

Abstract Submitted
for the MAR15 Meeting of
The American Physical Society

Low-temperature magnetization dynamic properties of yttrium iron garnet films YUE ZHAO, QI SONG, WEI YUAN, TANG SU, International Center for Quantum Materials, Peking University, Beijing, YONG WU, YONG JIANG, School of Materials Science and Engineering, University of Science and Technology Beijing, Beijing, WEI HAN, International Center for Quantum Materials, Peking University, Beijing, JING SHI, Department of Physics and Astronomy, University of California, Riverside, California 92521, USA — The long lifetime of collective spin excitations in yttrium iron garnet (YIG) has spurred intense interest in spintronics. Ferromagnetic resonance (FMR) is a sensitive tool for investigating the magnetization dynamics in YIG films as well as YIG-based heterostructure devices. Previous studies have been mainly focused on the room temperature magnetization dynamics of YIG thin films. In this talk, I will first describe a low-temperature broad-band FMR setup with a wide frequency range from 1 to 18 GHz incorporated in Quantum Design's Physical Properties Measurement System. Using this setup, we study the magnetization dynamic properties of the YIG thin films. In YIG films we observe an intriguing non-monotonic behavior in the temperature dependence of the FMR linewidth from which the Gilbert damping parameter can be extracted. Furthermore, various thicknesses of YIG films are studied to probe the underlying mechanisms that dominate the low-temperature magnetization dynamic behavior. Our temperature-dependence FMR results are very important for the understanding of the relaxation processes of YIG thin films.

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Date submitted: 13 Nov 2014

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