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Statistical Physics

Holonomic Gates in Pseudo-Hermitian Quantum Systems

The time-dependent pseudo-Hermitian formulation of quantum mechanics allows one to study open system dynamics in analogy to Hermitian quantum systems. In this setting, we show that the notion of holonomic quantum computation can equally be formulated for pseudo-Hermitian systems. Starting from a degenerate pseudo-Hermitian Hamiltonian we show that, in the adiabatic limit, a non-Abelian geometric phase emerges which realizes a pseudounitary quantum gate. We illustrate our findings by studying a pseudo-Hermitian gain-loss system which can be written in the form of a tripod Hamiltonian by using the biorthogonal representation. It is shown that this system allows for arbitrary pseudo- $U(2)$ transformations acting on the dark subspace of the system.

Talk: German/English

Slides: English

Location: Institute of Physics, Albert-Einstein-Str. 23, SR Didaktik