Do Black Holes Really Exist?

Garret Sobczyk

Universidad de Las Americas-Puebla

Seminar: Presented at

El Tercer Congreso Nacional Universitario de Fisica, Cholula, Feb. 16-20, 2009

Abstract

Black holes have fascinated scientists and the general public for more than a generation. We give a brief history of black holes, and show that in spite of their great popularity, the theoretical foundations for their existence is shaky. We present an alternative theory based upon a Principle of local conservation of energy-momentum in Einstein's special relativity. In this alternative theory, there are no singularities and no black holes.

Brief History of Black Holes

- Two centuries ago, the English geologist John Michell considered the possibility of a dark star so massive that light could not escape. His ideas were published by the French mathematician Pierre Simon Laplace.

- Einstein's Special Relativity was introduce in 1905 and has proven itself to be an exceptionally powerful and well-verified theory.

Einstein's General Theory of Relativity (1915)

- Much more difficult and controversial.
  Problems with the
- Principle of covarience
- Conservation of energy-momentum
- Compatibility with quantum mechanics
- However - it correctly predicted the 43 arc-sec/century correction for the observed precession of the perihelion of Mercury.
- Gravitational Deflection of light near the sun.
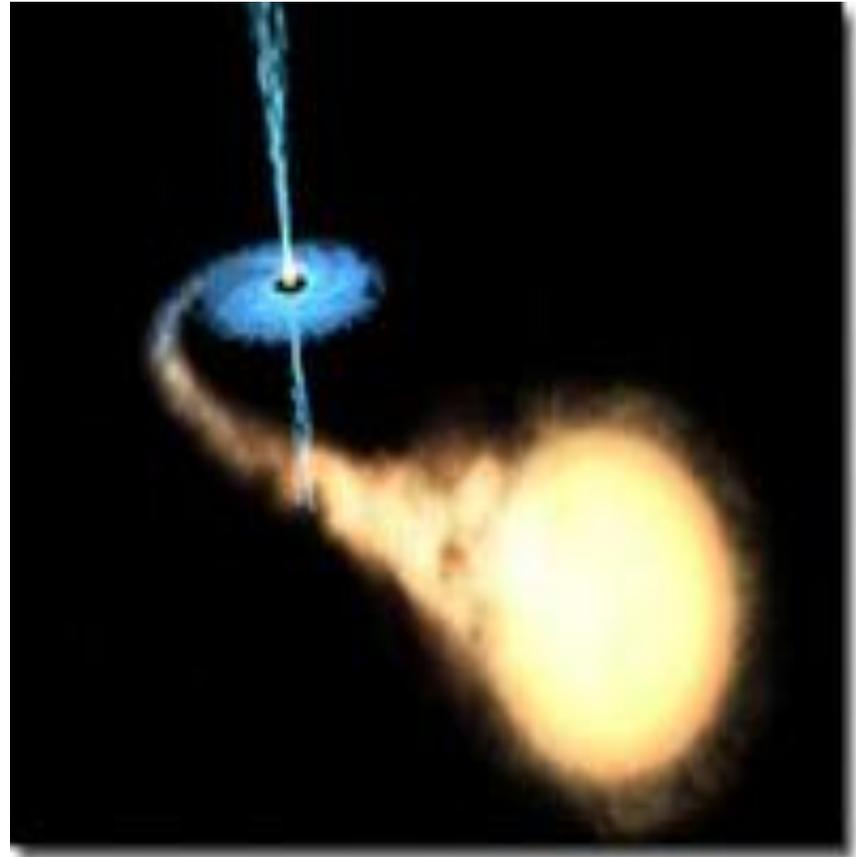- Gravitational red shift of light.

- Karl Schwarzschild's (1916) solution to Einstein's field equations for the Gravitational field of an isolated spherically symmetrical star.

- Falsely identified as providing the theoretical basis for black holes.

- In the 1920's a successful expedition was led by the British physicist Arthur Eddington to prove that gravity bent light as Einstein had predicted.

- Astrophysicist S. Chandrasekhar (1930's) produced a simple curve showing the larger the mass the smaller the radius of a star, leading to white dwarfs.

- In 1939 Robert Openheimer and H. Snyder showed when all thermonuclear sources of energy are exhausted, a star of mass greater than 1.4 times the mass of our sun, will collapse indefinitely.

