BPSI

核燃焼プラズマ統合コード研究会
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輸送モデル物理課題

Dynamic Behavior of Transport in JT-60U Plasmas with Internal Transport Barrier

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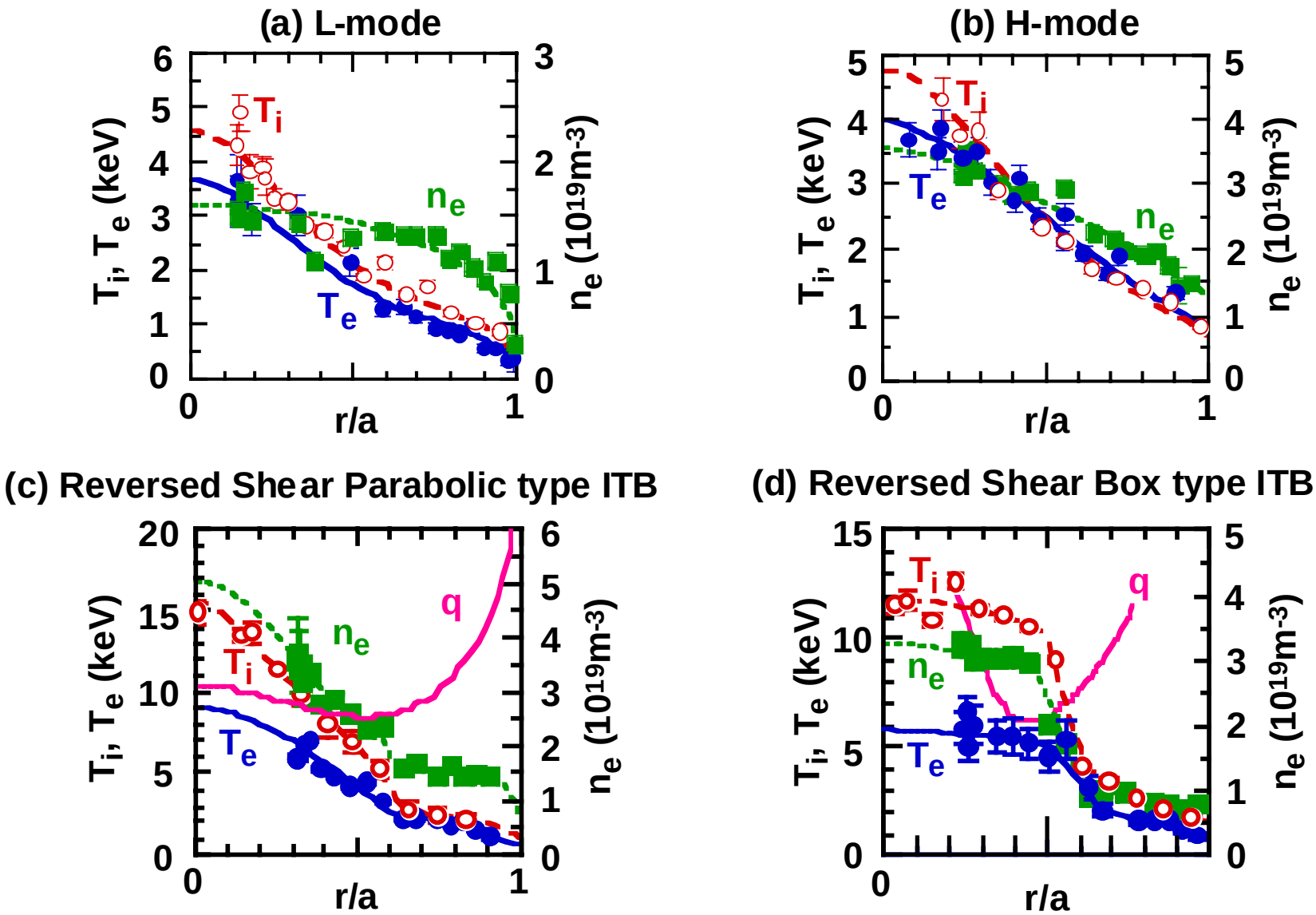
Various Confinement Modes in JT-60U Tokamak



