UNIVERSITÀ
DEGLI STUDI DI MILANO-BICOCCA

SYLLABUS DEL CORSO

Principles of laser physics and non-linear optics

2526-113R-019

Title

Principles of laser physics and non-linear optics

Teacher(s)

Giuseppe Chirico

Language

English

Short description

- **Population Inversion and Stimulated Emission**
  Fundamental principles underlying the generation of laser light, with emphasis on the role of population inversion and stimulated emission as essential prerequisites.

- **Confocal Cavities and Gaussian Modes**
  Analysis of confocal optical cavities and the characteristics of the electric field in Gaussian modes, including implications for beam propagation and stability.

- **Linear and Nonlinear Excitation in Scanning Optical Microscopy**
  Exploration of the consequences of linear versus nonlinear excitation mechanisms in scanning optical microscopy, highlighting differences in resolution, signal generation, and imaging depth.

- **Biophysical Applications of Multiphoton Microscopy**
  Advanced applications of scanning microscopy in biophysics, focusing on two-photon and three-photon excitation techniques, as well as second- and third-harmonic generation processes for high-resolution imaging of biological systems.

CFU / Hours

1/8 hours

Teaching period

september & ocotber 2026

Sustainable Development Goals

GOOD HEALTH AND WELL-BEING