

## An overview of the upgrade of the TCABR tokamak

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This work provides a general overview of an upgrade that is being conducted on the TCABR tokamak, which is a small-size tokamak ( $R_0 = 0.62$  m and  $a = 0.2$  m) operated at the University of São Paulo, Brazil. This upgrade consists mainly in the installation of (i) graphite tiles to cover entirely the inner surface of the vacuum vessel wall, (ii) new poloidal field (PF) coils to allow for the generation of various divertor configurations such as single-null, double-null, snowflake and x-point target divertors, (iii) in-vessel HFS and LFS non-axisymmetric control coils for ELM suppression studies, and (iv) a coaxial helicity injection system to improve plasma start-up. Among other goals, this upgrade will allow for studies of the impact of RMP fields on advanced divertor configurations, such as the x-point target and snowflake divertors. Different aspects of this upgrade will be presented, with emphasis on preliminary studies of the different plasma configurations that will be generated in TCABR with the new PF coils and the magnetic diagnostic system needed for the plasma control. These studies are being used to design the PID plasma controllers and also to determine the required voltage/current wave forms that shall be supplied by 15 high-current power supplies that are being designed. Additional power supplies are also being designed to allow for toroidally rotating RMP fields. An important aspect of this upgrade is that it will serve to pave the road towards the establishment of a national laboratory that will be constructed in Brazil to concentrate and coordinate studies on nuclear fusion across the country.

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