|101\rangle - \|110\rangle + \|111\rangle)$	$\frac{1}{2\sqrt{6}}(x_0(\|00\rangle - \|11\rangle) + x_0(\|01\rangle - \|10\rangle))$	$2\sqrt{6}\sigma_z \otimes I$
	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(-\|000\rangle + \|010\rangle + \|011\rangle - \|101\rangle + \|110\rangle + \|111\rangle)$	$\frac{1}{2\sqrt{6}}(x_0(\|00\rangle - \|11\rangle) + x_0(\|01\rangle - \|10\rangle))$	$2\sqrt{6}\sigma_z \otimes I$
	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(-\|000\rangle + \|010\rangle - \|011\rangle + \|101\rangle + \|110\rangle + \|111\rangle)$	$\frac{1}{2\sqrt{6}}(x_0(\|00\rangle - \|11\rangle) + x_0(\|01\rangle - \|10\rangle))$	$2\sqrt{6}\sigma_z \otimes I$
	$\|\Pi\rangle = \frac{1}{\sqrt{2}}(\|001\rangle + \|100\rangle)$	$\frac{1}{2\sqrt{2}}(x_0(\|00\rangle - \|11\rangle) + x_0(\|01\rangle - \|10\rangle))$	$2\sqrt{2}\sigma_z \otimes I$
	$\|\Pi\rangle = \frac{1}{2}(\|000\rangle + \|001\rangle + \|100\rangle - \|110\rangle)$	$\frac{1}{4}(x_0(\|00\rangle - \|11\rangle) + x_0(\|01\rangle - \|10\rangle))$	$4\sigma_z \otimes I$
	$\|\Pi\rangle = \frac{1}{2}(-\|000\rangle + \|001\rangle + \|100\rangle + \|110\rangle)$	$\frac{1}{4}(x_0(\|00\rangle - \|11\rangle) + x_0(\|01\rangle - \|10\rangle))$	$4\sigma_z \otimes I$

	$\|\Pi\rangle = \frac{1}{2}(\|001\rangle + \|011\rangle + \|100\rangle - \|101\rangle)$	$\frac{1}{4}(x_0(\|00\rangle - \|11\rangle) + x_0(\|01\rangle - \|10\rangle))$	$4\sigma_z \otimes I$
	$\|\Pi\rangle = \frac{1}{2}(\|001\rangle - \|011\rangle + \|100\rangle + \|101\rangle)$	$\frac{1}{4}(x_0(\|00\rangle - \|11\rangle) + x_0(\|01\rangle - \|10\rangle))$	$4\sigma_z \otimes I$
	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(\|000\rangle + \|001\rangle + \|011\rangle + \|100\rangle - \|101\rangle - \|110\rangle)$	$\frac{1}{2\sqrt{6}}(x_0(\|00\rangle - \|11\rangle) + x_0(\|01\rangle - \|10\rangle))$	$2\sqrt{6}\sigma_z \otimes I$
	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(\|000\rangle + \|001\rangle - \|011\rangle + \|100\rangle + \|101\rangle - \|110\rangle)$	$\frac{1}{2\sqrt{6}}(x_0(\|00\rangle - \|11\rangle) + x_0(\|01\rangle - \|10\rangle))$	$2\sqrt{6}\sigma_z \otimes I$
	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(-\|000\rangle + \|001\rangle + \|011\rangle + \|100\rangle - \|101\rangle + \|110\rangle)$	$\frac{1}{2\sqrt{6}}(x_0(\|00\rangle - \|11\rangle) + x_0(\|01\rangle - \|10\rangle))$	$2\sqrt{6}\sigma_z \otimes I$
	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(-\|000\rangle + \|001\rangle - \|011\rangle + \|100\rangle + \|101\rangle + \|110\rangle)$	$\frac{1}{2\sqrt{6}}(x_0(\|00\rangle - \|11\rangle) + x_0(\|01\rangle - \|10\rangle))$	$2\sqrt{6}\sigma_z \otimes I$
	$\|\Pi\rangle = \frac{1}{\sqrt{2}}(\|100\rangle + \|111\rangle)$	$\frac{1}{2\sqrt{2}}(x_0(\|00\rangle - \|11\rangle) + x_0(\|01\rangle - \|10\rangle))$	$2\sqrt{2}\sigma_z \otimes I$
	$\|\Pi\rangle = \frac{1}{2}(\|000\rangle + \|100\rangle - \|110\rangle + \|111\rangle)$	$\frac{1}{4}(x_0(\|00\rangle - \|11\rangle) + x_0(\|01\rangle - \|10\rangle))$	$4\sigma_z \otimes I$
	$\|\Pi\rangle = \frac{1}{2}(-\|000\rangle + \|100\rangle + \|110\rangle + \|111\rangle)$	$\frac{1}{4}(x_0(\|00\rangle - \|11\rangle) + x_0(\|01\rangle - \|10\rangle))$	$4\sigma_z \otimes I$
	$\|\Pi\rangle = \frac{1}{2}(\|011\rangle + \|100\rangle - \|101\rangle + \|111\rangle)$	$\frac{1}{4}(x_0(\|00\rangle - \|11\rangle) + x_0(\|01\rangle - \|10\rangle))$	$4\sigma_z \otimes I$
	$\|\Pi\rangle = \frac{1}{2}(-\|011\rangle + \|100\rangle + \|101\rangle + \|111\rangle)$	$\frac{1}{4}(x_0(\|00\rangle - \|11\rangle) + x_0(\|01\rangle - \|10\rangle))$	$4\sigma_z \otimes I$

