1049-35-111 **Marius Beceanu***, 5734 S. University Ave., University of Chicago Mathematics Department, Chicago, IL 60637. *A Centre-Stable Manifold in $H^{1/2}$ for the $H^{1/2}$ Critical NLS.*

Consider the $H^{1/2}$-critical Schrödinger equation with a cubic nonlinearity in $\mathbb{R}^3$

$$i\partial_t\psi + \Delta\psi + |\psi|^2\psi = 0.$$

It admits an eight-dimensional manifold of periodic solutions called solitons

$$e^{i(\Gamma+vx-t|v|^2+\alpha^2 t)}\phi(x-2tv-D,\alpha),$$

where $\phi(x,\alpha)$ is a positive ground state solution of the semilinear elliptic equation

$$-\Delta\phi + \alpha^2\phi = \phi^3.$$

We prove that in the neighborhood of the soliton manifold there exists a $H^{1/2}$ Lipschitz manifold N of asymptotically stable solutions of the equation, meaning they are the sum of a moving soliton and a dispersive term.
Furthermore, a solution starting on N remains on N for all positive time and for some finite negative time and N can be identified as the centre-stable manifold for this equation.
The proof is based on the method of modulation, introduced by Soffer and Weinstein and adapted by Schlag to the L^2-supercritical case.
The main result depends on a spectral assumption concerning the absence of embedded eigenvalues.
New estimates for the time-dependent and time-independent linear Schrödinger equation are also established. (Received February 26, 2009)