- In 1954, the physicist A.Z. Petrov of the Soviet Union classified the stress-energy tensor of spacetime. Radially ingoing and outgoing light rays in the Schwarzschild model show that it has Petrov type D structure.
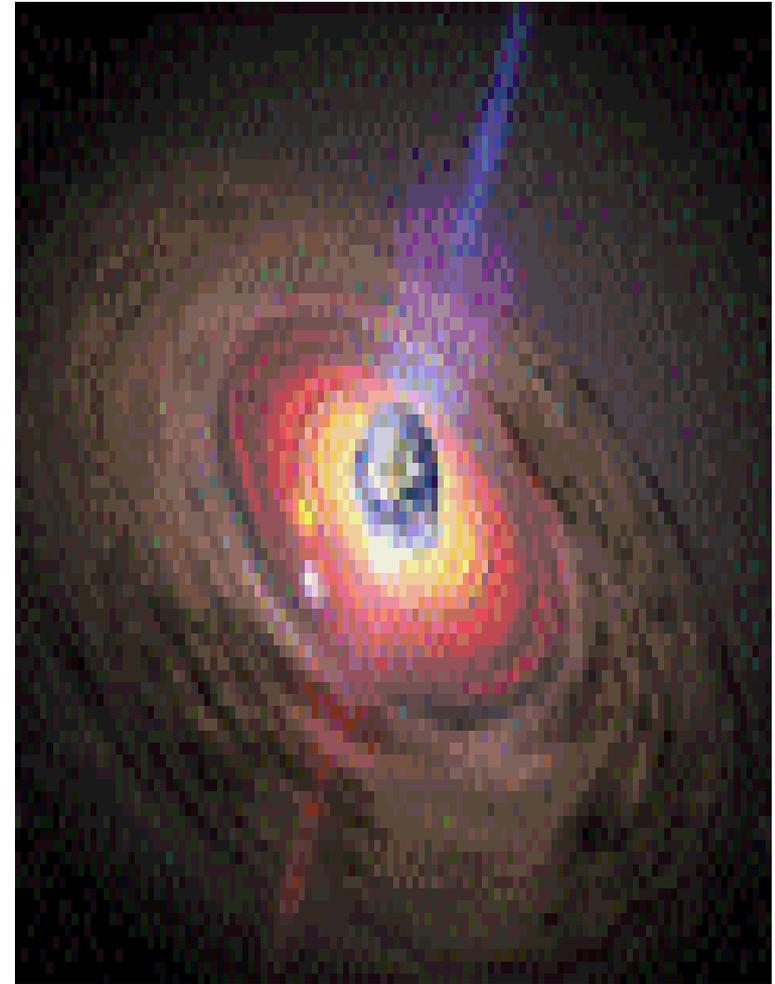
- In 1963, Roy Kerr at the University of Texas, found that Petrov type D metric tensors worked for rotating non-static stars.

- In 1967-68, R.H. Boyer and R.W. Lindquist (1967) studied geodesics in maximally extended Kerr spacetimes.

- 1968-1978. Work done principally by Werner Israel, Brandon Carter, Stephen Hawking, and David Robinson lead to the conclusion that a star collapses to a Kerr black hole uniquely determined by its mass and rate of rotation.
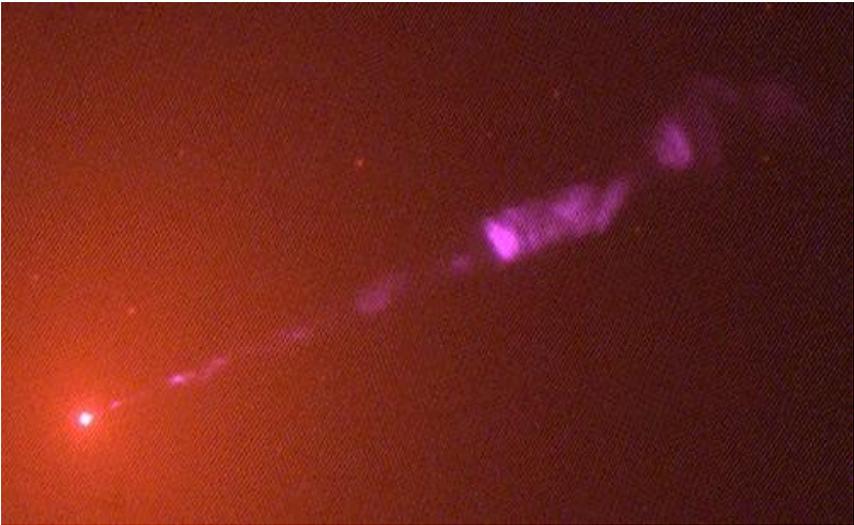
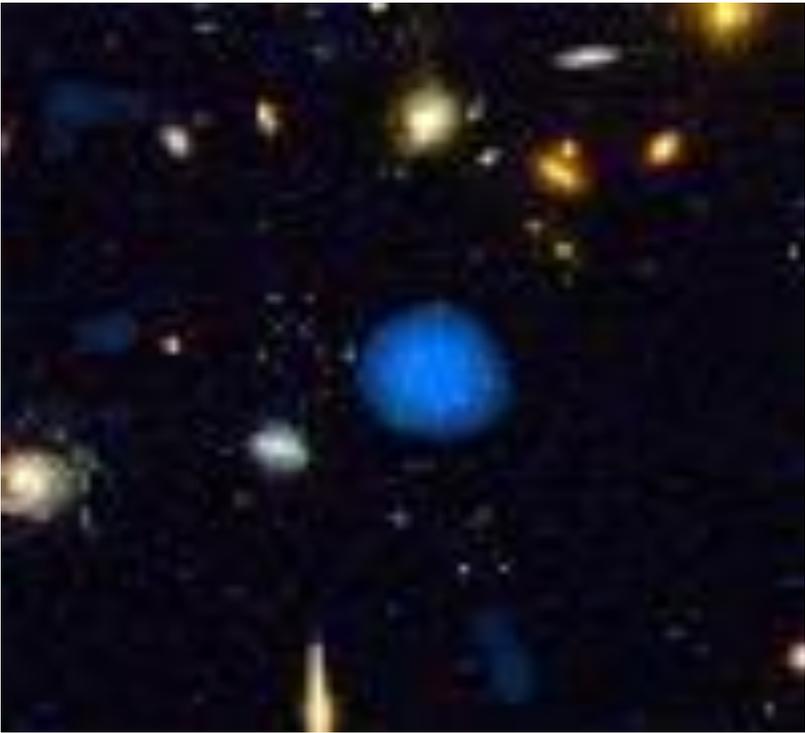For a more detailed version of this brief history, see

