

Characterization of Neutral-Beam Induced D_α Emission on DIII-D

B. A. Grierson¹, K. H. Burrell², W. M. Solomon¹,
N. A. Pablant¹ and W. W. Heidbrink³

¹Princeton Plasma Physics Laboratory, Princeton University,
Princeton, NJ 08543-0451, USA

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

³University of California, Irvine, CA 92697

E-mail: bgriers@pppl.gov

Abstract. D_α emission from neutral beam heated tokamak discharges in DIII-D [J.L. Luxon, Nucl. Fusion **42**, 614 (2002)] is characterized for evaluation of physically relevant main ion plasma parameters, such as deuterium temperature and toroidal rotation velocity. The spectral analysis takes into account passive D_α emission from the plasma edge and active emission from neutral beam injection. The interpretation of the spectral analysis is assisted by a complete physics model of the plasma environment. The result of the analysis is that D_α light emitted from charge-exchange between bulk ions and beam neutrals and halo neutrals can be quantitatively interpreted to extract accurate measurements of the thermal deuterium ion temperature and toroidal rotation velocity in a wide range of plasma conditions.

PACS numbers: 52.25.Fi, 52.55.Fa, 52.70.Kz