	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(\|000\rangle + \|011\rangle + \|100\rangle - \|101\rangle - \|110\rangle + \|111\rangle)$	$\frac{1}{2\sqrt{6}}(x_0(\|00\rangle - \|11\rangle) + x_0(\|01\rangle - \|10\rangle))$	$2\sqrt{6}\sigma_z \otimes I$
	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(\|000\rangle - \|011\rangle + \|100\rangle + \|101\rangle - \|110\rangle + \|111\rangle)$	$\frac{1}{2\sqrt{6}}(x_0(\|00\rangle - \|11\rangle) + x_0(\|01\rangle - \|10\rangle))$	$2\sqrt{6}\sigma_z \otimes I$
	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(-\|000\rangle - \|011\rangle + \|100\rangle - \|101\rangle + \|110\rangle + \|111\rangle)$	$\frac{1}{2\sqrt{6}}(x_0(\|00\rangle - \|11\rangle) + x_0(\|01\rangle - \|10\rangle))$	$2\sqrt{6}\sigma_z \otimes I$
	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(-\|000\rangle - \|011\rangle + \|100\rangle + \|101\rangle + \|110\rangle + \|111\rangle)$	$\frac{1}{2\sqrt{6}}(x_0(\|00\rangle - \|11\rangle) + x_0(\|01\rangle - \|10\rangle))$	$2\sqrt{6}\sigma_z \otimes I$
	$\|\Pi\rangle = \frac{1}{2}(\|001\rangle + \|010\rangle + \|100\rangle + \|111\rangle)$	$\frac{1}{2}(x_0(\|00\rangle - \|11\rangle) + x_1(\|01\rangle - \|10\rangle))$	$2\sigma_z \otimes I$
	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(\|000\rangle + \|001\rangle + \|010\rangle + \|100\rangle - \|110\rangle + \|111\rangle)$	$\frac{1}{\sqrt{6}}(x_0(\|00\rangle - \|11\rangle) + x_1(\|01\rangle - \|10\rangle))$	$\sqrt{6}\sigma_z \otimes I$
	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(-\|000\rangle + \|001\rangle + \|010\rangle + \|100\rangle + \|110\rangle + \|111\rangle)$	$\frac{1}{\sqrt{6}}(x_0(\|00\rangle - \|11\rangle) + x_1(\|01\rangle - \|10\rangle))$	$\sqrt{6}\sigma_z \otimes I$
	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(\|001\rangle + \|010\rangle + \|011\rangle + \|100\rangle - \|101\rangle + \|111\rangle)$	$\frac{1}{\sqrt{6}}(x_0(\|00\rangle - \|11\rangle) + x_1(\|01\rangle - \|10\rangle))$	$\sqrt{6}\sigma_z \otimes I$
	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(\|001\rangle + \|010\rangle - \|011\rangle + \|100\rangle + \|101\rangle + \|111\rangle)$	$\frac{1}{\sqrt{6}}(x_0(\|00\rangle - \|11\rangle) + x_1(\|01\rangle - \|10\rangle))$	$\sqrt{6}\sigma_z \otimes I$
	$\|\Pi\rangle = \|000\rangle + \|001\rangle + \|010\rangle + \|011\rangle + \|100\rangle - \|101\rangle - \|110\rangle + \|111\rangle$	$x_0(\|00\rangle - \|11\rangle) + x_1(\|01\rangle - \|10\rangle)$	$\sigma_z \otimes I$
	$\|\Pi\rangle = \|000\rangle + \|001\rangle + \|010\rangle - \|011\rangle + \|100\rangle + \|101\rangle - \|110\rangle + \|111\rangle$	$x_0(\|00\rangle - \|11\rangle) + x_1(\|01\rangle - \|10\rangle)$	$\sigma_z \otimes I$
	$\|\Pi\rangle = -\|000\rangle + \|001\rangle + \|010\rangle + \|011\rangle + \|100\rangle - \|101\rangle + \|110\rangle + \|111\rangle$	$x_0(\|00\rangle - \|11\rangle) + x_1(\|01\rangle - \|10\rangle)$	$\sigma_z \otimes I$

