

§21. Design and Fabrication of IR Imaging Bolometer for LHD

Peterson, B.J., Ashikawa, N. (Grad. Univ. Adv. Studies),
 Wurden, G.A. (LANL, USA)

As part of an ongoing collaboration between NIFS and Los Alamos National Laboratory (LANL) an IR Imaging Bolometer [1,2] was designed and fabricated for installation before the 3rd cycle of operation on LHD. The IRIB will be installed on Port 6.5-U as shown in Figure 1 and will have a two-dimensional view of the plasma at the midplane as shown in Figure 2. The IRIB consists of two copper masks, between which a 0.8 μm thick aluminum foil is sandwiched. This creates an array of foil pixels (blackened with graphite) which is mounted in a light shielding tube. The foil pixels are exposed to the plasma radiation on one side through a slit and are viewed on the other side by an IR camera which measures the resultant temperature rise through an IR vacuum view port (ZnSe). A drawing of the mask is shown in Figure 3. The IRIB has 118 channels with a spatial resolution of 26 cm in the poloidal direction and 17 cm in the toroidal direction with a time resolution of 33 ms. The brightness sensitivity of the foils is 0.5 mW/cm^2 . With this new diagnostic we plan to investigate the toroidal and poloidal variation of various radiation phenomena in LHD including asymmetric radiative collapse and MARFE.

References

- [1] G.A. Wurden, B.J. Peterson and S. Sudo, Rev. Sci. Instrum. 68, 766 (1997).
- [2] G.A. Wurden and B.J. Peterson, Rev. Sci. Instrum. 70, 766 (1999).

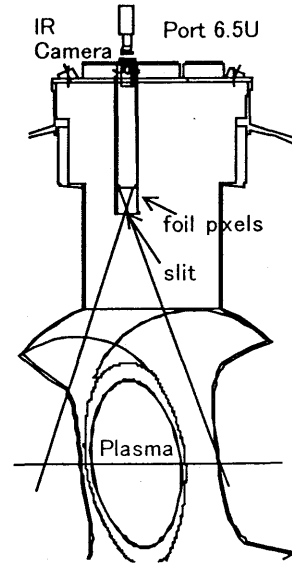


Fig. 1. IR imaging bolometer of field of view in poloidal/radial direction

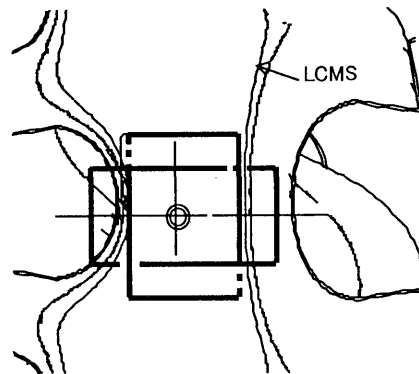


Fig. 2. IR imaging bolometer of field of view at midplane

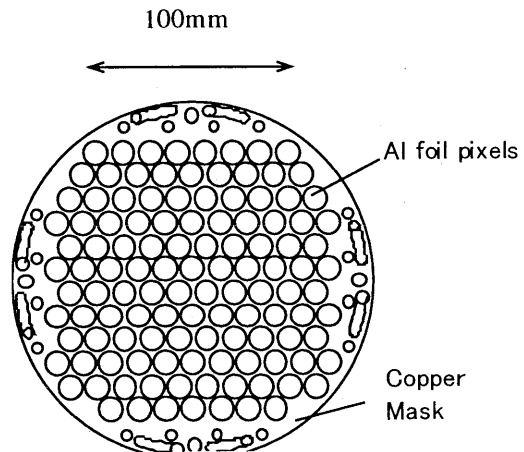


Fig.3. Mask pattern for Al foil