

Abstract Submitted
for the MAR11 Meeting of
The American Physical Society

Direct observation of four-magnon scattering in spin-wave micro-conduits HELMUT SCHULTHEISS¹, KATRIN VOGT, PHILIPP PIRRO, THOMAS BRAECHER, BURKARD HILLEBRANDS, Department of Physics and research center OPTIMAS, University of Kaiserslautern, Germany — We report on experiments which demonstrate the intrinsic nonlinear damping of spin waves due to four-magnon scattering processes in a micrometer sized permalloy stripe. The magnetization is excited by a microwave current transmitted through the shorted end of a coplanar waveguide. The excitation spectrum of the spin waves is locally probed by Brillouin light scattering microscopy for different excitation frequencies covering a wide range of excitation powers over three orders of magnitude. We find a transition from a pure and clean monochromatic excitation of spin waves at low microwave powers to a large broadening above a certain threshold power. The spectral distribution of the measured spin-wave intensities shows a unique profile which is in good agreement with theoretical expectations for four-magnon scattering processes.

¹now at MSD, Argonne National Laboratory

Helmut Schultheiss
Department of Physics and research center OPTIMAS,
University of Kaiserslautern, Germany

Date submitted: 26 Nov 2010

Electronic form version 1.4