

P2.1065 Dependence of the intrinsic toroidal current on heating power and density in the Wendelstein 7-X stellarator

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See full abstract here

<http://ocs.ciemat.es/EPS2019ABS/pdf/P2.1065.pdf>

The intrinsic, diffusion driven toroidal (bootstrap) current has been measured in the stellarator Wendelstein 7-X for several magnetic configurations at line integrated plasma densities between 2 and $16 \times 10^{19} \text{ m}^{-2}$ and heating powers between 0.5 and 6 MW. A Rogowski coil was employed to measure the net toroidal current in the plasma. This consists of the intrinsic bootstrap current and the counteracting, resistively dampened shielding current. The plasma parameters (with the exception of the shielding current) were kept constant over a time in the order of the decay time of the shielding current. The measured time trace of the net current was then fitted by a constant bootstrap current from which an exponentially decaying shielding current was subtracted. The main contribution to the experimental error is expected to be the unintentional current drive by the electron cyclotron resonance heating. It is expected to be in the order of 1 kA in most cases. The bootstrap currents obtained in this way varied between -7 and 5 kA for the high mirror and high iota configurations, which are optimized for small bootstrap current, and between -3 and 17 kA for the standard, intermediate (limiter) and low iota configurations. Currents generally decreased when the density was raised at constant heating power and generally increased when the heating power was raised at constant density.

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