Performance assessment of tightly-baffled long-leg divertor geometries in the ARC reactor concept

- ARC SOL and divertor model implemented in UEDGE for Super-X Divertor (SXD) and X-point Target Divertor (XPTD) setups.

- Power scans performed over P_{SOL} for SXD with/without 0.5% Ne impurity, and for various XPTD grids without impurities.

- Significant performance benefit observed for the XPTD geometry over SXD, but only when radial separation of X-point flux surfaces are small ($< 2 \lambda_{q//}$).

- Divertor detachment achieved up to 74 MW with no impurity seeding with small X-point separations (Fig. 2), a factor of ~2 greater performance than the SXD.
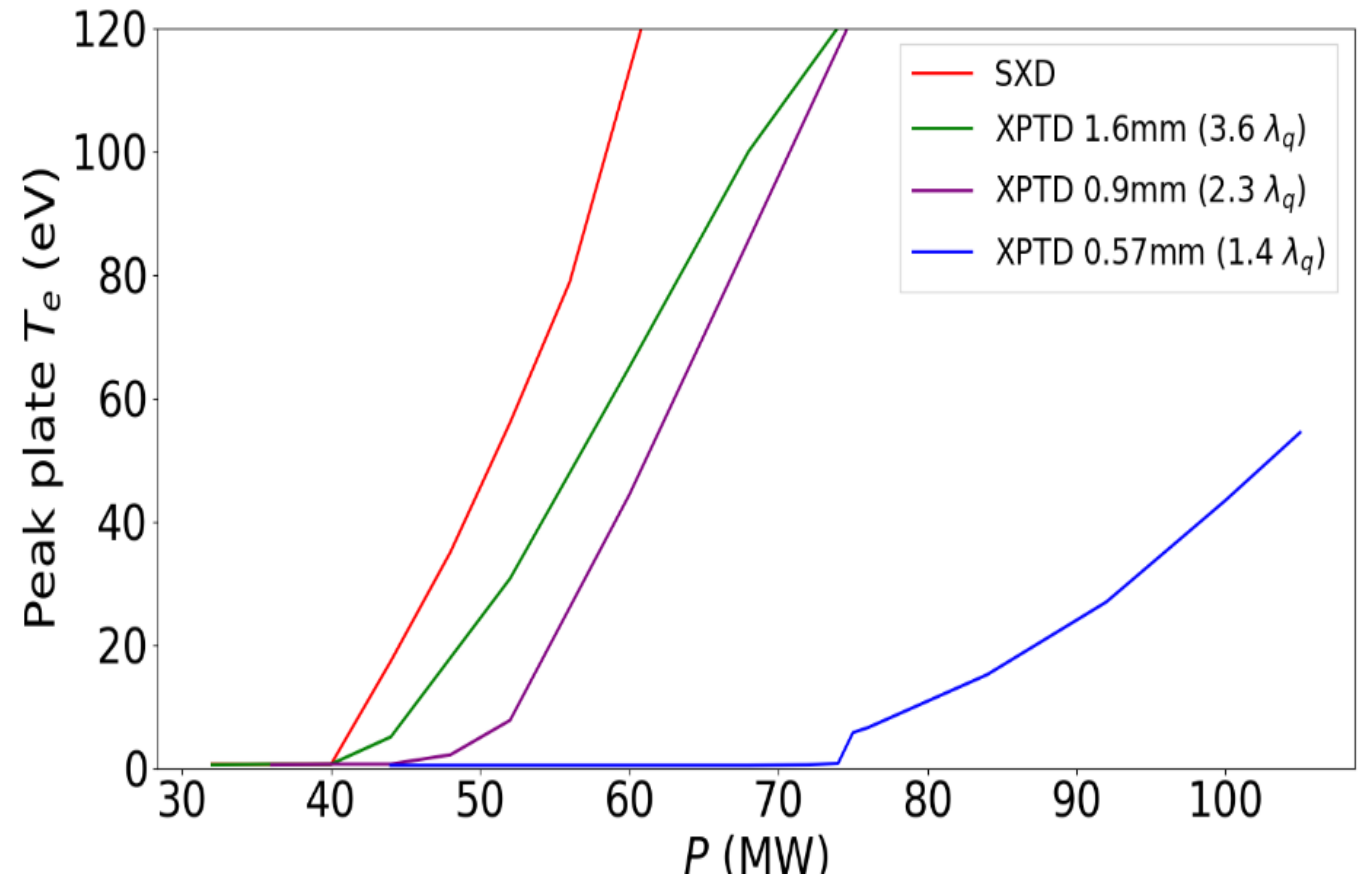

FIG 1: Peak outer target T_e vs input power P_{SOL}, for SXD (red) and XPTD grids with 1.6mm (green), 0.9 (purple) and 0.57mm (blue) X-point radial separations (mapped to midplane).