Abstract Submitted
for the DPP20 Meeting of
The American Physical Society

Divertor Closure Effects on a Lithium Vapor Box[1] ERIC EMDEE, ROBERT GOLDSTON, Princeton Plasma Physics Laboratory — The SOL heat flux in a fusion reactor is predicted to be beyond what any solid, attached divertor could handle. Detached divertors generally succeed in reducing the heatflux to the target but have difficulty preventing gaseous impurities from reaching the main plasma. The goal is then to cause controlled divertor detachment; localizing radiation and impurities while maintaining large heat flux reductions. The lithium vapor box is a detached divertor design that seeks to control the detachment front via differential pumping. By evaporating lithium close to the divertor target and placing condensing surfaces between the X-point and the target, a vapor density gradient can be created resulting in natural feedback control that impurity gas puffing struggles to obtain. Here we present SOLPS-ITER simulations of NSTX-U with a hypothetical lithium vapor box divertor. In previous work, the addition of a fueling gas puff has been shown to drastically reduce upstream contamination via the ion frictional force acting on the lithium impurities. The effect of divertor closure on a lithium vapor box will be examined, as well as evaporation location. Lithium upstream fractions as well as redeposition of lithium vapor in the divertor region will be primary metrics of performance.

[1]This work is sponsored by DOE Contract No. DE-AC02-09CH11466

Eric Emdee
Princeton Plasma Physics Laboratory

Date submitted: 29 Jun 2020 Electronic form version 1.4