Abstract Submitted
for the DPP15 Meeting of
The American Physical Society

RF Wave Propagation and Scattering in Turbulent Tokamak Plasmas W. HORTON, A. AREFIEV, Institute for Fusion Studies, University of Texas at Austin, USA, Y. PEYSSON, CEA, IRFM, F-13108 St-Paul-Lez-Durance, France, M. GONICHE, 2CEA, IRFM, F-13108 St-Paul-Lez-Durance, France — The propagation, scattering and absorption of the lower hybrid and electron cyclotron RF waves used to control fusion plasmas is reviewed. Drift wave turbulence driven by the steep ion and electron temperature gradients in H-mode divertor tokamaks produces strong scattering of the RF waves used for heating and plasma currents drive [W. Horton, et al., Physics of Plasmas 20, 112508 (2013)]. Both the 3-5GHz lower-hybrid (LH) and the 170GHZ electron cyclotron (EC) waves experience scattering and diffraction as propagating through the statistically complex density of the plasma. Ray equations are used to calculate the spread of the rays and the associated change in the parallel phase velocity of the RF waves and their change of polarization in the propagation through the fusion plasma. A Fokker Planck equation for the phase space of the RF plasmons is used to describe the spread of the RF wave power in the complex geometry of a divertor tokamak using the ray tracing codes. The evolution of the electron distribution function from the resonant electron-wave interactions is reviewed for several scenarios. The resulting X-ray spectrum is broaden giving better agreement with the measured X-ray spectrum than that calculated in the absence of the turbulent scattering of the RF waves.

Alexey Arefiev
Univ of Texas, Austin

Date submitted: 23 Jul 2015