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Edge Plasma Mode as the Signature of the EDA H-Regime[1] B. BASU, B. COPPI, T. ZHOU, MIT — A deep E_r-well observed in the EDA H-Regime produced by the Alcator C-Mod machine is considered as inducing a sharp localization of the Quasi-Coherent Mode proposed as the signature of this regime. This has a phase velocity in the ion diamagnetic velocity direction, in the plasma reference frame [1], and is a "viscous-ballooning-mode" driven by the combined effects of the plasma pressure gradient and the magnetic field curvature that would be stable due to FLR effects in the absence of a finite viscosity $\mu^i_\perp$. The frequency is near $\omega_{di} \equiv k_\phi v_{di}$ where $v_{di} \equiv -[c/(enB_\theta)]dp_i/dr$ and $k_\phi = n^0/R$. The relevant model dispersion relation [2] obtained for a plane geometry in which the magnetic field curvature is simulated by an effective gravity is $(\omega+i\gamma_\mu)(\omega-\omega_{di}) = -\gamma^2_{IC}+k^2_\parallel v^2_A/[1+ ik^2_\perp D_m/(\omega - \overline{\omega}_{*e})]$, where $\gamma_\mu \propto \mu^i_\perp$, γ_{IC} is the interchange growth rate, $D_m \equiv c^2\eta_\parallel/(4\pi)$, $\eta_\parallel$ is the longitudinal resistivity and $\overline{\omega}_{*e} \equiv [ck_\phi T_e/(enB_\theta)](dn/dr)(1 + 1.71d\ln T_e/d\ln n_e)$.

[1] I. Cziegler (2010).
[2] B. Coppi, et al., Ann. Phys. 121,1 (1979)

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