**Global dynamics and finite time blowup in a nonconservative nonlinear Schrödinger equation**

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(joint work with Jean-Philippe Lessard, Akitoshi Takayasu)

In this talk we discuss the nonlinear Schrödinger equation $iu_t = u_{xx} + u^2$ with $x \in \mathbb{T} \equiv \mathbb{R}/\mathbb{Z}$. This NLS does not have gauge invariance, $(e^{i\theta}u)^2 \neq e^{i\theta}u^2$ for generic $\theta \in \mathbb{R}$, and it does not admit a natural Hamiltonian structure.

In a recent series of papers, together with JP Lessard and A Takayasu, we have used computer assisted proofs to show that this equation exhibits rich dynamical behavior: such as non-trivial equilibria, homoclinic orbits, and heteroclinic orbits. Furthermore it turns out that the class of functions supported only on non-negative Fourier modes form an integrable subsystem, somewhat similar to the cubic Szegő equation. Within this class of initial data, we are able to explicitly construct solutions that are periodic, and solutions which blowup in finite time. This integrable subsystem is somewhat surprising, as it is also the case that the original PDE is nonconservative. I will conclude the talk with a discussion of some open problems.