

Supersymmetric Black Holes, Holography and Microstate Counting

Events for:
Monday, October 31st - Friday, November 4th

Monday, October 31st

9:00am **Breakfast - SCGP Cafe**

9:30am - **SCGP 102**

Speaker: Davide Cassani

Title: A story of 1 charge and 2 rotations at 4 derivatives in 5 dimensions

10:30am **Coffee Break - SCGP Cafe**

11:00am - **SCGP 102/ZOOM**

Speaker: Seyed Morteza Hosseini

Title: The joy of factorization at large N

Abstract: I will perform a direct saddle point analysis of partially twisted partition functions in three and five dimensions. They exhibit a large N factorized form in agreement with the supergravity expectations based on gravitational blocks. In particular, the twisted index in three dimensions correctly reproduces the entropy of magnetically charged rotating $AdS(4) \times S^{*7}$ black holes.

12:00pm **Lunch - SCGP Cafe**

2:30pm - **SCGP 102**

Speaker: Dario Martelli

Title: Branes wrapped on orbifolds and their gravitational blocks

3:30pm **Tea Time - SCGP Cafe**

4:00pm - **SCGP 102**

Speaker: Heeyeon Kim

Title: Partition functions of 5d supersymmetric gauge theories on 5-manifolds

Tuesday, November 1st

9:00am **Breakfast - SCGP Cafe**

9:30am - **SCGP 102**

Speaker: Francesco Benini

Title: Factorization and global symmetries in holography

10:30am **Coffee Break - SCGP Cafe**

11:00am - **SCGP 102**

Speaker: Seok Kim

Title: Three views on the black hole microstates

Abstract: I will discuss different approaches to understand the microstates of BPS black holes in AdS: the Yang-Mills matrix model, the giant graviton expansion and the cohomological construction of microstates.

12:00pm **Lunch - SCGP Cafe**

1:15pm - **SCGP 102**

Speaker: Sameer Murthy (Colloquium)

Title: Quantum black holes: a macroscopic window into quantum gravity

Abstract: The pioneering work of Bekenstein and Hawking in the 1970s showed that black holes have thermodynamic properties like temperature and entropy. This discovery gave rise to deep questions about the quantum structure of spacetime, in particular, (1) What is the nature of the microscopic states underlying a black hole? (2) How does one describe the collective behavior (phases) of these microstates? In this colloquium, I will discuss recent developments on these themes in the context of supersymmetric black holes in string theory. After a broad introduction I will discuss two prototype models in which we can study the above two questions in detail. In the first model we see how the integer number of microstates of the black hole are encoded in the continuum gravitational variables. In the second model we uncover a rich phase diagram that generalizes the Hawking-Page transition in the gravitational theory and the deconfinement transition in the dual gauge theory.

2:15pm - **SCGP Cafe**

Title: Break

2:30pm - **SCGP 102**

Speaker: Arash Ardehali

Title: Microstate counting in $(2,2)$ AdS₃/CFT₂

3:30pm **Tea Time - SCGP Cafe**

Wednesday, November 2nd

9:00am **Breakfast - SCGP Cafe**

9:30am - **SCGP 102**

Speaker: Finn Larsen

Title: The Attractor Mechanism in Gauged Supergravity

Abstract: The conserved charges of a black hole (mass, charge,...) maps to its near horizon data (area, electric flux, ...) through a nontrivial radial flow. The attractor mechanism for supersymmetric black holes in asymptotically flat spacetimes shows that the near horizon data has minimal dependence on the asymptotic behavior. In asymptotically AdS spacetimes the radial flow is important, because it is interpreted as the relation between the UV (high energy) and the IR (low energy). The corresponding radial flow is qualitatively distinct from its asymptotically flat analogue, but it has a simple description that agrees with expectations from quantum field theory.

10:30am **Coffee Break - SCGP Cafe**

11:00am - **SCGP 102**

Speaker: Gustavo Turiaci

Title: Revisiting the Logarithmic Corrections to the Black Hole Entropy

12:00pm **Lunch - SCGP Cafe**

2:30pm - **SCGP 102**

Speaker: Luca Iliesiu

Title: Black hole microstate counting from the gravitational path integral

3:30pm **Tea Time - SCGP Cafe**

4:00pm - SCGP 102

Speaker: Evita Verheijden

Title: Near-AdS₂ Spectroscopy: non-universal dynamics of black holes in 4D N=2 SUGRA

Abstract: Many properties of black holes, such as their entropy, are universal; this suggests that there is a commonality in their statistical description. In this talk, I will discuss non-universal aspects of near-extremal black holes in 4D N=2 SUGRA, which are encoded in deformations away from an idealized AdS₂ geometry. Such features are important to understand in order to construct a microscopic dual of (the near-horizon region of) near-extremal black holes.

Thursday, November 3rd

9:00am **Breakfast - SCGP Cafe**

9:30am - SCGP 102

Speaker: Pietro Benetti Genolini

Title: Complex saddles and black holes in AdS₄

10:30am **Coffee Break - SCGP Cafe**

11:00am - SCGP 102

Speaker: Valentin Reys

Title: Large N observables, holography, and black holes

Abstract: In this talk, I will present some recent progress on precision holography in four dimensions. I will discuss new results concerning supersymmetric observables in 3d SCFTs at large N, with a focus on the ABJM theory on compact Euclidean 3-manifolds for illustration purposes. I will explain how the perturbatively exact expressions for these observables have important consequences for our understanding of M-theory and quantum aspects of black holes via the AdS/CFT correspondence. Time permitting, I will also discuss recent advances in five dimensions.

12:00pm **Lunch - SCGP Cafe**

2:30pm - SCGP 102

Speaker: Ji Hoon Lee

Title: Exact stringy microstates from gauge theories

3:30pm **Tea Time - SCGP Cafe**

4:00pm - **SCGP 102/ZOOM**

Speaker: Alejandro Cabo Bizet

Title: Partition functions from localization methods

Abstract: Sometimes localization theorems can be used to reduce averages of periodic functions to sums over fixed-points of a moment map. After introducing one such localization mechanism and briefly remarking its potential to study averages such as partition functions of gauge theories, the talk will focus on explaining how this mechanism applies to the superconformal index of four-dimensional $N = 4$ SYM, and how it compares to the Bethe-ansatz approach.

Friday, November 4th

9:00am **Breakfast - SCGP Cafe**

9:30am - **SCGP 102**

Speaker: Yosuke Imamura

Title: Analytic continuation for giant gravitons

Abstract: We investigate contributions of giant gravitons to the superconformal index. In particular, we discuss analytic continuation needed to calculate them. Using the method, we obtain the index of the M5-brane theories from those of the M2-brane theories.

10:30am **Coffee Break - SCGP Cafe**

11:00am - **SCGP 102/Zoom**

Speaker: Alba Grassi

Title: Holographic thermal correlators from supersymmetric instantons

12:00pm **Lunch - SCGP Cafe**