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Direct observation of dynamic modes excited in a magnetic insulator by pure spin current

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Abstract

© Thte Author(s) 2016.Excitation of magnetization dynamics by pure spin currents has been recently recognized as an enabling mechanism for spintronics and magnonics, which allows implementation of spin-torque devices based on low-damping insulating magnetic materials. Here we report the first spatially-resolved study of the dynamic modes excited by pure spin current in nanometer-thick microscopic insulating Yttrium Iron Garnet disks. We show that these modes exhibit nonlinear self-broadening preventing the formation of the self-localized magnetic bullet, which plays a crucial role in the stabilization of the single-mode magnetization oscillations in all-metallic systems. This peculiarity associated with the efficient nonlinear mode coupling in low-damping materials can be among the main factors governing the interaction of pure spin currents with the dynamic magnetization in high-quality magnetic insulators.

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