

# Iterative Interplay between Aharonov-Bohm Deficit Angle and Berry Phase

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## Abstract

Geometric phases can be observed by interference as preferred scattering directions in the Aharonov-Bohm (AB) effect or as Berry phase shifts leading to precession on cyclic paths. Without curvature single-valuedness is lost in both case. It is shown how the deficit angle of the AB conic metric and the geometric precession cone vertex angle of the Berry phase can be adjusted to restore single-valuedness. The resulting interplay between both phases confirms the non-linear iterative system providing for generalized fine structure constants obtained in the preliminary work. Topological solitons of the scalar coupling field emerge as localized, non-dispersive and non-singular solutions of the (complex) sine-Gordon equation with a relation to the Thirring coupling constant and non-linear optics.

**Keywords:** abelian, local, non-pertubative, nonabelian, nonlocal, geometric, phase, berry, sine-Gordon, Aharonov, Bohm, Thirring, fine structure, memory, curvature, spacetime, iteration, iterative

**Subjects:** [Specific Sciences: Physics: Fields and Particles](#)  
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