

Abstract Submitted  
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**Recent Fast-ion Experiments**<sup>1</sup> W.W. HEIDBRINK, Y. LUO, University of California-Irvine, K.H. BURRELL, R.I. PINSKER, GA, E.D. FREDRICKSON, R. NAZIKIAN, PPPL, M.A. VAN ZEELAND, ORISE, T.L. RHODES, G. WANG, UCLA — Diagnostic improvements and operational flexibility have facilitated new fast-ion studies on DIII-D. The Balmer $\alpha$  light from deuterium ions that neutralize as they pass through a neutral beam yields the fast-ion energy distribution and spatial profile; neutral particle, neutron, and beam-ion loss diagnostics corroborate the D $\alpha$  diagnostic. In plasmas with fast-wave heating at the fourth, fifth, and sixth cyclotron harmonic, fast ions are accelerated above the injection energy; the profile data show that the acceleration is greatest near the cyclotron harmonic resonance layer. Internal density and external magnetic fluctuations produced by fast-ion instabilities with MHz frequencies are now measured. Experiments with magnetic fields as low as 0.5 T indicate that compressional Alfvén eigenmodes are readily excited in conventional tokamaks and will probably be excited in ITER. A study of Alfvén cascade modes provides our first simultaneous measurements of internal fluctuations and the resulting impact on the fast-ion profile.

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