High Heat Flux Langmuir Probe Array for the DIII-D Divertor Plates*

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A Langmuir probe array with high power handling capability has been installed in the DIII-D lower divertor. The twenty pyrolytic graphite probe tips have higher thermal conductivity and 16X larger mass than the previously used domed probes. The new probe tips have lower surface temperature and increased total energy capacity for longer plasma exposures. The probe tips have a fixed 12.5 degree surface angle which distributes the heat flux more uniformly, and a symmetric "rooftop" design to allow operation with reversed toroidal magnetic field. A large, horizontal, spring-loaded contact area between tips, insulators, and the surrounding tile increases thermal contact with the tiles. The tips are brazed to a molybdenum foil electrical connector mounted in a ceramic tray. The 4 mm wide probes are located 1.5 cm radially apart in a staggered arrangement near the lower divertor pumping baffle entrance for improved spatial resolution and are linearly spaced 3 cm apart on the shelf above the in-vessel cryopump. Typical target plate profiles of n_e, T_e, and I_{sat} at high spatial resolution will be shown.

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