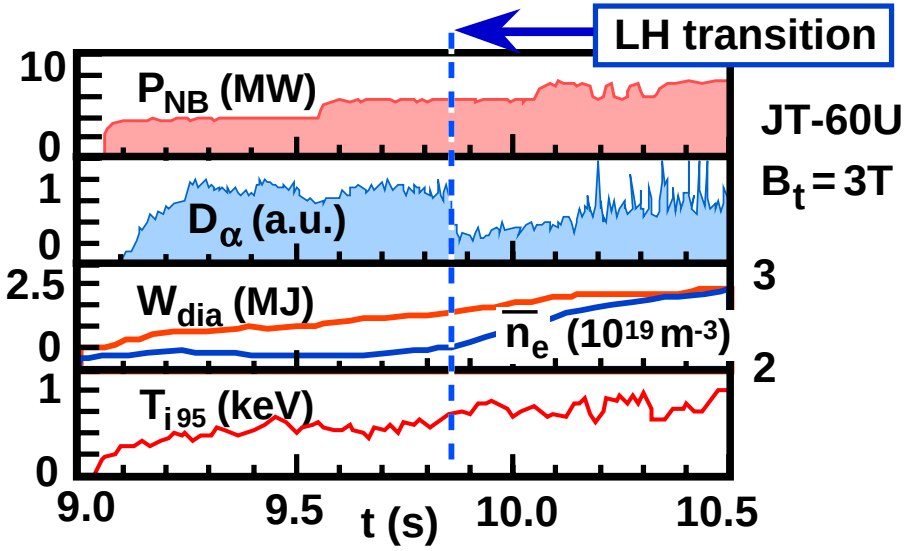
Mode Transitions

L-H transition

(ETB formation)

