BLACK HOLES, MATTER, SPACE AND TIME IN OUR UNIVERSE: CAN EVOLVE ELEMENTS OF OUR SOLAR SYSTEM TO A BLACK HOLE?

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ABSTRACT

Since the discovery of black holes as a result of the explosion of supermassive stars, the fact that the other heavenly bodies can be absorbed by these elements has grown its curiosity and studies. Increasingly astronomical analysis systems are more powerful and can see phenomena farthest harder or observation.

By applying expressions related to mathematics and physics, such as the Schwarzschild radius, we have tried to determine what would happen if major celestial bodies could become black holes, ii has studied its kinematics in a model of hole the 70 black. First we wanted certain if our universe as a black hole act towards us. Subsequently, we have analyzed different celestial bodies, planets, satellites and stars as potential black holes. As regards the results obtained, no planetary body may evolve black hole. Yes would be the case of some stars as Naos or Betelheuse.

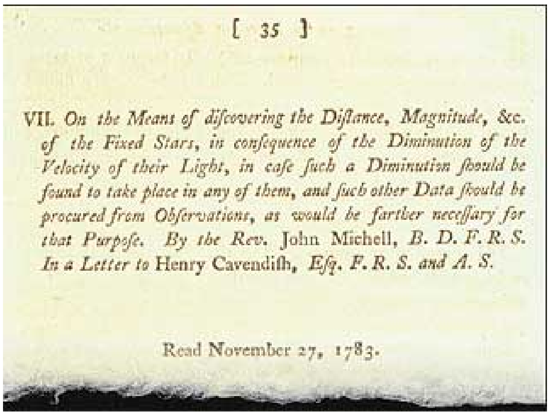
Finally, with regard to the kinematics which follows this model studied, it has been observed a gradual increase in the speed of attraction potential black hole would continue this way, as "hard" core completely thereof.

Keywords: astronomy, black hole, Schwarzschild radius, physics, celestial bodies.

INTRODUCTION

Have you ever ever wondered what's in the universe? Have you considered the fact that there are bodies that suck matter? Where they go? Do they stay in space or go to another galaxy? Can return to regenerate themselves?

But, specifically, what are black holes? The discovered a geologist named John Michell (fig. 1, 1783) in a letter (fig. 2) calls a star like dark or black. Bodies are extraordinarily large gravitational field. You can not escape or electromagnetic radiation. This is the reason why they call black holes.



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VII. On the Means of diſcovering the Diſtance, Magnitude, &c. of the Fixed Stars, in conſequence of the Diminution of the Velocity of their Light, in caſe ſuch a Diminution ſhould be found to take place in any of them, and ſuch other Data ſhould be procured from Obſervations, as would be farther neceſſary for that Purpoſe. By the Rev. John Michell, B. D. F. R. S. In a Letter to Henry Cavendiſh, Eſq. F. R. S. and A. S.

Read November 27, 1783.

Figure 1. Portrait of John Michell.

Source: blackholes.stardate.org

Figure 2. Written in 1783 where it is stated for the first time the concept of black star, black hole Newtonian version.

Source: infobservador.blogspot.com

May be formed during the course of the life of stars. When the core of a star is consumed, the pressure (directly related to the heat) it creates inside the star is not enough to hold its shape and size and collapses under its own gravity. So we define the formation of a black hole when a large star density has been compressed into a very small space (Fig. 3).

The reason that has motivated this project is our interest in astronomy and, specifically, black holes, the reason for its existence and other questions that the literature has not allowed us to clarify, as the possibility raised in job title.

In this project:

- It will seek to show more simply the creation and evolution of these heavenly bodies in space, based on theories.
- We will examine how these bodies are formed from recognized physical assumptions

and documentation received by specialized satellites and telescopes like Hubble.

- It will be shown, from mathematical expressions, such as Schwarzschild mathematical formula, if some characteristic elements of our solar system as the Sun and planets can evolve into black holes.

