Manoussos Grillakis:
Second order correction to the mean field of weakly interacting Bosons

Abstract: In the present talk I would like to consider the evolution of $N$ identical quantum particles (Bosons), for $N$ large but finite. The basic problem is that of an effective, approximate, description of the evolution. The mean field approximation achieves this goal by describing all particles by the same wavefunction $\phi(t, x)$ which satisfies the Hartree evolution equation. However the approximation is only in an average sense and valid only for times of the order $\log(N)$. I will describe a second order correction in terms of a kernel function $k(t, x, y)$ which describes fluctuations from the mean field and derive a Schrödinger type evolution equation for $k$ which is coupled with the Hartree dynamics. The correction tracks the exact dynamics for times of the order $\sqrt{N}$. This work is in collaboration with Matei Machedon and Dio Margetis.

Tai-Peng Tsai:
Small solutions of nonlinear Schrödinger equations near first excited states

Abstract: Consider a nonlinear Schrödinger equation in $\mathbb{R}^3$ whose linear part has three or more eigenvalues satisfying some resonance conditions. Solutions which are initially small in $H^1 \cap L^1(\mathbb{R}^3)$ and inside a neighborhood of the first excited state family are shown to converge to either a first excited state or a ground state at time infinity. An essential part of our analysis is on the linear and nonlinear estimates near nonlinear excited states, around which the linearized operators have eigenvalues with nonzero real parts and their corresponding eigenfunctions are not uniformly localized in space. This is a joint work with Kenji Nakanishi and Tuoc Van Phan.