Abstract Submitted
for the MAR16 Meeting of
The American Physical Society

From Vortex Rings to Hopfions in 3d Bose-Einstein Condensates

PANAYOTIS KEVREKIDIS, UMass, Amherst — In this talk we report a number of recent results on three-dimensional topological states. Motivated by our earlier work on vortices, we develop a two-fold approach for studying vortex rings. We analytically and numerically explore their emergence through an instability from planar or ring dark soliton states in the small amplitude/weak nonlinearity limit. We also analytically and numerically explore the opposite, particle based limit of large density/large nonlinearity in the Thomas-Fermi regime. We connect these two analytically tractable limits through detailed numerical computations revealing the spectral and nonlinear stability of such states. We also explore a series of other states, including so-called Hopfions, and dark-soliton-shells examining both their regimes of stability in 3d atomic BECs, as well as their mechanisms and manifestations of dynamical instabilities.

Panayotis Kevrekidis
UMass, Amherst

Date submitted: 17 Oct 2015 Electronic form version 1.4