武汉物数所理论交叉学术交流系列报告

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Nonperturbative Leakage Elimination Operators

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频标楼4楼报告厅

About the speaker:

2008 – present: Ikerbasque Research Professor (permanent) in Ikerbasque Foundation and Department of Theoretical Physics and History of Science, The Basque Country University, Spain.
2000-2008: Research Associate in Center for Quantum Information & Quantum Control, University of Toronto, Canada.

1999-2000: The Alexander von Humboldt fellow in Department of Physics, Munich Technology University, Munich, Germany

1997-1999: Full Professor in Theoretical Physics, Department of Physics, Jilin University, Changchun, China.

1979 - 1989: B. Sc. and Ph. D. in Physics, Jilin University

Abstract:

Dynamical decoupling operations have been shown to reduce errors in quantum information processing. Leakage from an encoded subspace to the rest of the system space is a particularly serious problem for which leakage elimination operators (LEOs) were introduced. Here we provide an analysis of nonideal pulses, rather than the well-understood idealization or bang-bang controls. Under realistic conditions, we show that these controls will provide the same protection from errors as idealized controls. Our work indicates that the effectiveness of LEOs depends on the integral of the pulse sequence in the time domain, which has been missing because of the idealization of pulse sequences. Our results are applied to a three- level system for the nitrogen-vacancy centers under an external magnetic field and are illustrated by the fidelity dynamics of LEO sequences, ranging from regular rectangular pulses, random pulses, and even disordered (noisy) pulses

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