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Nonlocal magnon spin transport in a ferrimagnetic insulator
JUAN SHAN, LUDO CORNELISSEN, JING LIU, NYNKE VLIETSTRA, TIMO KUSCHEL, Physics of Nanodevices, Zernike Institute for Advanced Materials, University of Groningen, JAMAL BEN YOUSSEF, Laboratoire de Magntisme de Bretagne, Universit de Bretagne Occidentale, REMBERT DUINE, Institute for Theoretical Physics and Center for Extreme Matter and Emergent Phenomena, Utrecht University, BART VAN WEES, Physics of Nanodevices, Zernike Institute for Advanced Materials, University of Groningen — Magnons recently entered the field of spintronics as novel, long-distance spin information carriers. In this talk, I will show the experimental demonstration of the diffusive magnon transport in yttrium iron garnet (YIG), a ferrimagnetic insulator [1]. Magnons can be excited in two ways simultaneously: electrical injection as a result of the spin Hall effect in an adjacent heavy metal, and thermal generation due to the bulk spin Seebeck effect. Magnons excited in both methods can be described by diffusive transport over a magnon relaxation length, around 10 \mu m at room temperature [2]. We studied the transport behavior of both types of magnons as a function of magnetic field, YIG thickness and temperature [3][4]. However, the study of magnon transport in different YIG thickness shows quantitative disagreement with the magnon diffusion model, suggesting more complex processes. [1] Cornelissen *et al., Nature Phys.* **11**,1022 (2015) [2] Cornelissen *et al.*, *Phys. Rev. B* **94**, 014412 (2016) [3] Cornelissen *et al., Phys. Rev. B* **93**, 020403 (R) (2016); *Phys. Rev. B* **94**, 180402(R) (2016) [4] Shan *et al.*, *Phys. Rev. B* in press, arxiv:1608.01178; J. Shan *et al.*, in preparation

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