

Abstract Submitted
for the APR12 Meeting of
The American Physical Society

Impurity Modes and Signature of the I-Regime¹ TIANCHUN ZHOU, BRUNO COPPI, MIT — The excitation of an impurity mode [1, 2] at the plasma edge is considered as the signature of the I-Regime [3]. The mode phase velocity, predicted in the electron diamagnetic velocity direction, was confirmed by the experiments [4]. The outward impurity transport produced by this mode is consistent with the observation that impurities accumulate at the edge in the I-Regime, a feature not present in the EDA or Elmy H-Regime. The plasma spontaneous rotation in the ion diamagnetic velocity direction is also consistent with the mode phase velocity direction, according to the Accretion Theory[5] of this phenomenon. In accordance with our theory, the I-Regime exhibits a temperature “knee” at the edge but no density “knee” as the mode excitation involves large values of $d \ln T_i / d \ln n_i$. A correlation of the values of the observed poloidal magnetic field fluctuations with those of the derived density fluctuations is provided by the same theory.

[1] B. Coppi, et al., Phys. Rev. Lett. **17**, 377 (1966).

[2] B. Coppi and T. Zhou, Phys. Lett. A **375**, 2916 (2011); PoP **18** (2011)(in press) and MIT-LNS Report HEP 09/04 (2009).

[3] A. Hubbard, et al., PoP **18**, 056115 (2011).

[4] I. Cziegler(2010).[5]B. Coppi, Nucl. Fusion **42**, 1 (2002).

¹Sponsored in part by the U.S. DOE.

Tianchun Zhou
MIT

Date submitted: 04 Jan 2012

Electronic form version 1.4