

PerAPS

2025 MERCOLEDÌ 23 APRILE



A.D. 1308
unipg

DIPARTIMENTO
DI FISICA E GEOLOGIA

ORE 15:00 – AULA A



Introduction to nuclear fusion

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In the current considerations about possible energy scenarios to sustain the increasing energy demand and the challenges imposed by the climate change, nuclear fusion is gaining more and more space and credibility as potential key player in future energy mix. Studied since the 50s thanks to breakthroughs discoveries by Russian scientists, nuclear fusion has long been seen as potential unlimited, clean and intrinsically safe source of energy, while the enormous technological challenges to make it real have constantly delayed its actual deployment. As of today, the most advanced and promising nuclear fusion concept is the tokamak: the ITER project under construction is south of France as international effort and supposed to get humankind one step closer to a commercial fusion power plant, is based on the tokamak concept. In this seminar nuclear fusion principle will be briefly introduced and compared to nuclear fission (used in the conventional nuclear power plants), and an overview of tokamak based machines, their construction principles and their challenges will be given. Deployment of nuclear fusion needs a number of parallel side activities and large projects, in particular for the qualification and licensing of the structural material to be used at the core of the fusion reactor, which is exposed to nuclear flux conditions different to the ones of nuclear fission materials. A complementary outlook will be provided in this seminar to the linear accelerators used as neutron sources for the qualification and licensing of nuclear fusion structural and functional materials.