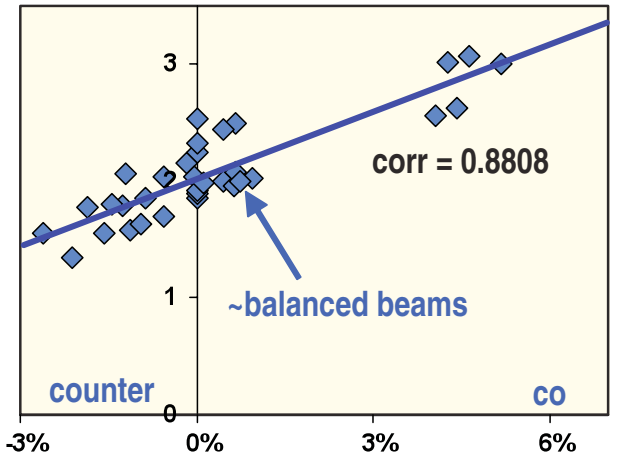
Onset β Continues to Fall with Counter Plasma Rotation in DIII-D

- **No systematic variations or trends in key profiles**
  - ★ rotation degenerate with flow shear
    . . . profile unchanged with co/ctr beam mix
- **For counter rotation, flow shear reverses sign wrt magnetic shear**
  - ★ relative sign important?
    . . . or "shift" in zero to left?

(R.J. Buttery et al, PoP 2008)

2/1 Onset β_N

$$\left(\frac{\beta}{I/aB}\right)$$



2/1 Onset β_N

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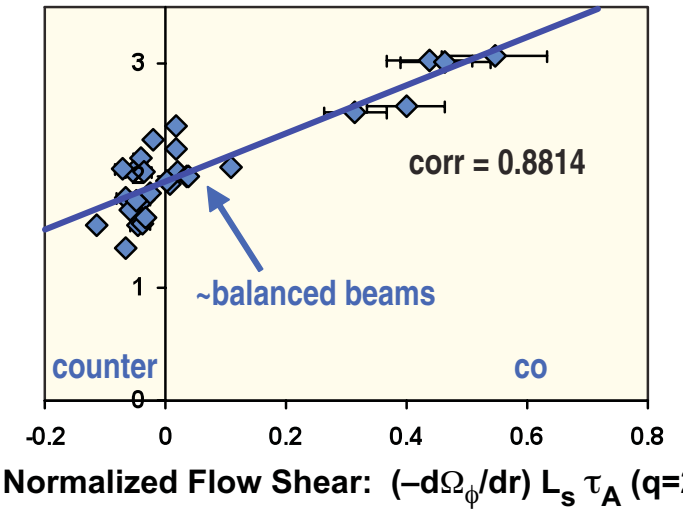
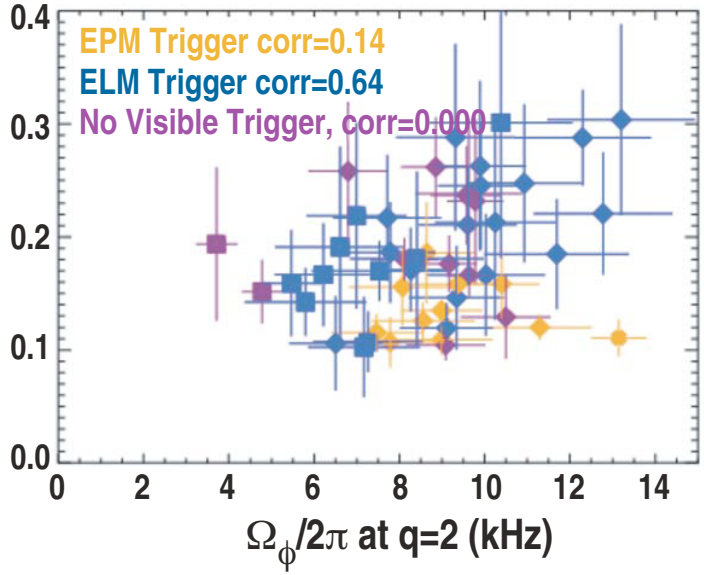
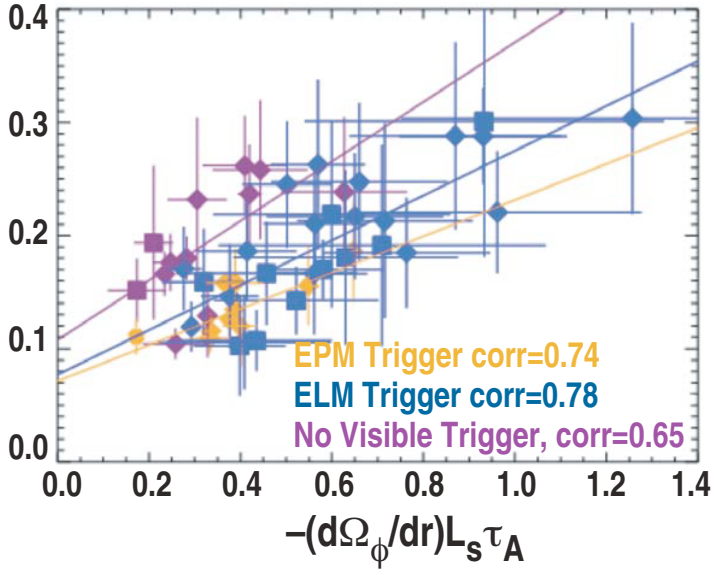


Strongest Correlation Found Between Local Mode Drive at Onset and Normalized Flow Shear in Low Aspect Ratio NSTX

- **NTM "drive" at onset only poorly correlated with q=2 (carbon) rotation, "CHERS"**
- **Essentially no correlation for Energetic Particle Modes and "Triggerless" cases**
  - ELM correlation better
- **Degeneracy between Ω_ϕ and $d\Omega_\phi/dr$ broken in NSTX with use of n = 3 magnetic braking from external coil**
- **Strongest correlation between "noise-prone" parameters (i.e., gradients)**
  - Provides confidence that this is the correct physics

$$\frac{\mu_0 L_q \delta j_{BS,\,Sauter}}{B_\theta} \left(\approx \frac{\varepsilon^{1/2} L_q \beta_{\theta e}}{2 L_{pe}} \right)$$





S. Gerhardt et al, NF 2009

NSTX