http://www.math.ucla.edu~bon/kerrhistory.html

Museum of Black Holes

Galaxy M84 Nucleus
Hubble Space Telescope • WFPC2 • STIS

Galaxy NGC 4261 Nucleus
Hubble Space Telescope • WFPC2 • WFPC2

Globular Star Clusters
Hubble Space Telescope • WFPC2
NASA, The Hubble Heritage Team (AURA/STScI) and M. Rich (UCLA) • STScI-PRC02-18

M15

M31 G1
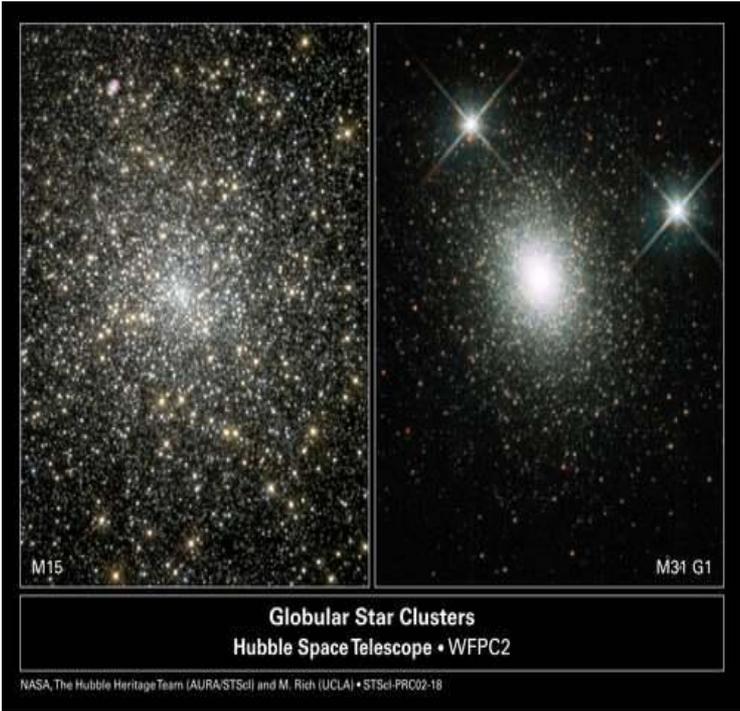
Black Holes Really??

``In general relativity, a singularity is a place that objects or light rays can reach in a finite time where the curvature becomes infinite, or space-time stops being a manifold. Singularities can be found in all the black-holes…"

http://en.wikipedia.org/wiki/Penrose-Hawking_singularity_theorems

"The unconditional universal coupling is a crucial assumption for the singularity theorems of Hawking and Penrose (Hawking & Ellis 1973). …Such an interpretation was not questioned until the universal coupling was proven incorrect (Lo 1995, 2000) by the Hulse-Taylor experiment. By then, such a misinterpretation of $E = mc^2$ has become a prevailingly accepted assumption."

C. Y. Lo, Bulletin of Pure and Applied Sciences, Vol. 25D, (No. 1) 2006, pp. 41-47.

Dear Garret:

Thank you very much for your interesting email. I am not an expert on black holes or big bang. However, since you ask my opinion, I will tell you what I know. I have only one reason against these notions i,e., there is insufficient evidence. In physics, singularity usually means inadequate deliberation.The big bang theory is based on the singularity theorems of Penrose and Hawking. However, the problem is actually in the physical assumption of the coupling signs being unique. From the radiation of the binary pulsars, I have found that the coupling constants necessarily have different signs. Subsequently, I find that the formula $E = mc^2$ is only conditionally valid. It is generally believed that Hubble's law would support big bang. However, upon close examination, there is no valid evidence that can associate such redshifts as indications of receding velocities. Moreover, Einstein's theory of measurement, which is the mathematical foundation of an expanding universe, is invalid. Theoretically, his theory of measurement is inconsistent with Einstein's equivalence principle, and was based on invalid application of special relativity. Experimentally, his theory would lead to only one half of the observed deflection angle.

