Erratum: Generalized quantum state sharing of the arbitrary two particles state [Sci China Phys Mech Astron, 2010, 53(11): 2064]

WANG Chuan*

School of Science and Key Laboratory of Optical Communication and Lightwave Technologies, Beijing University of Posts and Telecommunications, Beijing 100876, China (email: wangchuan82@gmail.com)

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Eqs. (3)–(6) should read [1]:

$$|\phi_m^+\rangle = M \left(|00\rangle + \frac{1}{m^*} |11\rangle \right), \quad (1)$$

$$|\phi_m^-\rangle = M \left(\frac{1}{m} |00\rangle - |11\rangle \right), \quad (2)$$

$$|\psi_m^+\rangle = M \left(|01\rangle + \frac{1}{m^*} |10\rangle \right), \quad (3)$$

$$|\psi_m^-\rangle = M \left(\frac{1}{m} |01\rangle - |10\rangle \right), \quad (4)$$

where

$$M = |m| / \sqrt{1 + |m|^2}.$$

Provided that one can prove eq. (8) which describes the state of the composite system, it should read

$$|\Lambda\rangle_{\text{sub}} = C_1 \left(\alpha |0000\rangle + \frac{n\beta}{m} |0101\rangle + \frac{n\gamma}{m} |1010\rangle + \frac{n^2\delta}{m^2} |1111\rangle \right)_{b_1 b_2 c_1 c_2}, \quad (5)$$

where

$$C_1 = \frac{1}{\sqrt{|\alpha|^2 + |\frac{n\beta}{m}|^2 + |\frac{n\gamma}{m}|^2 + |\frac{n^2\delta}{m^2}|^2}}$$

is the normalized factor.

Here we give the fidelity of a pure state and the density matrix of the state described by eq. (11) should read:

$$F = \frac{|\alpha|^2 + |\beta|^2 n/m + |\gamma|^2 n/m + |\delta|^2 n^2/m^2}{|\alpha|^2 + |\beta n/m|^2 + |\gamma n/m|^2 + |\delta n^2/m^2|^2}. \quad (6)$$

If the quantum channels are composed of generalized Bell states, the state sharing process can be realized by generalized GHZ state measurement. One can prove that after measurement, if the outcomes are $|GHZ_{n1}^+\rangle|GHZ_{n1}^+\rangle$ the state of the composite system without normalization in eqs. (13) and (14) should read

$$|\Lambda\rangle_{\text{sub}} = \left(\alpha |0000\rangle + \beta \frac{n^*}{m^{*2}} |0101\rangle + \gamma \frac{n^*}{m^{*2}} |1010\rangle + \delta \frac{n^{*2}}{m^{*4}} |1111\rangle \right)_{b_2 b_4 c_2 c_4} \quad (7)$$

and

$$\begin{aligned}
 |\Lambda\rangle_{\text{sub}} = & \left[| + X \rangle_{b_2} | + X \rangle_{b_4} \left(\alpha |00\rangle + \beta \frac{n^*}{m^{*2}} |01\rangle + \gamma \frac{n^*}{m^{*2}} |10\rangle + \delta \frac{n^{*2}}{m^{*4}} |11\rangle \right) \right]_{c_2 c_4}, \\
 & + | + X \rangle_{b_2} | - X \rangle_{b_4} \left(\alpha |00\rangle - \beta \frac{n^*}{m^{*2}} |01\rangle + \gamma \frac{n^*}{m^{*2}} |10\rangle - \delta \frac{n^{*2}}{m^{*4}} |11\rangle \right) \right]_{c_2 c_4}, \\
 & + | - X \rangle_{b_2} | + X \rangle_{b_4} \left(\alpha |00\rangle + \beta \frac{n^*}{m^{*2}} |01\rangle - \gamma \frac{n^*}{m^{*2}} |10\rangle - \delta \frac{n^{*2}}{m^{*4}} |11\rangle \right) \right]_{c_2 c_4}, \\
 & + | - X \rangle_{b_2} | - X \rangle_{b_4} \left(\alpha |00\rangle - \beta \frac{n^*}{m^{*2}} |01\rangle - \gamma \frac{n^*}{m^{*2}} |10\rangle + \delta \frac{n^{*2}}{m^{*4}} |11\rangle \right) \right]_{c_2 c_4}. \quad (8)
 \end{aligned}$$

- 1 Wang C, Zhang Y, Jin G S. Generalized quantum state sharing of the arbitrary two particles state. *Sci China Phys Mech Astron*, 2010, 53(11): 2064–2068