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http://www.nature.com/nature/journal/v455/n7209/full/455039a.html

www.sjcrothers.plasmaresources.com/Reynolds-article.pdf
(for the full article)

Mr. Christopher S. Reynolds
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Dear Sir,

I write in relation to your recent article in the journal Nature, "Bringing black holes into focus" (attached). There are a number of anomalies in your article to which I must draw your attention.

1. You remark,

> *"It is believed that the centre of essentially every galaxy, including our own, plays host to a supermassive black hole. In a small fraction of galaxies, large quantities of gas rain down into these giant black holes, causing the black hole to grow while releasing enough energy within the central few light hours of the galaxy to outshine all of the galaxy's stars thousands of times over. "*

and of an alleged *"spinning black hole"* you say,

> *"Did it grow through the successive mergers of smaller black holes as galaxies came crashing together? Or did it grow through the accretion of gas and, if so, did it snack on gas hundreds of times or feast just once or twice?"*

By what means can a black hole interact with other matter? You have not even addressed this issue. First, the fundamental black hole (a so-called "Schwarzschild" black hole) is allegedly obtained from a solution for Ric = R_{ij} = 0 (subscripts i,j = 0,1,2,3), which is a spacetime that, by definition, contains no matter. So the alleged black hole can interact with nothing because its associated spacetime is empty by definition - it precludes the presence of any matter by virtue of Ric = 0. So there is no matter outside the black hole by initial hypothesis. Indeed, there is no matter present by initial hypothesis to even cause the gravitational field. Furthermore, Einstein's theory of gravitation is non-linear and so the 'Principle of Superposition' does not apply. It does apply in Newton's theory. These are fundamentally different theories, and so one cannot simply insert lumps of mass or electromagnetic radiation into any spacetime of Einstein by an analogy with Newton's theory. Now the "*supermassive black hole*" allegedly associated with Sgr A*, and the centres of galaxies in general, supposedly interacts with matter external to it, including other black holes, as you

have claimed in your article, But this is impossible since the spacetime associated with the alleged black hole is devoid of matter by hypothesis in the writing of and the solution for Ric = 0. So the notion of black holes at the centres of galaxies is nonsense. The addition of angular momentum makes no difference.

You also assert that not only does the "*supermassive black hole*" interact with "*large quantities of gas"* but also suggest that it has grown by "*the successive mergers of smaller black holes*". But Ric = 0 is also why alleged black hole collisions, mergers and binaries are also nonsense. Each black hole is obtained **separately** as a solution to Ric = 0. The one black hole cannot therefore be in the spacetime of another black hole and mutually interact in a mutual spacetime that by definition contains no matter! Furthermore, before one can talk of black hole interactions it must first be proven that even the two-body problem is well-defined within General Relativity. This can be done in only two ways, (a) derivation of an exact solution to Einstein's field equations for two bodies, or (b) proof of an existence theorem by which it can be shown that Einstein's field equations contain latent solutions for such a configuration of matter. There are no known solutions to the field equations for the interaction of two or more bodies, so option (a) has never been fulfilled, and no existence theorem has ever been proven, so option (b) has never been fulfilled either. Moreover, General Relativity has not been able to account for the simple experimental fact that two fixed bodies will approach one another upon release. The *post hoc* introduction of mass into the so-called "Schwarzschild solution" for Ric = 0 by an association with the Newtonian gravitational potential is clearly inadmissible. So all talk of black holes interacting is also nonsense. Since there is no known solution for two or more bodies and no existence theorem for such, by what solution to the field equations do you and the relevant astrophysical scientists allege that black holes can interact with one another or with other matter?

2. You say in the final paragraph of your article,

> "*We have entered a new era, one in which we can now directly image structure at the event horizon of a black hole. As the VLBI array capable of millimetre resolution is expanded and its sensitivity increased, the world at the edge of the black hole will literally come into focus."*

The signatures of the alleged black hole are (a) an infinitely dense-point-mass singularity and (b) an event horizon. Nobody has ever found a black hole, despite the many claims for their discovery here and there and everywhere, because nobody has ever found an infinitely dense point-mass singularity and nobody has ever found an event horizon. Moreover, according to the mathematical theory of black holes, it takes an infinite amount of time for an observer to establish the presence of an event horizon, but nobody has been and nobody will be around for an infinite amount of time, so it is impossible to resolve anything at the alleged event horizon. All claims for the discovery of black holes are thus patently false. Can you provide the coordinates of just one infinitely dense point-mass singularity? Can you provide the coordinates of just one event horizon? Nobody has ever done so.

