

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

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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 3<sup>rd</sup> 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  $\mu\text{m}$  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  $\text{mW}/\text{cm}^2$ . 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).

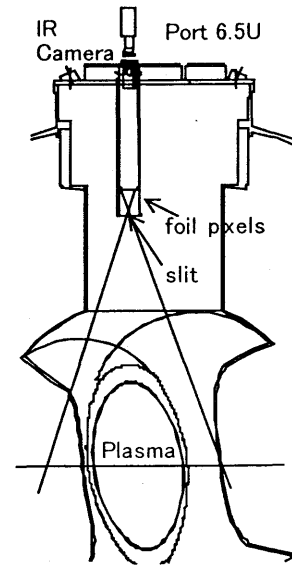


Fig. 1. IR imaging bolometer of field of view in poloidal/radial direction

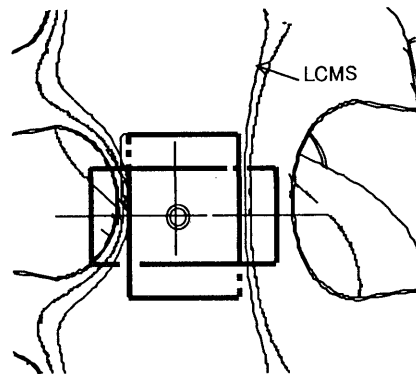


Fig. 2. IR imaging bolometer of field of view at midplane

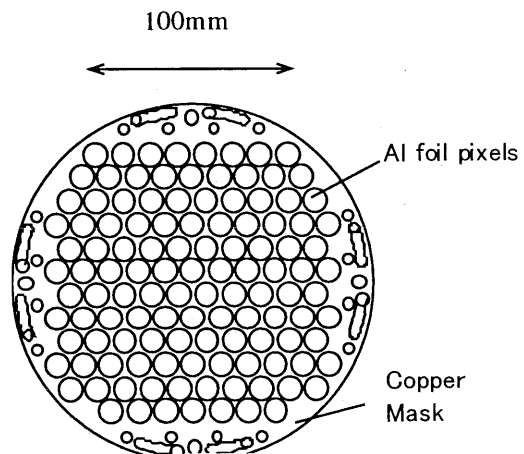


Fig.3. Mask pattern for Al foil