Abstract Submitted
for the DAMOP10 Meeting of
The American Physical Society

Dissipative Transport of a Bose-Einstein Condensate in an Optical Speckle Disorder Potential SATYAN BHONGALE, Rice University, PAATA KAKASHVILI, NORDITA, Sweden, HAN PU, Rice University, CARLOS BOLECH, University of Cincinnati — Very recent experiments involving ultra-cold atoms have proved very successful at probing the effects of disorder in an extremely controlled fashion. Most impressive is the observation of Anderson localization of bosonic atoms in the presence of a disorder potential created using an optical speckle pattern. These experiments are, for the first time, able to directly image the localized single particle wavefuniton. Other recent experiments, such as the one at RICE, are able to provide rich information with regards to transport in the presence of disorder. While such experiments are novel with no known analogues in the solid state context, a definitive understanding of the experimental results has been missing. In the present work, we provide a theoretical model suitable for describing such experiments. We illustrate the strength of our method by clearly identifying the distinct time scales, associated with the disorder induced dissipative transport, in striking agreement with experimental observations. Analytic expressions derived in our work provide clear insight into the physical mechanism responsible for dissipation.

Satyan Bhongale
Rice University

Date submitted: 20 Jan 2010 Electronic form version 1.4