	$\|\Pi\rangle = -\|000\rangle + \|001\rangle + \|010\rangle - \|011\rangle + \|100\rangle + \|101\rangle + \|110\rangle + \|111\rangle$	$x_0(\|00\rangle - \|11\rangle) + x_1(\|01\rangle - \|10\rangle)$	$\sigma_z \otimes I$
	$\|\Pi\rangle = \frac{1}{\sqrt{2}}(\|000\rangle + \|011\rangle)$	$\frac{1}{2\sqrt{2}}(x_1(\|00\rangle - \|11\rangle) + x_1(\|01\rangle - \|10\rangle))$	$2\sqrt{2}\sigma_z \otimes \sigma_x$
	$\|\Pi\rangle = \frac{1}{2}(\|000\rangle + \|010\rangle + \|011\rangle - \|100\rangle)$	$\frac{1}{4}(x_1(\|00\rangle - \|11\rangle) + x_1(\|01\rangle - \|10\rangle))$	$4\sigma_z \otimes \sigma_x$
	$\|\Pi\rangle = \frac{1}{2}(\|000\rangle - \|010\rangle + \|011\rangle + \|100\rangle)$	$\frac{1}{4}(x_1(\|00\rangle - \|11\rangle) + x_1(\|01\rangle - \|10\rangle))$	$4\sigma_z \otimes \sigma_x$
	$\|\Pi\rangle = \frac{1}{2}(\|000\rangle + \|001\rangle + \|011\rangle - \|111\rangle)$	$\frac{1}{4}(x_1(\|00\rangle - \|11\rangle) + x_1(\|01\rangle - \|10\rangle))$	$4\sigma_z \otimes \sigma_x$
	$\|\Pi\rangle = \frac{1}{2}(\|000\rangle - \|001\rangle + \|011\rangle + \|111\rangle)$	$\frac{1}{4}(x_1(\|00\rangle - \|11\rangle) + x_1(\|01\rangle - \|10\rangle))$	$4\sigma_z \otimes \sigma_x$
	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(\|000\rangle + \|001\rangle + \|010\rangle + \|011\rangle - \|100\rangle - \|111\rangle)$	$\frac{1}{2\sqrt{6}}(x_1(\|00\rangle - \|11\rangle) + x_1(\|01\rangle - \|10\rangle))$	$2\sqrt{6}\sigma_z \otimes \sigma_x$
	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(\|000\rangle - \|001\rangle + \|010\rangle - \|011\rangle + \|100\rangle + \|111\rangle)$	$\frac{1}{2\sqrt{6}}(x_1(\|00\rangle - \|11\rangle) + x_1(\|01\rangle - \|10\rangle))$	$2\sqrt{6}\sigma_z \otimes \sigma_x$
	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(\|000\rangle + \|001\rangle - \|010\rangle + \|011\rangle + \|100\rangle - \|111\rangle)$	$\frac{1}{2\sqrt{6}}(x_1(\|00\rangle - \|11\rangle) + x_1(\|01\rangle - \|10\rangle))$	$2\sqrt{6}\sigma_z \otimes \sigma_x$
	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(\|000\rangle - \|001\rangle - \|010\rangle + \|011\rangle + \|100\rangle + \|111\rangle)$	$\frac{1}{2\sqrt{6}}(x_1(\|00\rangle - \|11\rangle) + x_1(\|01\rangle - \|10\rangle))$	$2\sqrt{6}\sigma_z \otimes \sigma_x$
	$\|\Pi\rangle = \frac{1}{\sqrt{2}}(\|101\rangle + \|110\rangle)$	$\frac{1}{2\sqrt{2}}(x_1(\|00\rangle - \|11\rangle) + x_1(\|01\rangle - \|10\rangle))$	$2\sqrt{2}\sigma_z \otimes \sigma_x$
	$\|\Pi\rangle = \frac{1}{2}(\|010\rangle - \|100\rangle + \|101\rangle + \|110\rangle)$	$\frac{1}{4}(x_1(\|00\rangle - \|11\rangle) + x_1(\|01\rangle - \|10\rangle))$	$4\sigma_z \otimes \sigma_x$

