

## A New High-Heat Flux Divertor Concept

A molten lithium divertor may be able to remove extremely high heat fluxes without having the lithium evaporate or splash into the machine. This is possible due to the thermo-electric effect. Two dissimilar metals (lithium and the moly structure it is sitting in) create a voltage where they touch which is dependent on the temperature. Since the divertor will be hotter at its surface touching the plasma, than deeper in where there are cooling channels, the thermoelectric effect will create a current going into the divertor plate. Combined with the torroidal field, this will create a force on the lithium moving the lithium across the plate. The higher the heat flux, the faster the lithium flows. When the pulse is over, and the plate cools down, the flow stops. Initial experiments at Illinois showed that this effect is real. Calculations say it is significant enough to remove even 50 MW/m<sup>2</sup> while keeping the lithium below its critical temperature. Experiments are proposed at Illinois to prove this. This effect could be used in an NSTX upgrade and there is significant interest for using it in HT-7 in China. A lithium plasma-facing component has tremendous advantages for confinement, impurity control, and disruption mitigation. Having the ability to remove heat too may make it the material of choice for DEMO and beyond.