Further thoughts on, " On a general theory of gravity based on Quantum Interactions ". Part Two.

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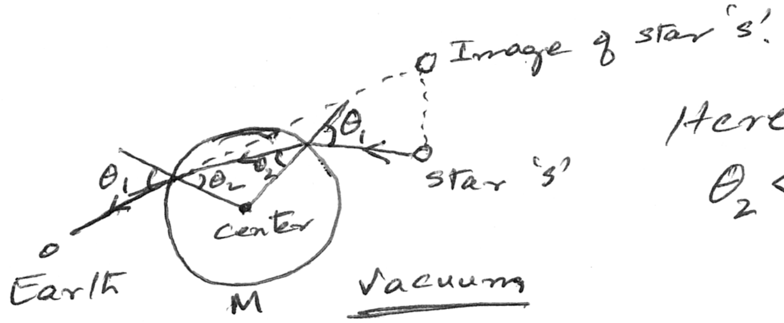
In order to obtain practical results from the theory we can consider the " matter density " equation defining an object in terms of a fluid. We can then use the mathematics of fluid dynamics and fluid mechanics. To derive some results we may have to use the " matter density " equation and for others the equivalent " energy density " equation. Considering an object as a fluid mass leads to consider that the QI (which is proportional, to "atleast", to $\rho_m(r)$) is "equivalent" to viscosity or using classical terms, the " gravitation field strength " is "equivalent" to viscosity of the fluid.

Here I am going to present a qualitative discussion on the various " gravitational " effects we can deduce using this fluid analogy for an object:

1) The bending of light due to an object which was ascribed to gravity:

Using the fluid analogy, we can easily see that the bending of a beam of light by an object is simply the result of Snell's law for refraction of light. This can be diagrammed as follows:



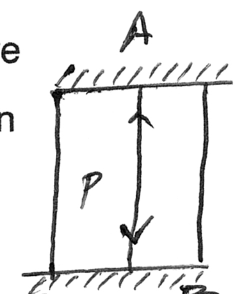
Here, of course, $\theta_2 < \theta_1$.

2) It is an established fact that the speed of light within a fluid is less than it's speed in vacuum, i.e $C(F) < C(V)$. Hence, if we have an object (fluid mass) with $\rho_m(r)$ such that the speed of light when traveling through it becomes zero, then such an object will be same as a " black hole ". Of course, unlike the Einstein's General Theory of Relativity (GTR), there is no " rip " in the space-time continuum (STC) here.

3) Using fluid mechanics we should be able to calculate the orbit of a mass 'm' about the center of mass 'M', i.e

Here, 'M' is a fluid mass with matter density of $\rho_M(r)$ at distance 'r' through which the fluid mass 'm' is traveling with a speed $V_m(r)$ in an orbit about the center of 'M'. Now, considering the graph for $\rho_M(r)$ we see that for $r \leq r_1$ the average $\rho_M(r)$, i.e $\langle \rho_M(r) \rangle$ is $\simeq K\lambda M$. This is independent of 'r', which means the orbital speed, $V_m(r)$, for objects at distance 'r' is the same for all $r \leq r_1$. For $r_1 < r \leq r_2$, we have the $\langle \rho_M(r) \rangle$ decrease linearly. This means, the orbital speed $V_m(r)$ of objects at distance 'r', where $r_1 < r \leq r_2$, decreases, to a 1^o approximation atleast, linearly with 'r' upto $r \leq r_2$. For $r > r_2$, the $\langle \rho_M(r) \rangle \approx 0$, which leads to the conclusion that the orbital speed, $V_m(r)$, for objects at distance $r > r_2$ is zero.

4) The time (or more precisely " Einstein time ") dilation effect due to gravity:



" Einstein clock (EC)

Here we will use a clock that Einstein used to derive his Lorentz-Einstein transformation equations in his Special Theory of Relativity (STR). Our clock consists of a contraption that consists of two perfectly reflective mirrors between which a photon is bouncing back and forth between them. This clock will look something as follows:

'A' and 'B' are perfectly reflective mirrors. 'P' is the path of a photon reflecting between 'A' and 'B' without loosing any energy with each reflection.

If we put this EC at different 'r' within an object, we can immediately see that the speed of the photon is dependent on 'r' due to $\rho_m(r)$.

This means the speed of the photon at 'r', $C(r)$ is less than $C(V)$, where $c(v)$ is the speed of the photon in vacuum. This then leads to the conclusion that $\Delta t(r) > \Delta t(v)$, or the time interval for the photon to travel between 'A' and 'B' is longer the closer it is to the center of the object compared to the interval when the clock is in vacuum. Also, if $r_2 > r_1$, then $\Delta t(r_2) < \Delta t(r_1)$. This means our theory of gravity, which uses three dimensional space, also allows for the time dilation effect similar to Einstein's GTR without the need for distortion of a four dimensional STC.

At this point I like to go into a brief discussion on the concept of " time ". We can agree that " time " is an abstract entity. We humans have an innate, intuitive, feeling about the existence of this abstract entity called " time ". Over the course of human history we have attempted to represent and measure this abstract entity. We can start with Galileo's attempt. He reduced time to the motion of a pendulum, which in turn is connected to gravity. This Galilean Time (GT) remained in scientific use until Isaac Newton introduced the " Newtonian Time " (NT) in his equations. This NT was also universal time. At any moment it was the same at any point in space within the universe. It was independent of motion, gravity or any other entity. It came closest to the representation of the abstract entity of time. Einstein then introduced his own representation of time which we will call the " Einstein Time " (ET). It is based on the movement or speed of light as seen in his STR and the Einstein Clock (EC). However, to define " simultaneity " he used the movement of the hands of a mechanical clock (MC). The question whether ET as measured by EC is same as that measured by MC was never clarified in his STR. We will not go into a discussion about that either here as it will take us beyond what I like to present. Einstein showed that ET was not universal unlike NT, but that it depended on the motion of bodies and on gravity in his theories STR and GTR respectively. Recent experiments using atomic clocks (which use vibrating atoms, and hence motion) do indeed behave like ET as predicted by STR and GTR. The question that now arises is, " Does the proof of the existence of ET necessarily and sufficiently disprove the existence of NT "? I am not so sure the answer is yes. In Quantum Physics (QP) we encounter entangled particles and to accurately describe the events involving such particles (which, by the way, may be at the ends of the universe) we may have to resort to some kind of Universal Time or atleast bring back NT into the equations that describe such events. The other question is, does ET represent the abstract entity " time " accurately and completely? What about time that is based on entropy or the shortening of the telomeres on the chromosomes or the decay of living things or the psychological time we all experience and gives rise to phenomenon such as deja' vu and jamais' vu? Can we say that they are also encompassed by ET and should behave as per STR and GTR? I believe that " time " is much broader than what Einstein thought and that ET is a gross oversimplification. The reality may be such that for some events we will need ET and for some NT and for others a completely new definition of " time". I do not think that the abstract entity " time " can be accurately and completely be reduced to any particular representation.

The next step is to make predictions based on the theory of gravitation proposed here that can not only be tested but also cannot be explained by any other theory on gravity available today.

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