

Scrape-off layer ion acceleration during fast wave injection in the DIII-D tokamak

D.C. Pace¹, R.I. Pinsky², W.W. Heidbrink³, R.K. Fisher²,
M.A. Van Zeeland², G.R. McKee⁴, and M. García-Muñoz⁵

¹Oak Ridge Institute for Science and Education, Oak Ridge, TN 37831-0117, USA

²General Atomics, P.O. Box 85608, San Diego, CA 92186-5608

³University of California-Irvine, Irvine, CA 92697, USA

⁴University of Wisconsin-Madison, 1500 Engineering Dr., Madison, WI 53706, USA

⁵Max-Planck Institut für Plasmaphysik, Garching D-85748, Germany

E-mail: pacedc@fusion.gat.com

Abstract. Fast wave injection is employed on the DIII-D tokamak as a current drive and electron heating method. Bursts of energetic ions with energy $E_o > 20$ keV are observed immediately following fast wave injection in experiments featuring the 8th ion cyclotron harmonic near the antenna. Using the energy and pitch angle of the energetic ion burst as measured by a fast ion loss detector, it is possible to trace the origin of these ions to a particular antenna. The ion trajectories exist entirely within the scrape-off layer. These observations are consistent with the presence of parametric decay instabilities near the antenna strap. It is suggested that the phase space capabilities of the loss detector diagnostic can improve studies of wave injection coupling and efficiency in tokamaks by directly measuring the effects of parametric decay thresholds.

PACS numbers: 52.35.Mw, 52.20.Dq, 52.40.Fd, 52.50.Qt, 52.55.Fa, 52.70.Nc