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Ultra high resolution neutron scattering: Neutron Resonance Spin-Echo and Larmor Diffraction ANDREW WALTERS, THOMAS KELLER, BERNHARD KEIMER, Max Planck Institute for Solid State Research — The TRISP spectrometer at the FRM II neutron source near Munich, Germany, is a unique world-leading neutron scattering instrument which employs the Neutron Resonance Spin-Echo technique (NRSE). Linewidths of dispersive excitations with energy transfers up to 50 meV can be measured with an energy resolution in the μeV range without the restrictive flux limitations that normally apply to high resolution neutron triple-axis spectrometers. Pioneering studies on the electron-phonon interaction in elemental superconductors[1] and the lifetimes of magnetic excitations in archetypal magnetic systems will be reviewed.[2] The instrument can also be used as a Larmor diffractometer, enabling d-spacings to be measured with a resolution of $\frac{\Delta d}{d} \sim 10^{-6}$, i.e. more than one order of magnitude more sensitive than conventional diffraction techniques.[3] Ongoing and future NRSE and Larmor diffraction projects will be outlined, especially in regard to prospective studies which will take full advantage of the new low temperature and high pressure sample environment capabilities now available at TRISP.

[1]P. Aynajian et al., Science **319** 1509 (2008)
[2]S. Bayrakci et al., Science **312** 1928 (2006)
[3]C. Pfleiderer et al., Science **316** 1871 (2007)

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