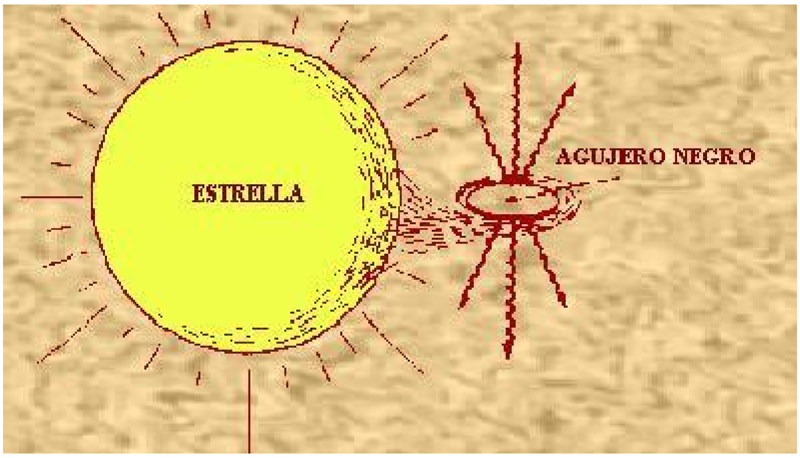

Figure 3. Schematic representation of the mass of a star by a black hole.

Source: http://www.dmae.upm.es

The initial hypotheses are:

- The mass is related to the gravitational force. If the mass of a star exceeds 1.4 solar masses become black hole.
- All matter that enters a black hole can not leave, and the energy disappears. Scientifically, energy is never finished, only transformed, but scientists have not yet discovered what happens to this matter or he does. So the matter may end up in the funnel, where it enters.
- The operation and existence of a black hole has a difficult application, but you can make mathematical models shaped figure that would simulate the effects of gravitational pull of black holes, objects that are within the Schwarzschild's radius.

MATERIALS AND METHODS

Description of the variables

- **Radius of the event horizon of a black hole**: gravitational area where no object can escape. Will apply the mathematical expression of Schwarzschild. Is given in m.

- **Escape speed**: speed that a body needs to overcome the gravitational force of the sun. Is given in m / s.

Materials used

For the experimental determination

- Different celestial bodies Bibliographic Data.
- Mathematical expression Schwarzschild's radius.

For the realization of the model

- A rectangular wooden tablet to represent the radius of a black hole event.
- Different pieces of cork to fit the shape of the black hole model.
- Cutter to cut and glue to assemble the pieces.
- Compass to represent circular sections that will form our black hole.
- A marble would represent an object.
- Stopwatch and tape measure.

Methodology

For the experimental determination

As a practical application of this work, composite scenarios of elements in our solar system, as the Sun and the planets own elements, a priori, could evolve into a black hole. Also explain the effect it will have on the moon if Earth became a black hole, as a special case within the Earth-Moon system.

According to the mathematical formula to calculate the Schwarzschild's radius of the event horizon of a black hole (the gravitational field is special about this) are applied:

$$R = 2 \cdot G \cdot M \cdot C^2$$

Where:

- M = body mass (kg)
- G (gravitational constant) = 6.67 · 10-11 N · m^2 / kg ^{2}
- C (constant light) = 3.108 m / s
- R = radius of the event horizon of the black hole (m)

This formula is derived from the escape velocity (Ve = 2 · G · MR). This is defined as the speed you need a body to overcome the gravitational force of the sun. Therefore, if we say that you can not exceed the speed of light and that a body inside the event horizon can not escape if c = Ve us will result gravitational radius of the area in which you can not escape any object (event horizon).

<u>For the realization of the model</u>

Each blade is the base and the upper surface of the hole (Fig. 4). In each circular piece has internal holes of different diameter and have gathered. Internally it has been glued paper and has been painted black. Structure supported by its corners with rods.

RESULTS

For the experimental determination

We live in a black hole? The data obtained by the radius or Schwarzschild event (rS) of the order of $5.2 \cdot 10^{24}$ is less than the value considered by the radius of the observable universe (rU), which is of the order of 4, 4.1026. Therefore, since rS <rU (Table 1), the answer to this question is NO.

Rocky bodies can become black holes? From the results we have obtained from rocky bodies in our solar system has given us none of the bodies have enough radios to become their black holes (Table 2).

