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# Thermal Duality and Gravitational Collapse

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Thermal duality is a relationship between the behaviour of heterotic string models of the E(8)xE(8) or SO(32) types at inversely related temperatures, a variant of T duality in the Euclidean regime. This duality would have consequences for the nature of the Hagedon transition in these string models. We propose that the vacuum admits a family of deformations in situations where there are closed surfaces of constant area but high radial acceleration (a 'string regularized'version of a Penrose trapped surface), such as would be formed in situations of extreme gravitational collapse. This would allow a radical resolution of the 'firewall paradox' by allowing quantum effects to significantly modify the spacetime geometry around a collapsed object. A 'string bremsstrahlung'process would convert the kinetic energy of infalling matter in extreme gravitational collapse to form a region of the deformed vacuum, which would be equivalent to forming a high temperature string phase. A notable feature of this scenario is that the spectrum of final states would respect time reversal (T) symmetry, unlike conventional black holes.This process might have observable consequences for charged particles falling into a rotating collapsed object by producing high energy particles via a variant of the Penrose process.

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