

## Comparison between liquid lithium and liquid tin limiters in FTU

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In the framework of the liquid metals research it has been taken into account the use of metals, such as lithium and tin, as plasma facing materials. The use of liquid metals has been suggested as a possible alternative to solid walls option due to the regenerative properties of the liquid surface. Two different materials have been studied in the Frascati Tokamak Upgrade (FTU): lithium and tin. The behavior of these materials is very dissimilar starting from the strong difference in the atomic weight, which is strictly related to the plasma compatibility. However the operating window for tin is much larger than that for lithium due to the low vapor pressure of tin. The possibility to increase the operation temperature, and, thereby, the energy removal capacity, allows to increase the steady state heat load on the surface up to very high value [1]. FTU is the first tokamak in the world operating with liquid tin limiter and one of the pioneers in liquid metal applications. The compact high magnetic field FTU device can achieve a high power flux close to the LCMS, and a set of dedicated diagnostics aims directly at the limiters. Four Langmuir probes monitor density and electron temperature close to the limiter, a fast IR-camera the surface temperature and one spectrometer detects visible radiation. In the near future it is also foreseen to install a high speed visible camera. The FTU typical discharge has been adapted to optimize the liquid metal investigation allowing both short high current pulses and long low current shots. The objective is to characterize liquid metals properties in different real tokamak plasma scenarios. A database is already under development, it include data taken from performed scans in plasma density and in limiters distances from the LCMS. Values of the heat load up to 10MW/m<sup>2</sup> have been recorded for both metals, obviously with large difference in impurity influx to the plasma. Typical FTU plasma parameters close to the limiter include, density in the order of  $8 \cdot 10^{19} \text{m}^{-3}$  and electron temperature around 10-20 eV with a typical decay length of 1-1.5cm. The paper will present the comparison between the two liquid metal limiters and will show the data collected during several experimental campaigns in FTU.

[1] J.W. Coenen et al., Phys. Scr. T159 (2014) 014037

\*See Appendix A- Overview of FTU Results “IAEA Conference 2016 Paper OV/P-4