Abstract Submitted
for the DPP16 Meeting of
The American Physical Society

Possible phase coherence of annulus resonant modes in a cylindrical cold plasma: a perspective on SOL losses of fast-wave power on NSTX RORY PERKINS, JOEL HOSEA, NICOLA BERTELLI, GARY TAYLOR, JAMES WILSON, Princeton Plasma Physics Laboratory — Efficient high-harmonic fast-wave (HHFW) heating on the National Spherical Torus eXperiment (NSTX) would enable new experiments in turbulence, energetic particles, and impurity transport. However, scrape-off layer (SOL) losses of HHFW power can severely limit the heating efficiency down to ˜40%. The power is lost along scrape-off layer field lines, creating bright spirals of heat deposition on the divertor [1]. A cylindrical cold-plasma model finds modes, named "annulus resonances," that conduct a large fraction of the wave power in the outer low-density region [2], making such modes a potential candidate to explain the SOL losses on NSTX. Here, we present result for full three-dimensional reconstructions of the wave fields. There is typically one such mode for each azimuthal mode number and a near linear relationship between azimuthal and axial wavenumbers, suggesting the existence of helices of constant phase. The potential role of these helices in relation to the field-aligned SOL losses will be discussed. This work was supported in part by DOE Contract No. DE-AC02-09CH11466. [1] J. C. Hosea et al., AIP Conf. Proc. 1187 (2009) 105. [2] R. J. Perkins et al., accepted by Phys. Plasmas.

Rory Perkins
Princeton Plasma Physics Laboratory

Date submitted: 20 Jul 2016 Electronic form version 1.4