Abstract Submitted
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Counting statistics and entanglement in a disordered free fermion system with a voltage bias[1] JOSEPH BURG, GREGORY LEVINE, Hofstra University — The Full Counting Statistics is studied for a disordered one-dimensional system of non-interacting fermions with and without a voltage bias. For two unbiased L site lattices connected at time $t = 0$, the charge variance increases as the natural logarithm of t, following the universal expression $\langle \delta N^2 \rangle \approx \frac{1}{\pi^2} \log t$. Since the static charge variance for a length l region is given by $\langle \delta N^2 \rangle \approx \frac{1}{\pi^2} \log l$, this result reflects the conformal invariance and dynamical exponent $z = 1$ of the disorder-free lattice. With disorder and strongly localized fermions, we have compared our results to a model with a dynamical exponent $z \neq 1$, and also a model for entanglement entropy based upon dynamical scaling at the Infinite Disorder Fixed Point (IDFP). The latter scaling, which predicts $\langle \delta N^2 \rangle \propto \log \log t$, appears to better describe the charge variance of disordered 1-d fermions. When a bias voltage is introduced, the behavior changes dramatically and the charge and variance become proportional to $(\log t)^{1/\psi}$ and $\log t$, respectively. The exponent ψ may be related to the critical exponent characterizing spatial/energy fluctuations at the IDFP.

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