UNIVERSITY AT ALBANY
State University of New York

College of Arts and Sciences
Department of Mathematics and Statistics

Colloquium

Israel Michael Sigal
University of Toronto

Magnetic vortex lattices

Friday, March 15th, 2019
3:00 p.m. in ES-143
(tea & coffee at 2:30 p.m. in ES-152)

Abstract. The Ginzburg - Landau equations play a fundamental role in various areas of physics, from superconductivity to elementary particles. They present the natural and simplest extension of the Laplace equation to line bundles. Their non-abelian generalizations - Yang-Mills-Higgs and Seiberg-Witten equations - have applications in geometry and topology.

Of a special interest are the least energy (per unit volume) solutions of the Ginzburg - Landau equations. Though the equations are translation invariant, these turned out to have a beautiful structure of (magnetic) vortex lattices discovered by A.A. Abrikosov. (Their discovery was recognized by a Nobel prize. Finite energy excitations are magnetic vortices, called Nielsen-Olesen or Nambu strings, in particle physics.)

I will review recent results about the vortex lattice solutions and their relation to the energy minimizing solutions on Riemann surfaces and, if time permits, to the microscopic (BCS) theory.