Abstract

In this thesis, I summarize my work on supergravity and supersymmetric quantum field theories in the context of holography [1–3]. From the gravity side of the correspondence, I present a solution of $D = 4$, $\mathcal{N} = 4$ gauged supergravity, firstly found in [1], conjectured to be a near-horizon solution of an extremal dyonically charged, rotating, and accelerating supersymmetric black hole in AdS4. The solution is distinguished by the presence of an orbifold geometry: the shape of the event horizon is $\mathbb{\Sigma} = \mathbb{WCP}^1[n_+, n_-]$. Following the steps of [4], I provide an exhaustive thermodynamic analysis of the solution, motivating the setup of the dual supersymmetric field theory. I then consider a three-dimensional $\mathcal{N} = 2$ supersymmetric field theory defined on a general complex-valued background, capable of accommodating the spindle. Finally, I present the novel "spindle index," introduced in [2], and its derivation by a localization computation involving an application of the equivariant orbifold index theorem [3].

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[1] Pietro Ferrero, Matteo Inglese, Dario Martelli, and James Sparks. Multicharge accelerating black holes and spinning spindles. *Phys. Rev. D*, 105(12):126001, 2022.

[2] Matteo Inglese, Dario Martelli, and Antonio Pittelli. The spindle index from localization. *J. Phys. A*, 57(8):085401, 2024.

[3] Matteo Inglese, Dario Martelli, and Antonio Pittelli. Supersymmetry and Localization on Three-Dimensional Orbifolds. 12 2023.

[4] Davide Cassani, Jerome P. Gauntlett, Dario Martelli, and James Sparks. Thermodynamics of accelerating and supersymmetric AdS4 black holes. *Phys. Rev. D*, 104(8):086005, 2021.