H-L back transition

Non-local behavior



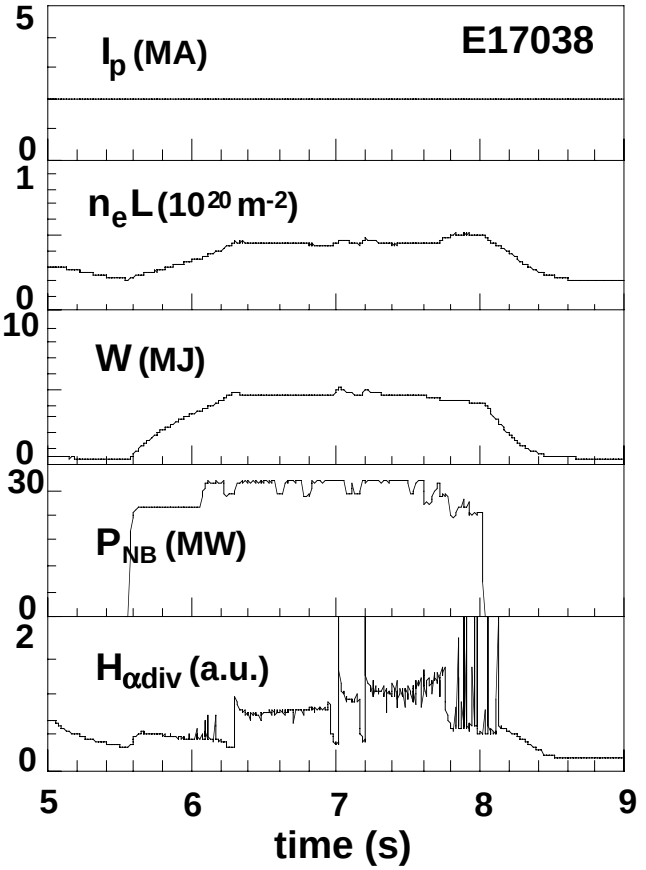
ITB formation

ITB event (I) weak ITB → strong ITB

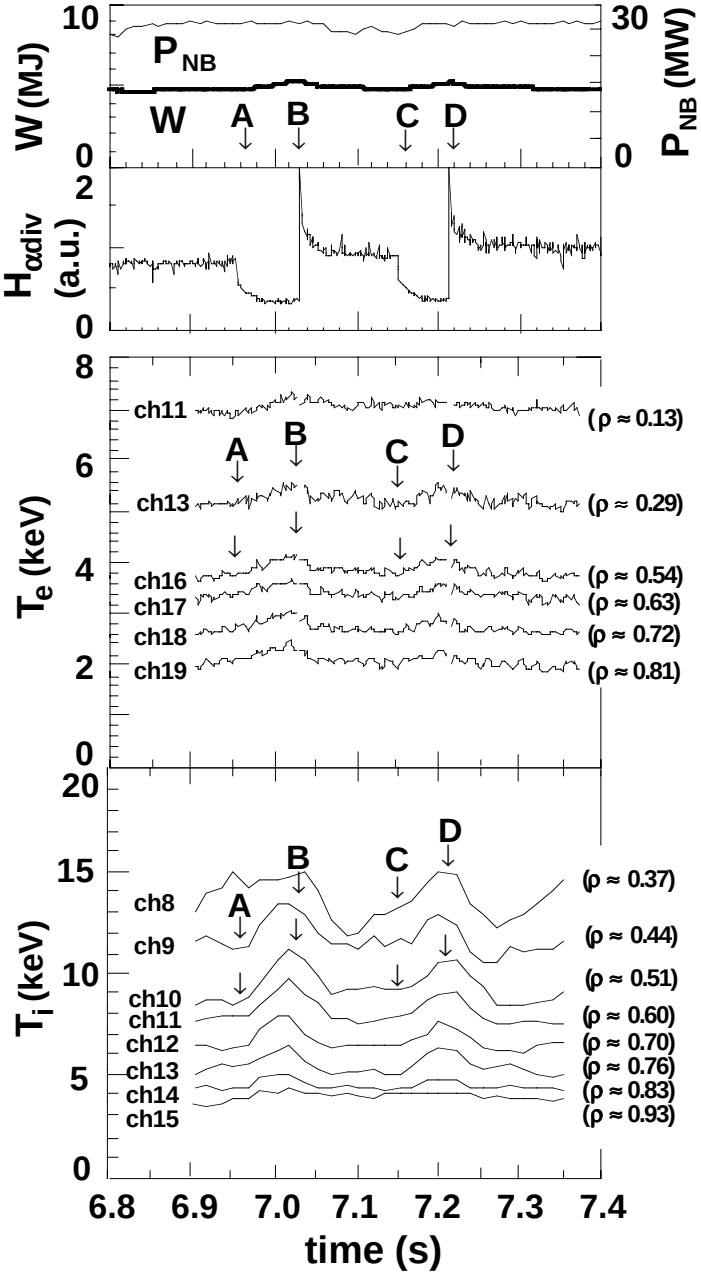
(D) strong ITB → weak ITB

Interplay of L-H-L transition and ITB events

