

PHYSICS

DM 630/ENI - Physics of plasmas and of high magnetic field instability in the SPARC tokamak device: NIMROD code and MHD simulations

Funded By	ENI S.P.A. [Piva/CF:00905811006] MINISTERO DELL'UNIVERSITA' E DELLA RICERCA [Piva/CF:97429780584]
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Context of the research activity	<p>Theoretical and numerical studies of the stability of magnetically confined fusion plasmas, with particular attention to the SPARC tokamak device under construction in USA by Commonwealth Fusion Systems, in collaboration with the Massachusetts Institute of Technology and the Physics Fusion Team at ENI S.P.A. The research may require periods spent at the MIT Plasma Science and Fusion Center and at the ENI fusion center in Novara.</p> <p>Progetto finanziato dal PNRR a valere sul DM 630/2024 - CUP E14D24002380004</p>
Objectives	<p>The proposed research is innovative and exciting. It will make use of state-of-the-art analytic understanding on the magneto-hydro-stability (MHD) stability of fusion plasmas confined to be expected in the SPARC tokamak, a new confinement device developed at MIT. SPARC, which is supposed to start its operation in 2026, will employ record-high magnetic fields produced by new kind of High-Temperature superconductors. New physics phenomena are expected to be observed in SPARC. Therefore, this research will give an opportunity to explain and model new plasma physics observations. In addition to analytic work, one of the main tools available for this project is a state-of-the-art numerical code, called NIMROD, which solves nonlinear, 3D, extended-MHD equations. The research is sponsored in part by ENI S.P.A. While most of the work will be carried out at the Politecnico di Torino under the guidance of the well-known MHD expert Prof. Francesco Porcelli, part of the research will require periods spent in Novara and at MIT (USA).</p>
Skills and competencies for the development of	<p>Basic knowledge of Physics, Mathematics, and numerical methods, as acquired by most degree courses in Physics and in Engineering at the Master level. The interested candidate should have a passion for analytic and numerical methods and a keen interest in working in a collaborative</p>

