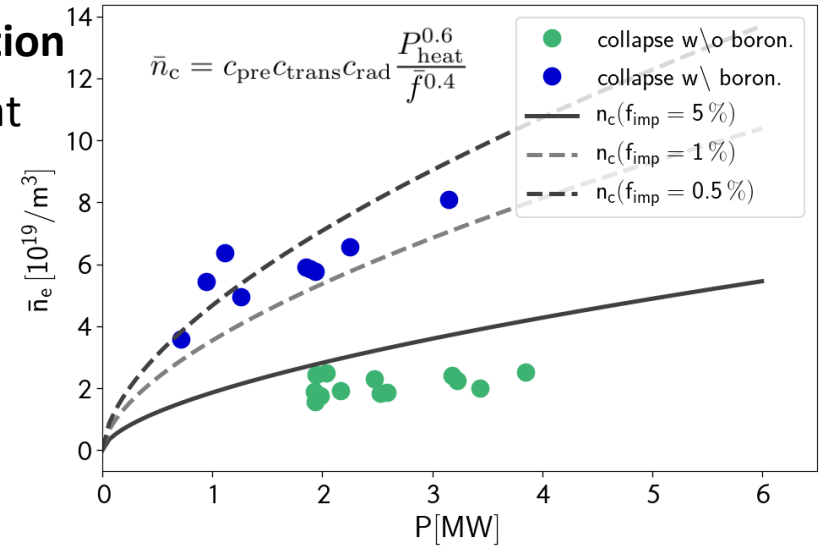
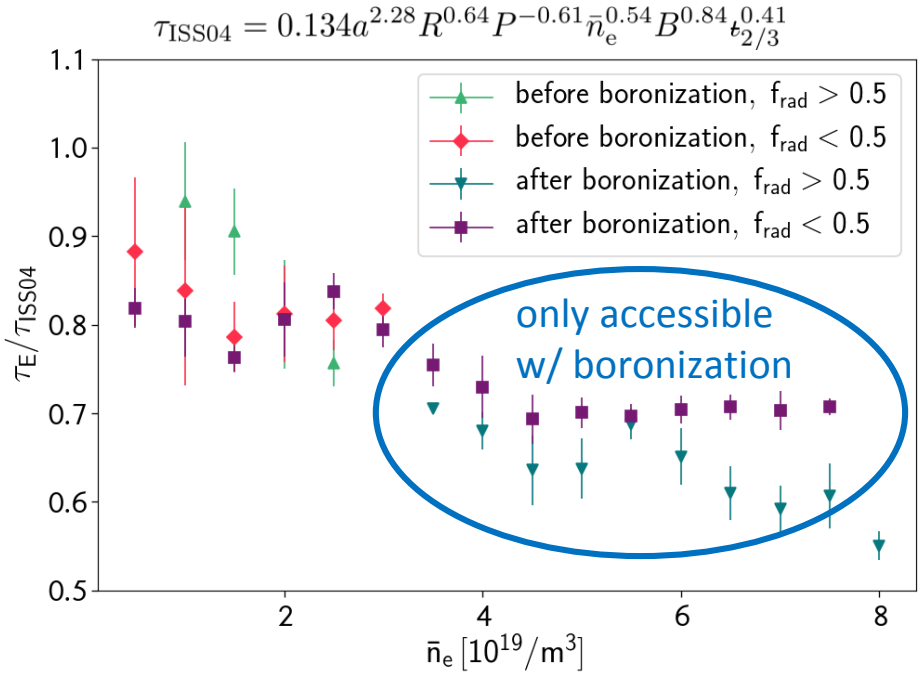
Energy confinement at higher densities in W7-X

Accessible density range increased by boronization

- After boronization, radiative collapses occur at higher densities (factor 2 to 3).
- Critical density (n_c) can be estimated by analytical models.
- Observations suggest significant reduction of edge impurities.





Favorable τ_E scaling in extended n_e range

- Empirical ISS04 [1] suggests $\tau_E \sim n_e^{0.54}$
- In W7-X, τ_E scales like ISS04 (τ_E/τ_{ISS04} constant) as long as radiated power lower than 50 % of the heating power ($f_{rad} < 0.5$).

[1] Yamada, NF 42, (2005)

→ High n_e beneficial for energy confinement if operational boundaries are avoided