

Contribution submission to the conference München 2019

Consistently calculating the radiated power in near real time at the stellarator Wendelstein 7-X — ●PHILIPP HACKER, FELIX REIMOLD, DAIHONG ZHANG, MACIEJ KRYCHOWIAK, RAINER BURHENN, and THOMAS KLINGER FOR THE WENDELSTEIN 7-X TEAM-COLLABORATION — Max-Planck Institute for Plasma Physics, Greifswald, Germany

At the stellarator Wendelstein 7-X a two-camera bolometer system consisting of detectors with blackened gold foil absorbers has been used in the previous experiment campaign to implement and optimize a real time evaluation of the radiated power. The calculated line integrated radiation intensity was used for feedback control of the plasma discharge with auxiliary gas fueling as an actuator. The bolometer views the plasma at a triangular cross-section of W7-X horizontally and vertically across a poloidal position. Its fan-shaped lines of sight provide full coverage of the studied plasma at this cross-section with a spatial resolution of 5 cm on the magnetic axis. Based on the line-integrated measurements the radiated power loss of the plasma has been estimated independently for both cameras. Different methods of estimation have been used to access the radiated power in near real time. A single channel signal and weighting factor was used for edge radiating plasma. As a second estimator, a selection of sightlines were used together with their geometrical properties to extrapolate the power loss by radiation, as is done for the offline analysis of the radiated power. Feedback results will be shown, including benchmarks of the global power balance using the calculated radiated power.

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