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A gravitational block formula for spindle geometries

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In the past two years there has been a surge in the interest towards low dimensional gauged supergravity solutions where the spacetime metric includes a 2d orbifold known as spindle. Topologically a spindle is a 2-sphere, but it has conical singularities at the two poles. Remarkably, uplifting such solutions to type IIB/11d supergravity on Sasaki-Einstein manifolds leads to perfectly smooth geometries. In this talk, I will introduce some recent developments stemming from applying the geometric extremization procedure on generic $AdS_2 \times Y_9$ and $AdS_3 \times Y_7$ geometries, where Y_9 and Y_7 are fibrations of respectively 7d and 5d Sasaki-Einstein manifolds X_7 and X_5 over the spindle Σ. When put on-shell, such geometries are solutions of M-theory and type IIB supergravity respectively, and they are expected to arise as near horizon limit of supersymmetric magnetically charged accelerating AdS_4 black holes uplifted on X_7 and supersymmetric accelerating AdS_5 black strings uplifted on X_5. The result is a gravitational block formula for respectively the entropy function of the AdS_4 black holes and the trial central charge of the 2d $\mathcal{N} = (2, 0)$ SCFTs dual to the AdS_3 solutions. This formula looks like a sum of two contributions ("blocks") localized over the two poles of the spindle that depend only on geometric data of the the fibers X_7 and X_5 as well as on how these are twisted over Σ. Remarkably, by algebraically extremizing this quantity over the possible R-symmetry vectors one can obtain the on-shell entropy/central charge without ever having to solve the supergravity equations of motion.

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