

§41. Optical Alignment for a Soft X-ray Polychrometer

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To observe a soft X-ray emission with a energy of several keV, a space and time resolving soft X-ray polychrometer is now in process of optical alignment. This soft X-ray polychrometer adopts the Rowland mounting and has several features : (1) the introduction of a spherical ion - etched SiO₂ grating avoiding a 0 th order stray light in short wavelength region, (2) the use of the grating with high groove density (1600 lines/mm) and large radius of curvature of 10 m for for high resolution measurements. (3) the use of a curved entrance slit for spatially resolved measurements of chordal radiances.

In the present stage, the observation of Al - K emission (Al - K $\alpha_{1,2}$ 8.34 Å) with the resolution of 520 is achieved by the trial - and - error adjustment. (see Fig. 1) Though , the calculated value of the resolution is 1500 in this system. In addition to the lower spectral resolution than the expected one, it was found that the best focusing position of Al - K α line deviates 650 mm from the designed position. This deviation of focal point is rather large from the view point of grating equation.

In our polychrometer system, the detector part of soft X-ray emission consists of a micro-channel-plate and a fluorescent screen. This detector part is moved in two dimensional way and rotatable in order to get the best focusing position. So, a major cause for the unexpected focusing property is thought to be a mis-alignment of the entrance slit and the grating with the Rowland circle.

Then we had a doubt about the radius of curvature of the grating. By means of Foucault test, the radius of curvature of the grating was re-measured and found to be $R = 10096.9 \pm 1.7$ mm. The difference of the measured radius from the nominal radius $R = 10331$ mm is $- 234.1$ mm.

A new trial for the optical adjustment is carried out taking into account of the corrected radius of the curvature.

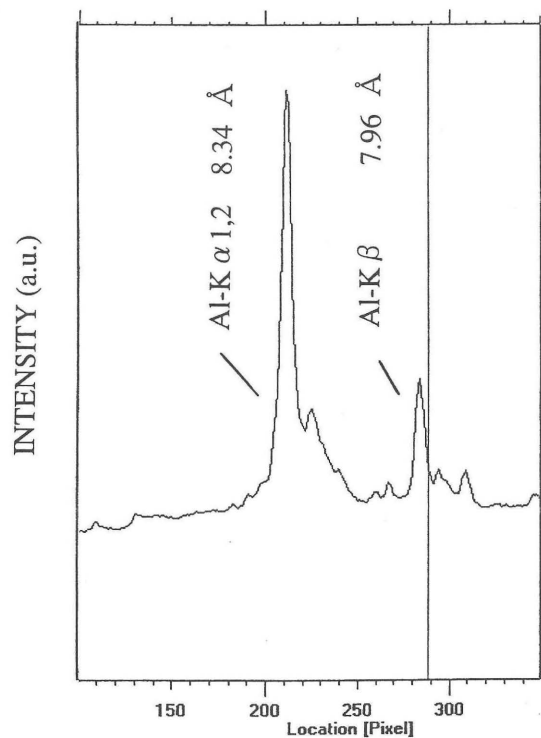


Fig. 1 Measured Al-K α, β spectra.