Department of Theoretical Physics

THE QUANTUM SPACETIME SEMINAR SERIES

The 1/16-BPS index and black holes in 4d N=4 Super Yang-Mills

(Zoom Seminar)

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Date: November 2, 2020

Time: 3:30 pm IST

Zoom link shall be shared separately

I will discuss the superconformal index that counts BPS states preserving two supercharges in 4d N=4 SYM, and more generally in 4d N=1 SCFTs, on S3. This index is captured by a unitary matrix model with purely double trace operators in the action. The AdS/CFT correspondence predicts that the index should have exponential growth at large charges and large N, corresponding to the 1/16-BPS black hole (BH) in AdS5. I will present analytical and numerical analyses of the matrix model which show this expected BH growth. In particular, I will introduce a deformation of the matrix model which allows us to easily find large-N saddle-points and the resultant phase structure. I will show that there is an infinite family of large-N saddle points of the relevant matrix integral, one of which is identified with the black hole. The deformation is closely related to the Bloch-Wigner elliptic dilogarithm, a function introduced by number theorists.Finally, using techniques from representation theory, I will clarify some properties of the finite-N index and show that the index interpolates between counting multi-gravitons at small charge and BHs at large charge.

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