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EINSTEIN EQUATIONS: PHYSICAL AND MATHEMATICAL ASPECTS OF GENERAL RELATIVITY

SHORT TALKS

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Quantum Ergosphere and Brick Wall Entropy

Abstract

In this talk we revisit t' Hooft's "brick wall" model for black hole entropy taking into account backreaction effects on the horizon structure. We do so by adopting an evaporating metric in the quasi-static approximation in which departures from the standard Schwarzschild metric are governed by a small luminosity factor.

One of the effects of the backreaction is to create an ergosphere-like region which naturally tames the usual divergence in the calculation of the partition function of the field. The black hole luminosity sets the width of such 'quantum ergosphere'. We find a finite horizon contribution to the entropy which, for the luminosity associated to the Hawking flux, reproduces remarkably well the Bekenstein-Hawking entropy-area law.