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## Tritium extraction from HCLL/WCLL/DCLL PbLi BBs of DEMO and HCLL TBS of ITER

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The Tritium balance in DEMO Reactor is a key factor for the successful of the production of energy from Thermonuclear Fusion Reactor. Three of the four Breeder Blankets (BB) concepts candidates for DEMO used the eutectic Pb-16Li enriched at 90% in  ${}^6\text{Li}$  as breeder, the WCLL (Water Cooled Lithium Lead), DCLL (Dual Coolant Lithium Lead) and HCLL (Helium Cooled Lithium Lead) BBs, therefore the design and characterization of the Tritium Extraction and Removal System (TER) from PbLi with high efficiency is a critical issue in the European Roadmap. In ITER Research Reactor a PbLi BB concept will be qualified, the HCLL BB. A HCLL Test Blanket Module, PbLi loop, instrumentations and auxiliary systems will be characterized with the support of European infrastructures. However, the Tritium Extraction Unit from PbLi (TEU) selected and designed for ITER, is based on Gas Liquid Contactor technology, a reliable technologies but with less than 40% efficiency. Instead, the TER candidates technologies of DEMO BBs, the PAV (Permeator Against Vacuum) and VST (Vacuum Sieve Tray), will not qualified in ITER because these systems will not be fully mature by the start of the Reactor. PAV and VST can theoretically achieve efficiency above 80%.

The present works aims to analyse the technologies candidates for ITER and DEMO reactors, describe and compare TEU and TER design for each concept of BB and the integration of TER in DEMO tokamak building taking into account two design requirements: self-sufficient sustainable of fusion nuclear reactor and safety requirements.

### Eligible for student paper award?

No

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