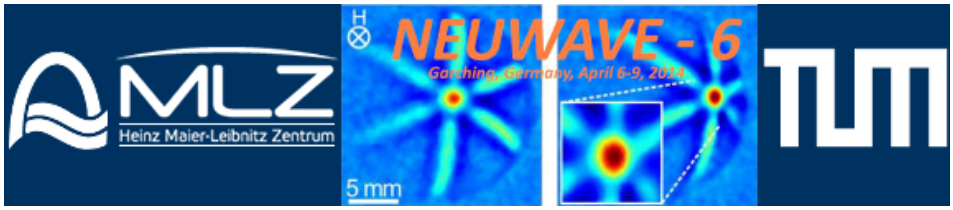

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Recent progress of the IMAT project at ISIS

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The materials science instrument IMAT is currently under construction at the second target station of the ISIS pulsed neutron source [1]. IMAT will offer neutron radiography, tomography and energy selective imaging measurements. In the long run, diffraction detectors on IMAT will offer spatially-resolved crystallographic phase, residual strain and texture analyses of regions of interest in a sample. IMAT will exploit the energy dependences of total cross sections of materials for contrast variation and, specifically, for mapping residual strains and texture in metals and alloys. To do this, energy discrimination is required which is achieved by making use of time of flight techniques on the pulsed 10Hz neutron source. A flexible selection of relatively narrow bandwidths (down to 0.5 Å) or large bandwidths (up to 15 Å) is achieved by operating two double disk choppers at different frequencies and opening times. Energy selection with much higher resolution as required for Bragg edge analysis is achieved with time-of-flight measurements by synchronizing the imaging camera with the ISIS source trigger. The wavelength resolution is ultimately limited by the neutron pulse width given by the slowing-down process of neutrons in the moderator. Monte Carlo simulations of the instrument and experimental data from the IMAT moderator indicate that the energy resolution for imaging will be better than 0.8% [2]. The flexible selection of neutron wavelengths using choppers and time-of-flight capable cameras is achieved for a field of view up to 200 mm.

A straight neutron guide has been installed to transport the neutrons to an aperture selector which will define L/D values up to 2000 at a distance of 10 m from the aperture. Current activities include development and construction of two double-disk choppers and a T0 chopper, a pinhole selector, a heavy-duty sample positioning system, and a camera positioning system. The commissioning programme will start with two neutron imaging cameras: a gated CCD imaging system [3] developed by CNR Messina, Italy, and a time-of-flight capable high-resolution imaging detector based on a neutron sensitive MCP [4] developed at Berkeley, USA. Two relatively small diffraction detectors at scattering angles of 90 degrees will be commissioned as well. It is envisaged that IMAT will have first neutrons in summer 2015.

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