1085-81-195 **Michael A Bishop*** (mbishop@math.arizona.edu). *Ground State of Interacting Boson Systems in Random Potentials.*

The recent experimental realization of Bose-Einstein condensate and the development of techniques in cold atom experiments provide new methods for investigating quantum phenomena and the models that describe them. The Gross-Pitaevskii mean-field approximation is a popular model for describing these interacting boson systems. In this approximation, each particle in the many-particle state is assumed to have the same one-particle state, substituting a linear operator on a large tensor space with a nonlinear operator on a smaller function space. I will discuss a work in preparation with J. Wehr on the ground state of Gross-Pitaevskii mean-field model with local 'soft core' interactions and random potentials. The interplay of interactions and random potentials is unclear: particles localize in systems with random potentials, but repulsive interactions cause states to spread because localization of the entire multi-particle state is energetically expensive. The main result is a criterion for the minimal localization of a mean-field state given its per particle energy and the interaction strength. To help understand this theorem, it will be applied to the model in one discrete dimension with Bernoulli distributed potential. (Received September 10, 2012)