1060-35-227 **Russell K. Jackson*** (rkjackso@usna.edu), Department of Mathematics, 572C Holloway Road, United States Naval Academy, Annapolis, MD 21402-5002. *Bifurcations of standing waves in the cubic-quintic Schrödinger equation with a multi-well potential.* Preliminary report.

In this talk, we consider a cubic-quintic Schrödinger equation with an external potential

$$i\phi_t = \phi_{xx} + 2|\phi|^2\phi - |\phi|^4\phi + V(x)\phi.$$

Models like this one appear in a number of applications, recently in both nonlinear optics and Bose-Einstein condensation. In optics, the potential $V(x)$ might represent the varying refractive index in channels or waveguides; in Bose-Einstein condensates, it can be an optical or magnetic trap. The competing cubic-quintic nonlinearity suggests attraction (or self-focusing) at low intensities and repulsion (or defocusing) at higher intensities.

The interplay between the dispersion, nonlinearity and potential sews the seeds for an incredible variety of standing wave solutions. Even for a simple square-well potential, observers have noted the coexistence of a short and a tall standing wave – both stable! We describe these waves geometrically, pinpointing the mechanism for this bistability. Geometric techniques are also used to characterize the many standing waves in the presence of an N-well potential. We monitor the changing properties of these solutions as the space between adjacent wells increases. Finally, we fit our results where the well-spacing is large into a more general theoretical framework. (Received March 30, 2010)