Current-Induced Control of Spin-Wave Attenuation

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The spin wave is ubiquitous in magnetic systems and has long been a fundamental research topic in magnetism. Current injection in the magnetic nanowire where spin wave propagates generates the current-induced Doppler shift [1] due to the adiabatic spin torque. In this talk, we discuss the effect of the nonadiabatic spin torque on a propagating SW. We demonstrate theoretically and numerically that the current injection can modify the spin wave attenuation [2]. The attenuation length of spin wave can increase when the spin waves and electrons move in the same direction. It is directly affected by the nonadiabaticity of the spin-transfer torque and thus can be used to estimate the nonadiabaticity. When the nonadiabatic spin torque is sufficiently large, the attenuation length becomes negative, resulting in the amplification of spin waves.

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