Abstract Submitted
for the DPP15 Meeting of
The American Physical Society

On the development of a compact toroid injector at the University of Illinois at Urbana-Champaign[1] MICHAEL CHRISTENSON, SOONWOOK JUNG, STEVEN STEMMLEY, XIA SANG, KISHOR KALATHIPARAMBIL, DAVID RUZIC, Univ of Illinois - Urbana — The ThermoElectric-driven Liquid-metal plasma-facing Structures (TELS) device is a gas-puff driven, theta pinched, transient plasma source used to simulate extreme events incident on materials in the edge and divertor regions of a tokamak plasma. Previous work has shown that in its current form, TELS can bombard a target with a peak energy of 0.08 MJ m^{-2} over a 0.15 ms pulse, leading to a total heat flux of 0.5 GW m^{-2}. While these values are sufficient to mimic Type 1 ELMs in smaller devices, the plasma energy of TELS must be improved by a factor of greater than two to adequately simulate larger-scale Type 1 ELMs. It is for this reason that modifications to the existing TELS device have been proposed in the form of developing a compact toroid (CT) injector since the new self-contained structure allows for higher densities and energies delivered onto a target. The new setup will use a bias field, generating a peak magnetic field greater than 0.1 T and a peak magnetic flux greater than 2 mWb, surrounding the existing plasma gun arrangement to create the CT and the existing theta pinch to compress and translate the plasmoid. Preliminary results and analyses are presented and discussed in relationship to interactions with both solid and liquid metal targets.

[1]Supported by DOE Grant DE-SC0008587

Michael Christenson
Univ of Illinois - Urbana

Date submitted: 24 Jul 2015 Electronic form version 1.4