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Theory of ultrafast demagnetization in transition metals - the role of single-particle and collective excitations[1] LUKASZ CYWINSKI, L.J. SHAM, University of California, San Diego — An optical excitation with a short pulse causes the magnetization of an itinerant ferromagnet (e.g. Fe,Ni,Co) to decrease by at least a couple percent during one picosecond [1]. A consistent microscopic theory of such an ultrafast demagnetization process is still missing. We introduce a non- equilibrium generalization of the Stoner model, within which we calculate the demagnetization due to Eliot-Yafet spin relaxation of single-particle excitations (recently proposed as a mechanism of demagnetization in [2]). We show that in order to account for the observed magnitude of demagnetization, the scattering of optically excited electrons with collective excitations (spin waves) has to be included. 1. E. Beaurepaire et. al., Phys. Rev. Lett. **76**, 4250 (1996) 2. B. Koopmans et. al., Phys. Rev. Lett. **95**, 267207 (2005)

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