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Runaway electrons diagnostics using segmented semiconductor detectors

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The runaway electron generation during plasma disruptions presents a danger to the vacuum vessel and associated instrumentation. The presented work concerns application of semiconductor detectors for study and characterization of runaway electrons events. The recent advances in the field of semiconductor detectors allow for the development of new diagnostic methods, utilizing their particle detection capabilities,

including unprecedented dynamic range as well as spatial and temporal resolutions. They can be applied as diagnostic instruments, enabling better resolution of both direct measurement of charged particles and indirect one of X-rays or neutrons. In tokamaks, both processes could be exploited for detecting runaway electrons - either directly inside the vacuum chamber, or indirectly via radiation produced by interaction with plasma facing material. Results of the new technique are to be compared with already existing diagnostic methods such as scintillation devices detecting X-rays and photoneutrons.