

Abstract Submitted
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Unified Theory for High/Improved Confinement Regimes* B. BASU, B. COPPI, T. ZHOU, MIT — A unified theory [1, 2] for the modes excited at the edge of the plasma column that are signatures of the EDA/ELMy H-Regime and of the I-Regime is presented. The mode phase velocities, the produced transport processes, their frequencies, their wavelengths and their consistency with the direction of the spontaneous rotation are the factors considered for comparison with relevant experiments. The identified modes have characteristics that agree with or have anticipated those of the modes observed experimentally for each of the investigated regimes. The Quasi-Coherent Mode that is present in the EDA H-Regime and has a phase velocity in the direction of the ion diamagnetic velocity [3] is identified as a ballooning mode near MHD marginal stability. In the I-Regimes the excited “Heavy Particle” modes [1,2] are not of the ballooning type. They can either have a finite frequency with phase velocity in the electron diamagnetic velocity direction or be purely growing, explaining why in some I-Regimes there are no fluctuations. These modes expel the impurities towards the plasma edge. *US DOE partly sponsored.

- [1] B. Coppi and T. Zhou, Phys. Plasmas, 19 102509 (2012).
- [2] B. Coppi and T. Zhou, Phys. Plasmas 19 012302 (2012).
- [3] I. Cziegler, Ph. D. thesis, Physics Dept., MIT, (2011).

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