

Speaker: Ken MCLAUGHLIN (Tulane University, New Orleans USA)

Title: Introduction to the analysis of integrable PDEs when the number of solitons goes to infinity, with an aim towards analytical and computational research projects

Abstract: In these lectures, we will present a concise introduction to the analytical representation of multi-soliton solutions for the focusing nonlinear Schrödinger equation, connecting Riemann-Hilbert methods with Darboux transform / dressing methods. Then we will discuss the analysis of the accumulation of infinitely many solitons, in a number of different settings of interest, which will give rise to potential research projects. Examples of potential research projects may include the “edge behavior” in the formation of a soliton gas, or the interaction of a soliton gas with a dispersive wave induced by a nontrivial reflection coefficient. We will also discuss open questions regarding how to stabilize numerical computations of the accumulation of solitons, critical for the study of statistical properties of solitons in the presence of randomness.