	$\|\Pi\rangle = \frac{1}{2}(-\|010\rangle + \|100\rangle + \|101\rangle + \|110\rangle)$	$\frac{1}{4}(x_1(\|00\rangle - \|11\rangle) + x_1(\|01\rangle - \|10\rangle))$	$4\sigma_z \otimes \sigma_x$
	$\|\Pi\rangle = \frac{1}{2}(\|001\rangle + \|101\rangle + \|110\rangle - \|111\rangle)$	$\frac{1}{4}(x_1(\|00\rangle - \|11\rangle) + x_1(\|01\rangle - \|10\rangle))$	$4\sigma_z \otimes \sigma_x$
	$\|\Pi\rangle = \frac{1}{2}(-\|001\rangle + \|101\rangle + \|110\rangle + \|111\rangle)$	$\frac{1}{4}(x_1(\|00\rangle - \|11\rangle) + x_1(\|01\rangle - \|10\rangle))$	$4\sigma_z \otimes \sigma_x$
	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(\|001\rangle + \|010\rangle - \|100\rangle + \|101\rangle + \|110\rangle - \|111\rangle)$	$\frac{1}{2\sqrt{6}}(x_1(\|00\rangle - \|11\rangle) + x_1(\|01\rangle - \|10\rangle))$	$2\sqrt{6}\sigma_z \otimes \sigma_x$
	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(-\|001\rangle + \|010\rangle + \|100\rangle - \|101\rangle + \|110\rangle + \|111\rangle)$	$\frac{1}{2\sqrt{6}}(x_1(\|00\rangle - \|11\rangle) + x_1(\|01\rangle - \|10\rangle))$	$2\sqrt{6}\sigma_z \otimes \sigma_x$
	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(\|001\rangle - \|010\rangle + \|100\rangle + \|101\rangle + \|110\rangle - \|111\rangle)$	$\frac{1}{2\sqrt{6}}(x_1(\|00\rangle - \|11\rangle) + x_1(\|01\rangle - \|10\rangle))$	$2\sqrt{6}\sigma_z \otimes \sigma_x$
	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(-\|001\rangle - \|010\rangle + \|100\rangle + \|101\rangle + \|110\rangle + \|111\rangle)$	$\frac{1}{2\sqrt{6}}(x_1(\|00\rangle - \|11\rangle) + x_1(\|01\rangle - \|10\rangle))$	$2\sqrt{6}\sigma_z \otimes \sigma_x$
	$\|\Pi\rangle = \frac{1}{\sqrt{2}}(\|000\rangle + \|101\rangle)$	$\frac{1}{2\sqrt{2}}(x_1(\|00\rangle - \|11\rangle) + x_1(\|01\rangle - \|10\rangle))$	$2\sqrt{2}\sigma_z \otimes \sigma_x$
	$\|\Pi\rangle = \frac{1}{2}(\|000\rangle + \|010\rangle - \|100\rangle + \|101\rangle)$	$\frac{1}{4}(x_1(\|00\rangle - \|11\rangle) + x_1(\|01\rangle - \|10\rangle))$	$4\sigma_z \otimes \sigma_x$
	$\|\Pi\rangle = \frac{1}{2}(\|000\rangle - \|010\rangle + \|100\rangle + \|101\rangle)$	$\frac{1}{4}(x_1(\|00\rangle - \|11\rangle) + x_1(\|01\rangle - \|10\rangle))$	$4\sigma_z \otimes \sigma_x$
	$\|\Pi\rangle = \frac{1}{2}(\|000\rangle + \|001\rangle + \|101\rangle - \|111\rangle)$	$\frac{1}{4}(x_1(\|00\rangle - \|11\rangle) + x_1(\|01\rangle - \|10\rangle))$	$4\sigma_z \otimes \sigma_x$

