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Mason A Porter* (mason@caltech.edu), MC 114-36, California Institute of Technology, Sloan Annex 130, Pasadena, CA 91125-3600. *A Dynamical Systems Study of Bose-Einstein Condensates in Optical Lattice and Superlattice Potentials.*

Over the past several years, the study of Bose-Einstein condensates (BECs) has become one of the most important areas of atomic and molecular physics. Their study has begun to yield an increased understanding of superfluidity and superconductivity, and their eventual engineering applications also hold great promise. In this talk, I will discuss my recent research on the macroscopic dynamics of coherent structures in BECs loaded into lattice and superlattice potentials, for which I employ methods from dynamical systems and perturbation theory. (Received August 30, 2005)