

Abstract

It is argued that the general four-dimensional extremal Kerr-Newman-AdS-dS black hole is holographically dual to a (chiral half of a) two-dimensional CFT, generalizing an argument given recently for the special case of extremal Kerr. Specifically, the asymptotic symmetries of the near-horizon region of the general extremal black hole are shown to be generated by a Virasoro algebra. Semiclassical formulae are derived for the central charge and temperature of the dual CFT as functions of the cosmological constant, Newton's constant and the black hole charges and spin. We then show, assuming the Cardy formula, that the microscopic entropy of the dual CFT precisely reproduces the macroscopic Bekenstein-Hawking area law. This CFT description becomes singular in the extreme Reissner-Nordstrom limit where the black hole has no spin. At this point a second dual CFT description is proposed in which the global part of the $U(1)$ gauge symmetry is promoted to a Virasoro algebra. This second description is also found to reproduce the area law. Various further generalizations including higher dimensions are discussed." (Written by Thomas Hartman, Keiju Murata, Tatsuma Nishioka, Andrew Strominger, arXiv:0811.4393)