	$\|\Pi\rangle = \frac{1}{2}(\|000\rangle - \|001\rangle + \|101\rangle + \|111\rangle)$	$\frac{1}{4}(x_1(\|00\rangle - \|11\rangle) + x_1(\|01\rangle - \|10\rangle))$	$4\sigma_z \otimes \sigma_x$
	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(\|000\rangle + \|001\rangle + \|010\rangle - \|100\rangle + \|101\rangle - \|111\rangle)$	$\frac{1}{2\sqrt{6}}(x_1(\|00\rangle - \|11\rangle) + x_1(\|01\rangle - \|10\rangle))$	$2\sqrt{6}\sigma_z \otimes \sigma_x$
	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(\|000\rangle - \|001\rangle + \|010\rangle - \|100\rangle + \|101\rangle + \|111\rangle)$	$\frac{1}{2\sqrt{6}}(x_1(\|00\rangle - \|11\rangle) + x_1(\|01\rangle - \|10\rangle))$	$2\sqrt{6}\sigma_z \otimes \sigma_x$
	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(\|000\rangle + \|001\rangle - \|010\rangle + \|100\rangle + \|101\rangle - \|111\rangle)$	$\frac{1}{2\sqrt{6}}(x_1(\|00\rangle - \|11\rangle) + x_1(\|01\rangle - \|10\rangle))$	$2\sqrt{6}\sigma_z \otimes \sigma_x$
	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(\|000\rangle - \|001\rangle - \|010\rangle + \|100\rangle + \|101\rangle + \|111\rangle)$	$\frac{1}{2\sqrt{6}}(x_1(\|00\rangle - \|11\rangle) + x_1(\|01\rangle - \|10\rangle))$	$2\sqrt{6}\sigma_z \otimes \sigma_x$
	$\|\Pi\rangle = \frac{1}{\sqrt{2}}(\|011\rangle + \|110\rangle)$	$\frac{1}{2\sqrt{2}}(x_1(\|00\rangle - \|11\rangle) + x_1(\|01\rangle - \|10\rangle))$	$2\sqrt{2}\sigma_z \otimes \sigma_x$
	$\|\Pi\rangle = \frac{1}{2}(\|010\rangle + \|011\rangle - \|100\rangle + \|110\rangle)$	$\frac{1}{4}(x_1(\|00\rangle - \|11\rangle) + x_1(\|01\rangle - \|10\rangle))$	$4\sigma_z \otimes \sigma_x$
	$\|\Pi\rangle = \frac{1}{2}(-\|010\rangle + \|011\rangle + \|100\rangle + \|110\rangle)$	$\frac{1}{4}(x_1(\|00\rangle - \|11\rangle) + x_1(\|01\rangle - \|10\rangle))$	$4\sigma_z \otimes \sigma_x$
	$\|\Pi\rangle = \frac{1}{2}(\|001\rangle + \|011\rangle + \|110\rangle - \|111\rangle)$	$\frac{1}{4}(x_1(\|00\rangle - \|11\rangle) + x_1(\|01\rangle - \|10\rangle))$	$4\sigma_z \otimes \sigma_x$
	$\|\Pi\rangle = \frac{1}{2}(-\|001\rangle + \|011\rangle + \|110\rangle + \|111\rangle)$	$\frac{1}{4}(x_1(\|00\rangle - \|11\rangle) + x_1(\|01\rangle - \|10\rangle))$	$4\sigma_z \otimes \sigma_x$
	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(\|001\rangle + \|010\rangle + \|011\rangle - \|100\rangle + \|110\rangle - \|111\rangle)$	$\frac{1}{2\sqrt{6}}(x_1(\|00\rangle - \|11\rangle) + x_1(\|01\rangle - \|10\rangle))$	$2\sqrt{6}\sigma_z \otimes \sigma_x$