3. You also remark,

"But the strong bending of light rays within the gravitational field of the black hole will double the apparent size of the event horizon, the boundary of the area around the black hole from which nothing, not even light, can escape. Thus Doeleman and colleagues' observations have finally brought us to the threshold of imaging horizon-scale structures — a holy grail of radio astronomy.

"Black holes are truly bizarre objects. Einstein's theory of general relativity tells us that they are objects in which gravity has run amok, cutting off a region of space (inside the event horizon) from the outside Universe. Inside the event horizon, theory predicts the existence of regions in which densities laws of physics break down."

The so-called "Schwarzschild radius" is alleged to be the radius of the event horizon, beneath which is a region of spacetime. However, there is no interior region, i.e. the alleged event horizon does not mark a boundary between two regions of spacetime. The alleged event horizon does not contain a volume. Indeed, the alleged radius of the event horizon, the "Schwarzschild radius", is not a distance in the spacetime manifold, let alone a radial distance. The astrophysical scientists have asserted this in ignorance of even elementary differential geometry. The irrefutable geometric fact is that the quantity denoted by 'r' in the line element of the so-called "Schwarzschild solution", a particular value of which they call the "Schwarzschild radius", does not directly determine any distance at all in the spacetime manifold because it is in fact the inverse square root of the Gaussian curvature of any spherically symmetric geodesic surface in the spatial section of the spacetime manifold. As such it is **not** the geodesic radial distance from the centre of spherical symmetry of the spatial section. Only in this sense can the said quantity 'r' be called a radius: it is the inverse square root of the Gaussian curvature of a spherically symmetric geodesic surface in the spatial section – the radius of Gaussian curvature thereof. It does not directly define any distance whatsoever in the spatial section of the so-called "Schwarzschild" spacetime manifold. Gaussian curvature is an intrinsic property of any surface, as Gauss proved long ago by his Theorema Egregium. The geometry of the line element for Ric = 0 is non-Euclidean, and in consequence of this any point in the associated spatial section has the property that it has a finite non-zero surface area, but a geodesic radius of zero and a volume of zero. This is odd, but inevitable. The indefinite metrics associated with Einstein's General Theory of Relativity admit of other oddities, such as null vectors, i.e. non-zero vectors that have zero length, or equivalently, non-zero vectors that are orthogonal to themselves. These are also inevitable geometric consequences of the associated pseudo-Riemannian geometry.

So it is demonstrably false that the alleged event horizon contains anything. It in fact describes a geometric point having the properties described above, in a pseudo-Riemannian metric space. No proponent of the black hole is even aware of the fact that their quantity 'r' in their so-called "Schwarzschild solution" relates to the Gaussian curvature of a spherically symmetric geodesic surface in the spatial section of the spacetime manifold, **not** to distances in the spatial section of the spacetime manifold. Can you provide a mathematical proof that the quantity denoted by the symbol 'r' in the so-called "Schwarzschild solution" is a radial distance, or even a distance, in the spatial section of the spacetime manifold? No proponent of the black hole has ever done this, and for good reason, it is impossible, because it is false.

Rigorous mathematical proof of the Gaussian curvature is given here:

http://www.ptep-online.com/index_files/2007/PP-09-14.PDF

and here

http://www.ptep-online.com/index_files/2008/PP-12-11.PDF

Can you provide a proof that the spacetime of Ric = 0 does not violate Einstein's Principle of Equivalence? Can you provide a proof that the laws of Special Relativity can manifest in the spacetime of Ric = 0, a spacetime that by definition contains no matter? Can you provide a proof that a freely falling inertial frame can manifest in the empty spacetime of Ric = 0?

