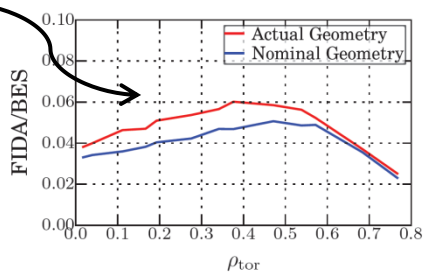
Neutral beam current drive experiments on ASDEX Upgrade

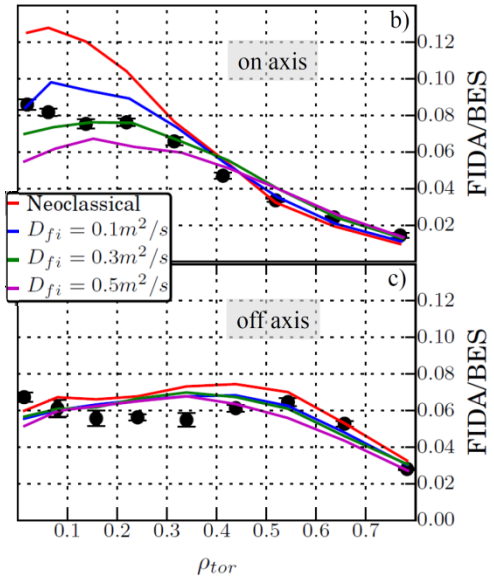
On- and off-axis NBCD and anomalous (microturbulent?) **fast ion transport**

- Good progress in MSE calibration
  - ➢ Still MSE too insensitive to $j(r)$ variation by microturbulent FI transport.
- Precise actual beam geometries by IR imaging of heat shield

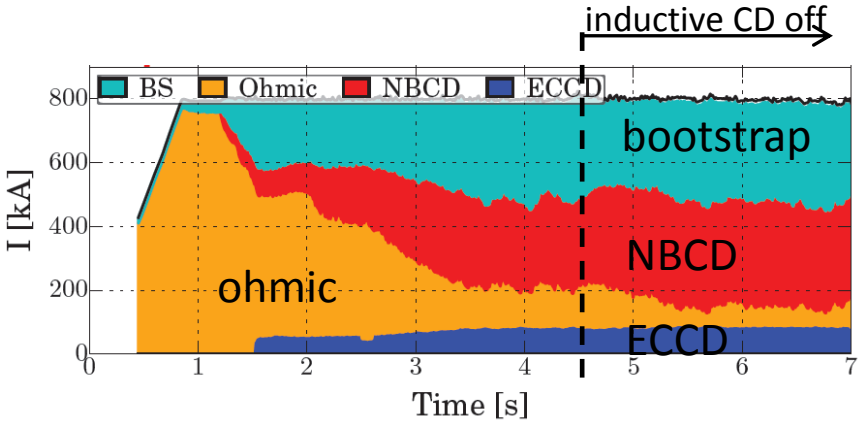


On-axis NBI:
FIDA can resolve FI diffusion.
Best agreement:
$D \approx 0.3$ m^2/s

Off-axis NBI plus 1 on-axis beam for MSE + FIDA
Profiles too flat for detectable modifications.



NBCD efficiency in 800 kA **almost completely non-inductive discharges**



$P_{NBI} = 12.5$ MW
$P_{ECRH} = 2.8$ MW
$q_{min} > 1.5$, $q_{95} = 5.5$
$\beta_N \approx 2.5$, $H_{98} \approx 1$

I_{ECCD} and I_{ohmic} small (I_p constant when central solenoid current = const. from 4.5 s)

→ **Good benchmark for TRANSP-calculated (in colors) bootstrap and NBI-driven current.**