



## NYU-ECNU Institute of Mathematical Sciences at NYU Shanghai

### LITERATURE AND WORKING SEMINAR

**Topic:** On the Nodal Sets for Eigenvalue Problems and Equations with Schrödinger Operator

**Speaker:** Dr. Dan Liu

**Time:** 14:30-16:30, 14 November 2013

**Venue:** Room 371, Geography Building, 3663 Zhongshan Road North, Shanghai  
(华东师范大学中山北路校区, 地理楼 371 室)

#### ABSTRACT OF THE TALK

The investigation of nodal sets is an important research in the analysis of PDEs. One of the motivations comes from the mathematical theory of superconductors and liquid crystals. Based on the theories, the nodal set of the order parameter can indicate the location of the vortices, where the superconductor loses its superconductivity. To begin with, we review some well-known results due to Professor FH. Lin, Professor H. Matano, Professor B. Helffer, Professor XB. Pan and so on. It is known that the eigenvalue problems of magnetic Schrödinger operator play an important role in the mathematical theory of superconductors. As an important special case, next we present the result on the nodal set for the eigenvalue problem with Schrödinger operator in 2-dimensional space, due to B. Helffer et al in 1999. In addition, we introduce the corresponding nodal set theories related to the time-dependent equations. Finally, we briefly talk about some applications of nodal set theory, such as the Betti number estimates and the nodal set to the elliptic homogenization problems, which is the joint work with Professor Fanghua Lin.

#### BIOGRAPHY

Dr. Dan Liu received her Ph.D. from Department of Mathematics of East China Normal University. Currently, she is a postdoctor of Center for Partial Differential Equations at ECNU. Her research mainly focus on the topics related to the nodal sets and its applications.