249

Title:Relaxation time of terahertz magnons excited at ferromagnetic surfaces

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Abstract:The temporal and spatial properties of terahertz magnons excited at ferromagnetic fcc Co(100) and bcc Fe(110) surfaces are investigated experimentally. The magnon lifetime is found to be a few tens of femtoseconds at low wave vectors, which reduces significantly as the wave vector approaches the Brillouin zone boundary. Surprisingly, the lifetime is very similar in both systems, in spite of the fact that the excitation energy in the Co(100) film is by a factor of two larger than in the Fe(110) film. The magnon wave packets propagate only a few nanometers within their lifetime. In addition to the fact that our results describe the damping mechanism in ultrafast time scales, they may provide a way to predict the ultimate time scale of magnetic switching in nanostructures. © 2012 American Physical Society.