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Precession damping in itinerant ferromagnets KEITH GILMORE, MARK STILES, National Institute of Standards and Technology, YVES IDZERDA, Montana State University — The damping of excited magnetic states has long been understood at a phenomenological level through the Landau-Lifshitz-Gilbert equation. Increased interest in nanoscale devices, the behavior of which can be strongly dependent on the damping, demands a more thorough understanding of the relaxation process. While magnetic alloy systems are used in most applications, we consider the simpler 3d transition metals (iron, nickel, and cobalt) in order to understand the most basic processes involved in damping before approaching the more complicated mechanisms expected in alloys. Resonance experiments for Co and Ni indicate low and high temperature regions for which the damping parameter is roughly proportional and inversely proportional, respectively, to the scattering time. We report and numerically test a model that produces both of these behaviors. As with all previous work, the calculations presented are given in terms of an unknown electronic scattering time. To make meaningful comparisons between the calculated and measured damping parameters we evaluate an expression for the conductivity, derived by similar methods, and compare also to transport experiments.

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