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

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 $k=1,2,\cdots,16$ [not 30], and [⋯]. [⋯], on her qubits in the state $\left|G^{(k)}\right\rangle$ ($k=1,2,\cdots,16$ [not 30]) respectively. [⋯], the probability of all qubits $B^{(k)}$ in the states $\frac{1}{g_nT_n}\left|\mu^{+}\right\rangle$ or $\frac{1}{g_nT_n}\left|\mu^{-}\right\rangle$ ($g_n=2^{(6-n)/2}, n=1,2,\cdots,6$) 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 $\left|\psi_6^{+}\right\rangle$ 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, [⋯]. [⋯] will be in the ratio of one to u ($u=\left(\frac{x^{32}}{y^{31}}\right)^2/\left(\frac{y^{32}}{x^{31}}\right)^2\approx 9.22\times10^{18}$ [not 1.45×10^{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 $\left|\psi_1^{\pm}\right\rangle$ 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 $\left|\psi_6^{+}\right\rangle$ and other 15 [not 29] qubits $B^{(k)}$ collapsed randomly into the states $\frac{1}{g_nT_n}\left|\mu^{\pm}\right\rangle$

($g_n = 2^{(6-n)/2}$, $n = 1, 2, \cdots, 6$) 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 $w_{(1)}$ ($w_{(1)} > 1.6$ [not 2.5]) after Bob's measurements. Now we consider the case in which there are two qubits $B^{(k')}$ and $B^{(k'')}$ in the state $|\psi_6^+\rangle$ 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 $w_{(2)}$ ($w_{(2)} \geq 3.43$ [not 5.15]) after Bob's measurements. For the cases in which more qubits $B^{(1)}$, $B^{(2)}$, $\cdots$, $B^{(l)}$ ($l = 3, 4, \cdots, 16$ [not 30]) collapsed into the state $|\psi_6^+\rangle$ 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 $w_{(l)}$ ($w_{(l)} > w_{(2)}$, $l = 3, 4, \cdots, 16$ [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 $|\psi_6^+\rangle$ (*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 $W \in \{\omega_{(j)} : j = 1, 2, \cdots, 16\}$ [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 $|G^{(k)}\rangle$ (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:

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

On page 77, Section 4, first paragraph:

[⋯], where $i = 1, 2$, $j = 1, 2, \cdots, 40$, and $k = 1, 2, \cdots, 16$ [not 30], and [⋯].

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