

# Special TEP Seminar

UCLA

Thursday, November 17 @ 10:00 AM

Physics & Astronomy Building (PAB) 4-330

## “Black Holes and Thermoelectric Transport”

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In seeking possible applications of holography to real materials the thermoelectric conductivity is an important observable to study. Like the entropy we show that, universally, the DC conductivity can be obtained in terms of the behaviour of black hole spacetimes purely at the horizon. More precisely, we show that the DC conductivity can be obtained by solving a generalised set of Navier-Stokes equations for a fluid living on the black hole horizon. Unlike other connections between fluids and black holes, this is an exact result and can be viewed as a precise manifestation of the membrane paradigm for black holes in holography. We use the result to obtain a generalised Wiedemann-Franz Law that holds universally within holography in the case of weak momentum dissipation. We also show that CFTs (not just holographic) with spatially dependent temperature gradients and strains can exhibit the novel phenomenon of thermal backflow, in which heat currents locally flow in the opposite direction to that of an applied DC source.