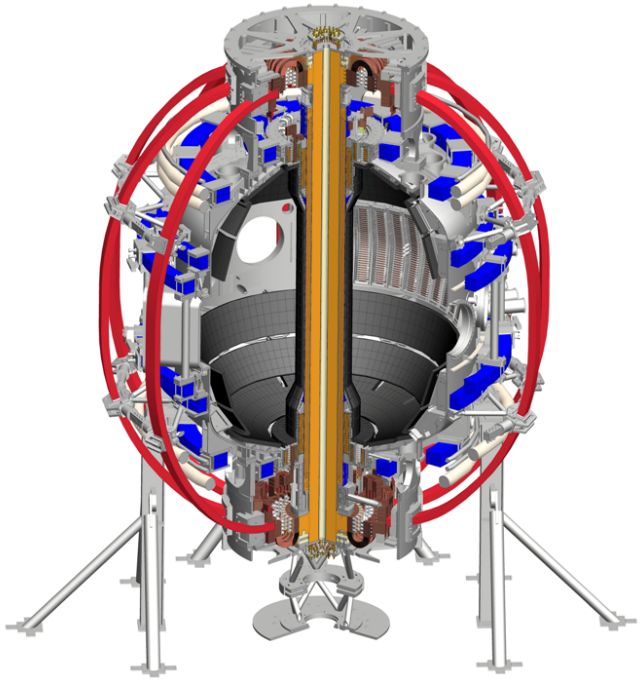
Dependence of low-k turbulence properties on rho* in the ST



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Rho* scaling of low-k turbulence

- Rho* is a size-scaling parameter
  - Modern experiments can achieve nearly all of the dimensionless parameters expected in ITER and future burning plasmas, with the exception of rho*
- Measurements at large-A on DIII-D (McKee et al, NF 2001)
  - Radial and poloidal correlation lengths and wavenumber spectra scaled in a fashion consistent with predictions from the gyrokinetic equations, namely that correlation lengths scale with the gyroradius.
  - In addition, fluctuation amplitude and decorrelation time scaled in a manner consistent with gyro-Bohm scaling.
- The ST shows different confinement scalings
  - Ip scaling is weaker and Bt scaling is stronger (Kaye et al PRL), suggesting that a different underlying mechanism might be at play.

Rho* scaling of low-k turbulence

- Experimental plan
  - Scan rho* via Bt over the maximum range while keeping dimensionless parameters nearly constant, with the exception of rho*
  - Measure turbulence characteristics with 2D BES and other fluctuation diagnostics, and ultimately assess their scaling with rho*

- Addresses NSTX-U mission element for unique ST parameter regimes for predictive capabilities and R15-1 for H-mode confinement characteristics