Abstract Submitted
for the MAR12 Meeting of
The American Physical Society

Holographic noise near quantum critical points[1] ANDREW GREEN, London Centre of Nanotechnology, JULIAN SONNER, DAMTP, University of Cambridge — The dynamical scaling present in equilibrium correlations near to a quantum critical point suggests the possibility of universal, out-of-equilibrium steady states. This has been demonstrated in analyses of the response of the bosonic Hubbard model to a strong electric field. The universal out-of-equilibrium behaviour is particularly apparent in the current noise; at high field, a current noise power $\mathcal{S}_j \propto \sqrt{E}$ was found which was interpreted as Johnson-like with an effective temperature $\propto \sqrt{E}$ [Phys. Rev. Lett. 97, 227003 (2006)]. We revisit this problem using the holographic mapping to a classical gravitational system. We recover a current noise that extends the previously known equilibrium and strongly out-of-equilibrium results with a full interpolation between the two: $\mathcal{S}_j \propto T_{eff}$ with $T_{eff} = (T^4 + E^2/\pi^4)^{1/4}$.

[1]We acknowledge financial support from Trinity College Cambridge, the EPSRC and KITP Santa Barbara

Andrew Green
London Centre of Nanotechnology

Date submitted: 28 Nov 2011 Electronic form version 1.4