Abstract Submitted
for the MAR10 Meeting of
The American Physical Society

Dislocation-induced superfluidity in a model supersolid[1] KINJAL DASBISWAS, DEBAJIT GOSWAMI, CHI-DEUK YOO, ALAN DORSEY, University of Florida — The effect of an edge dislocation in inducing superfluidity is explored by coupling the elastic strain field of the dislocation to the superfluid density, and solving the corresponding Ginzburg-Landau theory. It is shown that superfluid density is induced along a single dislocation below a critical temperature determined by the ground state solution of a 2D Schrödinger equation with a dipolar potential. This superfluid behavior can be described by a 1D Ginzburg-Landau equation obtained through a weakly nonlinear analysis. We then extend our analysis to a network of dislocation lines considered before by Shevchenko and Toner, which could serve as a model for superflow through solid ^{4}He. The effect of fluctuations and dynamics are included through a full time dependent Ginzburg-Landau theory.

[1]This work is supported by the NSF

Kinjal Dasbiswas
University of Florida

Date submitted: 20 Nov 2009 Electronic form version 1.4