Abstract Submitted
for the DPP14 Meeting of
The American Physical Society

Benchmark of 3D halo neutral simulation in TRANSP and FIDASIM and application to projected neutral-beam-heated NSTX-U plasmas D. LIU, UC Irvine, S.S. MEDLEY, M.V. GORELENKOVA, PPPL, W.W. HEIDBRINK, L. STAGNER, UC Irvine — A cloud of halo neutrals is created in the vicinity of beam footprint during the neutral beam injection and the halo neutral density can be comparable with beam neutral density. Proper modeling of halo neutrals is critical to correctly interpret neutral particle analyzers (NPA) and fast ion D-alpha (FIDA) signals since these signals strongly depend on local beam and halo neutral density. A 3D halo neutral model has been recently developed and implemented inside TRANSP code. The 3D halo neutral code uses a "beam-in-a-box" model that encompasses both injected beam neutrals and resulting halo neutrals. Upon deposition by charge exchange, a subset of the full, one-half and one-third beam energy components produce thermal halo neutrals that are tracked through successive halo neutral generations until an ionization event occurs or a descendant halo exits the box. A benchmark between 3D halo neural model in TRANSP and in FIDA/NPA synthetic diagnostic code FIDASIM is carried out. Detailed comparison of halo neutral density profiles from two codes will be shown. The NPA and FIDA simulations with and without 3D halos are applied to projections of plasma performance for the National Spherical Tours eXperiment-Upgrade (NSTX-U) and the effects of halo neutral density on NPA and FIDA signal amplitude and profile will be presented. **Work supported by US DOE*

D. Liu
UC Irvine

Date submitted: 11 Jul 2014 Electronic form version 1.4