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Disruption avoidance through active magnetic feedback in tokamak plasmas ROBERTO PACCAGNELLA, PAOLO ZANCA, VADIM YANOVSKIY, CLAUDIO FINOTTI, GABRIELE MANDUCHI, CHIARA PIRON, LORELLA CARRARO, PAOLO FRANZ, Consorzio RFX, RFX TEAM — Disruptions avoidance and mitigation is a fundamental need for a fusion relevant tokamak. In this paper a new experimental approach for disruption avoidance using active magnetic feedback is presented. This scheme has been implemented and tested on the RFX-mod device operating as a circular tokamak. RFX-mod has a very complete system designed for active mode control that has been proved successful for the stabilization of the Resistive Wall Modes (RWMs). In particular the current driven 2/1 mode, unstable when the edge safety factor, qa, is around (or even less than) 2, has been shown to be fully and robustly stabilized. However, at values of qa (qa >3), the control of the tearing 2/1 mode has been proved difficult. These results suggested the idea to prevent disruptions by suddenly lowering qa to values around 2 where the tearing 2/1 is converted to a RWM. Contrary to the universally accepted idea that the tokamaks should disrupt at low qa, we demonstrate that in presence of a well designed active control system, tokamak plasmas can be driven to low qa actively stabilized states avoiding plasma disruption with practically no loss of the plasma internal energy.

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