

Publication

Absence of Spontaneous Magnetic Order of Lattice Spins Coupled to Itinerant Interacting Electrons in One and Two Dimensions

JournalArticle (Originalarbeit in einer wissenschaftlichen Zeitschrift)**ID** 2841457**Author(s)** Loss, Daniel; Pedrocchi, Fabio L.; Leggett, Anthony J.**Author(s) at UniBasel** [Loss, Daniel](#) ;**Year** 2011**Title** Absence of Spontaneous Magnetic Order of Lattice Spins Coupled to Itinerant Interacting Electrons in One and Two Dimensions**Journal** Physical Review Letters**Volume** 107**Number** 10**Pages / Article-Number** 107201

We extend the Mermin-Wagner theorem to a system of lattice spins which are spin coupled to itinerant and interacting charge carriers. We use the Bogoliubov inequality to rigorously prove that neither (anti-) ferromagnetic nor helical long-range order is possible in one and two dimensions at any finite temperature. Our proof applies to a wide class of models including any form of electron-electron and single-electron interactions that are independent of spin. In the presence of Rashba or Dresselhaus spin-orbit interactions (SOI) magnetic order is not excluded and intimately connected to equilibrium spin currents. However, in the special case when Rashba and Dresselhaus SOIs are tuned to be equal, magnetic order is excluded again. This opens up a new possibility to control magnetism electrically.

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