Physikalisches Kolloquium

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»Geometrical phase and diabolical points in molecular magnets«

Einführung: P. Wölfle

Molecular magnets offer to physicists a unique playground, allowing them to explore experimentally a number of fundamental concepts of quantum mechanics, such as tunneling, Berry phase, decoherence, etc. [1]. Recently, much attention has been deoted to the "diabolical points" (accidental degeneracies) [2] due to the Berry phase in molecular magnets [3], giving rise to spectacular oscillations of quantum tunneling for Fe8 molecular magnets [4].

I present here a general topological theory of diabolical points in molecular magnets [5]. Each diabolical point is characterized by a "diabolicity index" (topological charge), for which, by means of the Berry phase, several "topological sum rules" can be derived. The application of these sum rules provides a global understanding of the diabolical points in molecular magnets, and to clarify a number of apparent "paradoxes" in experimental results.Furthermore, I shall discuss some deep analogies between the physics of molecular magnets and other, apparently unrelated, quantum phenomena, such as the quantum Hall effect, the Aharonov-Bohm effect and the Hofstadter butterfly.

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[3] M.V. Berry, Proc. R. Soc. A 392, 45 (1984)
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[5] P. Bruno, Phys. Rev. Lett. 96, 117208 (2006).

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Anschließend Nachsitzung im Gastdozentenhaus „Heinrich Hertz"