

## **Evaluation of fast-ion confinement using radially injected neutral beam on LHD**

M.Osakabe, S.Murakami\*, T.Itoh, M.Isobe, S.Kobayashi\*2, T.Tokuzawa, K.Nagaoka,  
T. Takeiri and LHD-group

*National Institute for Fusion Science, Toki 509-3292, Japan*

*\*Kyoto University, Kyoto 606-8501, Japan*

*\*2Kyoto University, Uji 611-0011, Japan*

osakabe.masaki@LHD.nifs.ac.jp

An achievement of good confinement properties of fast-ions is one of the most important issues in realizing fusion-reactors based on helical-configurations since the three dimensional ripple components of magnetic fields significantly affect the orbit topologies of fast-ions and the effects by the ripple components might degrade the heating efficiency of fusion-born alpha particles.

On LHD, the confinement properties of fast-ions are evaluated by using the short-pulse injection of radial Neutral Beams (NB). Since the fast-ions produced by the radial-NB have most of their kinetic energies perpendicular to the magnetic field lines, their confinement properties are expected to depend largely on the ripple structures of magnetic configurations. The decay times of fast-neutrals after the short-pulse NB injections are measured by an array of Si-diodes[1,2] and the lifetimes of fast-ions staying on particular orbits are evaluated by comparing the decay times with the slowing-down times of these fast-ions. The evaluations are done for several magnetic configurations of LHD by changing the magnetic axis locations from outward to inward and show the good fast-ion confinement properties of inwardly-shifted configurations of LHD. This is consistent with the theoretical predictions for fast-ion confinement properties on LHD[3]. Detailed analysis on the experimental data will be shown at the presentation.

[1] M.Osakabe, *Rev. Sci. Instrum.*, **72**, 788(2001)

[2] M.Isobe, *et.al.*, to be published at *Fusion Science and Technology*.

[3] S.Murakami *et.al.*, *Fusion Science and Technology*, **46**, 241(2004)