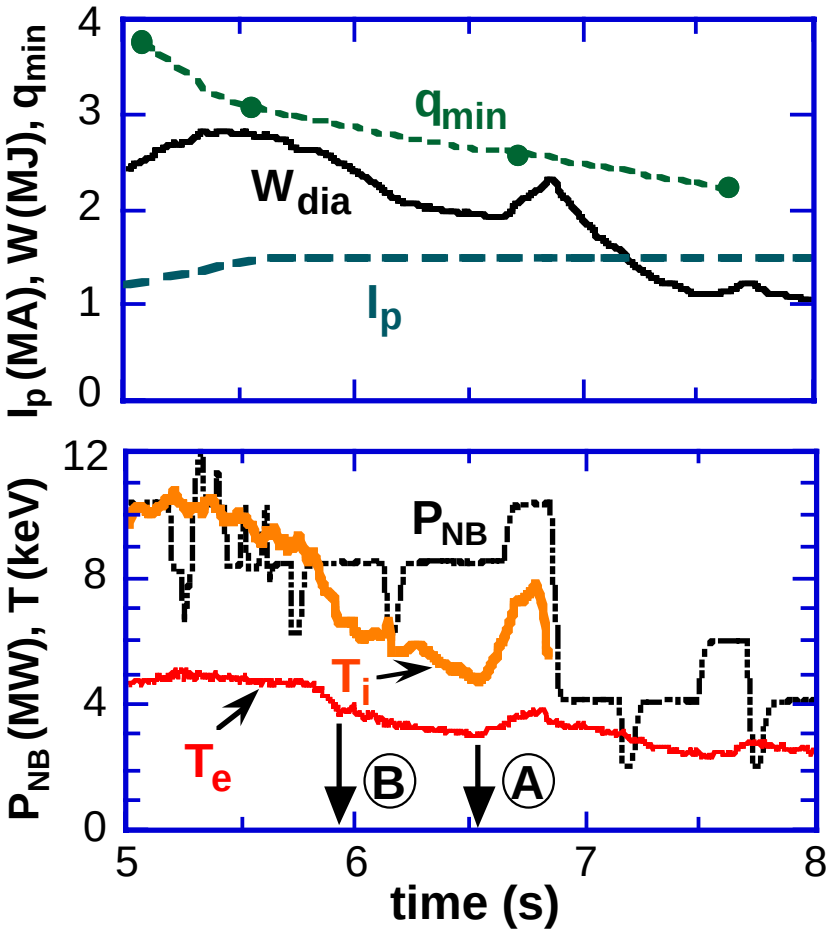
Non-local Behavior of L-H-L Transision



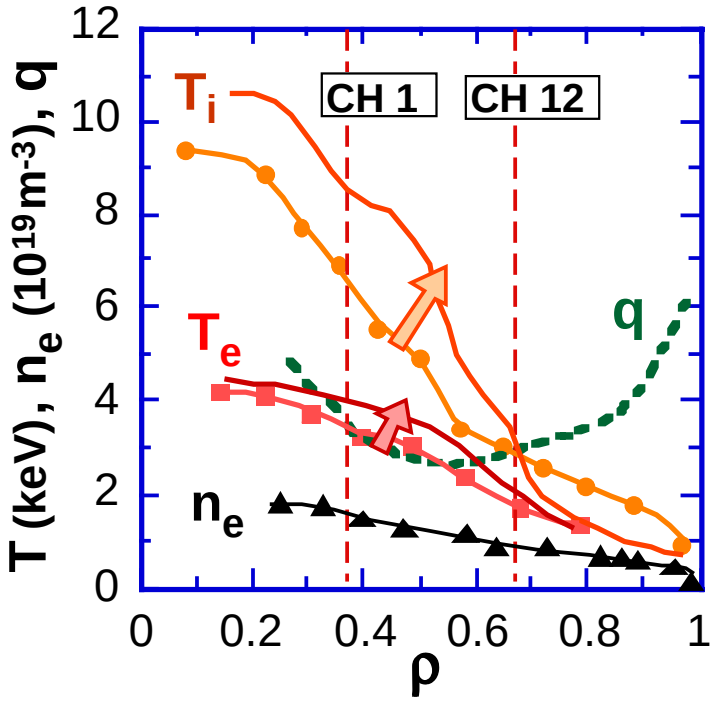
S.V. Neudatchin, T. Takizuka, H. Shirai, et al., "Time Behavior of Heat Diffusivity during L-H-L Transitions in JT-60U", Jpn. J. Appl. Phys. **35**(1996) 3595



