Global kinetic effect on the collisionality dependence of the neoclassical toroidal viscosity in the superbanana-plateau regime

- Neoclassical toroidal viscosity (NTV) plays a key role in predicting the rotation in ITER.

- Two global kinetic simulations show NTV has different $\nu_b^\ast$-dependency from the standard Superbanana-Plateau (SBP) theory.

- Key mechanisms for the NTV are:
  - The resonance condition of SBP theory is modified by the magnetic shear effect.
  - Resonance occurs for the barely-trapped particles.
  - Large banana width of barely-trapped particles ($\Delta_b = 0.2a_0$) significantly degrades the resonance.

- Global kinetic simulations are essential for experimentally relevant NTV predictions.