Abstract Submitted
for the MAR15 Meeting of
The American Physical Society

Time Resolved Imaging at 10GHz and Beyond Using the SSRL Scanning Transmission X-ray Microscope HENDRIK OHLDAG, SLAC National Accelerator Laboratory, STEFANO BONETTI, Stockholm University, ROOPALI KUKREJA, UC San Diego, ZHAO CHEN, Stanford University, JOSEPH FRISCH, HERMANN DÜRR, JOACHIM STÖHR, SLAC National Accelerator Laboratory — Understanding magnetic properties at ultrafast timescales is crucial for the development of new magnetic devices. Such devices will e.g. employ the spin torque or spin Hall effect, whose manifestation at the nanoscale is not yet sufficiently understood. Hence, addressing these effects is of great fundamental significance. X-ray microscopy at the nanoscale is an excellent tool for the study of complex magnetic devices but it is crucial to push the time resolution and sensitivity well beyond the current capabilities. For this reason we developed a microscope with a single photon counting electronics that effectively allows us to use a double lock-in detection at 476MHz (the x-ray pulse frequency) and 1.28MHz (the synchrotron revelation frequency). The sample excitation is fully synchronized with the detection as well. This setup allows us to achieve a signal to noise ratio of better than 10000, enabling us to detect miniscule variations of the x-ray absorption cross section with tens of ps of time resolution. In this talk I will describe our setup and present first results. We successfully achieved the first direct observation of so called traveling spin waves and the detection of a spin polarized current in Cu injected from an adjacent Co layer.

Hendrik Ohldag
SLAC National Accelerator Laboratory

Date submitted: 10 Nov 2014 Electronic form version 1.4