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Electric probe for spin transition and fluctuation ZHIYONG QIU, Tohoku University, JIA LI, University of California at Berkeley, DAZHI HOU, Tohoku University, ELKE ARENHOLZ, ALPHA T. NDIAYE, ALI TAN, Lawrence Berkeley National Laboratory, KEN-ICHI UCHIDA, KOJI SATO, Tohoku University, YAROSLOV TSERKOVNYAK, University of California, Z. Q. QIU, University of California at Berkeley, EIJI SAITOH, Tohoku University — Spin fluctuation and transition have always been one of central topics of magnetism and condense matter science. To probe them, neutron scatterings have been used as powerful tools. A part of neutrons injected into a sample is scattered by spin fluctuation inside the sample. This process transcribes the spin fluctuation onto scattering intensity, which is commonly represented by dynamical magnetic susceptibility of the sample and is maximized at magnetic phase transitions. Importantly, a neutron carries spin without electric charge, and it thus can bring spin into a sample without being disturbed by electric energy: an advantage of neutrons, although large facilities such as a nuclear reactor is necessary. Here we show that spin pumping, frequently used in nanoscale spintronic devices, provides a desktop micro probe for spin fluctuation and transition; not only a neutron beam, spin current is also a flux of spin without an electric charge and its transport reflects spin fluctuation in a sample. We demonstrate detection of anti-ferromagnetic transition in ultra-thin CoO films via frequency dependent spin-current transmission measurements.

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