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**Topological transitions in the geometric phase in spin interferometers** HENRI SAARIKOSKI, RIKEN Center for Emergent Matter Sicence, Saitama, Japan, ENRIQUE VAZQUEZ, JOSE PABLO BALTANAS, DIEGO FRUSTAGLIA, Departamentode Fisica Aplicada II, Universidad de Sevilla, E-41012 Sevilla, Spain, FUMIYA NAGASAWA, JUNSAKU NITTA, Department of Materials Science, Tohoku University, Sendai 980-8579, Japan — An electronic spin transported around a circuit acquires a phase factor that depends on the geometry of the path in the parameter space. In the adiabatic limit this is the Berry phase and it has been argued that it can undergo an abrupt transition via manipulation of the topology of the path [1]. However, spin transport in mesoscopic structures is usually nonadiabatic, which is associated with the Aharonov-Anandan geometric phase. Here we identify the characteristic signatures of topological transitions in nonadiabatic spin transport by 1D and 2D calculations of mesoscopic loops. We find that the topological transition is characterized by an effective Berry phase due to correlations between dynamic and geometric phases close to the region where the transition occurs. This effective Berry phase is related to the topology of the field texture rather than the spin-state structure. The transition manifests as a distinct dislocation of the interference pattern in the quantum conductance. The phenomenon is robust, and can be observed in mesoscopic arrays of loops where phase coherence is significant. [1] Y. Lyanda-Geller, Phys. Rev. Lett. 71, 657 (1993).

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