ITB event of Improvement （weak ITB to strong ITB）

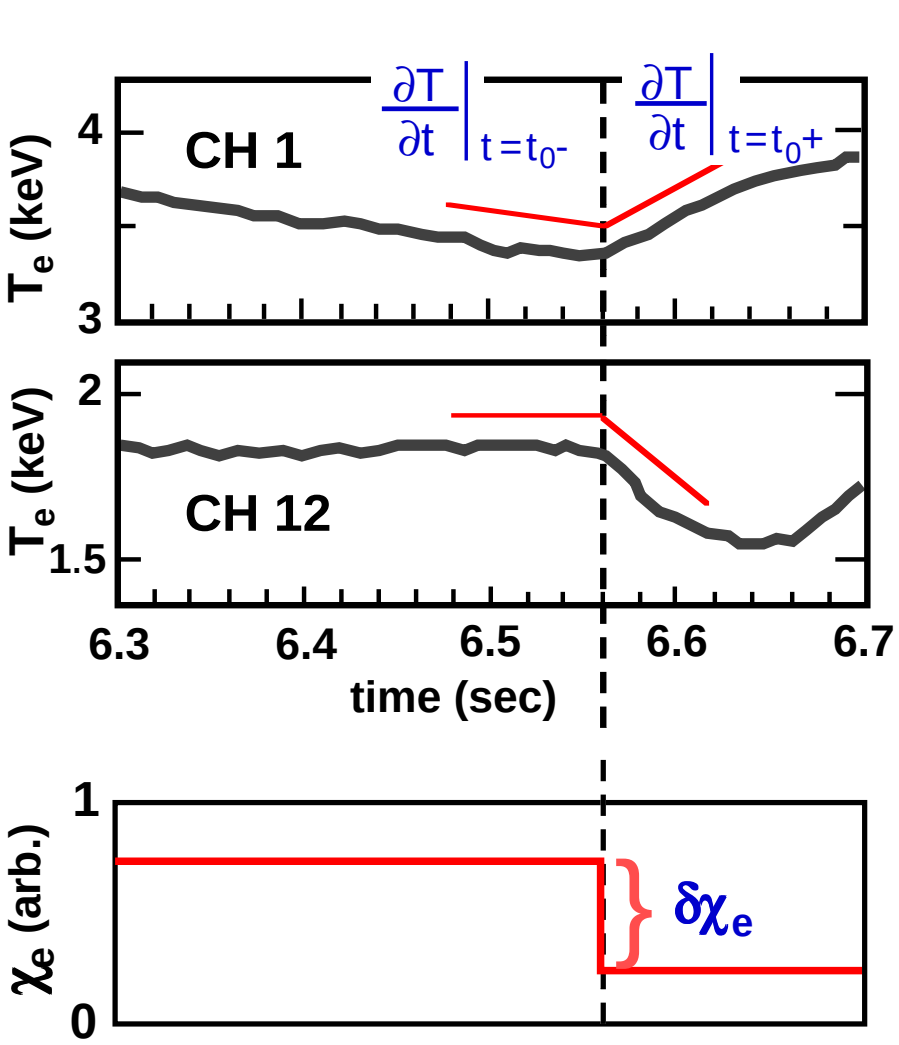


Profiles before and after the ITB event (I) Ⓐ



Ⓑ **Series of ITB events (I) and (D)**

ITB Event, the Abrupt Change in χ_e, is seen as Bipolar Perturbation of T_e



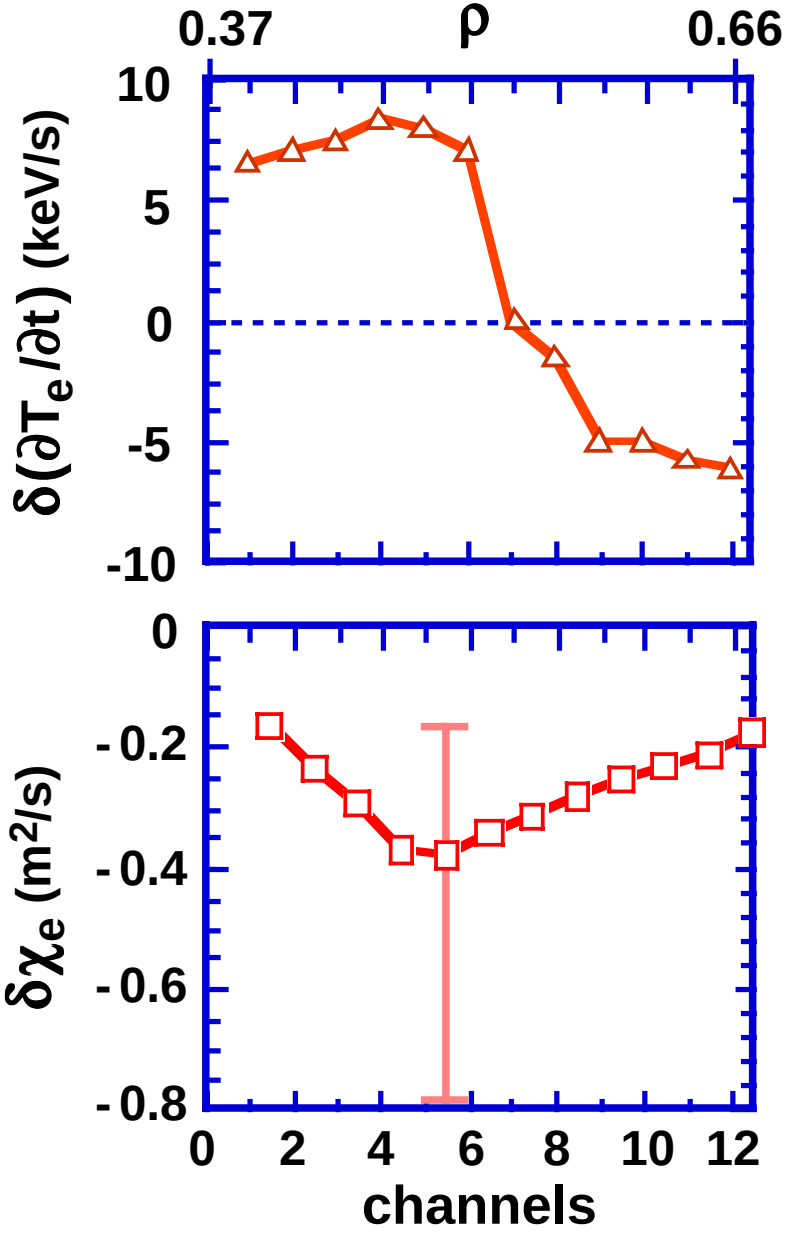
$$\delta\left(\frac{\partial T}{\partial t}\right) \equiv \left.\frac{\partial T}{\partial t}\right|_{t=t_0+} - \left.\frac{\partial T}{\partial t}\right|_{t=t_0-}$$

$\delta\left(\frac{\partial T}{\partial t}\right) > 0$ inner T_e increases because of transport improvement

$\delta\left(\frac{\partial T}{\partial t}\right) < 0$ outer T_e decreases because of heat flux reduction

