

Abstract Submitted
for the DPP20 Meeting of
The American Physical Society

Full-orbit simulations of fast-ion charge-exchange losses induced by neutral particles outside the plasma¹ GERRIT KRAMER, Princeton Plasma Physics Laboratory, MIKE VAN ZEELAND, General Atomics, ALESSANDRO BORTOLON, Princeton Plasma Physics Laboratory — The full orbit following SPIRAL code [1] has been used to simulate the interaction between edge neutrals and neutral beam generated fast ions that move outside the separatrix and traverse the tokamak plasma periphery. Significant fast-ion losses were found, up to 20% in a DIII-D case. It is shown that at beam energies up to ~ 100 keV fast-ion losses are considerable because of charge exchange reactions between the neutrals and the fast ions. Approximately half of the fast ions that neutralize outside the plasma get lost to the wall while the other half re-enters the plasma and ionizes again, often on better confined orbits which is visible as an enhanced beam power deposition in the plasma core ($r/a < 0.7$). As a result, the plasma performance as measured from beam-plasma fusion reactions is hardly changed despite the significant fast-ion losses toward the plasma edge. [1] G.J. Kramer et al. (2013) Plasma Phys. Control. Fusion 55 025013

¹DE-AC02-09CH11466, DE-FC02-04ER54698

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Date submitted: 02 Jul 2020

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