The notion of black holes involves many implicit assumptions that have not even identified. In the derivation of black holes, Professor Weinberg, my teacher, is against it because it takes almost forever waiting for its creation. The basic notion from Newton is that gravity is always attractive. However, this notion obtained from observation of weak gravity is infinitely extended to very highly concentrated matter. There is no evidence that we can do this. In Chinese philosophy, there are saying that the extreme would turn to the opposite. Now, I have found at least the charge-mass interaction can be repulsive. Thus, it is invalid to continue assuming gravity is always attractive. So far, there is no observational evidence for black holes. That is about all. Thank you.

Sincerely yours,

C. Y. Lo

The Emperor has no clothes

``Neither the layman nor the specialist, in general, have any knowledge of the historical circumstances underlying the genesis of the idea of the Black Hole. Essentially, almost all and sundry simply take for granted the unsubstantiated allegations of some ostentatious minority of the relativists. The historical record clearly demonstrates that the Black Hole has been conjured up by combination of confusion, superstition and ineptitude, and is sustained by widespread suppression of facts, both physical and theoretical.''

A Brief History of Black Holes, Stephen J. Crothers, Volume 2 PROGRESS IN PHYSICS April, 2006. (Sydney, Australia)
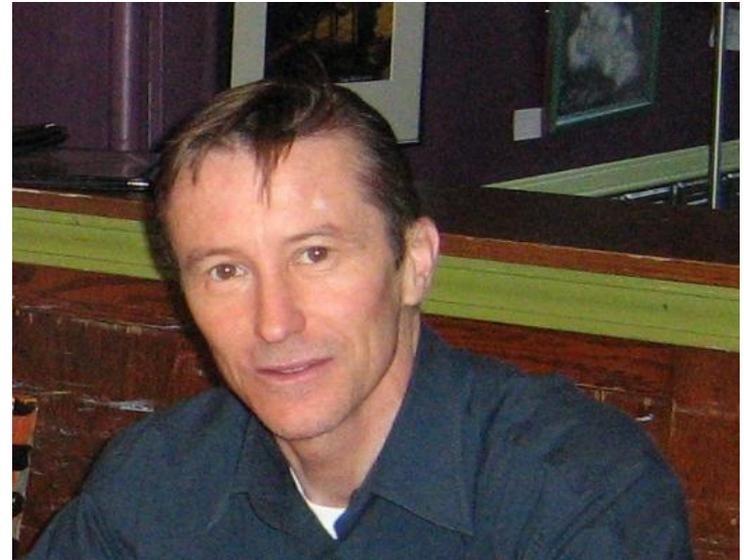
- It is asserted in all textbooks and all the literature on black holes that the black hole was first predicted by Schwarzschild, by the so-called Schwarzschild solution. This is not true.

- The so-called Schwarzschild solution is not Schwarzschild's solution. Schwarzschild's actual solution does not predict black holes. In fact, it does not allow black holes at all.

- It is reported almost invariably in the literature that for Schwarzschild's solution

$$ds^2 = \left(1 - \frac{2m}{r}\right)dt^2 - \left(1 - \frac{2m}{r}\right)^{-1}dr^2 - r^2(d\theta^2 + \sin^2\theta\,d\psi^2),$$

that r can go down to zero in some way, producing an infinitely dense point-mass singularity there, with an event horizon at the Schwarzschild radius of $r = 2m$: a black hole.

- The metric which was actually obtained by K. Schwarzschild in 1915 (published January 1916),

$$\mathbf{ds^2} = \left(1 - \frac{\alpha}{\mathbf{R}}\right)\mathbf{dt^2} - \left(1 - \frac{\alpha}{\mathbf{R}}\right)^{-1}\mathbf{dR^2} - \mathbf{R^2}(\mathbf{d}\theta^2 + \sin^2\theta\,\mathbf{d}\psi^2),$$

$$\mathbf{R} = \mathbf{R(r)} = (\mathbf{r^3} + \alpha^3)^{\frac{1}{3}}, \quad \mathbf{0 < r < \infty}$$

where alpha is an undetermined constant. There is only one singularity in Schwarzschild's solution, at *r=0*, to which his solution is constructed.

- He did not claim that there is an 'event horizon', and his solution clearly forbids the black hole because when Schwarzschild's *r=0* his *R=alpha*, and so there is no possibility for his R<*alpha*.

