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Low frequency resistance fluctuations in nanoribbons of charge density wave (CDW) conductor $NbSe_3$ ZHENZHONG SHI, ADAM STABILE, Department of Physics, PETER MARLEY, Department of Chemistry, SUJAY SINGH, Department of Physics, SARBAJIT BANERJEE, Department of Chemistry, GANAPATHY SAMBANDAMURTHY, Department of Physics, University at Buffalo, Buffalo, NY 14260. — We investigate finite size effects in the low-frequency (1 mHz $<$ f $<$ 10 Hz) resistance fluctuations of individual nanoribbons of single-crystalline $NbSe_3$ (cross sections of 10^4 nm^2) across the two CDW transitions ($\sim$ 59 K and $\sim$ 141 K). This ultra sensitive frequency-dependent study of the electrical noise is crucial in improving our understanding of the mechanisms that generate noise around CDW transitions. The power spectral density, S_R, of the resistance noise has a generic form, $S_R \sim 1/f^{\alpha}$, typical of a diffusive metallic conductor. Below the CDW transition at 59 K, where the CDW is pinned by disorder, S_R (at 1 Hz) shows a non-monotonic behavior with a maximum magnitude around 45 K. A similar peak in S_R is also observed at 125 K, below the second CDW transition. Also, it is well known that the CDW state can be depinned by an application of a high bias voltage or current and S_R is measured as a function of current across the pinning-depinning of CDW. S_R shows a complex, non-monotonic dependence and is extremely sensitive to temperature below the CDW transition. In contrast, S_R is bias independent above the CDW transitions as expected from a metal. The implications of these noise behaviors in understanding the pinning and depinning of CDW in $NbSe_3$ will be discussed.

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