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DEDICATED RUNAWAY ELECTRONS STUDIES AT THE TOKAMAK COMPASS

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Runaway electrons (RE) present one of the major concerns for future fusion devices (tokamaks), since the uncontrolled localized RE losses can compromise the integrity of tokamak device and its further operation. Runaway electrons can emerge within a tokamak plasma either at low density, during the discharge start-up phase or as a result of rapid plasma termination, associated with sudden cooling causing a significant electric field induction. In the presence of such a strong electric field, electrons can reach several tens of MeV (kinetic energy ˜ tens of MJ). The fully effective mitigation strategy was still not identified despite the increased effort of the fusion community. Several approaches have to be explored.
The COMPASS tokamak is an ideal device for testing such strategies and developing new ones due to its high flexibility, advanced RE feedback, compact size and the high reproducibility of RE scenarios. The main studied mitigation strategies are the injection of impurities and the application of external resonant magnetic perturbations (RMPs). The combination of mentioned mitigation strategies with emphasis on RMPs will be examined. Conclusions about their efficiency at COMPASS will be elaborated and basic assumptions toward larger fusion devices will be derived.

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