

The CAesium Test Stand for the development of the caesium ovens for negative ion sources

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The ITER Heating Neutral Beam (HNB) injector is required to deliver 16.7 MW of power into the plasma from a neutralised beam of H⁺/D⁻ negative ions, produced by an RF source and accelerated up to 1 MeV. To enhance the H⁺/D⁻ production, the ion source needs to be coated with caesium to reduce its work function. Cs must be routinely evaporated in the source by means of dedicated ovens embedded in the source. Controlling and monitoring the evaporation rate of caesium inside the source is fundamental to attain the desired performances on the ITER HNB. In the Neutral Beam Test Facility at Consorzio RFX the prototype RF negative ion source SPIDER has been developed and built. Currently SPIDER is in operation. In SPIDER, liquid Cs based ovens will be used to inject Cs vapours inside the source. The CAesium Test Stand (CATS) has been specifically designed and set up for testing, commissioning, and characterizing Cs ovens in vacuum, in terms of repeatability of the Cs evaporation and deposition onto surfaces. To this aim, a set of diagnostics were installed: fixed Surface Ionization Detectors (SID), embedded in the oven and located in front of the oven nozzle apertures, movable SIDs, to reconstruct the angular distribution of the emission, a quartz microbalance, at a fixed position to provide the cumulated caesium flux, and the laser absorption spectroscopy, to measure the line-integrated caesium density. The poster will present the CATS set-up with a description of the layout and the present configuration of the diagnostic set-up and future upgrades.