Abstract Submitted
for the MAR14 Meeting of
The American Physical Society

Finite size effects in electrical transport and noise measurements in mesoscopic $NbSe_3$ nanobeams ALI ALSAQQA, SHI ZHENZHONG, SUJAY SINGH, DAVID WILSON, Department of Physics, University at Buffalo-SUNY, KATIE FARLEY, SARBAJIT BANERJEE, Department of Chemistry, University at Buffalo-SUNY, G. SAMBANDAMURTHY, Department of Physics, University at Buffalo-SUNY, Buffalo, NY 14260, USA — $NbSe_3$ is a transition metal trichalcogenide system exhibiting two charge density wave (CDW) transitions at 59 K and 141 K. At temperatures below the transition, the CDW state is pinned by residual disorder and a finite electric field can depin and slide the CDW. In this study, individual nanobeams of single-crystalline $NbSe_3$ are used in a muli-terminal device configuration to study the effects of finite length (from few μm to hundreds of μm) on the physical properties near the CDW transitions. Transport and ultra low frequency (less than 1 Hz) noise measurements are carried out as functions of temperature, device length and electric field across the thermal-driven CDW transitions and across electric-field induced depinning of the CDW state. The dependence of the depinning threshold electric field on device length is found to be different than in bulk samples thereby underlying the presence of finite size effects. The dependence on device length of the noise magnitude across the CDW transition will also be presented and the implications of these results in understanding the pinning/depinning transition in finite size samples of $NbSe_3$ will be discussed. The work is supported by NSF DMR 0847324.

Ali Alsaqqa
Department of Physics, University at Buffalo-SUNY

Date submitted: 15 Nov 2013 Electronic form version 1.4