

Chiral excitations of spin waves in ferromagnetic films

Tao Yu¹, Chuanpu Liu², Haiming Yu², Yaroslav M. Blanter¹, and Gerrit E. W. Bauer^{1,3}

¹*Kavli Institute of Nanoscience, Delft University of Technology, Lorentzweg 1, Delft, the Netherlands*

²*Fert Beijing Institute, BDBC, School of Microelectronics, Beihang University, Beijing 100191, China*

³*Institute for Materials Research & WPI-AIMR & CSRN, Tohoku University, Sendai 980-8577, Japan*

We theoretically investigate the interlayer dipolar and exchange couplings for an array of metallic magnetic nanowires grown on top of an extended ultrathin yttrium iron garnet film. The calculated interlayer dipolar coupling agrees with observed anticrossings, concluding that the interlayer exchange coupling is suppressed by a spacer layer between the nanowires and film. The Kittel mode in the nanowire array couples chirally to spin waves in the film, even though Damon-Eshbach surface modes do not exist. This chirality is suppressed when the interlayer exchange coupling becomes strong.

[1] T. Yu et al, Arxiv:1901.09182.