Gaseous bodies can become black holes? The results of gaseous bodies (includes Jupiter and Saturn) has also given us can not become black holes of radio failure (Table 2).

For the realization of the model

What is the order of magnitude of the change in the rate of attraction of a body when it enters a black hole? For the model, we do not have results now, but in a video recorded in the Science Park of Granada on a model like (Fig. 5), the average speed of the "body" was 29.7 rpm, variable according to the area "black hole", lower surface area (10.4 rpm) and higher when it enters this channel (47.9 rpm).

CONCLUSIONS

- We not live in a black hole. This statement has several explanations so blunt about it. Firstly, the results obtained in the experimental model used. From the definition of Schwarzschild's radius, this would be the limit for which the escape velocity of an object would be less than the attraction itself would make the black hole toward this object. Moreover, the light could not enter that black hole course. Therefore, by a logic we live today in a bright thanks to the Sun, we would not be within this structure. Finally, this course would be formed black hole compacting whole mass of our planet in a size of a marble, something that, of course, is not fulfilled.
- According to the black hole model worked, when a body comes within the range of black hole's event, begins to suffer an attractive force and an increase in their rate of attraction is not constant but increases progressively as it approaches the hole center.

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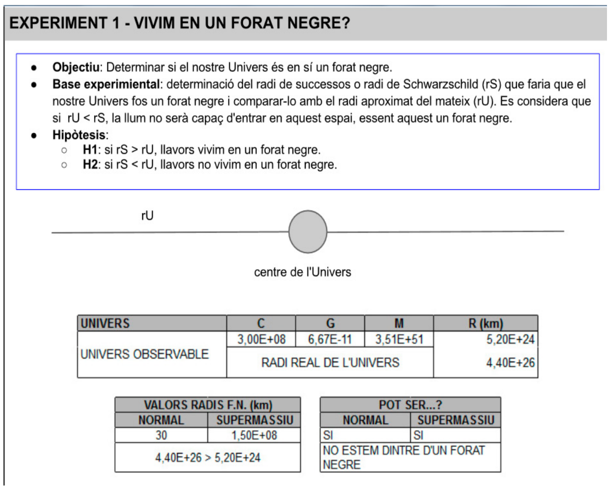
ANNEX

Figure 4.. Building a model of black hole, according to a model of the 70 present in the Science Museum in London.



EXPERIMENT 1 - VIVIM EN UN FORAT NEGRE?

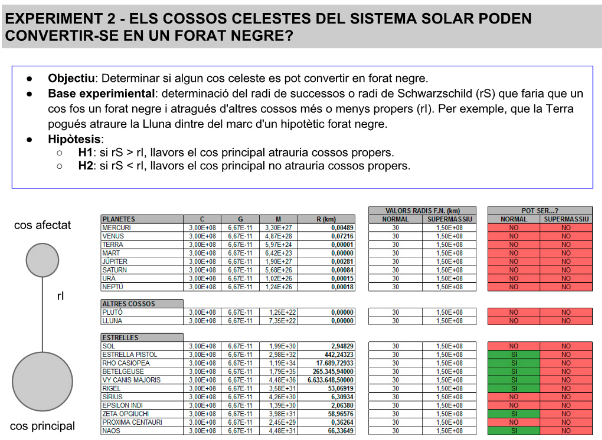
- **Objectiu**: Determinar si el nostre Univers és en sí un forat negre.
- **Base experimental**: determinació del radi de successos o radi de Schwarzschild (rS) que faria que el nostre Univers fos un forat negre i comparar-lo amb el radi aproximat del mateix (rU). Es considera que si rU < rS, la llum no serà capaç d'entrar en aquest espai, essent aquest un forat negre.
- **Hipòtesis**:
  - **H1**: si rS > rU, llavors vivim en un forat negre.
  - **H2**: si rS < rU, llavors no vivim en un forat negre.

