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Microwave pump-probe transmission x-ray microscopy for magnetization dynamics imaging[1] STEFANO BONETTI, ROOPALI KUKREJA, Stanford University, HENDRIK OHLDAG, SLAC National Accelerator Laboratory, RICHARD HOUANCHE, University at Albany, JUDE PINTO, JOSEF FRISCH, JO STOHR, HERMANN DURR, SLAC National Accelerator Laboratory — The development of scanning transmission x-ray microscopy at synchrotron lightsources has seen a rapid development in recent years. The possibility of combined elemental specificity, nanometer resolution, magnetic sensitivity and even time-resolved capabilities, have made this imaging technique relevant for a large number of investigations in condensed matter physics. We further built up on these recent achievements by developing a new microwave "pump-probe" technique, where the "pump" is a continuous microwave source, precisely synchronized with the frequency of the synchrotron pulses, the "probe". Combined with the availability of low-alpha operation at Stanford Synchrotron Radiation Lightsource, that provides x-ray pulses as short as 10-15 ps FWHM, our instrument is capable of creating direct images of dynamical phenomena in the 5-10 GHz range, with 40 nm resolution, at x-ray energies in the 500-1000 eV range. When used together with circularly polarized x-rays, the above capabilities can be used in magnetism. In particular, they can be combined to study magnetic phenomena at microwave frequencies, such as spin waves or magnetization switching. Preliminary results on the imaging of spin waves emitted by spin transfer torque in nano-contacts will be discussed.

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