Abstract Submitted
for the 4CF12 Meeting of
The American Physical Society

Direct observation of microwave-driven nonlinear three magnon splitting and confluence processes in yttrium iron garnet films by time-resolved Brillouin light scattering[1] JASON LIU, GRANT RILEY, Colorado State University, CÉSAR ORDÓÑEZ-ROMERO, Universidad Nacional Autónoma de México, BORIS KALINIKOS, St. Petersburg Electro-technical University, KRISTEN BUCHANAN, Colorado State University — Low-loss yttrium iron garnet (YIG) films provide a model system for the study of nonlinear spin wave processes. One such process is known as parametric pumping. This involves the conversion of spin waves or magnons at the pumping frequency f_p into two magnons, both with frequencies of $f_p/2$, through a process known as three magnon splitting. The three magnon splitting and confluence processes, that is the subsequent recombination of the parametrically pumped magnons, were observed recently in YIG films using Brillouin light scattering (BLS) in both the magnetostatic surface wave (MSW) and the backward volume wave (MSBVW) configurations. These experiments were done, however, using continuous wave microwave excitations and no time-resolved information was obtained. In this work we explore the time-evolution of the splitting and confluence processes in the MSBVW configuration using time resolved BLS. Pulsed microwave excitations from a microstrip transducer were used to excite propagating spin waves in a long and narrow YIG film stip. Examination of the arrival times of the scattered photons shows that there are subsequent time delays between the f_p and $f_p/2$ signals, and between the $f_p/2$ and f_c signals.

[1]This work was supported by NSF-DMR and NIST.

Jason Liu
Colorado State University

Date submitted: 25 Sep 2012 Electronic form version 1.4