Amplification effect of parallel counter-streaming gravitons

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Abstract: Modified Newtonian Dynamics can explain the flat rotation curves of stars in very weak gravitational fields in the outlying regions of our galaxy, but it needs a physical basis to form a complete theory. In the MOND paradigm, acceleration decreases slower, by 1/r, than in Newtonian dynamics, $1/r^2$.

This paper explores a physical process with amplifies the stream of gravitons between distant stars, thereby keeping gravity stronger at longer distances, yet allowing the acceleration to decrease as 1/r.

The streams of gravitons between distant stars is parallel, allowing time for counter-streaming gravitons to interact with each other. **This interaction will compress the beam and, most importantly, will pull adjacent streams into the main gravitation stream.** This results in an amplification of gravity between the two stars. The frequency of gravitational interaction with the mass of the stars will decrease as 1/r, due to the longer travel time of the gravitons between the stars.

Main paper – Amplification effect of parallel counter-streaming gravitons

Gravitational information must be communicated between stars and planets. Newton's action at a distance and Mach's Principle gives credence to this assertion. The graviton, a hypothetical particle, transmitting the information of gravity, was proposed by Blokhintsev and Gal'perin. Ref. 1

Does the graviton have a very small mass? I have searched the literature. Some papers state that its mass is zero and others state that it is very, very small. In this paper, it needs to be assumed that the graviton has a very small mass, less than 7.7E^-23 eV/c^2. Also, the graviton moves at or very near the speed of light. Ref. 2

The main hypothesis: The stream of gravitons between distant stars is parallel. As the gravitons are interchanged when they interact with the mass of a star, a counter-streaming beam of gravitons is formed, some of whose gravitons are parallel to the incoming stream. There will also be gravitons interchanged which are at various angles to the parallel stream. Here, just the parallel flows are being discussed. Since counter-streaming gravitons are parallel to each other and will be parallel for a considerable time frame, at least a few light years, the gravitons will have time to react with each other. They will attract each other and concentrate the beam at each star. **They will also pull in adjacent parallel streams into the beam. This will result in an amplification of the beam and will result in an increased gravity between these two stars.** This amplification effect is very small at sub-galaxial distances between individual pairs of stars. At 1,000 light years distance between a pair of stars, the Newtonian acceleration is 1.47E-03 and the MOND acceleration is 4.21E-07, with the Newtonian acceleration being 3,490 times larger. At 3.51 million light years, the accelerations due to Newton and MOND are the same. Beyond this distance, MOND acceleration is dominant.

How can this very small additional acceleration affect the velocities of stars? The reason is that each star will interact with many other stars and there are millions of stars between which this effect will come into play. The stars will be in the outer regions of our galaxy, that is, in the very low gravity regions where MOND calculations are the limit.

A future paper will attempt to make models exploring whether the sum of these small additional centripetal accelerations will be enough or will be too much to account for the higher orbital speeds of stars than those predicted by Newtonian dynamics. The first model will be centered around our sun, since most data is available and less assumptions will need to be made. To explain the orbital speed of any star, a complex model will have to be made of that star and its extended stellar environment.

Mathematical equations will need to be derived predicting the amplification effect of parallel counter-streaming gravitons. The result $a = \sqrt{a_N a_0}$ is know from M. Migrom's MOND.

Refer to Fig. 1 and Fig. 2 for a graphical explanation of the amplifying effect of counter-streaming gravitons.

