THREADS

Lia Bronsard

Title:  *Saturn rings or Hedgehogs? The mathematics behind defects in a nematic liquid crystal.*

Abstract: The mathematical analysis of liquid crystal models poses many challenging questions, as can be seen by their close relationship to the study of singularities for harmonic maps. In this talk, I will discuss the structure of defects in the context of different models of nematic liquid crystals, and their connection to classical results on harmonic maps into the sphere.

Jean-Pierre Gabardo

Title:  *Weighted Beurling density and sampling in spaces of band-limited functions*

Abstract: The concepts of upper and lower Beurling density play an important role in the sampling theory for square-integrable, band-limited functions in Euclidean space whose spectrum is contained in a bounded set. In this talk, we will consider the problem of defining appropriate notions of density for Hilbert spaces of band-limited functions whose norm are defined using a weighted integral of the square of the Fourier transform, such as Sobolev spaces. We will use the theory of frames to extend the classical density results of H. Landau to this more general setting.
Title:  *Integrable semi-discretization of integrable PDEs*

Abstract: I will explain how Backlund transformation can be employed to obtain an integrable semi-discretization of the classical KdV equation. The result is used to discover for the first time integrable semi-discretization of the nonlinear Dirac equation.