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Quantum black holes and holography

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It is often said that Einstein's theory of gravity (GR) and quantum field theory (QFT) are incompatible. I will present an argument for this claim based on thermodynamic properties of black holes in asymptotically flat spacetime. Applying similar reasoning in anti-de Sitter spacetime suggests that in this case the theory of gravity in D dimensions could be compatible with a quantum field theory, albeit one that lives in $D-1$ dimensions! This is a manifestation of the concept of holography, a promising route to a quantum theory of gravity. After a brief introduction to its realization in string theory, known as the AdS/CFT correspondence, I will discuss how this framework provides a quantum statistical framework to understand black hole entropy. Finally, I will discuss how recent work of me and my collaborators extends these successes in new directions. In our work, exciting new generalizations of modular forms play a key role. The talk is aimed at a general audience and will assume only a basic familiarity with concepts in GR and QFT.

Apply to be considered for a student ; award (Yes / No)?

No

Level for award;(Hons, MSc, PhD, N/A)?

N/A

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