Light Cone Black Holes

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When probed with conformally invariant matter fields, light cones in Minkowski spacetime satisfy thermodynamical relations which are the analog of those satisfied by stationary black holes coupled to standard matter fields [1]. These properties stem from the fact that light cones are conformal Killing horizons stationary with respect to observers following the radial conformal Killing fields in flat spacetime. The four laws of light cone thermodynamics relate notions such as (conformal) temperature, (conformal) surface gravity, (conformal) energy and a conformally invariant notion related to area change. These quantities do not admit a direct physical interpretation in flat spacetime. However, they become the usual thermodynamical quantities when Minkowski is mapped, via a Weyl transformation, to a target spacetime where the conformal Killing field becomes a proper Killing field. In this poster I will present the properties of such spacetimes [2]. The simplest realisation turns out to be the Bertotti-Robinson solution, which is known to encode the near horizon geometry of near extremal and extremal charged black holes. The analogy between light cones in flat space and black hole horizons is therefore strengthened. The construction works in arbitrary dimensions; in two dimensions one recovers the Jackiv-Teitelboim black hole of dilaton gravity. Other interesting realisations are also presented.

References

[1] T. De Lorenzo and A. Perez, *Light Cone Thermodynamics*, *Phys. Rev.* **D97** (2018) 044052, [1707.00479].

[2] T. De Lorenzo and A. Perez, *Light Cone Black Holes*, *In the press for Phys. Rev. D* (2019) , [1811.03667].