- Hilbert's metric for *0 < r < 2m*, used today, is inconsistent with Schwarzschild's true solution.

General Relativity must be consistent with Special Relativity

- The relative mass of *m* moving at velocity *v* is

$$m_v = \frac{m}{\sqrt{1 - v^2/c^2}}.$$

- The dimension *x* of the moving mass (cube) *m_v* in Special Relativity contracts in the direction *x_v* of motion,

$$x_v = x\sqrt{1 - v^2/c^2}.$$

- It follows that the moving mass has the volume

$$\mathrm{Vol}_v = x^3\sqrt{1 - v^2/c^2}$$

- For a black hole, the density

$$D = \infty$$

- But this implies that

$$D = \frac{m_v}{Vol_v} = \frac{m}{x^3(1 - v^2/c^2)} = \infty$$

so velocity **v=c** the speed of light, which is impossible in Special Relativity!!

- Therefore black holes are impossible!

Yours Truly to the Rescue

GARRET SOBCZYK,

TOLGA YARMAN

UNIFICATION OF SPACE-
TIME-MATTER-ENERGY,
Appl. Comput. Math. 7
(2008), no.2, pp.255-268

The conflict between General Relativity and Special Relativity can be simply resolved in Special Relativity:

- The most famous formula in Special Relativity $\mathbf{E = mc^2}$ expresses the deep relationship between matter and energy.

- We assume a new Principle of Local Conservation of Energy-Momentum: Each body must subtract/add the mass-equivalent for any **+/-** change in its kinetic energy when acted upon by any of the 4 elementary forces of Nature.

- Every material body contains precisely the mass-energy equivalent that would be required to accelerate that body to the speed of light.

- Letting two equally massive bodies fall towards each other would result in their mutual (theoretical) annihilation at *r=0*, if this limiting distance could be reached.

- Whenever a material body or elementary particle reaches the speed the speed of light, it does so only by converting all of its mass into kinetic energy. It is for this reason that in our theory black holes simply do not exist.

- The principle of local conservation of energy-momentum applies to all of the known 4 fundamental forces in nature.
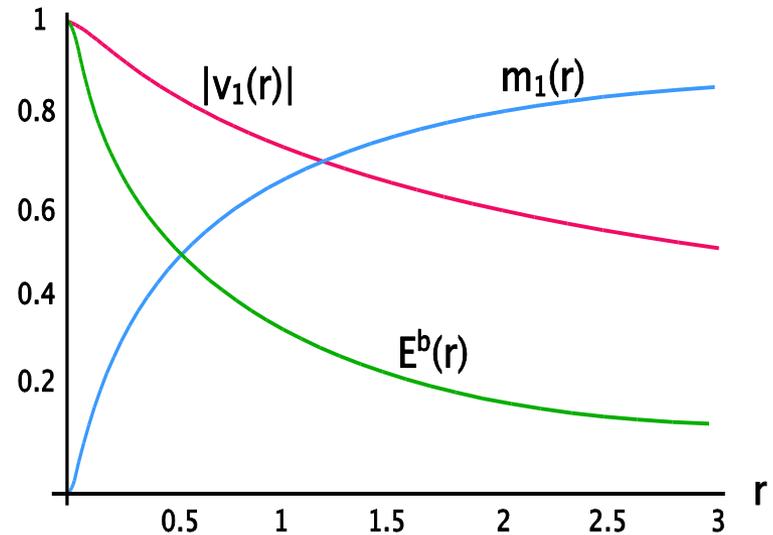
Let us take a closer look at some of these ideas

- The principle of local conservation of energy-momentum requires that we replace

$$m_v = \frac{m}{\sqrt{1 - v^2/c^2}}$$

  which is true for a mass accelerated in a rocket ship, by

$$m_v = m\sqrt{1 - v^2/c^2},$$

  when the change in velocity is due to gravity or any other elementary force.

- Hoover Dam generates 4+ billion kilowatt hour of electricity each year, energy extracted from water by the force of gravity.

$$m_v = m\sqrt{1 - v^2/c^2}$$

- We see immediately that $m_v \rightarrow 0$

  as $v \rightarrow c$.

- The 4 elementary forces of Nature tell a particle how to move as it navigates in space, but the particle itself pays its own way; there is no free lunch in Nature.

- When an apple falls it must pay for the work done by subtracting the equivalent mass-energy from the apple given by the famous formula

$$E = mc^2.$$

# The concept of rest mass

- Definition: The rest mass **m** of a body is measured at temperature 0 degrees Kelvin, and when the body is isolated from all forces of Nature.

- The relative force **F** as measured in the rest frame is

$$\mathbf{F} = \frac{1}{\sqrt{1 - \frac{v^2}{c^2}}}\mathbf{ma},$$

  where **a= dv/dt** is the relative acceleration experienced by the particle as measured in the rest frame. This form of Newton's Second Law applies to particles subjected only to elementary forces.

