My lectures will begin by reviewing the Gibbons-Hawking semiclassical theory of the thermodynamics of black holes in Einstein gravity. I will describe recent progress in computing quantum corrections to this theory for charged black holes using a theory of time reparameterizations controlled by a Schwarzian action. Then I will turn to the Sachdev-Ye-Kitaev model of fermions with random interactions: remarkably, the low temperature properties of this model are also described by the same theory of time reparameterizations. Finally, I will describe the theory of strange metals obtained by coupling a two-dimensional Fermi surface to gapless scalars: a SYK-style strong coupling theory shows that this strange metal has linear-in-temperature resistivity from spatially random fluctuations in the Yukawa couplings between the fermions and the scalars.