

Quantum Physics

Operators for the Aharonov-Anandan and Samuel-Bhandari Phases

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We construct an operator for the Aharonov-Anandan phase for time independent Hamiltonians. This operator is shown to generate the motion of cyclic quantum systems through an equation of evolution involving only geometric quantities, i.e. the distance between quantum states, the geometric phase and the total length of evolution. From this equation, we derive an operator for the Samuel and Bhandari phase (SB-phase) for non cyclic evolutions. Finally we show how the SB-phase can be used to construct an operator corresponding to a quantum clock which commutator with the Hamiltonian has a canonical expectation value.

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