# Regarding 'Information Preservation and Weather Forecasting for Black Holes' by S. W. Hawking

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It is proposed that the 'apparent horizons' assumed by Hawking to resolve the black hole information paradox, are in reality the regions where in Lorentzian relativity the absolute velocity against a preferred reference system at rest with the zero point vacuum energy reaches the velocity of light, and where an elliptical differential equation holding matter in a stable equilibrium goes over a transluminal Euler–Tricomi equation into a hyperbolic differential equation where such an equilibrium is not more possible, with matter in approaching this region disintegrating into radiation. Hawking's proposal depends on the anti-de Sitter/conformal field theory (AdS/CFT) conjecture which in turn depends on string/M theory which in the absence of super-symmetry will not work.

*Key words:* Black Hole Information Paradox; Firewall Hypothesis.

## 1. Introduction

Most recently S. W. Hawking has come up with the argument that the black hole information paradox [1] can be resolved by AdS/CFT which 'is the only resolution of the paradox compatible with charge-parity-time-reversal (CPT) invariance' [2]. And that 'the collapse to form a black hole will in general be chaotic and the dual CFT on the boundary of AdS will be turbulent'. He then adds that 'like weather forecasting on earth, information will effectively be lost, although there would be no loss of unitarity'.

## 2. Quantum Theory Has Precedence

Quantum theory is a theory for all possible objects, while the general theory of relativity, a misnomer for a theory of gravitation, is a theory about just one object as is Maxwell's theory of the electromagnetic field. For this reason quantum mechanic unitarity has precedence over general relativity and any suggestion that general relativity can violate unitarity must be suspected to be false, such as Hawking's information loss by falling through an event horizon of a black hole, not the kind of non-unitarity-violating information loss by turbulence. The black hole information paradox therefore suggests that Einstein's celebrated theory might be wrong, of course not completely wrong as Newton's mechanics is not completely wrong if compared with quantum mechanics. Newtonian mechanics was falsified by going to higher energies as they occur in electric discharges. And the same strategy must be followed to falsify general relativity. As Feynman has said, to make progress you must prove yourself to be wrong as fast as possible.

## 3. Hawking Radiation Has Never Been Detected

For Hawking's black hole theory to work, there should be many gamma ray bursts from the many mini-black holes, black footballs, black oranges, black peanuts et. al, left over from the big bang, which should sooner or later end their life, but which never have been detected. Observed rather are the huge gamma ray bursts where masses larger as a solar mass disintegrate in seconds or less.

## 4. Hawking's New Attempt to Solve the Paradox

To solve the paradox [1], Hawking tries to negate the firewall hypothesis with a number of examples:

(i) 'If the firewalls were located at the event horizon, the position of the event horizon is not locally determined but is a function of the future of spacetime'.

(ii) 'Calculations of the regularized energy momentum tensor of matter fields are regular on the extended Schwarzschild background in the Hartle–Hawking state [3, 4]'.

(iii) 'If firewalls form around black holes in asymptotically flat space, then they should also form around black holes in asymptotically anti-de Sitter space for very small lambda'.

(iv) 'Further evidence against firewalls comes from considering asymptotically anti-de Sitter to the metrics that fit in an S1 cross S2 boundary at infinity'.

To objection (i): This objection is certainly true for the general theory of relativity where the event horizon in one reference system can simply be transformed away by going to another reference system, for example to the system of a free falling observer, but this is not the case in a theory with a preferred reference system as in Lorentzian relativity. To objection (ii): According to calculations done under reference [3, 4], the energy momentum tensor at the event horizon in the Hartle–Hawking state is made up from two infinite terms of opposite sign, and has to be regularized with a put in by hand regularization constant to make the difference finite, which in view of Haag's theorem is highly questionable. To objection (iii): An anti-de Sitter space is unstable and for this reason unsuitable to describe black holes. To objection (iv): The same as for objection (iii).

In his attempt to solve the black hole information paradox Hawking tries to use the instability of the anti-de Sitter space proposing a turbulent 'apparent horizon' replacing the event horizon of a black hole. Unlike an event horizon such an 'apparent horizon' cannot be removed by a coordinate transformation as in general relativity. Unlike the event horizon the turbulent 'apparent horizon' is generated by infalling mater and has similarity to the 'grand unified theory (GUT) horizon' minus anti-de Sitter by Dehnen and Ghaboussi [5]. For a collapsing spherical mass the event horizon would first appear as a point in its center where an infalling particle would reach the velocity of light, happening both in Newtonian and Einsteinian gravity.

## 5. Solution of the Paradox with Lorentzian Relativity

Rather than blaming the general theory of relativity for the black hole information paradox, the special theory of relativity is more likely the cause for this problem. It enters here through the ability of a black hole to act as a particle accelerator reaching for an infalling elementary particle the Planck energy of $10^{19}$ GeV, about 16 orders of magnitude larger than the $10^3$ GeV which can be reached with the large hadron collider (LHC). At these high energies the Lorentzian theory of relativity of the pre-Einstein theory of relativity by Lorentz and Poincaré, may be a better way to describe what happens at the event horizon. In this theory all the relativistic effects are explained by the contraction of rods in absolute motion against a preferred reference system, resulting in likewise slower going clocks because they are made up of such rods. Because Lorentzian relativity is more flexible than Einstein's theory which with its kinematic postulates is 'cast in concrete', it is the likewise equivalent replacement of the non-Euclidean space of general relativity with deformed rods in a flat space suggested to the author by Heisenberg as a better way to quantize gravity [6]. As for the Lorentzian theory of relativity it would depend on the existence of a preferred reference system which in quantum theory is provided by the zero point vacuum energy which is Lorentz invariant all the way up to the Planck energy, but because it has to be cut off at this energy it creates a preferred reference system where this energy is at rest. There then in the preferred reference system the special theory of relativity would be accurate by the order $v/c = 1-(m/M)^2 = 1-10^{-34}$, where $m$ is the mass of the electroweak scale and $M$ the Planck mass, and the same would be true for the general theory of relativity. This condition is well met except near the event horizon of a black hole or for a hypothetical particle accelerator which can reach the Planck energy. There then the elliptic equations holding matter in a stable equilibrium, like the equation for the electrostatic potential $\boldsymbol{\Phi}$ and charge distribution $Q(r)$ in Maxwell's theory

$$\nabla^2 \boldsymbol{\Phi} = -4\pi Q(r) \tag{1}$$

is in the Lorentzian theory described by the equation

$$\begin{aligned}\left(1-\frac{v^2}{c^2}\right)\frac{\partial^2 \boldsymbol{\Phi}'}{\partial x'^2}+\frac{\partial^2 \boldsymbol{\Phi}'}{\partial y^2}+\frac{\partial^2 \boldsymbol{\Phi}'}{\partial z^2}\\ = -4\pi Q'(x',y,z)\,,\end{aligned} \tag{2}$$

where $v$ is the absolute velocity against the preferred reference system. Comparing (1) with (2) one can see that (2) follows from (1) setting $\boldsymbol{\Phi}' = \boldsymbol{\Phi}$, and $\partial x' = \partial x\sqrt{1-v^2/c^2}$ provided $v < c$. For $v > c$ (2) is hyperbolic where no static equilibrium is possible. The transition from the elliptic to the hyperbolic equation is as in gas dynamics described by a transluminal Euler–Tricomi equation [7]. In approaching the event horizon of a black hole, where in the preferred reference system the velocity of light is reached, all matter must disintegrate into particles of vanishing rest mass [8]. This happens without loss of information or unitarity, as it has been demanded by Almheiri, Marolf, Polchinski, Stanford, and Sully [9].


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