

Contribution submission to the conference Hannover 2020

Local radiated power sensitivity and intrinsic impurity correlation analysis at the stellarator Wendelstein 7-X —

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The two-camera resistive bolometer system at the stellarator Wendelstein 7-X with its blackened gold absorbers has provided a real time evaluation of the total radiated power for plasma feedback during the last experiment campaign. Based on the assumption of poloidal symmetry the radiated power loss of the plasma can be estimated independently for both cameras and each channel from line-integrated measurements. Using a limited set out of the total available fan of sight lines covering most radial emission shells the radiation level was calculated for plasma feedback control with fast auxiliary gas fueling as an actuator. Investigations regarding the best set of sight lines predicting the radiated power loss have been done for all camera and channel combinations as well as different mathematical weighting methods. Normalisation with individual cross correlations functions of single line integrated signals yields a set of channels with particular relevance for the total radiated power. Incorporating results from the 1-D impurity transport code STRAHL and spectroscopic diagnostics we attempt to link the contribution of different intrinsic impurities to the loss distribution.

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