

Lopes, André Filipe Mocho Costa

PhD Student – APPLAuSE [Técnico Lisboa]

andlop15@gmail.com

PhD Thesis Abstract

Collective Thomson Scattering and Plasma Position Reflectometry systems for ITER and DEMO: Neutronics performance assessment and optimisation

One of the major challenges our world is currently facing is the lack of one sustainable source of energy. Nuclear Fusion appears, apart from renewable energies, as a candidate to solve that challenge and with that goal, big devices capable of achieving nuclear fusion have been developed over the last decades. Instituto de Plasmas e Fusão Nuclear (IPFN) and the Center of Nuclear Technologies of the Technical University of Denmark (DTU-Nutech) are two major laboratories which are focused on developing two diagnostics systems - the Plasma Position Reflectometer (PPR) and the Collective Thomson Scattering (CTS) respectively - which are going to be incorporated in one of those devices - ITER. This PhD programme is aiming at studying the impact of 14.1 MeV neutron radiation on the components of the diagnostics using state-of-the-art codes like MCNP and ANSYS, which use respectively Monte Carlo and Finite Elements Analyses simulations. Using these codes, a complete characterisation of the thermal, mechanical and electromagnetic properties of the studied components will be done once the components are bombarded with these highly energetic neutrons. These studies will allow the determination of whether such diagnostics and, in particular, some plasma-facing components will resist to short and long term neutron irradiation.