

Introduction to astrophysics (2020/2021) (40 h)

The course provides an introductory overview of key astrophysical processes and questions, such as planetary formation and properties, stellar evolution and nucleosynthesis, the interstellar medium and star formation, galactic evolution and cosmology, and some modern aspects of gravitational physics. The course will start the last week of February and end on the last week of May.

General program:

Solar System, Protoplanetary disks and extrasolar planets
Gas dynamics, instabilities and turbulence
Star formation and accretion processes
Stellar structure, evolution and nucleosynthesis
Relevant topics of galactic and extragalactic physics
Gravitational waves in relativistic and high energy processes

Detailed program:

Formation and evolution of protoplanetary disks and planets 2h (V. Roccatagliata)
The Solar System: features and problems 4h (P. Paolicchi)
The physics of the stars 4 h (P.G. Prada Moroni)
H burning stars. Solar models and solar neutrinos. 3 h (S. Degl'Innocenti)
He burning stars and distance indicators. 3 h (S. Degl'Innocenti)
The final fate of stars of different masses 2h (P.G. Prada Moroni)
hydrodynamic processes: turbulence and flows 4h (S. Shore)
star formation and ISM 3h (S. Shore)
Dynamics of binary systems and gravitational waves from binary black holes 4h (W. Del Pozzo)
Detection and parameter estimation of gravitational waves 3h (W. Del Pozzo)
Formation and evolution of galaxies 2h (M. Cignoni)
Dynamics of galaxies and the problem of dark matter 2h (M. Cignoni)
Distance ladder and H_0 2h (M. Cignoni)
Cosmic microwave background and history of cosmic structure formation 2h (M. Cignoni)