Scaling comparison of time-averaged transport and underlying turbulence

- The scaling of time-averaged transport in the far SOL appears to be fairly independent of plasma parameters ($v^*$, $\rho^*$, $\beta$).

- Similar conclusions can be drawn with respect to the radial velocity of the underlying turbulence.

- Goal - understand their similarities and differences -> better understand transport physics.
The SOL $n_e$ profile shape appears to be a consequence of both transport and neutral physics

- Although the transport is the same across tokamaks the profiles can be quite different (JET profiles less broad, less ‘shoulder’)

- The hypothesis is that the differences in profiles are due to differences in SOL opacity to neutrals
  - Higher opacity leads to more ionization in the far SOL to achieve the same core fueling
  - Increased ionization in SOL leads to higher fluxes -> a radial high recycling condition
Experimental plan

• Data
  - Time-averaged profiles across a wide range in \( \nu^*, \rho^*, I/a \) (for opacity)
  - Fluctuation characteristics recorded as well

• Diagnostics
  - Turbulence, \( n_e, T_e \), ionization source SOL profiles

• Conditions needed
  - Discharge gaps > 2 cm, L-mode, range of density
  - \( I_p \) (0.4, 0.8 MA) w/2 magnetic fields at least for higher \( I_p \)

• Achieve
  - More clearly define role of neutrals in affecting profile shapes
  - Better characterization of relation between time-averaged profiles and underlying turbulence