

§11. Soft X-ray Space and Time Resolving Polychromator: Construction

Ishiguro, E. (College of Education, Univ. of the Ryukyus)

Mimura, M., Sasano, T. (Dept. of Appl. Phys., Osaka City Univ.)

Yamashita, K. (Dept. of Phys., Nagoya Univ.)

Kondo, K. (Kyoto Univ.)

Morita, M., Sato, K.

The polychromator allows us to observe spatial distribution of soft x-ray emission from impurities in plasma of LHD. The construction of the polychromator started at the fiscal year of 1993. The polychromator consist of a grating chamber which accommodated an entrance slit and a grating and a movable detector chamber connected with the grating chamber by a bellows. These were completed at 1994, together with a driving mechanism of the detector chamber. Schematic drawing of the main chamber was given in our previous report¹⁾. The grating and detector chamber were evacuated by turbo molecular pumps of 200 l/s and 50 l/s, respectively and the pressure of the chambers was 1×10^{-5} torr.

Detector of soft x-ray emission is an assembly of two stage MCP and a fluorescent screen. The sensitive area of the MCP (F2805-03, Hamamatsu Photonics K.K.) is $50 \times 50 \text{ mm}^2$. The detector assembly attached to a flange is shown in Fig. 1.

Before measuring plasma of LHD, the optical characterization of the polychromator should be performed. For this purpose, a soft x-ray tube with aluminum target was provided and the performance was examined. A proportional counter with PR gas ($90\% \text{Ar} + 10\% \text{CH}_4$) was used as a detector. The pulse height distribution of the output signals was shown in Fig. 2. The broad band is due to the Al- $k\alpha$ emission of 1.49 keV. This spectrum was taken when the aluminum target was bombarded with electrons of acceleration energy 4 keV.

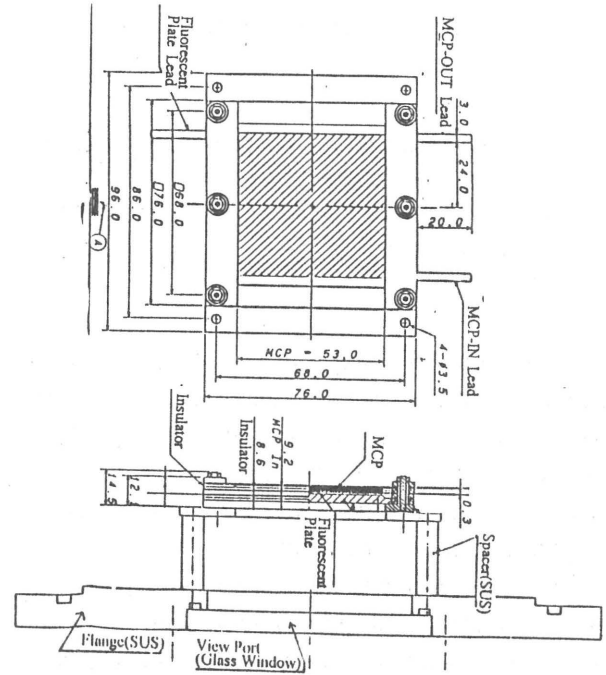


Fig. 1. Detector assembly of two stage MCP and a fluorescent screen

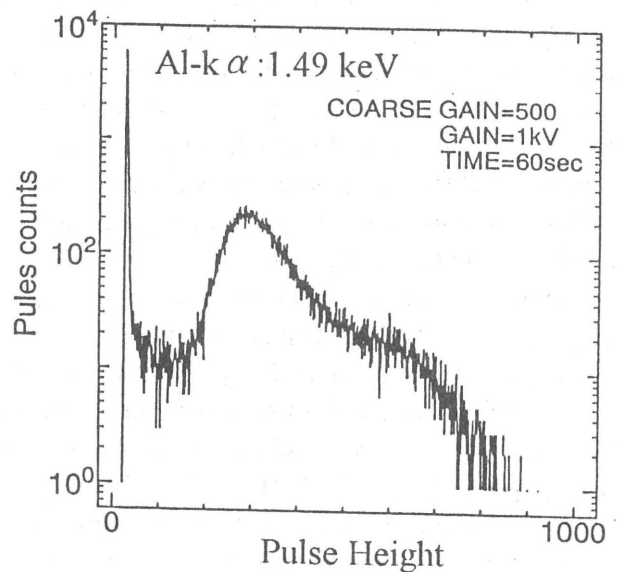


Fig. 2. Pulse height distribution from a soft x-ray tube with target of Aluminum

Reference

- 1) E. Ishiguro et al., Annual Report of NIFS, April 1993-March 1994, 89