- Because of the total binding energy $\mathbf{E} = \mathbf{mc^2}$ expended by the forces acting between them, the bodies will gain the respective velocities $\mathbf{v_1(E^b)}$ and $\mathbf{v_2(E^b)}$ fueled by the losses to their rest masses $\mathbf{m_1^{\infty}}$ and $\mathbf{m_2^{\infty}}$.
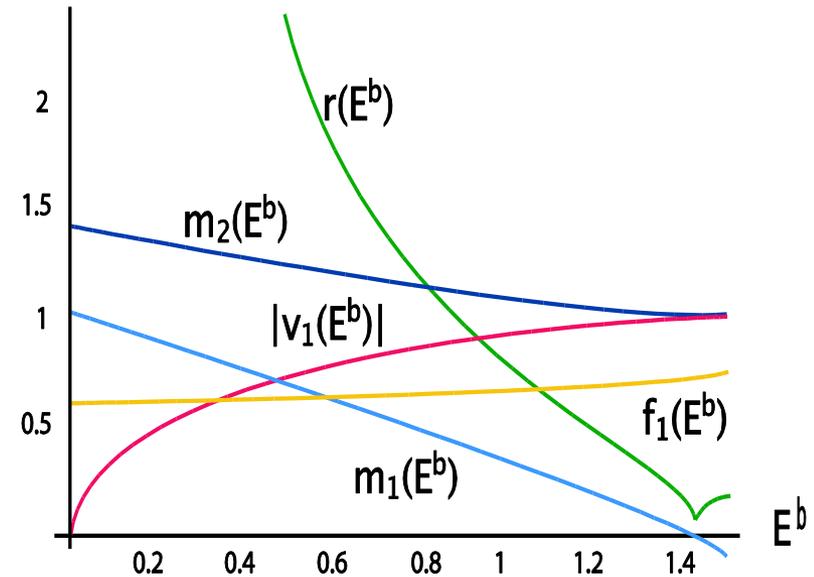
- Note that *r -> 0* when the binding energy $\mathbf{E^b} = \sqrt{\mathbf{2}}$,

