Abstract Submitted
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Group theoretical analysis of nitrogen-vacancy center's energy levels and selection rules JERONIMO MAZE, ADAM GALI, EMRE TOGAN, YIWEN CHU, ALEXEI TRIFONOV, EFTHIMIOS KAXIRAS, MIKHAIL LUKIN — Defect in solids such as the nitrogen-vacancy center in diamond are promising candidates for high precision measurements, quantum information and quantum communication. A vast knowledge of their complicated dynamics is essential to effectively implement these applications. Here, we show that group theoretical analysis can be successfully used to unravel the properties of any point defect in solids. In particular, we work out in detail the energy levels and selection rules of the nitrogen-vacancy center and show how they can be implemented in applications such as spin-photon entanglement, an essential step towards quantum communication. Furthermore, we analyze the performance of these properties under perturbations that reduce the symmetry of the defect such as strain and electric field. We provide useful guidance on how to overcome these undesired perturbations and compare our model with recent experimental results.

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