	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(-\|001\rangle + \|010\rangle + \|011\rangle - \|100\rangle + \|110\rangle + \|111\rangle)$	$\frac{1}{2\sqrt{6}}(x_1(\|00\rangle - \|11\rangle) + x_1(\|01\rangle - \|10\rangle))$	$2\sqrt{6}\sigma_z \otimes \sigma_x$
	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(\|001\rangle - \|010\rangle + \|011\rangle + \|100\rangle + \|110\rangle - \|111\rangle)$	$\frac{1}{2\sqrt{6}}(x_1(\|00\rangle - \|11\rangle) + x_1(\|01\rangle - \|10\rangle))$	$2\sqrt{6}\sigma_z \otimes \sigma_x$
	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(-\|001\rangle - \|010\rangle + \|011\rangle + \|100\rangle + \|110\rangle + \|111\rangle)$	$\frac{1}{2\sqrt{6}}(x_1(\|00\rangle - \|11\rangle) + x_1(\|01\rangle - \|10\rangle))$	$2\sqrt{6}\sigma_z \otimes \sigma_x$
	$\|\Pi\rangle = \frac{1}{2}(\|000\rangle + \|011\rangle + \|101\rangle + \|110\rangle)$	$\frac{1}{2}(x_1(\|00\rangle - \|11\rangle) + x_0(\|01\rangle - \|10\rangle))$	$\sigma_z \otimes \sigma_x$
	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(\|000\rangle + \|010\rangle + \|011\rangle - \|100\rangle + \|101\rangle + \|110\rangle)$	$\frac{1}{\sqrt{6}}(x_1(\|00\rangle - \|11\rangle) + x_0(\|01\rangle - \|10\rangle))$	$\sqrt{6}\sigma_z \otimes \sigma_x$
	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(\|000\rangle - \|010\rangle + \|011\rangle + \|100\rangle + \|101\rangle + \|110\rangle)$	$\frac{1}{\sqrt{6}}(x_1(\|00\rangle - \|11\rangle) + x_0(\|01\rangle - \|10\rangle))$	$\sqrt{6}\sigma_z \otimes \sigma_x$
	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(\|000\rangle + \|001\rangle + \|011\rangle + \|101\rangle + \|110\rangle - \|111\rangle)$	$\frac{1}{\sqrt{6}}(x_1(\|00\rangle - \|11\rangle) + x_0(\|01\rangle - \|10\rangle))$	$\sqrt{6}\sigma_z \otimes \sigma_x$
	$\|\Pi\rangle = \frac{1}{\sqrt{6}}(\|000\rangle - \|001\rangle + \|011\rangle + \|101\rangle + \|110\rangle + \|111\rangle)$	$\frac{1}{\sqrt{6}}(x_1(\|00\rangle - \|11\rangle) + x_0(\|01\rangle - \|10\rangle))$	$\sqrt{6}\sigma_z \otimes \sigma_x$
	$\|\Pi\rangle = \|000\rangle + \|001\rangle + \|010\rangle + \|011\rangle - \|100\rangle + \|101\rangle + \|110\rangle - \|111\rangle$	$x_1(\|00\rangle - \|11\rangle) + x_0(\|01\rangle - \|10\rangle)$	$\sigma_z \otimes \sigma_x$
	$\|\Pi\rangle = \|000\rangle - \|001\rangle + \|010\rangle + \|011\rangle - \|100\rangle + \|101\rangle + \|110\rangle + \|111\rangle$	$x_1(\|00\rangle - \|11\rangle) + x_0(\|01\rangle - \|10\rangle)$	$\sigma_z \otimes \sigma_x$
	$\|\Pi\rangle = \|000\rangle + \|001\rangle - \|010\rangle + \|011\rangle + \|100\rangle + \|101\rangle + \|110\rangle - \|111\rangle$	$x_1(\|00\rangle - \|11\rangle) + x_0(\|01\rangle - \|10\rangle)$	$\sigma_z \otimes \sigma_x$
	$\|\Pi\rangle = \|000\rangle - \|001\rangle - \|010\rangle + \|011\rangle + \|100\rangle + \|101\rangle + \|110\rangle + \|111\rangle$	$x_1(\|00\rangle - \|11\rangle) + x_0(\|01\rangle - \|10\rangle)$	$\sigma_z \otimes \sigma_x$

