



University of Crete
Department of Physics

Physics Colloquium

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Black holes as a hologram

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ABSTRACT

Black holes constitute the ultimate testing ground of fundamental physics. A century after their discovery as solutions of Einstein's equations of gravity, they continue to challenge our deepest understanding of nature, as well as our experimental capabilities. It was not until the operation of the LIGO and Virgo gravitational wave detectors in the last few years that a direct observation of black holes became possible. A consistent mathematical framework for quantum gravity capable of addressing key questions such as the black hole information paradox and the microscopic origin of black hole entropy was developed also relatively recently, with the discovery of string theory and the AdS/CFT correspondence. I will describe black holes as thermodynamic systems and as renormalization group flows in the context of holographic dualities. This will lead us to a discussion of recent advances in the identification of the microscopic degrees of freedom responsible for the macroscopic entropy of supersymmetric and near extremal black holes in terms of strongly interacting quantum systems.