4. At the start of your article you say:

> *"Do black holes exist? Observations at the finest resolution so far indicate that only gross deviations in the behaviour of gravity from that predicted by general relativity can invalidate the case that they do."*

The geometrical facts already enunciated above are sufficient to prove the black hole a fallacy. On a much simpler level the black hole is inconsistent with the Theory of Relativity. The alleged singularity of the black hole is infinitely dense. Now Special Relativity forbids infinite density because infinite density implies that a material body can acquire the speed of light in vacuum (or equivalently that there is infinite energy), which violates the fundamental premise of Special Relativity. General Relativity, by definition, cannot violate Special Relativity, and so it too forbids infinite density. Thus, the Theory of Relativity forbids infinitely dense point-mass singularities and hence forbids black holes. Consequently, all alleged black hole phenomena are meaningless.

Black holes are not predicted by Newton's theory of gravitation either, despite the claims of the astrophysical scientists. The hypothetical Michell-Laplace dark body of Newton's theory is not a black hole because it possesses an escape velocity, whereas the black hole has no escape velocity; it does not require irresistible gravitational collapse, whereas the black hole does; it has no infinitely dense point-mass singularity, whereas the black hole does; it has no event horizon, whereas the black hole does; there is always a class of observers that can see the dark body, but there is no class of observers that can see the black hole; the Michell-Laplace dark body can persist in a space which contains other matter and interact with that matter, but the black hole's spacetime is devoid of matter and so it cannot interact with any matter. Thus the Michell-Laplace dark body does not possess the signatures of the alleged black hole and so it is not a black hole.

The so-called "Schwarzschild solution" from which the "Schwarzschild black hole" is alleged, is not even Schwarzschild's solution. This is easily verified by simply reading Schwarzschild's first paper on the subject (he wrote two papers), available here:

www.sjcrothers.plasmaresources.com/schwarzschild.pdf

Schwarzschild's actual solution does not admit of the black hole. There is no event horizon associated with his actual solution. The so-called "Schwarzschild solution" is a corruption, by David Hilbert (Dec 1916,) of the solution obtained by Schwarzschild (Nov/Dec 1915, published 1916) and also a corruption of the solution obtained independently by Johannes Droste (May 1916, published 1917). Droste's original paper can be obtained here:

www.sjcrothers.plasmaresources.com/Droste.pdf

Droste's solution is consistent with Schwarzschild's solution, and so it accordingly does not admit of the alleged black hole. Hilbert's corruption is inconsistent with Schwarzschild and hence with Droste. Marcel Brillouin also obtained a solution in 1923, consistent with Schwarzschild and Droste. His paper can be obtained here:

www.sjcrothers.plasmaresources.com/brillouin.pdf

It was from Hilbert's corruption that the black hole was originally conjured.

Thus, General Relativity does not predict the existence of black holes. I shall amplify this even further.

According to Einstein, in his gravitational field, gravitational mass and inertial mass are equivalent, and also, in a sufficiently small region of his gravitational field his laws of Special Relativity must hold. Here is what Einstein himself expounded (see his book 'The Meaning of Relativity', Science Paperbacks and Methuen & Co. Ltd., 1967, pp. 56–57, which Einstein revised in 1954, the year before his death):

> *"Let now K be an inertial system. Masses which are sufficiently far from each other and from other bodies are then, with respect to K, free from acceleration. We shall also refer these masses to a system of co-ordinates K', uniformly accelerated with respect to K. Relatively to K' all the masses have equal and parallel accelerations; with respect to K' they behave just as if a gravitational field were present and K' were unaccelerated. Overlooking for the present the question as to the 'cause' of such a gravitational field, which will occupy us later, there is nothing to prevent our conceiving this gravitational field as real, that is, the conception that K' is 'at rest' and a gravitational field is present we may consider as equivalent to the conception that only K is an 'allowable' system of co-ordinates and no gravitational field is present. The assumption of the complete physical equivalence of the systems of coordinates, K and K', we call the 'principle of equivalence'; this principle is evidently intimately connected with the law of the equality between the inert and the gravitational mass, and signifies an extension of the principle of relativity to co-ordinate systems which are in non-uniform motion relatively to each other. In fact, through this conception we arrive at the unity of the nature of inertia and gravitation. For, according to our way of looking at it, the same masses may appear to be either under the action of inertia alone (with respect to K) or under the combined action of inertia and gravitation (with respect to K').*

> *"Stated more exactly, there are finite regions, where, with respect to a suitably chosen space of reference, material particles move freely without acceleration, and in which the laws of special relativity, which have been developed above, hold with remarkable accuracy."*

