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Quantum Decoherence of a Single Trapped Ion due to Engineered Reservoir

YI Xue-Xi

Institute of Theoretical Physics, Academia Sinica, P.O. Box 2735, Beijing 100080, China
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Abstract: Known as an engineered reservoir due to fluctuations in trap parameter, a classical source of quantum decoherence is considered for a single trapped ion theoretically. For simplicity it is assumed that the fluctuations involved are white noise processes, which enables us to give a simple master equation description of this source of decoherence. Our results show that the decoherence rate depends on the vibrational quantum number in different ways corresponding to the vibrational excitation sideband used there. Besides, this source of decoherence also leads to occurrence of dissipation in the ion system.

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Key words: quantum decoherence, engineered reservoir, trapped ion

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