Beam-Ion Profile Diagnostic Using 3 MeV Protons\textsuperscript{1}

W.D. CROSS, W.W. HEIDBRINK, University of California, Irvine — Calculations based on classical beam-ion confinement often overestimate the measured pressure profile and neutron rate, particularly in DIII-D Advanced Tokamak plasmas with beam-driven Alfvén activity. In these discharges with plasma currents of $\sim 1$ MA, a significant fraction of the charged d-d fusion reaction products are unconfined, affording the opportunity to infer the d-d reaction profile from measurements of 3-MeV protons that are lost on their first orbit. In contrast to earlier studies,\textsuperscript{2} the advent of accurate poloidal field reconstructions based on Motional Stark Effect measurements simplifies the design requirements for a useful diagnostic. Sensitivity studies and a preliminary design are presented.

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