1099-35-44 **Roy Goodman**, **Michael I Weinstein** and **Jeremy L Marzuola*** (marzuola@math.unc.edu), Department of Mathematics, CB #3250, Chapel Hill, NC 27599. *The long-time existence of self-trapping and Josephson tunneling solutions to the nonlinear Schrödinger Equation.*

We discuss recent work with Roy Goodman and Michael Weinstein to describe large scale dynamics that move mass from one well to another in a nonlinear Schrödinger equation with a double-well potential, V. Specifically, we study the long time exchange of mass that can occur given initial data taken to be a particular complex, linear combination of linear modes of the Schrödinger operator $H = -\Delta + V$, for which will assume there exists a symmetric ground state, ψ_0, and an anti-symmetric excited state, ψ_1. The recent work expands our understanding of the finite dimensional dynamical system that arises from taking the ansatz,

$$u(x,t) = c_0(t)\psi_0 + c_1(t)\psi_1 + \text{error},$$

and studying the resulting equations for c_0, c_1. Once we have controlled the finite dimensional dynamics on long time scales, we work to prove that even for relatively large orbits, the infinite dimensional dynamics can be controlled by the shadowing theorem proved by Weinstein and myself for a limited family of finite dimensional orbits. (Received January 14, 2014)