Abstract Submitted
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Magnetic friction: From Stokes to Coulomb behavior[1] MARTIN MAGIERA, SEBASTIAN ANGST, ALFRED HUCHT, DIETRICH E. WOLF, Faculty of Physics and CeNIDE, University of Duisburg-Essen, D-47048 Duisburg, Germany — We demonstrate that in a ferromagnetic substrate, which is continuously driven out of equilibrium by a field moving with constant velocity v, at least two types of friction may occur when v goes to zero: The substrate may feel a friction force proportional to v (Stokes friction), if the field changes on a time scale which is longer than the intrinsic relaxation time. On the other hand, the friction force may become independent of v in the opposite case (Coulomb friction). These observations are analogous to e.g. solid friction. The effect is demonstrated in both, the Ising (one spin dimension) and the Heisenberg model (three spin dimensions), irrespective which kind of dynamics (Metropolis spin-flip dynamics or Landau-Lifshitz-Gilbert precessional dynamics) is used. For both models the limiting case of Coulomb friction can be treated analytically. Furthermore we present an empiric expression reflecting the correct Stokes behavior and therefore yielding the correct cross-over velocity and dissipation. arXiv:1111.2494

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