UNIVERS	C	G	M	R (km)
	3,00E+08	6,67E-11	3,51E+51	5,20E+24
UNIVERS OBSERVABLE	RADI REAL DE L'UNIVERS			4,40E+26

VALORS RADIS F.N. (km)	
NORMAL	SUPERMASSIU
30	1,50E+08
4,40E+26 > 5,20E+24	

POT SER...?	
NORMAL	SUPERMASSIU
SI	SI
NO ESTEM DINTRE D'UN FORAT NEGRE	

Table 1. Demonstration of the fact that we live in a black hole.



EXPERIMENT 2 - ELS COSSOS CELESTES DEL SISTEMA SOLAR PODEN CONVERTIR-SE EN UN FORAT NEGRE?

- **Objectiu**: Determinar si algun cos celeste es pot convertir en forat negre.
- **Base experimiental**: determinació del radi de successos o radi de Schwarzschild (rS) que faria que un cos fos un forat negre i atragués d'altres cossos més o menys propers (rl). Per exemple, que la Terra pogués atraure la Lluna dintre del marc d'un hipotètic forat negre.
- **Hipòtesis**:
  - **H1**: si rS > rl, llavors el cos principal atrauria cossos propers.
  - **H2**: si rS < rl, llavors el cos principal no atrauria cossos propers.

PLANETES	C	G	M	R (km)	VALORS RADIS F.N. (km) NORMAL	VALORS RADIS F.N. (km) SUPERMASSIU	POT SER...? NORMAL	POT SER...? SUPERMASSIU
MERCURI	3,00E+08	6,67E-11	3,30E+27	0,00489	30	1,50E+08	NO	NO
VENUS	3,00E+08	6,67E-11	4,87E+28	0,07216	30	1,50E+08	NO	NO
TERRA	3,00E+08	6,67E-11	5,97E+24	0,00001	30	1,50E+08	NO	NO
MART	3,00E+08	6,67E-11	6,42E+23	0,00000	30	1,50E+08	NO	NO
JÚPITER	3,00E+08	6,67E-11	1,90E+27	0,00281	30	1,50E+08	NO	NO
SATURN	3,00E+08	6,67E-11	5,68E+26	0,00084	30	1,50E+08	NO	NO
URÀ	3,00E+08	6,67E-11	1,02E+26	0,00015	30	1,50E+08	NO	NO
NEPTÚ	3,00E+08	6,67E-11	1,24E+26	0,00018	30	1,50E+08	NO	NO
ALTRES COSSOS								
PLUTÓ	3,00E+08	6,67E-11	1,25E+22	0,00000	30	1,50E+08	NO	NO
LLUNA	3,00E+08	6,67E-11	7,35E+22	0,00000	30	1,50E+08	NO	NO
ESTRELLES								
SOL	3,00E+08	6,67E-11	1,99E+30	2,94829	30	1,50E+08	NO	NO
ESTRELLA PISTOL	3,00E+08	6,67E-11	2,98E+32	442,24323	30	1,50E+08	SI	NO
RHO CASIOPEA	3,00E+08	6,67E-11	1,19E+34	17.689,72933	30	1,50E+08	SI	NO
BETELGEUSE	3,00E+08	6,67E-11	1,79E+35	265.345,94000	30	1,50E+08	SI	NO
VY CANIS MAJORIS	3,00E+08	6,67E-11	4,48E+36	6.633.648,50000	30	1,50E+08	SI	NO
RIGEL	3,00E+08	6,67E-11	3,58E+31	53,06919	30	1,50E+08	SI	NO
SÍRIUS	3,00E+08	6,67E-11	4,26E+30	6,30934	30	1,50E+08	NO	NO
EPSILON INDI	3,00E+08	6,67E-11	1,39E+30	2,06380	30	1,50E+08	NO	NO
ZETA OPGIUCHI	3,00E+08	6,67E-11	3,98E+31	58,96576	30	1,50E+08	SI	NO
PROXIMA CENTAURI	3,00E+08	6,67E-11	2,45E+29	0,36264	30	1,50E+08	NO	NO
NAOS	3,00E+08	6,67E-11	4,48E+31	66,33649	30	1,50E+08	SI	NO

Table 2. Results of various celestial bodies

Figure 5. Results for the study of kinematics of an object in a model that represents a black hole.