Contribution ID: **175** Type: **not specified**

# Local supersymmetry enhancement and the entropy of three-charge black holes

*Thursday 12 January 2023 17:50 (30 minutes)*

In string theory, black holes can be realised as bound states of branes and strings. The branes and the strings preserve a set of global supersymmetries, which imposes the geometry of the near-horizon region. However, there exists a whole moduli space of brane systems that preserve those same global supersymmetries, but whose number of local supersymmetries is enhanced. Such brane configuration should describe some microstates of the black hole; but how much of the black-hole entropy can these configurations account for? In this talk, I will first present this (new) formalism based on local supersymmetries that identifies the ingredients needed to describe the microstates of a supersymmetric black hole. Then, I will illustrate the local supersymmetry enhancement mechanism with the three-charge F1-NS5-P black hole and its U-dual, the M2-M5-P black hole. In Type IIA, the black-hole entropy is accounted by the fractionation, due to the presence of the five-branes, of the fundamental strings into many 'little strings'which act as independent momentum carriers. These microstates are the celebrated ''Dijkgraaf-Verlinde-Verlinde (DVV) microstates,''and have a description in M theory in terms of strips of M2 branes connecting pairs of parallel M5 branes. I will apply the supersymmetric enhancement mechanism to the DVV microstates, and show it gives rise to a new class of black-hole microstate solutions which preserve the rotational symmetry of the black-hole horizon. Finally, I will explain why one should expect their supergravity description to be horizonless, and thus, how our results point towards a change of strategy in the fuzzball programme in the endeavour of constructing horizonless black-hole microstates. Based on [arXiv:2211.14326] with I. Bena, S. Hampton, A. Houppe and D. Toulikas.

**Presenter:** LI, Yixuan (MPI Munich)

**Session Classification:** 30' Contribution