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BPS microstates and the open topological string wave function

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Abstract

It has recently been conjectured that the closed topological string wave function computes a grand canonical partition function of Bogomol'nyi–Prasad–Sommerfield (BPS) black hole states in four dimensions: $Z_{\rm BH} = |\psi_{\rm top}|^2$. We conjecture that the open topological string wave function also computes a grand canonical partition function, which sums over black holes bound to BPS excitations on D-branes wrapping cycles of the internal Calabi–Yau: $Z^{\rm open}_{\rm BPS} = |\psi^{\rm open}_{\rm top}|^2$. This conjecture is verified in the case of Type IIA on a local Calabi–Yau three-fold involving a Riemann surface, where the degeneracies of BPS states can be computed in q-deformed two-dimensional Yang–Mills theory.

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