- and

$$\lim_{\mathbf{E^b} \to \mathbf{0}} \mathbf{r(E^b)} = \infty.$$

Experimental Evidence for our New Theory

- Tolga Yarman has shown that this new theory predicts a 42 second arc per Century for the precession of the perihelion of Mercury versus Einstein's general relativity prediction of 43 degree.
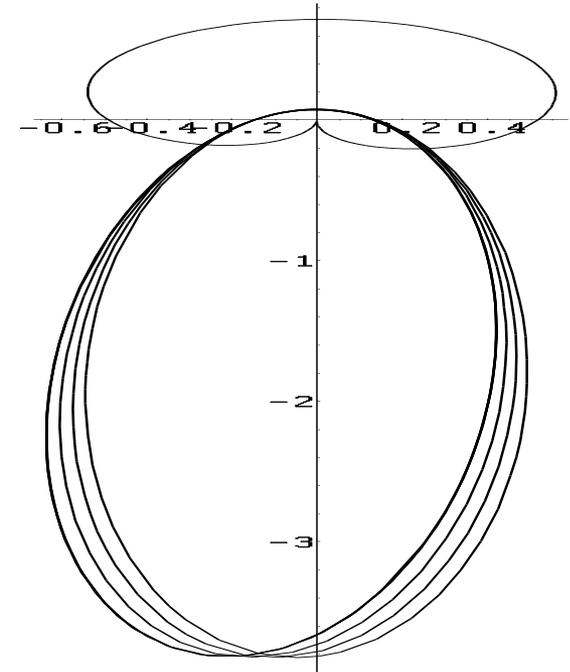
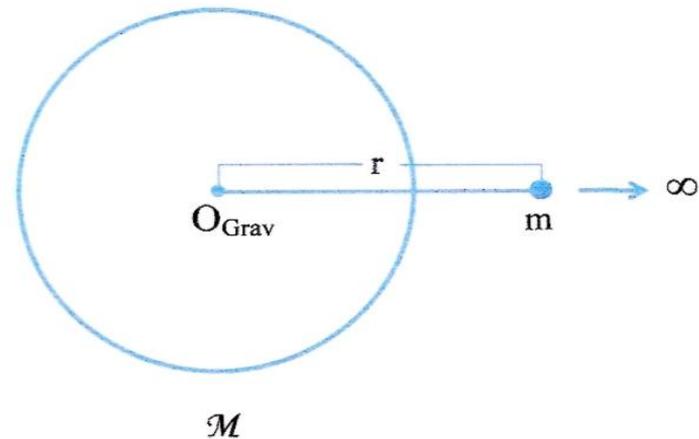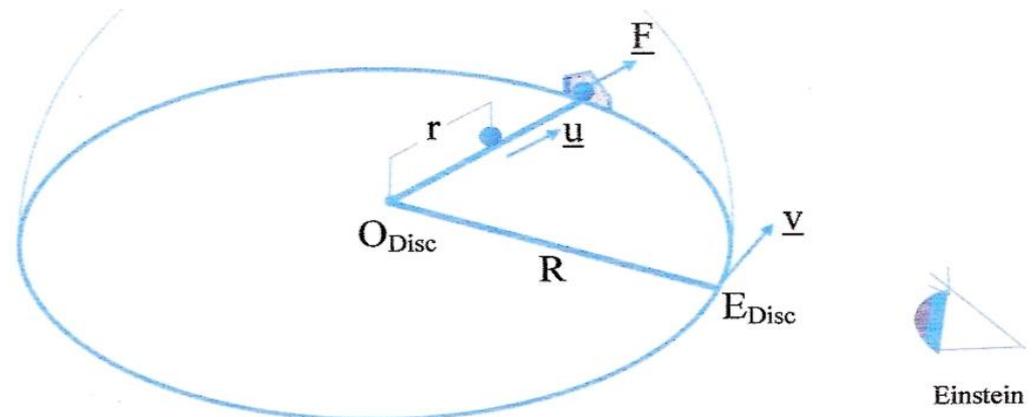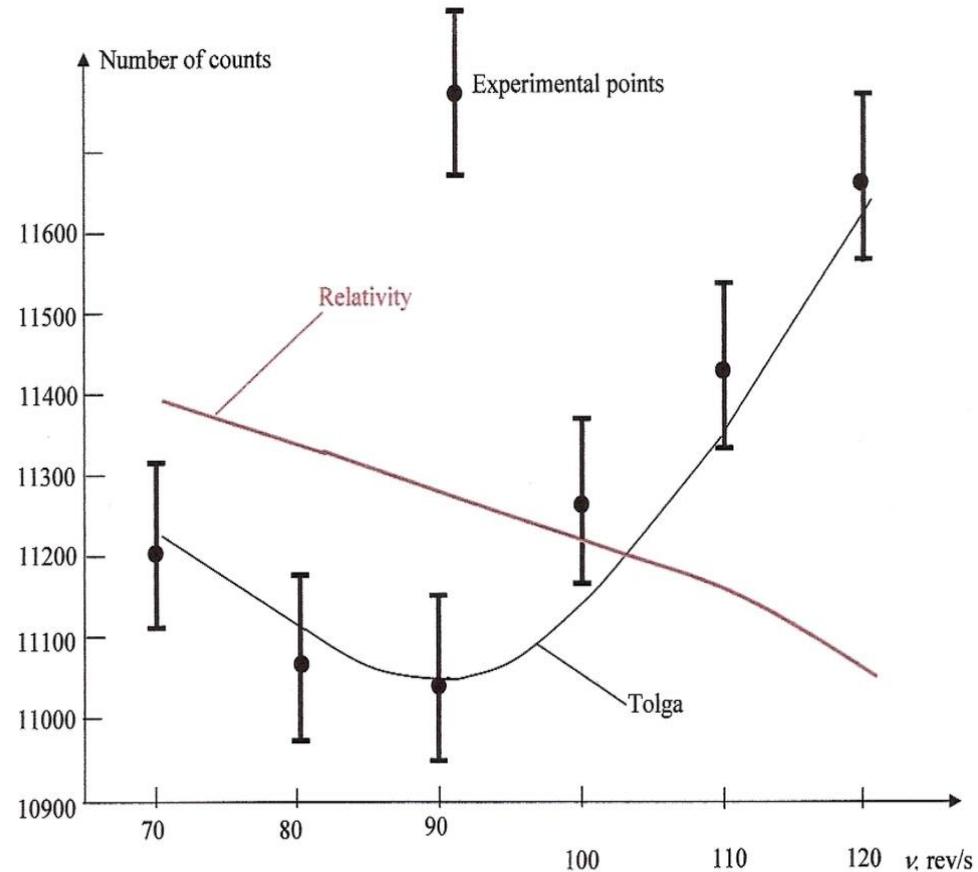- Tolga Yarman's Rotating Disk Cobalt Clock versus Einstein.

Figure 1: The "Disc World" Versus The "Gravitation World"

Disk World versus Einstein

- Tolga Yarman's Rotating Disk Cobalt Clock versus Einstein

The dependence of number of counts on the rotational frequency ν, comparison of experimental and theoretical results: relativistic prediction (k=0.5) is shown in brown; black line is plotted for k=1.

Confused?

- You may want to join the Flat Earth Society!

- There is some support for this venerated old theory.

Flat Earth Society

- Logo of the United Nations

- Thank you!

Bibliography

[1] A. Einstein, *The Meaning of Relativity*, Princeton University Press, 1953.

[2] P. G. Bergmann, *Introduction to the Theory of Relativity*, Dover, 1976.

