Re: Why is push gravity concept considered not viable by mainstream science?

Source: http://sci.tech−archive.net/Archive/sci.physics.research/2006−05/msg00329.html

- *From*: "Sid Lanier" <slanier01@xxxxxxxxxxx>
- *Date*: Tue, 30 May 2006 22:02:47 +0000 (UTC)

<carlip−nospam@xxxxxxxxxxxxxxxxxx> wrote in message
news:e54rdfqcb1@xxxxxxxxxxxxxxxxxxxxxx

> Blaze Labs <saviour@xxxxxxxxxxxxx> wrote:
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>> Hello guys,
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>> I would like to know the main reasons why the push gravity concept is not considered as a viable concept by mainstream science.
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> There are a few generic objections, along with particular problems with particular models. The main generic objections I know of are
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> 1. Drag: As Feynman pointed out in the Feynman Lectures, anything that's capable of "pushing" will also create drag on a moving object. There are very strong observational limits on such drag, in the Solar System and in binary pulsar systems.

I assume (perhaps incorrectly) that you are referring to the paragraph in Vol. I, pages 7−9 to 7−10, in which Feynman commented on the theory of a mechanism of gravitation. I was thinking that if these "push−particles" are traveling at the speed of light, c, something like the following might hold. Let F be the flux of these particles thoughout space (i.e., the number of particles passing through unit area in unit time.) Also, assume the flux is isotropic in direction. Consider a thin sheet of matter traveling at speed u in the +X direction (traveling broadside so you see the full area when looking along X.) To simplify, consider only those particles going either in the +X or −X direction. (Nothing is lost, in principle, by doing this, as you could integrate over velocity components for other directions.) When the object is at rest, it sees the same particle flux, F,coming from both the front side and the hind side. But in motion, the flux it meets is increased to F(c+u)/c and the flux from behind is decreased to F(c−u)/c. If Feynman's anology with running in the rain applies, the thing would certainly absorb more particles from the front than from the back per unit time, and would feel a resistance to the motion. (With raindrops, if they hit, they are absorbed.) However, the sheet of matter is composed of individual absorber particles, say "atoms". Looking at a single atom, the number of encounters per second it has with a push−particle is proportional to the particle flux in the vicinity of the atom. The number absorbed per second by that atom is equal to the number of encounters per second times the probability, p, of absorption per encounter.So, for push−particles coming from the front, an atom in the sheet of material would absorb

$N(1) = ApF(c+u)/c$ particles per second (1)

where A is the proportionality constant mentioned above for encounters, and p is the probability of absorption per encounter.

This same atom would absorb from behind,

$N(2) = ApF(c-u)/c$ particles per second. (2)

If the probability were the same in each case, the atom would certainly absorb more per second from the front than from behind. However, the atom (or whatever absorbing "particle") may be assumed to have an effective absorbing diameter,d. A particle can be absorbed by it only when it is traversing this distance through, or close by, the atom. It takes a time $t(1) = d/(c+u)$ for the particles meeting the atom to traverse its sphere of influence. And for those coming from the rear, it takes a time $t(2) = d/(c-u)$ for them to get away from its influence. The probability of absorption per encounter should also be proportional to the time lapse of the encounter. (if it stays in the vicinity of the atom longer, it should have a higher probability of absorption.) Therefore, the probability of absorption in each case would be $p(1) = Bd/(c+u)$ for particles meeting it, and $p(2) = Bd/(c-u)$ for particles coming from behind, where B is the proportionality constant.

Replacing the probability p in equations (1) and (2) above with these probabilities as a function of the time lapse of encounter, gives:

the number absorbed from the front per second by a given atom as
$N(1) = A[Bd/(c+u)]F[(c+u)/c] = (ABdF)/c$

and the number absorbed from behind per second by the same atom as:
$N(2) = A[Bd/(c-u)]F[(c-u)/c] = (ABdF)/c$

The result is the same, which shows that a moving object will absorb the same number per second of push−particles from the front as from the back. Therefore the object will feel no net force due to motion in this isotropic flux of particles. (If one worries about the energy build−up, we may assume that the particles, once absorbed, are very quickly re−scattered isotropically.)

Whether I'm right or not,
Have one on me!

> 2. Aberration: Suppose "pushing" particles move at a speed v, and look at the effect on the Solar System. For a planet at distance d from the Sun, the "push" will not be toward the instantaneous position of the Sun, but towards its position at a time d/v in the past. This is a drastic effect −− if v is the speed of light, the Solar System would be drastically unstable over a thousand−year time scale.
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> (The effect of aberration is to increase the velocity of a planet, and you might hope that drag would cancel it. But it's easy to check that such cancellation can occur at, at most, one radial distance from the Sun.)
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> 3. Principle of equivalence: It is observed that gravity acts not only on mass, but on all forms of energy. A "push gravity" theory would have to come with an explanation of how the particles that do the pushing manage to push against, for example, electrostatic binding energy and the kinetic energy of electrons in an atom, and why that "push" exactly matches the "push" against ordinary matter.
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> In particular, we observe that gravitational binding energy itself gravitates. This seems to require self−interaction among the pushing particles. On the other hand, the accuracy of the inverse square law over long distances requires that the self−interaction be very small −− you certainly need a mean free path larger than the size of the Solar System if you don't want to mess up Pluto's orbit.
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> 4. Gravitational screening: There are very strong limits on the kind of "gravitational screening" one would expect from a "push gravity" model −− see, for example, Unnikrishnan et al., Phys. Rev. D 63 (2001) 062002.
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> [...]
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>> Please note, I am NOT asking about Le Sage ultramundane particles theory (which also falls under the push gravity category), which I can easiely discredit myself. I'm mostly interested in the concept of electromagnetic radiation pressure of high frequency radiation acting as the gravitational mechanism, and its shadowing creating the inverse square law, low pressure areas.
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> You immediately run into trouble with the principle of equivalence, for one thing. Electromagnetic waves don't interact with other

electromagnetic waves (except by truly tiny quantum effects); but
gravity bends light. Nor do electromagnetic waves interact with
internal energy, not with neutrinos; but these *are* affected by
gravity. You also run into grave problems with aberration (see above),
and very probably with drag. You would *further* have to explain why
this high frequency radiation is not absorbed by the Earth enough to
lead to gravitational screening of the type ruled out by experiment.

Note that "high frequency [electromagnetic] radiation" is gamma radiation.
There are experimental measurements of very high energy gamma rays, and
a fair amount is known about their spectrum. I suspect you would have
a very hard time reconciling your model with these observations.

Steve Carlip

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