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X-ray imaging of magnetic normal modes driven by spin transfer torque in magnetic nanopillar devices LIN XUE, YONG-TAO CUI, R.A. BUHRMAN, D.C. RALPH, Cornell University, TOLEK TYLISZCZAK, Advanced Light Source, LBNL, MI-YOUNG IM, PETER FISCHER, Center for X-ray Optics, LBNL — We have used time-resolved x-ray microscopy to image the fundamental dynamical modes that are driven by spin transfer torque in magnetic devices. We apply a continuous microwave current to exert an oscillating spin torque in a nanopillar structure. By varying frequency and the applied magnetic field, this spin torque selectively excites different individual magnetic normal modes, which are then imaged by x-ray pulses synchronized to the microwave current. We obtain images with 70 ps time resolution and 25 nm spatial resolution. Our results identify modes having different spatial distributions of amplitude and phase, which can be explained by the combined effects of spin transfer torque and the Oersted field. We will discuss the implications of our results for understanding spin-torque-driven magnetic dynamics.

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