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**Direct X-Ray Imaging of Transient Spin Accumulation near a Ferromagnet/Nonmagnet Interface** ZHAO CHEN, Dept. Physics, Stanford University, ROOPALI KUKREJA, Dept. Materials Science, Stanford University, STEFANO BONETTI, Dept. Physics, Stanford University, DIRK BACKES, ANDREW KENT, Dept. Physics, NYU, JORDAN KATINE, HGST, Inc., HERMANN DURR, HENDRIK OHLDAG, JOACHIM STOHR, SLAC National Accelerator Laboratory — The physics of spin transport across a ferromagnet/nonmagnet interface is not well understood, even though such interfaces are common in spintronic devices. We use time-resolved x-ray spectro-microscopy to directly image transient spin accumulation in a Cu film caused by an injected spin current from an adjacent Co film. The measurement uses element-specific, circularly polarized x-rays detected via a scanning transmission x-ray microscope (STXM) in conjunction with 1.28MHz temporal modulation for remarkably increased x-ray sensitivity to spin signals. The transient moments per atom within the spin diffusion length from the interface were measured to be 8 x $10^{-5}\mu_B$ per Cu atom and 1.5 x $10^{-4}\mu_B$ per Co atom. The transient spin signal in Cu is found to be confined to states at the Fermi level, as expected, but we also observe a second peak of the same spin polarization in the spin accumulation signal that is 0.7eV higher than Fermi. The transient moments in the 28nm thick Cu layer exhibit the same spin sign as both the hybridization-induced static spins in Cu at the Cu/Co interface and the spins in the Co film. In contrast, the transient moments in the Co layer have the opposite sign, consistent with magnetization depleting from the Co polarizing layer.

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