Berry Phase and Fine Structure

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Abstract

Irrational numbers can be assigned to physical entities based on iterative processes of geometric objects. It is likely that iterative round trips of vector signals include a geometric phase component. If so, this component will couple back to the round trip frequency or path length generating an non-linear feedback loop (i.e. induced by precession). In this paper such a quantum feedback mechanism is defined including generalized fine structure constants in accordance with the fundamental gravitomagnetic relation of spin-orbit coupling. Supported by measurements, the general relativistic and topological background allows to propose, that the deviation of the fine structure constant from 1/137 could be assigned to Berry's phase. The interpretation is straightforward: spacetime curvature effects can be greatly amplified by non-linear phase-locked feedback-loops adjusted to single-valued phase relationships in the quantum regime.

Keywords:	Berry phase, Aharonov-Bohm effect, gauge theory, fine structure constant, gravitomagnetic interaction, chaos, spin-orbit coupling, quantum electrodynamics, magnetic monopole, winding number
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