[3] Barret O'Neil's webpage:
http://archive.ncsa.uiuc.edu/Cyberia/NumRel/BlackHoleHistory.html

[4] C. Y. Lo, Misinterpretation of E = mc^2 and Einstein's Theory of General Relativity, Bulletin of Pure and Applied Sciences, Vol. 25D, (No. 1) 2006, pp. 41-47.

[5] C. Y. Lo, The Necessity of Unifying Gravitation and Electromagnetism and the Mass-Charge Repulsive Effects in Gravity, in Physical Interpretations of Relativity Theory, PIRT-2007, Bauman Moscow State Technical University, Edited by M.C. Duffy, V.O. Gladyshev, A.N. Morozov, P. Rowlands, Moscow 2007, pp.82-92.

[6] S. J. Crothers, *A Brief History of Black Holes*, PROGRESS IN PHYSICS, Volume 2 April, 2006, pp. 54-57. http://www.ptep-online.com/index_files/2006/PP-05-10.PDF

[7] S. J. Crothers, ``Why black holes are fictitious'', Personal Correspondence, January 27, 2009. http://www.sjcrothers.plasmaresources.com/index.html

[8]   T. Yarman, The End Results of General Relativity Theory via just Energy Conservation and Quantum Mechanics, Foundations of Physics Letters, Vol. 19, No. 7, December 2006, pp. 675-694.

[9]   Tolga Yarman (tyarman@gmail.com), Okan University, Akfirat, Istanbul, Turkey, Vladislav B. Rozanov, Lebedev Institute, Moscow, Russia, Metin Arik, Bogaziçi University, Istanbul, Turkey, THE INCORRECTNESS OF THE CLASSICAL PRINCIPLE OF EQUIVALENCE, AND THE CORRECT PRINCIPLE OF EQUIVALENCE, THOUGH NOT NEEDED FOR A THEORY OF GRAVITATION, in Physical Interpretations of Relativity Theory, PIRT-2007, Bauman Moscow State Technical University, Edited by M.C. Duffy, V.O. Gladyshev, A.N. Morozov, P. Rowlands, Moscow 2007, pp.187-197.

[10] G. Sobczyk, Tolga Yarman, Unification of Space-Time-Matter-Energy, *Applied and Computational Mathematics*, Vol. **7**, No. 2, 2008, pp.255-268.
      http://www.garretstar.com/Garret-Azerbeycan-08.pdf

[11] G. Sobczyk, *Active and Passive Boosts in Spacetime,* Physical Interpretations of Relativity Theory, PIRT-2007, pp.123-129.
      http://arxiv.org/abs/0710.0084

[12] G. Sobczyk, *Geometry of Moving Planes,*
      http://arxiv.org/PS_cache/arxiv/pdf/0710/0710.0092v1.pdf

[13] G. Sobczyk, *Space-time algebra approach to curvature*, J. Math. Phys. **22** (2), February 1981, pp. 333-342. http://www.garretstar.com/stacurvature81.pdf

[14] W.E. Baylis, G. Sobczyk, *Relativity in Clifford's geometric algebras of space and spacetime*, International Journal of Theoretical Physics, **43** (10) (2004) 1386-1399.
      http://arxiv.org/abs/math-ph/0405026

[15] G. Sobczyk, *Killing Vectors and Embedding of Exact Solutions in General Relativity*, in Clifford Algebras and their Applications in Mathematical Physics, Edited by S.R. J. Chisholm, Kluwer, 227-244 (1986).

[16] D. Hestenes and G. Sobczyk. *Clifford Algebra to Geometric Calculus: A Unified Language for Mathematics and Physics*, 2nd edition, Kluwer 1992.
http://www.amazon.com/Clifford-Algebra-Geometric-Calculus-Mathematics/dp/9027725616

[17] D. Hestenes, *Spacetime physics with geometric algebra*, American Journal of Physics, **71** (6) (2003).
http://modelingnts.la.asu.edu/pdf/SpacetimePhysics.pdf

[18] D. Hestenes, *Spacetime Geometry with Geometric Calculus,* Foundations of Physics, 35(6):903-970 (2005).
http://modelingnts.la.asu.edu/pdf/SpacetimeGeometry.w.GC.proc.pdf

[19] D. Hestenes, Curvature Calculations with Spacetime Algebra, *Int. J. Theo. Phys.*, **25**, 1986, 581-588. http://modelingnts.la.asu.edu/pdf/Curv_cal.pdf

Other interesting links:

http://www.eurekalert.org/features/doe/2005-05/dlnl-dbh050505.php

http://www.newscientist.com/article/dn12089

http://en.wikipedia.org/wiki/Gravastar

http://www.nap.edu/html/biomems/schandrasekhar.pdf

http://www.einstein-online.info/en/elementary/generalRT/index.html

URL of this talk: http://www.garretstar.com/blackholestalk.ppt