

Abstract Submitted
for the DPP15 Meeting of
The American Physical Society

A Vlasov-BCA analysis on the wall erosion of a beryllium wall exposed to a high-density Helium plasma SHANE KENILEY, DAVIDE CURRELI, Univ of Illinois - Urbana — Understanding the effects of plasma-material interactions on the wall of fusion reactors will help characterize the durability and performance of plasma facing components over time. It can provide insight into how impurities injected into the plasma from the wall can affect plasma performance. To this end, we perform a numerical characterization of the gross and net erosion of a Beryllium wall exposed to a Helium plasma by using a Vlasov description of the plasma phase coupled to a Binary Collision Approximation model (Fractal-TRIDYN) of the material under plasma irradiation. Both the plasma ions and the impurities are treated as Vlasov kinetic species, allowing high resolution even at very disparate density ratios of the main species over the impurities. From the moments of the distribution, all the relevant fluid quantities are obtained, including densities, particle fluxes, drift velocities, and energy fluxes. From our model we can provide a measure, intended as magnitude and uncertainty, of net erosion. The effects of the impurity release on the plasma sheath stability and structure is preliminarily explored.

Shane Keniley
Univ of Illinois - Urbana

Date submitted: 24 Jul 2015

Electronic form version 1.4