

DPP06-2006-000472

Abstract for an Invited Paper  
for the DPP06 Meeting of  
the American Physical Society

### **FTU experimental results using a lithium liquid limiter<sup>1</sup>**

GIUSEPPE MAZZITELLI, Associazione EURATOM-ENEA sulla Fusione, Centro Ricerche di Frascati, C.P. 65-00044

For the first time in a medium size tokamak as FTU a liquid lithium limiter has acted as main limiter. The main goal of the experiment aims to test the capillary porous system (CPS) configuration. The experiment has two main aspects: a technological one related to the use of a liquid metal such as the capability to control high heat loads and to ensure the self-regeneration of plasma facing components. The other, more physical, to test the CPS LL behaviour and to use it like a conditioning system to deposit a lithium film on the chamber walls. In this first experimental campaign the LL has been tested in ohmic plasma discharges with  $B_T = 6\text{T}$ ,  $I_p = 0.5\text{--}0.9\text{ MA}$  and average electron density  $n_e$  from  $0.15$  up to  $2.6 \times 10^{20}\text{m}^{-3}$ . The experimental results confirm the strong capability of lithium to pump hydrogen particles allowing to extend the range of plasma operations to the lowest electron density never reached on FTU ( $1.5 \times 10^{19}\text{m}^{-3}$ ). As consequences of this pumping effect we have measured significant modifications of the scrape off layer, mainly of electron temperature. Furthermore reductions in the total radiated power and in the loop voltage have been observed due to low  $Z_{eff}$  values. After lithiation,  $Z_{eff}$  is equal to 1.5 at low density ( $0.5 \times 10^{20}\text{m}^{-3}$ ) and 1. at higher density ( $1 \times 10^{20}\text{m}^{-3}$ ). The behaviour of the lithium limiter as first wall material has been successfully tested for thermal loads in the range  $1\text{--}10\text{ MW/m}^2$ . Thermal analysis and modeling will be discussed.

Co-authors: M.L. Apicella, M. Marinucci, C. Mazzotta, V. Pericoli Ridolfini, O. Tudisco, R. Zagorski, V. Lazarev, A. Vertkov, A. Alekseyev.

<sup>1</sup>This work was supported by the Euratom Communities under the contract of Association between EURATOM/ENEA. The view and opinions expressed herein do not necessarily reflect those of the European Commission.