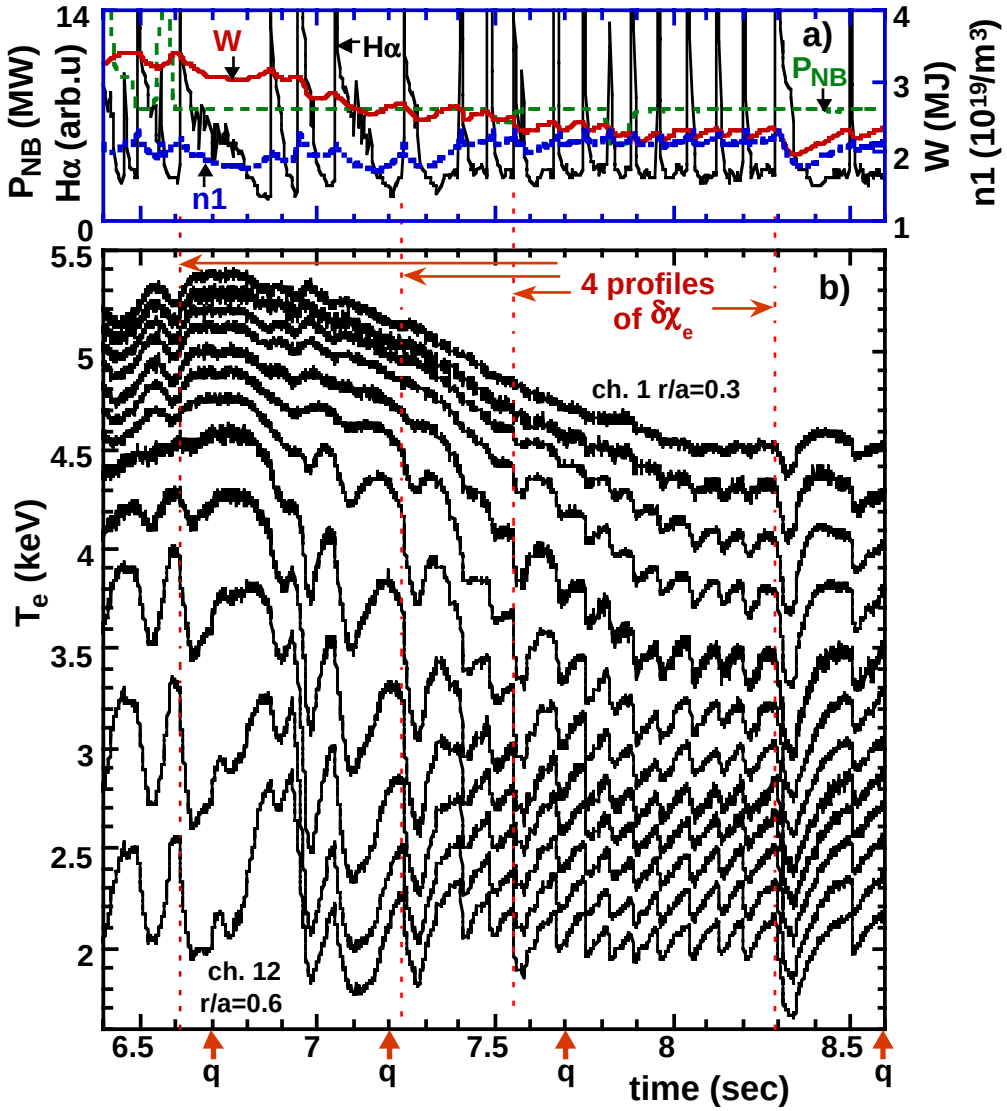
$$\delta\chi_e = \frac{3}{2}\,\frac{\int_0^V dV\, n_e\, \delta\left(\frac{\partial T}{\partial t}\right)}{n_e\, \nabla T_e\, S}$$

Abrupt and simultaneous ms time scale) rise and ecay of T_e in two zones bipolar perturbation) are reated by the abrupt (~ms) nd wide (> 0.3a) variation f χ_e ($\delta\chi_e$).



S.V. Neudatchin, T. Takizuka, H. Shirai, et al., "Abrupt in Time and Wide in Space Variations of Heat Diffusivity during ITB Formation in JT-60U Reversed Shear Discharges", Plasma Phys. Control Fusion **41** (1999) L39

Interplay of L-H-L transition and ITB events



S.V. Neudatchin, T. Takizuka, H. Shirai, et al., "Dynamics and Interplay of L-H-L Transitions and ITB Events in Reversed Shear Plasmas with Internal Barriers in JT-60U", Plasma Phys. Control. Fusion **44** (2002) A383.