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Characterization of DR profiles for various Wendelstein 7-X scenarios

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This work concerns a newly created database of plasmas from the most recent operational phase of Wendelstein 7-X (October 2022 –April 2023). This database includes a comprehensive assortment of various plasma configurations, densities and heating schemes, for which profiles of the radial electric field (E_r) and the back-scattered power (S) were measured using the V-band DR system located at the AEA-21 port, overlooking the bean shaped plasma cross-section. The database includes gas-puffed ECH plasmas from four island-divertor configurations and one limiter configuration. Additionally, we have examined a set of high-performance NBI-heated plasmas in three island-divertor and one limiter configuration: First, these plasmas are created with ECH heating, followed by a phase sustained solely by NBI and then a final phase with a combination of ECH and NBI. In this last phase, a significant increment of the stored energy is observed indicating a change in the transport properties. We analyze and compare the E_r and S profiles for these plasmas alongside those of the gas-puffed pure ECH plasmas. Finally, we present our findings regarding the values of the Er measured in the SOL for all these scenarios and how the formed edge E_r shear influences the local density fluctuation amplitude.

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