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Enhancements of the Fast Interlock System for Wendelstein 7-X operational phase OP2.1

An extended modification phase of the superconducting fusion experiment Wendelstein 7-X was completed late 2021 after installing actively cooled divertor units and the integration or modification of new technical components and diagnostics. Currently, the commissioning of the W7-X experiment is underway. First plasma operation is scheduled to take place at the end of September 2022, and scientific plasma operation will start at the end of November.
The Fast Interlock System (FIS) is an independent subsystem of the safety control system of W7-X. The main task of the FIS is to protect the inner plasma vessel components from thermal overload from both plasma heating systems (e.g. neutral beam injection) and the plasma itself. There are strict limits for reaction times, which have to be observed in order to prevent overload situations of the first wall.
The requirements for the FIS were substantially modified and extended in order to address the challenges due to the actively cooled divertor. This led to extensive revision of the technical implementation and the software of the FIS.
In this paper, after a short introduction of requirements, functions and structure of the safety system of W7-X, the requirements to the FIS for OP2.1 is presented, followed by a description of the technical aspects of the FIS and the implementation of the interlock functions. Finally, the first results during the commissioning of the FIS are discussed.

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Yes

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No

Are you a student?

No

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