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P4.056 Integration of the TESPEL injection system at W7-X

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Since impurities determine the plasma performance in magnetically-confined fusion plasmas, analyzing their behavior and controlling their confinement is significantly important for a stable and steady-state operation of fusion devices. A comparison of the impurity transport in the core region of large stellarators, such as Wendelstein 7-X and Large Helical Device (LHD) is quite useful to gain a better understanding of the impurity transport in reactor-relevant stellarator plasmas. Therefore, a Tracer-Encapsulated Solid Pellet (TESPEL) injection system has been newly installed for the operational phase OP1.2b of W7-X. The injector was designed and manufactured by NIFS to achieve a similar TESPEL deposition location as in LHD. Technical guidelines and functional specifications, addressing the specific conditions at W7-X had been implemented in close collaboration between NIFS and IPP. This resulted in a compact 3-stage differential pumping system considering spatial restrictions due to existing and future diagnostics, material requirements and limitations due to the magnetic stray field in the vicinity of the turbo pumps.

This contribution reports on the design and the integration of the new TESPEL injection system to W7-X and first achievements during the commissioning of the system.

Presenter: Dr LAUBE, Ralph (Max-Planck-Institut für Plasmaphysik (IPP))

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