Abstract Submitted
for the DPP20 Meeting of
The American Physical Society

Current-Drive via Plasmoid-Mediated Reconnection in Spherical Tokamaks FATIMA EBRAHIMI, Princeton Plasma Physics Laboratory, ROGER RAMAN, University of Washington — Fully solenoid-free current start-up is one of the primary objectives of the ST program.[1] Due to its simplicity and favorable scaling, the transient helicity injection technique via plasmoid reconnection [2] has shown to be a promising startup method for advanced ST scenarios. We investigate stability and physics of plasmoid mediated reconnection during startup helicity injection at high current in spherical tokamaks. Our recent 3-D NIMROD simulations [3] in NSTX/NSTX-U have shown stable current-carrying axisymmetric plasmoid formation. Here, we first examine the accessibility to the regimes of maximum current (MA level) of start-up plasma formation with increased toroidal and injector fluxes. The goal is to achieve ohmically self-heated plasma formation via generation of large axisymmetic plasma current in the absence of large 3-D fluctuations. Preliminary results of 3-D simulations of plasmoid reconnection during helicity injection in PEGASUS-like configuration will also be presented. [1] M. W. Bongard et al. APS-DPP-CPP initiative whitepaper (2019).[2] F. Ebrahimi, R. Raman, PRL 114, 205003 (2015); [3] F. Ebrahimi PoP, 26, 092502 (2019). Work supported by DOE grants DE-AC02-09CHI1466, and DE-SC0010565.

Fatima Ebrahimi
Princeton Plasma Physics Laboratory

Date submitted: 10 Jul 2020 Electronic form version 1.4