An overview of the upgrade of the TCABR tokamak

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ABSTRACT

- An upgrade is being conducted on the TCABR tokamak, which consists in the installation of:
  - graphite tiles to cover entirely the inner surface of the vacuum vessel wall
  - new poloidal field coils to allow for the generation of various plasma configurations
  - in-vessel HFS and LFS RMP control coils
  - a coaxial helicity injection system
- Preliminary studies of the different plasma configurations envisaged for TCABR are being used for:
  - Designing the PID plasma controllers
  - determining the required voltage/current wave forms that shall be supplied by 17 high-current power supplies
- Additional power supplies are also being designed to allow for toroidally rotating RMP fields

This upgrade 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

BACKGROUND

- TCABR is a small-sized tokamak (R₀ = 0.62 m and a = 0.2 m) of maximum Iₚ = 120 kA and B₀ = 1.5 T
- The plasma scenarios generated used the Lagrange Multiplier technique to find the shaping coil currents that minimise the dissipated power and current dipoles [1]

PRELIMINARY RESULTS

- An innovative set of RMP coils will allow for physics model validation of plasma response under a wide range of coil geometries and spectra
  - 5 sets of 18 inter-connected power supplies are being designed to allow for rotating RMP fields
- HFS RMP coils expected to perturb plasma edge more than plasma core [2]

REFERENCES / ACKNOWLEDGEMENTS


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