THE CORE CXRS SPECTROMETER PROTOTYPE FOR ITER

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In ITER, a Charge eXchange Recombination Spectroscopy (CXRS) diagnostic is foreseen to detect the Helium profile, plasma rotation and ion temperature, and impurity concentration as a function as radial position. The measurement of the density profile of helium ash in the plasma core is vital for ITER.

The CXRS system for ITER is being designed by a consortium. The consortium members are; ITER-NL, FZJ, CCFE and HAS.

The system can be divided in three assemblies: a Port plug, fiber bundle and a suite of spectrometers. A prototype spectrometer is being developed at the moment. The prototype spectrometer will be tested on TEXTOR (in the coming months) and later on other tokamaks. The first results will be presented in the paper.

This is an extra-ordinary spectrometer, because it combines an excellent spectral resolution with an enormous light collecting power (etendue). The light collecting power is of big importance, since the CXRS signals are small and, especially for ITER, buried under a large Bremsstrahlung background. By increasing the light collecting power, the signal-to-noise level is improved.

The spectrometer combines three spectral channels that share the same grating. Compared to alternative designs that require separate spectrometers for each channel, this is a large advantage in terms of cost, volume and transmission. Due to the design of the spectrometer's front optics, it remains possible to set the spectral resolution for each channel separately.

In the paper the opto-mechanical design, performance and test results of the spectrometer will be discussed.