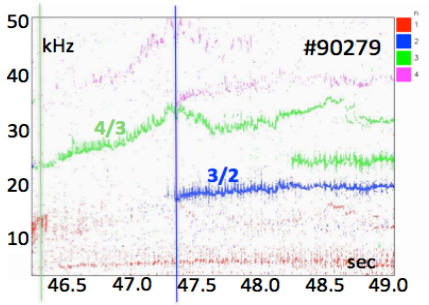
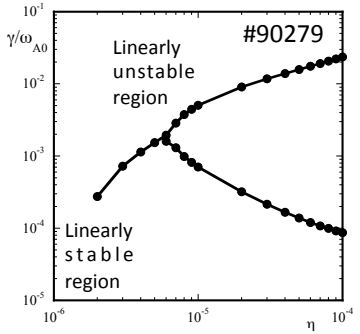
ANALYSIS AND MODELLING OF NTMs DYNAMICS IN JET DISCHARGES USING THE ETS CODE AND INTEGRATED MODELLING TOOLS

- NTM analysis and modelling of JET hybrid scenario: Ne seeding discharge **#90279** (I_p =1.4 MA, B_t =1.9T, P_{NBI} = 16 MW, β_N = 2.1) **4/3 & 3/2 tearing modes**



- **LINEAR analysis with MARS full MHD, toroidal code**
  fully compliant with EU-IM & IMAS environment

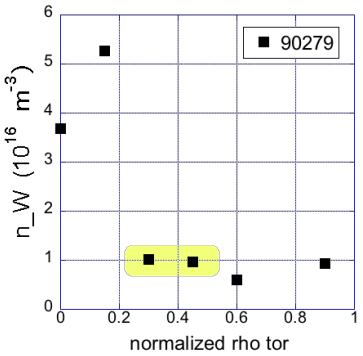
LINEAR n=2 growth rate γ vs resistivity η
NO SOLUTIONS for the experimental $\eta = 10^{-8}$ => **MODE STABLE (Neoclassical)**

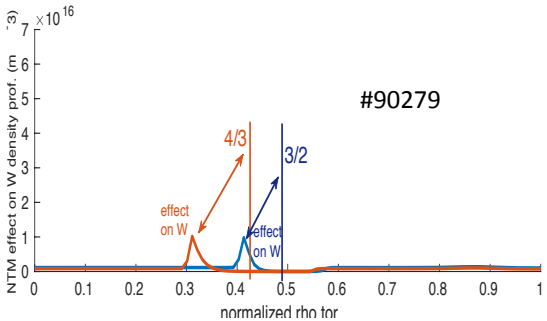


4/3 and 3/2 modes LINEARLY STABLE (NTM) for all the considered hybrid pulses in agreement with the results from other codes as the NTM module in ETS .
*However, saturated NTMs detected in the spectrogram are **non linearly unstable** for neoclassical effect*

- **Effect of NTM on W heavy impurity density profile**
  NON LINEAR analysis via NTM module integrated in the modular European Transport Simulator (ETS)
  ETS simulation with Bohm-gyro-Bohm model, imposing CONSTANT W Diffusion (D_W) and Convection (V_W) coefficients, **EFFECTS introduced by NTM on the D_W and V_W isolated and quantified => D_W and V_W perturbed by NTM using a Gaussian function with width proportional to mode size => small in this and similar shots w ~ 0.03 m for 4/3 mode and w~0.04m for 3/2 mode.**

W density profile by SXR data at 3/2 onset time t=47.3s with green region where NTM can play a role





Isolated effects of NTM on the W density profile calculated by the NTM module in ETS:
W concentration not sensitive to the presence of NTM with SMALL sizes, even if they can provide changes of the W density profile at given off-axis positions. NTM with larger amplitude could affect the plasma core

S. Nowak et al., | TH/P6-26