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P2.005 Development of reactor relevant pellet launching system technology on ASDEX Upgrade

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Controlling the plasma density in a future fusion reactor will be mainly attributed to pellet injection using a control algorithm based on a rather difficult density measurement. The underlying technology to capacitate the Pellet Launching System (PLS) for the requirements is challenging. The ASDEX Upgrade (AUG) PLS was retrofitted for this task, intensifying the integration into the Discharge Control System (DCS). Lessons learnt and their consequences for the design of a new system “from scratch” will be described.

The technology of the ice production process is discussed as well as the observed performance in view of isotope ratio accuracy and plasma fuelling performance, mimicking the reactor fuel (mixture D/T) by using a mixture of H/D. Since a fusion power plant will require a steady-state pellet source, the development of a control strategy in view of process control is mandatory. The procurement of a new pellet source was launched in order to enhance the existing centrifuge acceleration system. This contribution will show first considerations.

An innovative conceptual design will be presented comprising the potential to replace nowadays centrifuge systems. Present-day vacuum rotating feedthrough technology enables the installation of the motor for the accelerating arm on the atmosphere side avoiding a series of technical difficulties.

The existing PLS on AUG is in operation now for almost 30 years, no fall-back option is available right now. A conceptual design for a new PLS consisting of extruder, launcher and control systems (also for density control) with focus on reactor relevant technologies except tritium compatibility is under preparation.

Results presented here are complementary domestic activities to the EUROfusion WP TFV.

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