4.4 Operator

Setelah Bob menerima informasi klasik dari Alice dan telah melakukan operasi maka informasi yang dikirim oleh Alice dapat terkirim. Operasi digunakan matik identitas dan juga matrik Pauli ataupun perkalian *cross product* dari dua matrik. Apabila hasil dari pengukuran adalah

$$M\left|\Psi\right\rangle = (\left\langle\Pi\right| \otimes I)\left|\Psi\right\rangle \tag{68}$$

$$\left|\chi\right\rangle = x_0(\left|00\right\rangle + \left|11\right\rangle) + x_1(\left|01\right\rangle + \left|10\right\rangle) \tag{69}$$

$$(\left\langle\Pi\right| \otimes I)\left|\Psi\right\rangle = \lambda(x_0(\left|00\right\rangle + \left|11\right\rangle) + x_1(\left|01\right\rangle + \left|10\right\rangle)) \tag{70}$$

Dengan persamaan probabilitas adalah sebagai berikut

$$P = \left\langle\Psi\right| M^{\dagger}M\left|\Psi\right\rangle \tag{71}$$

Maka dari persamaan (70) dan(71) diperoleh

$$\begin{aligned} P &= (\lambda(x_0(\left|00\right\rangle + \left|11\right\rangle) + x_1(\left|01\right\rangle + \left|10\right\rangle)))^{\dagger}\lambda(x_0(\left|00\right\rangle + \left|11\right\rangle) + x_1(\left|01\right\rangle + \left|10\right\rangle)) \\ &= \lambda^2(x_0(\left\langle 00\right| + \left\langle 11\right|) + x_1(\left\langle 01\right| + \left\langle 10\right|))(x_0(\left|00\right\rangle + \left|11\right\rangle) + x_1(\left|01\right\rangle + \left|10\right\rangle)) \\ &= \lambda^2\{x_0{}^2(\left\langle 00\right| + \left\langle 11\right|)(\left|00\right\rangle + \left|11\right\rangle) + x_0x_1(\left\langle 00\right| + \left\langle 11\right|)(\left|01\right\rangle + \left|10\right\rangle) \\ &+ x_1x_0(\left\langle 01\right| + \left\langle 10\right|)(\left|00\right\rangle + \left|11\right\rangle) + x_1{}^2(\left\langle 01\right| + \left\langle 10\right|)(\left|01\right\rangle + \left|10\right\rangle)\} \\ &= \lambda^2(2x_0{}^2 + 2x_1{}^2) \end{aligned} \tag{72}$$

dimana berdasarkan sifat normalisasinya maka

$$\left|x_0\right|^2 + \left|x_0\right|^2 + \left|x_1\right|^2 + \left|x_1\right|^2 = 1 \tag{73}$$

Maka

$$P = \lambda^2$$

(74)

Berdasarkan perumusan yang telah di jabarkan diatas, terdapat suatu konstanta pada operator yang digunakan agar Bob dapat menerima informasi yang dikirimkan Alice. Konstanta tersebut dinyatakan dengan $1/\lambda$. Apabila dari persamaan (74) maka nilai konstanta pada operator matrik dipengaruhi oleh probabilitas informasi yang dikirimkan oleh Alice.

BAB V
KESIMPULAN

Berdasarkan perumusan pengiriman keadaan dua qubit dengan saluran tiga qubit diperoleh kesimpulan sebagai berikut:

1. Keadaan dua qubit sembarang tidak dapat dikirim dengan saluran tiga qubit (GHZ, W dan tiga qubit sembarang).

$$|\chi\rangle = x_0|00\rangle + x_1|01\rangle + x_2|10\rangle + x_3|11\rangle$$

2. Keadaan informasi dua qubit khusus dapat dikirim dengan saluran tiga qubit.
    a. Pengiriman informasi khusus dua qubit dengan dua suku dapat terkirim.
    b. Pengiriman informasi khusus dua qubit dengan tiga suku dapat terkirim jika ada nilai konstanta suku yang sama.

$$|\chi\rangle = x_0(|00\rangle + |01\rangle) + x_2|10\rangle$$

    c. Pengiriman informasi khusus dua qubit dengan empat suku dapat terkirim jika hanya ada dua nilai konstanta.

$$|\chi\rangle = x_0|00\rangle + x_1(|01\rangle + |10\rangle + |11\rangle)$$

$$|\chi\rangle = x_0(|00\rangle + |11\rangle) + x_1(|01\rangle + |10\rangle)$$

3. Pengiriman informasi khusus dua qubit dengan dua suku keadaan murni terbelit menggunakan saluran yang murni terbelit.
4. Pengiriman informasi khusus dua qubit dengan dua suku keadaan *unentangled* menggunakan saluran yang *entangled* sabagian.

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BIODATA

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