Name: Kenichi Ito

Research field: Partial differential equations, Functional analysis, Mathematical physics

Keywords: Linear Schrödinger equations, Spectral theory, Scattering theory, Microlocal analysis, Analysis on manifolds

Current research: I am working on the linear Schrödinger equation, particularly, on non-compact manifolds and infinite graphs. I am interested in how geometry of the space affects analytic properties of partial differential equations. For example, it has turned out that, on a manifold with asymptotically Euclidean and/or hyperbolic ends, the radial curvature of the ends behaves as potential term. By using this correspondence we can discuss the spectral and scattering theories on manifolds in a manner, to some extent, parallel to the Euclidean space, where the theories have been mainly developed so far. On the other hand, recently I also found an application of the methods on manifolds to the N-body problem on the Euclidean space. The analysis on the Euclidean space and that on manifolds are actually interacting with each other.

Main tools are from the functional analysis and the microlocal analysis. They are employed to translate a quantum system into the corresponding classical system, and vice versa. It is very interesting that the classical mechanics plays an important role in the research of the Schrödinger operator.

Requirements for students: You are required to be familiar with analysis in the undergraduate course, such as the Lebesgue integration, the Fourier analysis, the functional analysis and the Schwartz distributions. If you know the basics of the classical and quantum mechanics, you can interpret, predict and hence enjoy various mathematical results from physical view point. The differential geometry is not necessary. You can learn it in the graduate course if you are interested in the analysis on manifolds. Ambitious students are welcomed.