Now Einstein's field equations for the static vacuum gravitational field, i.e. Ric = 0, violate his 'Principle of Equivalence' because the equivalence of gravitational and inertial mass, and the laws of Special Relativity, cannot manifest in a spacetime which by definition contains no matter! QED. Clearly, Einstein's writing of Ric = 0 was a major blunder. Consequently, if his energy-momentum tensor is zero there is no Einstein gravitational field. Hence his field equations **must** take the following form:-

Gij/k + Tij = 0, (subscripts) i,j = 0,1,2,3, k = constant,

wherein the Gij/k are the components of a gravitational energy tensor. Thus the total energy of the gravitational field is always zero; the Gij/k and Tij must vanish identically; there is no possibility for the localisation of gravitational energy (i.e. there is no possibility for Einstein's gravitational waves). Moreover, this means that Einstein's General Theory of Relativity violates the experimentally well established conservation of energy and momentum, so if the usual conservation of energy and momentum is valid (bearing in mind that there is no experimental evidence to refute it) then Einstein's General Theory of Relativity is invalid. Also, Einstein, aware that his theory violated the usual conservation of energy and momentum, simply invented his pseudo-tensor to save it, and by which he and his followers claim that his gravitational energy can be localized. However, Einstein's pseudo-tensor is a meaningless concoction of mathematical symbols for the following reason – it implies the existence of a 1st-order intrinsic differential invariant which depends only upon the components of the metric tensor and their 1st-derivatives (to see this just contract his pseudo-tensor and apply Euler's theorem). But the pure mathematicians G. Ricci-Curbastro and T. Levi-Civita proved in 1900 that such invariants do not exist! So Einstein committed another major blunder when he invented his pseudo-tensor. In addition, Einstein and his followers resort to linearisation of his field equations to localize his gravitational energy and to obtain a "Newtonian approximation". This too is nonsense, because linearisation implies the existence of a tensor which, except for the particular case of being precisely zero, does not otherwise exist, as proven by H. Weyl in 1944. So LIGO and its international counterparts such as the AIGO in Australia and VIRGO in Europe, are all destined to detect nothing; and the black hole is not predicted by General Relativity.

Go here for a proof that Einstein's pseudo-tensor violates pure mathematics:

http://www.ptep-online.com/index_files/2008/PP-12-11.PDF

and here

www.sjcrothers.plasmaresources.com/Levi-Civita.pdf

Go here for H. Weyl's 1944 proof that linearization of Einstein's field equations is erroneous:

www.sjcrothers.plasmaresources.com/weyl-1.pdf

It is also alleged by most astrophysicists and astronomers that spacetimes described by the field equations

$$\text{Ric} = \lambda g_{ij}, \qquad \text{(subscripts) } i,j = 0,1,2,3$$

where λ is the 'cosmological constant', describe gravitational fields in the absence of matter; that the spacetimes are curved by themselves, without the causative influence of matter; in other words that a gravitational field can exist in the complete absence of matter as a causative agent. However, there is not a shred of physical evidence to suggest that a gravitational field can exist without a material cause. Curiously, the astrophysical scientists allege on the one hand that although this expression contains no sources for the gravitational field, because the energy-momentum tensor is zero, on the other hand they also allege that Ric = 0 contains a source even though the energy-momentum tensor is zero there too. In the latter case the massive source is inserted *post hoc* into the solution, and hence inadmissible. Furthermore, according to Einstein, matter is the cause of the curvature of spacetime, i.e. of the gravitational field, and the causative matter must manifest mathematically in a non-zero energy-momentum tensor in his field equations. The late theoretical physicist John A. Wheeler has reasserted Einstein's geometrodynamics thus, "*Matter tells spacetime how to curve and spacetime tells matter how to move*". The fact that Einstein's field equations violate the usual conservation of energy and momentum also means that $\text{Ric} = \lambda g_{ij}$ is a physically meaningless expression to begin with.

Can you provide a proof that Einstein's pseudo-tensor is not mathematical gibberish? Can you provide a proof that Einstein's field equations do not violate the usual conservation of energy and momentum? Can you provide or otherwise cite **experimental** evidence that a gravitational field can have no material cause?

Stephen J. Crothers.