

A POWER-BALANCE MODEL OF DENSITY LIMIT IN FUSION PLASMAS

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The n_G criterion does not describe well the maximum observed densities in a set of high density-disrupted JET L-mode discharges (FIG.1)

A power-balance model, including radiation from impurity and edge neutrals describes fairly well the experiments (example in FIG. 2 for C-wall)

Dependences of the **modeled density limit** can be summarized by:

- $(P/V_\phi I_p)^{4/9} I_p^{8/9}$, being P the total heating power

- Concentrations and cooling-rates of emitting species
- Profile effects

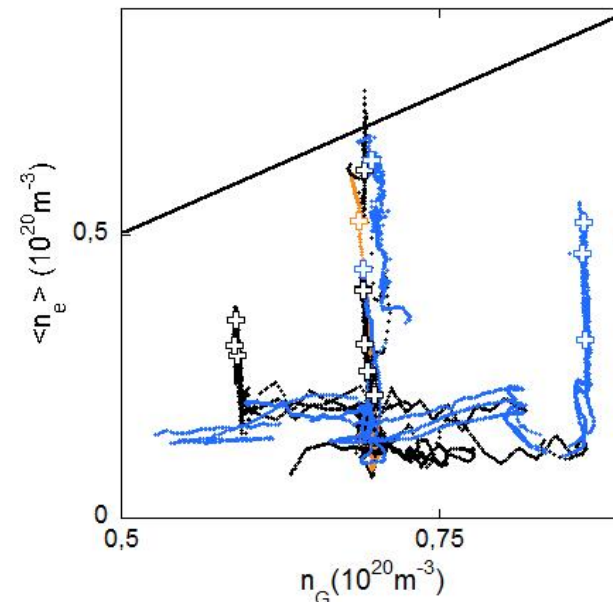


FIG. 1. Black: D with C-wall; orange: He with C wall; blue: D with Be-W wall). Crosses (with the same color code) mark the disruptions. The straight black line is the bisector $y=x$.

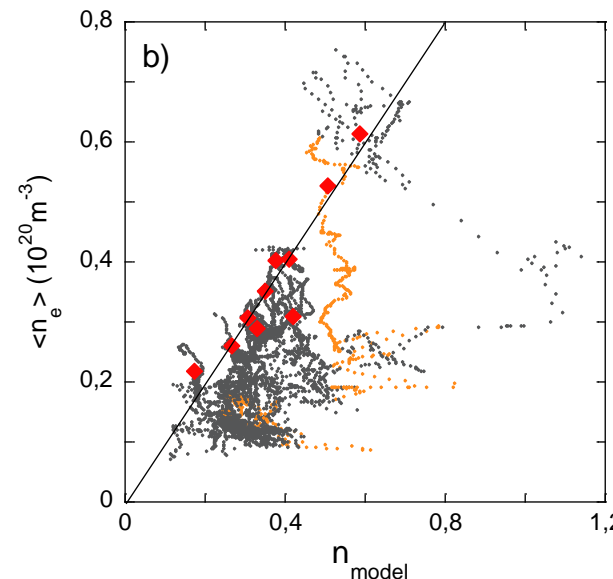
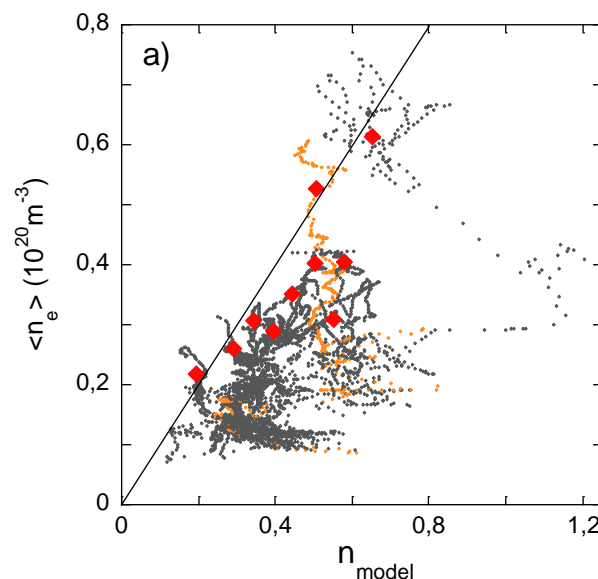


FIG. 2. C wall discharges. In addition to C impurity: no neutrals in (a), neutrals with concentration 0.005 in (b). In grey D shots, in orange He shot. The $y=x$ bisector is plotted in black. Red diamonds mark the disruptions.