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Neutron and X-ray Diffraction from Exotic Magnets in Pulsed Magnetic Fields

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Magnetic fields obtained by discharging a large capacitor bank through Helmholtz coils can be produced in excess of 25 T for relatively short periods of time, ~ 1 msec and longer. When combined with modern facilities for diffraction at modern neutron and synchrotron x-ray sources, one can study the structure and phase diagrams of new materials under extremes of magnetic field. I will present two such studies, each focussing on a new magnetic material which exhibit exotic low temperature states. I will show time-resolved neutron Laue diffraction on the multiferroic magnet MnWO4 [1], and time-resolved synchrotron x-ray studies of large magneto-elastic effects in the geometrically-frustarted pyrochlore magnet Tb2Ti2O7 [2], both in magnetic fields up to ~ 30 T. Such studies of new materials in extreme sample environments can be very revealing as to the nature of their exotic low temperature states.

[1] *H. Nojiri et al., Phys. Rev. Lett. 106, 237202 (2011),* ***[2]*** *J.P.C. Ruff et al., Phys. Rev. Lett. 105, 077203 (2010)*

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