**Observation of Global Alfvén Eigenmode Avalanche-like events on the National Spherical Torus Experiment** E. D. Fredrickson, N Gorelenkov, E Belova, N. Crocker[1], S. Kubota[1], M Podesta, S. Gerhardt, B. LeBlanc, R. E. Bell, H. Yuh[2], F. Levinton[2], PPPL, NJ 08543, [1]UCLA, CA 90095, [2]Nova Photonics, NJ 08543-----This paper presents the first observations of Global Alfvén Eigenmode (GAE) avalanches and concomitant fast ion redistribution. Super-Alfvénic ion populations, like the fusion-$\alpha$'s on ITER, can excite instabilities extending from low frequency Energetic Particle Modes (EPMs), through Toroidal Alfvén Eigenmodes [TAE] to Global and Compressional Alfvén Eigenmodes [GAE and CAE] in the frequency range of roughly $0.1\omega_{ci}$ to $0.7\omega_{ci}$. The GAE instabilities on NSTX exhibit complex non-linear behavior, including strong growth which onsets above an amplitude threshold, when resonance regions in phase space start to overlap, resulting in enhanced rapid growth and fast ion redistribution. No neutron drops or other direct indications of fast ion loss or redistribution are correlated with the strong GAE avalanche bursts, however, the modes are suppressed following the avalanche, suggesting depletion of fast ion density in the velocity space driving the modes and in some instances the GAE bursts appear to trigger lower frequency energetic particle driven activity, either TAE avalanches or Energetic Particle Modes, suggesting some significant redistribution of fast ions in phase space has occurred. This paper also provides some of the first measurements of internal GAE mode structure showing the mode amplitude peaks towards the plasma core.
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