

Geometric phases and quantum waveguides

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As it is well known, the dynamics of a spinless non-relativistic quantum particle constrained to move along a curve can be described, within the confining (or thin-layer) formalism, by an effective one-dimensional Schrödinger equation whose corresponding Hamiltonian depends on the curve's torsion and curvature.

In this setting, it can be shown that the state of a particle constrained to move in a unitary circle, acquires – in general – a geometric phase when the circle's shape undergoes a cyclic deformation in an adiabatic manner and, moreover, that such a phase can have physical consequences.

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