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Title: BPS states, permutations and information

Abstract: The physics of quarter BPS states in  $N=4$  SYM is related to multi-matrix correlators at finite  $N$ . Permutation algebras have been powerful tools for approaching these correlators. Recent work relates structural properties of these algebras to information theoretic questions about the complexity of the BPS state space. Enhanced symmetries of zero coupling Yang Mills theories are related to these permutation algebras. The transition to weak coupling can also be formulated in terms of permutations and related algebras. Some problems on quarter BPS giant gravitons in AdS/CFT which are so far only partially solved will be mentioned. Progress on these may well benefit from insights coming from condensed matter physics and quantum information theory.