Erratum: Thermalization of the Lipkin-Meshkov-Glick model in blackbody radiation [Phys. Rev. A 95, 042107 (2017)]

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In our paper we have erroneously stated that the quantity,

$$R_j = \frac{e^{-\beta E(j,m_z^{(1)})}}{Z_j}, \tag{1}$$

appearing in Eq. (62), attains the limit,

$$\lim_{N\to\infty} R_j = 0, \tag{2}$$

with an exponential decrease in N in both the paramagnetic and the ferromagnetic regions. However, a proper evaluation of the partition function Z_j shows that for N large R_j vanishes as $1/\sqrt{N}$ in the ferromagnetic region and approaches a constant value in the paramagnetic one. The correct result does not affect the conclusions of our paper in any way. In fact, independent of the vanishing speed, $\lim_{N\to\infty} R_j = 0$ implies $\lim_{N\to\infty} \tau^{(P)} \geqslant \lim_{N\to\infty} \tau^{(Q)}$, a condition effectively used only in the ferromagnetic region.

We also observe that Eqs. (47) and (48) contain some typographical errors, the correct expressions, respectively, being

$$Z_j = e^{\beta \mathcal{J} j(j+1)/N} \sum_{m_z \in [-j,-(j-1),\ldots,j]} e^{-\beta m_z(\mathcal{J} m_z/N - \Gamma)} = e^{\beta \mathcal{J} j(j+1)/N} \sum_{x \in [-1,-(j-1)/j,\ldots,1]} e^{-\beta \alpha x N(\mathcal{J}\alpha x - \Gamma)}, \tag{3}$$

and

$$Z_j = \sqrt{\frac{\pi N}{\beta \mathcal{J}}} e^{\beta \mathcal{J} j(j+1)/N} e^{\beta \Gamma^2 N/(4\mathcal{J})}. \tag{4}$$

More importantly, we notice that Eq. (4) (for simplicity we keep only the leading term in N) holds only for $|\Gamma| N/(2\mathcal{J}) < j$, i.e., in the ferromagnetic region $\Gamma_c^- < \Gamma < \Gamma_c^+$, where $\Gamma_c^\pm = \pm 2 j \mathcal{J}/N$. Further details on the expression of Z_j in the paramagnetic regions $\Gamma < \Gamma_c^-$ and $\Gamma > \Gamma_c^+$ together with an analysis of the ground-state properties of the Lipkin-Meshkov-Glick model will be given elsewhere.

