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String Theory in Greater Paris

Rencontres Théoriciennes

"Supergravité, théorie des cordes et théorie M"

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Geometric Extremization for AdS-CFT and Black Hole Entropy

We consider supersymmetric AdS3xY7 solutions of type IIB supergravity dual to N=(0,2) SCFTs in d=2, as well as AdS2xY9 solutions of D=11 supergravity dual to N=2 supersymmetric quantum mechanics, some of which arise as the near horizon limit of supersymmetric, charged black hole solutions in AdS4. The relevant geometry on Y(2n+1) was first identified in 2005-2007 and around that time infinite classes of explicit examples solutions were also found but, surprisingly, there was little progress in identifying the dual SCFTs.

We review new results which change the status quo. For the case of Y7, a variational principle allows one to calculate the central charge of the dual SCFT without knowing the explicit metric. This provides a geometric dual of c-extremization for d=2 N=(0,2) SCFTs analogous to the well known geometric duals of a-maximization of d=4 N=1 SCFTs and F-extremization of d=3 N=2 SCFTs in the context of Sasaki-Einstein geometry. In the case of Y9 a similar variational principle can be used to obtain properties of the dual N=2 quantum mechanics as well as the entropy of a class of supersymmetric black holes in AdS4 thus providing a geometric dual of I-extremization.

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