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A system’s wave function is uniquely determined by its underlying physical state – corrigendum

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In the published version of this article \([1]\) there is an omission in the intermediate calculation in Appendix B that makes it difficult to verify the bound of Equation (5). Furthermore, the form of \(|\zeta^k_j\rangle\) written in the displayed equation above Equation (B1) in \([1]\) is erroneous. We stress though that the bound (5) is correct and hence the conclusion of the paper is unaffected.

The issue arises because we write \((\hat{Z}_d)\Xi\) without stating which of the roots of \(\hat{Z}_d\) is taken. Furthermore, not all choices work. To state carefully a choice that works, we define \(sh_A[v]\) to be the number in \((-1/2, 1/2]\) that is equal to \(v + m\) for some \(m \in \mathbb{Z}\) and \(sh_B[v]\) to be the number in \([-1/2, 1/2)\) that is equal to \(v + m\) for some \(m \in \mathbb{Z}\). For \(x \in \{0, \ldots, d-1\}\) and \(a \in \{0, 2, \ldots, 2n-2\}\), the projectors \(\Pi_x^a\) are along the vectors \(|\zeta^a_x\rangle = U_dZ_{n,d}[a]|U_d^\dagger x\rangle\), where

\[Z_{n,d}[a] := \sum_{j=0}^{d-1} \exp \left[ \pi i sh_A[j/d] \frac{a}{n} \right] |j\rangle \langle j|,\]

while for \(y \in \{0, \ldots, d-1\}\) and \(b \in \{1, 3, \ldots, 2n-1\}\), the projectors \(\Pi_y^b\) are along the vectors \(|\zeta^b_y\rangle = U_dZ'_{n,d}[b]|U_d^\dagger y\rangle\), where

\[Z'_{n,d}[b] := \sum_{j=0}^{d-1} \exp \left[ \pi i sh_B[j/d] \frac{b}{n} \right] |j\rangle \langle j|.

These lead to the bound given in Equation (5). For details of the rest of the calculation we refer to Appendix B of \([2]\).

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