

## Investigating the outer magnetic field of Wendelstein 7-X using the magnetic probe

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During the first phase of the second experimental campaign OP1.2a of Wendelstein 7-X (W7-X) – featuring for the first time an island divertor – measurements of the edge magnetic field profiles were conducted using the combined probe [1] mounted on the Multi-Purpose-Manipulator (MPM) with its 3D coil array. The measurements with the combined probe have been performed in different magnetic configurations as well as with varying heating scenarios.

While the measured vacuum profiles matched the predictions quite well, it was observed that the measurements with plasma deviated noticeably. This is in contrast to the first operational campaign where the considerably lower pressures did not cause such a difference between the vacuum fields and those with plasma.

The measurements have been performed in different magnetic configurations and for different plasma heating scenarios which allows a dedicated comparison. Although W7-X has been optimized for small bootstrap currents, finite toroidal plasma currents were present in the scenarios and have been measured with Rogowski coils. It is currently not yet clear whether the differences in the measurements have to be attributed to the toroidal plasma current connected with the bootstrap current, to pressure-related effects or to a combination. To address this uncertainty in future works the measured data will be compared with MHD equilibrium models.

[1]: P. Drews et al. (2017). Measurement of the plasma edge profiles using the combined probe on W7-X. *Nuclear Fusion*. **57**. . 10.1088/1741-4326/aa8385.