# Device Upgrade – PF4 Commissioninng

- Additional shaping capability (F. Paoletti, S.Sabbagh)

- Physics flexibility – "Dimple XP" (S. Kaye et al.)

- Provide V-sec for non-center-stack startup scenarios (J. Menard)

"Dimple" Study

S. Kaye, J. Manickam, F. Paoletti, S. Sabbagh, S. Zweben, …..

-Stability calcs have shown the boundary "dimple" created by use of PF4 can destabilize ballooning modes near the edge of the plasma and reduce the achievable beta by 20% (Paoletti, Nuc. Fusion, 2002)

S=0
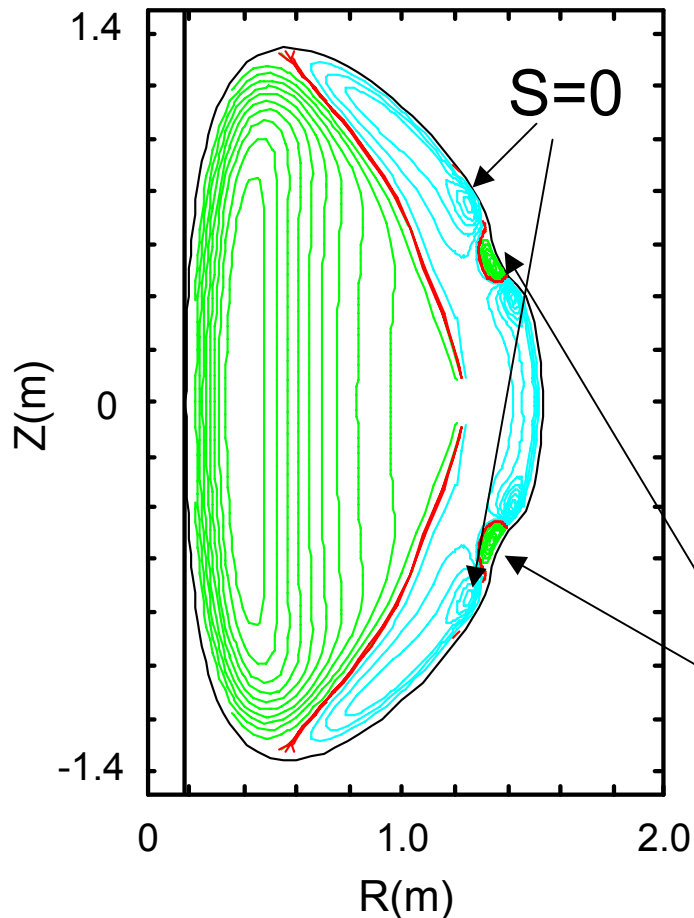
-PF5 was designed and constructed to avoid the dimple

- The ability to produce this dimple feature, however, provides a test of how sensitive the plasma stability is to boundary shape

Large ∇pk_n

Z(m)

1.4

0

-1.4

0   1.0   2.0

R(m)

Optimized profiles

-This XP is in the developmental stage – much scenario development needed

- Determine optimum location in operations space for XP

- Low li, broad p(r)

    - Determine stability between PF4 and PF5 generated boundaries

    - Minimize low-n mode effect (want high-n instability only)

    - Adjust PF currents (magnitude of dimple) triangularity, profiles to achieve high-n instability with PF4 boundary, but stablility with PF5 boundary

- Experiment needs XMPs to be run first

    - PF4 commissioning

    - Need for MSE (how sensitive are results to variation in j(r), especially near edge)?