Erratum: Local discrimination of quantum measurement without assistance of classical information [ J. Quantum Inf. Sci. 2015, 5, 71]

Youbang Zhan
School of Physics and Electronic Electrical Engineering, Huaiyin Normal University, Huaian, P. R. China
Email: ybzhan@hytc.edu.cn

Copyright © 2015 by author(s) and Scientific Research Publishing Inc.
This work is licensed under the Creative Commons Attribution International License (CC BY).
http://creativecommons.org/licenses/by/4.0

There are mistakes in Sections 3 and 4 of this paper, some calculated values need to be corrected in the following some sentences:

On page 75, Section 3, first paragraph:

Now let us turn to depict the LQMD. Suppose that two spacelike separated observers, Alice and Bob, share 16 [not 30] seven-qubit GHZ states, which […]

where \( k = 1, 2, \ldots, 16 \) [not 30], and […] [\( \ldots \)]. […] on her qubits in the state \( |G^{(k)}\rangle \) (\( k = 1, 2, \ldots, 16 \) [not 30]) respectively.

[…], the probability of all qubits \( B^{(k)} \) in the states \( \frac{1}{g_n T_n} |\mu^+\rangle \) or \( \frac{1}{g_n T_n} |\mu^-\rangle \) (\( g_n = 2^{(6-n)/2}, n = 1, 2, \ldots, 6 \)) is

\[ \left( \frac{63}{64} \right)^{16} \approx 0.78 \] [instead of \( \left( \frac{63}{64} \right)^{30} \approx 0.62 \)], i.e., the probability of at least one qubit \( B^{(k)} \) in the state \( |\psi^+_0\rangle \) is

\[ 1 - \left( \frac{63}{64} \right)^{16} \approx 0.22 \] [instead of \( 1 - \left( \frac{63}{64} \right)^{30} \approx 0.38 \)]. […] One can see that, after measurements of Bob, in the 22% [not 38%] cases, […] [\( \ldots \)] will be in the ratio of one to \( u \) (\( u = \left( \frac{y^{32}}{y^{31}} \right)^2 / \left( \frac{y^{32}}{x^{31}} \right)^2 \approx 9.22 \times 10^{-18} \) [not 1.45 \times 10^{-29}]), that is, the qubit \( B^{(k)} \) will be always collapsed into the state \( |1\rangle \). As a special case, we also assume that all the other 15 [not 29] qubits \( B^{(k)} \) are in the states \( |\psi^+_1\rangle \) after Alice’s measurements and then all the 15 [not 29] qubits are in the state \( |0\rangle \) after Bob’s measurements. In this situation, one can easily find that the probability of the 16 [not 30] qubits \( B^{(k)} \) in the state \( |0\rangle \) or \( |1\rangle \) will be in the ratio of one to 1.6 [not 2.5] after Bob’s measurements. For general cases in which the qubit \( B^{(k)} \) in the state \( |\psi^+_0\rangle \) and other 15 [not 29] qubits \( B^{(k)} \) collapsed randomly into the states \( \frac{1}{g_n T_n} |\mu^+\rangle \)
You-Bang Zhan

\( g_n = 2^{(6-n)/2}, \ n = 1,2,\ldots,6 \) after Alice’s measurements, it is easily found that the probability of the 16 [not 30] qubits \( B^{(k)} \) in the state \( |0\rangle \) or \( |1\rangle \) will be in the ratio of one to \( w_{(i)} (w_{(i)} > 1.6 \ [not \ 2.5]) \) after Bob’s measurements. Now we consider the case in which there are two qubits \( B^{(k)c} \) and \( B^{(k)r} \) in the state \( |\psi^+\rangle \) after Alice’s measurements. Similar to the above described, one can find that the probability of the 16 [not 30] qubits \( B^{(k)} \) in the state \( |0\rangle \) or \( |1\rangle \) will be in the ratio of one to \( w_{(i)} (w_{(i)} > 1.6 \ [not \ 5.15]) \) after Bob’s measurements. For the cases in which more qubits \( B^{(1)}, B^{(2)}, \ldots, B^{(l)} \) \((l = 3,4,\ldots,16 \ [not \ 30])\) collapsed into the state \( |\psi^+\rangle \) after Alice’s measurements, the probability of the 16 [not 16] qubits \( B^{(k)} \) in the state \( |0\rangle \) or \( |1\rangle \) will be in the ratio of one to \( w_{(i)} (w_{(i)} > w_{(2)}, \ l = 3,4,\ldots,16 \ [not \ 30]) \) after Bob’s measurements. As mentioned above, after Alice’s measurements, in the cases in which at least one qubit \( B^{(k)} \) in the state \( |\psi^+\rangle \) \(\text{(i.e., in the 22\% [not 38\%]cases)}\), the probability of the 16 [not 30] qubits \( B^{(k)} \) in the state \( |0\rangle \) or \( |1\rangle \) will be in the ratio of one to \( W (W \geq 1.6 \ [not \ 2.5]) \) after Bob’s measurements, where \( W \in \{\omega_{(j)}; j = 1,2,\ldots,16\} \ [not \ 30]. \)

On page 76, Section 3, second paragraph:

To ensure the result of Bob’s measurements more reliable, it can be further supposed that Alice and Bob share 40 entangled states groups (ESGs), each consisting of 16 [not 30] seven-qubit GHZ states \( |G^{(k)}\rangle \) \(\text{(see Eq. (11))}\). If Alice’s measurements are the CPMs, it is easy found that, after Alice’s and Bob’s measurements, the probability of all qubits \( B^{(k)} \) of each ESG in the state \( |0\rangle \) or \( |1\rangle \) will be still in the ratio of one to one. If Alice’s measurements are the SPMs, by statistics theory, after Alice’s and Bob’s measurements, in 8 [not 15] ESGs the probability of the qubits \( B^{(k)} \) of each ESG in the state \( |0\rangle \) or \( |1\rangle \) will be in the ratio of one to \( W (W \geq 1.6 \ [not \ 2.5]) \).

On page 76, Section 3, third paragraph:

As described above, one can see that, in this scheme, at the appointed time \( t \), Bob should measure his qubits \( B^{(k)} \) all in the basis \( \{ |0\rangle, |1\rangle \} \). If Alice employs the CPMs on her qubits, after Bob’s measurements, the probability of all qubits \( B^{(k)} \) in the state \( |0\rangle \) or \( |1\rangle \) will be in the ratio of one to one. If Alice’s measurements are the SPMs, after Bob’s measurements, in 8 [not 15] of the 40 ESGs the probability of the qubits \( B^{(k)} \) of each ESG in the state \( |0\rangle \) or \( |1\rangle \) will be in the ratio of one to \( W (W \geq 1.6 \ [not \ 2.5]) \). In accordance with these outcomes, Bob can discriminate that the measurements employed by Alice are CPMs or SPMs. Thus, the LQMD is completed successfully.

On page 76, Section 4, first paragraph:

\[ \ldots \], either EDS is composed of 40 ESGs and each ESG consisting of 16 [not 30] seven-qubit GHZ states, which \( \ldots \).

On page 77, Section 4, first paragraph:

\[ \ldots \], where \( i = 1,2, j = 1,2,\ldots,40, \text{ and } k = 1,2,\ldots,16 \ [not \ 30], \text{ and } \ldots \).

The correction of these mistakes does not affect the results and conclusion of the original paper.