Baylor University

COLLEGE OF ARTS & SCIENCES
Department of Mathematics

15TH BAYLOR LECTURE SERIES IN MATHEMATICS

Gigliola Staffilani, the Abby Rockefeller Mauze Professor of Mathematics at MIT

Public Lecture:
A small window on wave turbulence theory
Wednesday, January 24, 2024
4:30 pm – 5:30 pm
Refreshments to be served at 4:00 pm
Cashion Building CASHN 311

Wave turbulence theory is a vast subject and its goal is to formulate for us a global picture of wave interactions. Phenomena involving interactions of waves happen at different scales and in different media: from gravitational waves to the waves on the surface of the ocean, from our milk and coffee in the morning to infinitesimal particles that behave like wave packets in quantum physics. These phenomena are difficult to study in a rigorous mathematical manner, but because of this challenge, mathematicians have developed interdisciplinary approaches that are powerful and beautiful. I will describe some of these approaches and I will outline along the way questions that remain open in spite of the great progress already made.

Colloquium Lecture:
The Schrödinger equations as inspiration of beautiful mathematics
Thursday, January 25, 2024
3:30 pm – 4:30 pm
Sid Richardson Building SDRICH 344

In the last two decades great progress has been made in the study of dispersive and wave equations. Over the years the toolbox used in order to attack highly nontrivial problems related to these equations has developed to include a collection of techniques: Fourier and harmonic analysis, analytic number theory, math physics, dynamical systems, probability and symplectic geometry. In this talk I will introduce a variety of results using as model problem mainly the periodic 2D cubic nonlinear Schrödinger equation. I will start by giving a physical derivation of the equation from a quantum many-particles system, I will introduce periodic Strichartz estimates along with some remarkable connections to analytic number theory, I will move on to the concept of energy transfer and its connection to dynamical systems, and I will end with some results following from viewing the periodic nonlinear Schrödinger equation as an infinite dimensional Hamiltonian system.