

# Geometric Phase Locked in Fine Structure

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## Abstract

Berry's phase carries physical information coded as topological and geometrical objects that can be directly verified in measurements. In some cases the situation can be reduced to an irrational phase shift, that can be usually obtained by an iterative process. Take the Berry phase as the geometric object and let the iterative process be a non-linear phase-locked feedback mechanism defined by spin-orbit coupling and precession, a coupling of fast and slow rotating vectors. For spin-orbit coupling the realization is easy and fast generating irrational and rational numbers: generalized fine structure constants. As a result, this paper provides for additional evidence, that the Sommerfeld fine structure constant  $\alpha$  carries a Berry phase component  $2\pi(1-137\alpha)$ .

**Keywords:** Berry, phase, Aharonov, Bohm, gauge theory, fine structure, gravitomagnetic, chaos, spin-orbit, coupling, magnetic monopole, non-linear, topology, coherence

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