Abstract Submitted
for the MAR17 Meeting of
The American Physical Society

Experimental mapping of magnetostatic mode structures of a ferrimagnet spheroid ARNAUD GLOPPE, ALTO OSADA, RYUSUKE HISATOMI, ATSUSHI NOGUCHI, REKISHU YAMAZAKI, KOJI USAMI, RCAST, The University of Tokyo, YASUNOBU NAKAMURA, RCAST, The University of Tokyo, CEMS, RIKEN — The exploration of the interaction of light with spin waves in ferromagnets within an optical cavity might lead to new chiral photonic devices and be a stepping stone towards the coherent optical manipulation of magnons in the quantum regime. The developments made so far in cavity optomagnonics have been focused on the fundamental magnetostatic mode of an yttrium iron garnet (YIG) sphere, so-called 'Kittel mode'. Higher-order magnetostatic modes, with reduced mode volume and different orbital angular momentum, could couple more efficiently with the optical whispering gallery modes hosted by the YIG sphere. Hence, unambiguously identifying higher-order magnon modes in a spheroid is crucial to scrutinize these interactions. We demonstrate a scheme to map the magnon mode structures of a ferrimagnetic spheroid. Using two small loop coils in close proximity with a millimetric YIG sphere, we perform microwave transmission measurements at various latitude-longitude coordinates. These signals are found to be very sensitive to the magnon mode structures. This makes possible the identification of the modes, supported by the predicted dependency of their resonance frequencies in the dc magnetic field. This work paves the way to the systematic investigation of the optomagnonic interaction.

Arnaud Gloppe
RCAST, The University of Tokyo

Date submitted: 09 Nov 2016 Electronic form version 1.4