1086-37-796 **Rudy Lee Horne*** (rhorne@morehouse.edu), Morehouse College, Department of Mathematics, 830 Westview Drive S.W., Atlanta, GA 30314. *Stability and dynamics of solitary waves in AlGaAs waveguide arrays and BEC spinor lattices.*

In the early 20th century, S. Bose and A. Einstein predicted the existence of a state of matter composed of weakly interacting bosons (integer spin particles). Today, this is known as the Bose-Einstein condensate. The BEC was first experimentally realized in 1995 by E. Cornell and C. Wieman (U. of Colorado at Boulder) and W. Ketterle (MIT).

The focus of this work concerns understanding solitary waves in two different systems: AlGaAS waveguide arrays and in spinor BEC lattice systems. Both the AlGaAs waveguide array and the spinor BEC lattice can be described by two sets of coupled, partial differential equations. In the waveguide array system, we (i) derive solitary wave solutions for the model of interest and (ii) analyze the existence and stability of said solutions via an anti-continuum limit. For the BEC spinor model, we focus on a three-component dynamical lattice model with a mean field nonlinearity. In a similar manner to the waveguide array system, we look at (i) an anti-continuum limit for the model of interest and (ii) the existence and stability of the solitary wave solutions via a perturbative approach.

Keywords: solitary waves, AlGaAs waveguide arrays, discrete lattice, spinor, Bose-Einstein Condensate (Received September 12, 2012)