PhD course in Physics, Astrophysics, and Applied Physics - Università degli Studi di Milano
PhD cicle 40 (2024-2025)

All lectures will be given in English.

Course title	Nuclear structure theory: Density Functional methods in nuclear physics
Teacher in charge of the course	Silvia Leoni
List of the teachers of the course *[surname/name; affiliation; e-mail]*	Gianluca Colò, University of Milan, Gianluca.colo@unimi.it
Training objectives	The student will be led to understand and master the most widely used theoretical methods for nuclear structure studies
Prerequisites *[please insert details and also **state whether the course has advanced contents** suitable for students with prior knowledge of the topics or is also suitable for students without prior knowledge]*	Basic knowledge of nuclear physics
Detailed course program	• The nucleon-nucleon interaction and the nuclear many-body problem: a survey. • Nuclear structure models with emphasis on Density Functional Theory (DFT). • DFT: the original Hohenberg-Kohn theorem; transferring DFT from electronic systems to nuclei; basics on Skyrme, Gogny and relativistic functionals. • Applications of *static* DFT: ground-state properties (masses, radii, deformations). • Time-dependent DFT and nuclear vibrational states. Giant resonances. • The nuclear equation of state and applications to compact objects (neutron stars). • Further topics: nuclear superfluidity, isospin in nuclear physics, exotic resonances.
Examination modalities	Oral exam
Preliminary schedule *[please indicate the weeks when the lectures will be given]*	January 2025