

Abstract Submitted for the Forty-Seventh Annual  
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Category Number and Subject:

Theory     Experiment

**Recent Fast-ion Experiments,\*** W.W. Heidbrink, Y. Luo, *UCI*, 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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