

§15. Development of a Space and Time Resolving Soft X-Ray Polychromator

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A soft X-ray polychromator which covers a spectral range of 0.7 – 3 nm has been developed for the spectroscopic measurements in LHD plasmas. The use of the grating with high groove density (1600lines/mm) and large radius of curvature of 10 m is expected to be useful to keep out of a strong 0th order light.

The above grating with a large radius of curvature of 10 m gives high resolution spectra. However, the depth of a focus of a spectrum becomes to be shallow especially for a multichannel detector with a flat detection surface. We found that it is very hard to align optical components by usual try and error methods. Then a new optical alignment procedure on the Rowland mounting was tried.

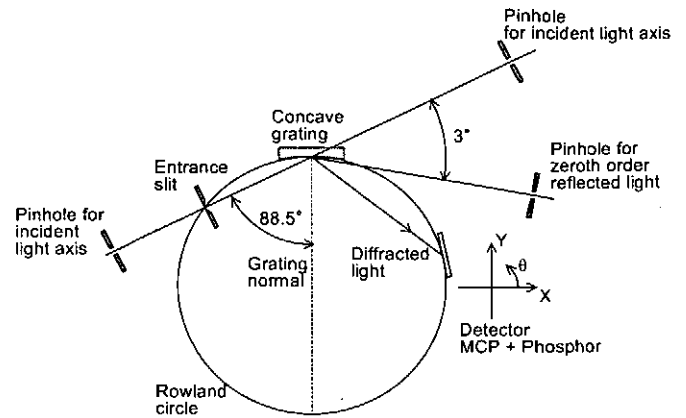


Fig. 1 Schematic of optical alignment for soft X-ray Polychromator.

Firstly, grating is set tangent to the laser beam as an incident light axis and cut the laser beam spot 50%. In its position, grating is rotated to pass the reflected laser beam through the pinhole as a zeroth order position (Fig. 1). This simple procedure worked satisfactory and spectral resolution of 1000 was realized (Fig. 2).

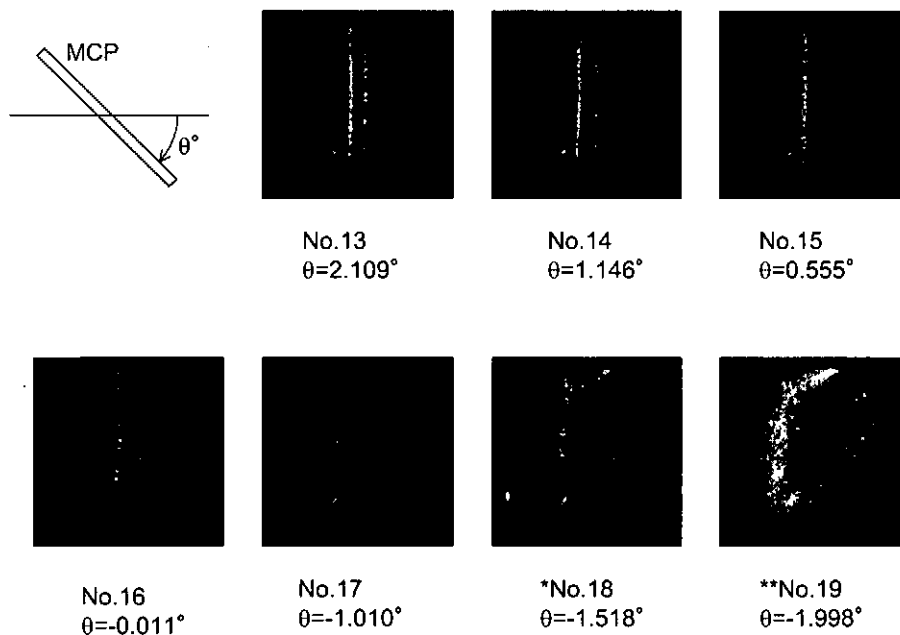


Fig. 2 Image of Al K α line 0.834 nm and 0.828 nm line depending on the tangential angle to the Rowland circle.