The dependence of H-mode energy confinement and transport on collisionality in NSTX (Outline) – S. Kaye et al.

I) Premise
   a. Unlithiated and lithiated plasmas exhibit different dependences of confinement on dimensional parameters (I_p, B_T etc)
      i. I_p, B_T scans of unlithiated and lithiated plasmas (Nu scan)
      ii. Between-shot lithium deposition scan at fixed I_p, B_T (Li scan)
   b. Collisionality unifies confinement trends
      i. Nu scan with constrained q, beta range
      ii. Li scan
   c. Strong, favorable dependence of normalized confinement with decreasing collisionality
      i. Even stronger dependence when rho-star variation taken into account and Bohm or gyro-Bohm dependence assumed

II) What causes reduced collisionality?
   a. Broadening of T_e profile; Z_{eff}, n_e variations not controlling

III) Local transport
   a. Electron transport reduced considerably (one order of magnitude) going from high to low collisionality
      i. Similar result when normalized to gyroBohm
   b. Ion transport relative to neoclassical actually increases up to a factor of 4 to 5 going from high to low collisionality
      i. Toroidal rotation shear also decreases going from high to low collisionality (which is more fundamental?)

IV) Linear gyrokinetic results
   a. ETG completely stabilized in outer regions going from highest to lowest collisionality
   b. Microtearing becomes less dominant; much stabilization
   c. Hybrid TEM/KBM(/ITG) modes become more radially extended, more predominant going from high to low collisionality

V) Summary
   a. Results appear to hang together
   b. NSTX-U important to see if improvement at lower nustar continues
   c. Also, flexible beams to change rotation/rotation shear to determine effect of this vs collisionality

VI) Status
   a. First draft of paper written and circulated to co-authors
   b. Linear g-k results being refined