Miguel ONORATO (Università di Torino)

Wave Turbulence

Wave Turbulence Theory describes, from a mesoscopic point of view, systems with a large number of dispersive and interacting waves. A most remarkable feature of the theory is its prediction of the Wave Kinetic Equation, which is an evolution equation for the energy density and the wave analogue of the Boltzmann kinetic equations for particle interactions. This equation, despite not being rigorously derived from deterministic equations, has been successfully applied to describe waves in different fields such as gravity, internal, and capillary waves, waves in plasmas, waves in Bose-Einstein condensate, etc.
In this short course I will give an introduction to the Wave Turbulence Theory, highlighting the open problems. Applications to the forecasting of surface gravity waves and to the problem of relaxation to equilibrium in anharmonic chains will be presented.