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Panos Kevrekidis* (kevrekid@math.umass.edu), University of Massachusetts Amherst, 710 N. Pleasant Street, Lederle Graduate Research Tower, Amherst, MA. *Dynamics of Dark Soliton and Vortex Matter Waves*.

In this talk, we will present some recent results on the dynamics of dark soliton and multi-soliton solitary waves, as well as of vortex and multi-vortex states that arise in Bose-Einstein condensates. We will start with a brief overview of the initial attempts to identify such states in BECs and subsequently turn to recent experimental efforts and the theoretical challenges that they pose. In attempting to address these challenges, we will formulate an ODE-based particle picture for the soliton and vortex dynamics and will attempt to compare equilibrium, near-equilibrium and far from equilibrium features of such reduced descriptions with their corresponding PDE counterparts. Finally, time permitting, we will speculate on some interesting directions for future exploration, discussing, in particular, some recent results on multi-component variants of the above structures. (Received March 12, 2010)