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TOMOGRAPHIC SPECTROSCOPY SYSTEM FOR H-1NF HELIAC

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A multi-channel tomographic spectroscopy system capable of time-resolved imaging has been installed and calibrated in preparation for its intended use to obtain detailed evolution of ion temperature and spectral emissivity of H-1NF plasmas.

Based on the Modulated Optical Solid-State (MOSS) spectrometer, a Fourier-transform device which utilises Doppler-broadening of an isolated emission line, the system is designed to produce two-dimensional images of a poloidal cross-section, showing emitted line intensity and species' temperature. In addition, bulk flow velocities can also be estimated from measurements at five poloidal-angular positions around the plasma.

A rotatable carrier ring apparatus, with 190° rotation range, is located inside the H-1NF vessel and encircles the plasma poloidally. Five arrays of eleven parallel lenses mounted on the ring couple light from the plasma into large core optical fibres. The light is transmitted, via an optical fibre bundle, to a 40mm aperture imaging MOSS spectrometer (external to the stellarator) which incorporates an 8x8 multi-anode photomultiplier tube array for light detection. The system can provide up to 55 channels for viewing spectroscopic emissions in the visible wavelengths.

Careful measurement of the spatial response of the system has been completed *in situ*, in preparation for use with the tomographic inversion routines. Calibration of the relative channel sensitivities and an unravelling of the cross-talk in the multi-anode photomultiplier array has also been carried out.