Erratum: Biexponential decay and ultralong coherence of a qubit

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There is a sign error in eq. (10) on p. 4 which, once corrected, leads to the expression

\[ \rho_{12}(t) = \frac{r_0}{2\Omega} \left\{ e^{-t\Lambda_+} \left( (\Omega - i\Delta)e^{i\phi_0} - ze^{i(2\theta - \phi_0)} \right) \right\}
+ \frac{r_0}{2\Omega} \left\{ e^{-t\Lambda_-} \left( (\Omega + i\Delta)e^{i\phi_0} + ze^{i(2\theta - \phi_0)} \right) \right\}. \]

This modification affects in turn eq. (11), which becomes

\[ (\Omega - i\Delta) z^{-1} = e^{2i(\theta - \phi_0)} \]

leading to the critical Bloch angle \( \phi_c = \theta - \arccos(\Omega/z)/2 \). These corrections affect neither fig. 1 nor the conclusions of the paper.

Additional remark: Although we compared the NTME to the LDME/BRME in the paper, we want to emphasize that we did not intend to provide a microscopic description of the transition from an exponential to a biexponential decay of the coherences \( \rho_{12} \). This would require to go beyond the second-order perturbation theory: according to (6) we have \( z \propto a(\Delta) \propto \gamma \) with \( \gamma \) the system-environment coupling strength. Lowering the temperature reduces the absorption thresholds (7)–(8) but leads at the same time to an exponential increase of the emission rate \( e(\Delta) \), according to the KMS condition \( e(\Delta) = e^{\beta\Delta} a(\Delta) \) with large \( \beta = 1/T \), so that at \( z = \Delta \) the reversible contribution is of the same order of magnitude as the irreversible one. This is compatible with our definition of the weak coupling regime which only requires the absorption rate \( a(\Delta) \) to be small. We wish to stress that, regardless of the precise definition of the weak coupling regime, our letter highlights a structural difference between the studied master equations with and without secular approximation. The discussed bifurcation phenomenon can be seen as a characteristic signature of this difference.

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