

Direzione Innovazione e Internazionalizzazione

> ID VP033_FIS

Visiting Professor Program Academic Year 2023/2024

TEACHING COMMITMENT: 12 hours

COURSE TITLE Nonlinear Waves and Turbulence

TEACHING PERIOD 1st term

SCIENTIFIC AREA Condensed Matter Physics

LANGUAGE USED TO TEACH English

COURSE SUMMARY

The lecture of the course will cover the following topics:

The wave equation; introduction to nonlinearity and dispersion; the Fermi Pasta Ulam Tsingou paradox; the ling wave limit and the Korteweg de Vries equation; solitons in physics; nonlinear coupled pendula in gravity: the Sine-Gordon equation; four-wave resonant interactions; the Zakharov equation and it narrow band approximation; solitons and breathers in the focusing and defocusing Nonlinear Schroedinger equation; description of a large number of interacting waves; the four-wave kinetic equation; the Rayleigh-Jeans distribution; the entropy and H-theorem; open systems: cascades and wave turbulence; Kolmogorov and Zakharov solution of the kinetic equation.

LEARNING OBJECTIVES

The objective of the course is to familiarise with the physics of nonlinear and dispersive wave systems. The students should also be trained on techniques and tools used for describing integrable systems and nonintegrable systems characterized by a large number of degrees of freedom.

TUTORSHIP ACTIVITIES

N/A

LAB ACTIVITIES

N/A

OTHER ACTIVITIES BESIDES THE COURSE N/A

VISITING PROFESSOR PROFILE

Long standing experience in the field of nonlinear waves and turbulence is required.

CONTACT REFERENT

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