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**A neutral particle analyzer for fast ion physics studies in LTX-b**[1]

W. J. CAPECCHI, J. K. ANDERSON, U. Wis., R. MAJESKI, R. KAITA, D. P. BOYLE, P. E. HUGHES, PPPL, D. B. ELLIOT, ORNL, C. HANSEN, U. Wash., L. E. ZAKHAROV, LiWall Fusion — The LTX-b device is unique in its capability to produce tokamak plasmas with nearly zero wall recycling. A 0.7MW neutral beam injector serves as a source of heating and fueling, as well as super-Alfvenic ions, whose non-thermal pressure may approach a level sufficient to destabilize the TAE or other Alfvenic eigenmodes found in the spherical tokamak. The low recycling environment results in a flat electron temperature profile, is expected to result in flat ion temperature profiles, and a very low background neutral density, reducing the drag on beam-induced plasma rotation and possibly affecting the damping of fast ion driven instabilities. As such, the study of the NBI-heated LTX-b plasma is valuable both for quantifying the effect of fast ions on a lithium-covered first wall, and for general understanding of instabilities that may arise in a future burning plasma. This work describes initial calculations of expected instability drive and damping in LTX-b, as well as the design of a neutral particle analyzer with sufficient sensitivity and time resolution to study instability-induced changes to the fast ion distribution.

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