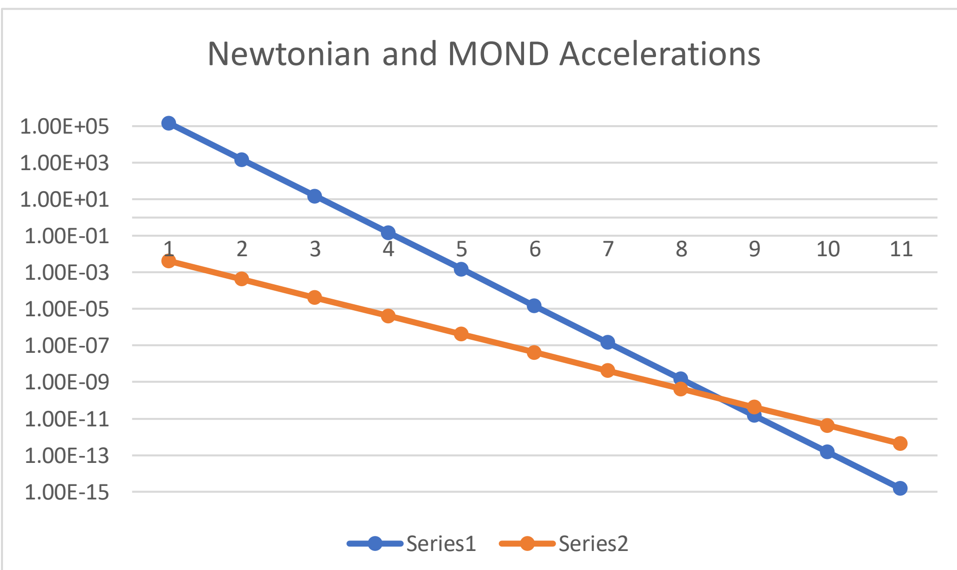
Distances in multiples of c

$$a_N = \frac{GM}{r^2}$$

$$a = \sqrt{a_N a_0}$$

Constan

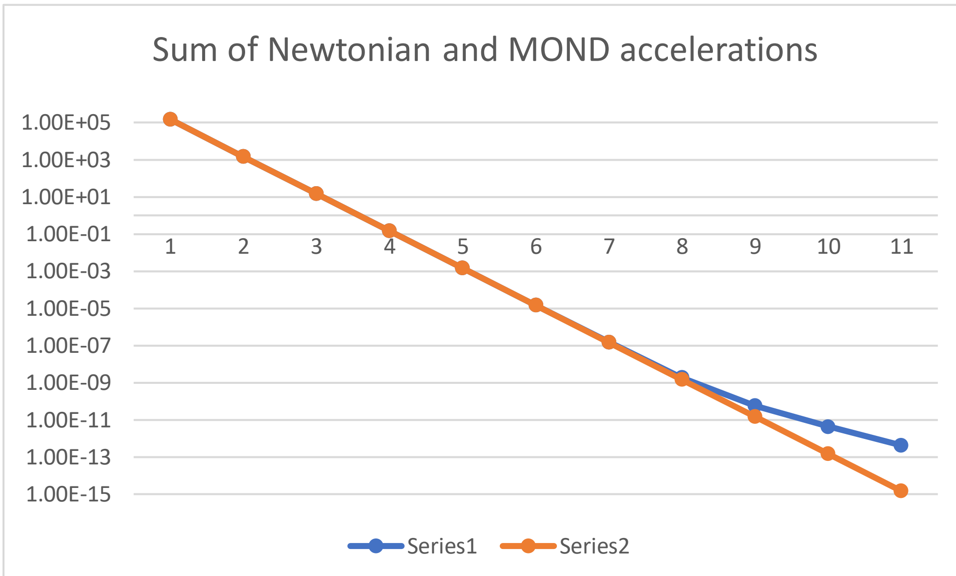
r				Values	Symbo
3.00E+07	one tenth	1.47E+05	4.21E-03	3.00E+08	c
3.00E+08	one	1.47E+03	4.21E-04	6.67E-11	G
3.00E+09	ten	1.47E+01	4.21E-05	1.99E+30	M
3.00E+10	hundred	1.47E-01	4.21E-06	1.20E-10	a_0
3.00E+11	thousand	1.47E-03	4.21E-07		
3.00E+12	ten thousand	1.47E-05	4.21E-08		
3.00E+13	hundred thousand	1.47E-07	4.21E-09		
3.00E+14	million	1.47E-09	4.21E-10		
3.00E+15	ten million	1.47E-11	4.21E-11		
3.00E+16	hundred million	1.47E-13	4.21E-12		
3.00E+17	billion	1.47E-15	4.21E-13		



Blue line is Newtonian acceleration

Brown line is MOND acceleration

At 3.51 x 10^6 light years, the accelerations due to Newton and MOND are the same.



Blue line is sum of Newtonian and MOND acceleration between two stars
Brown line is Newtonian acceleration
Note: Acceleration cannot drop below MOND acceleration

Conclusion: Newton's Law of Universal Gravitation quantifies the effect of the interaction of gravitons with mass. The effect of self-amplification of the counter-streaming graviton streams between stars adds to gravity but only makes a substantial difference in very weak gravitational fields.

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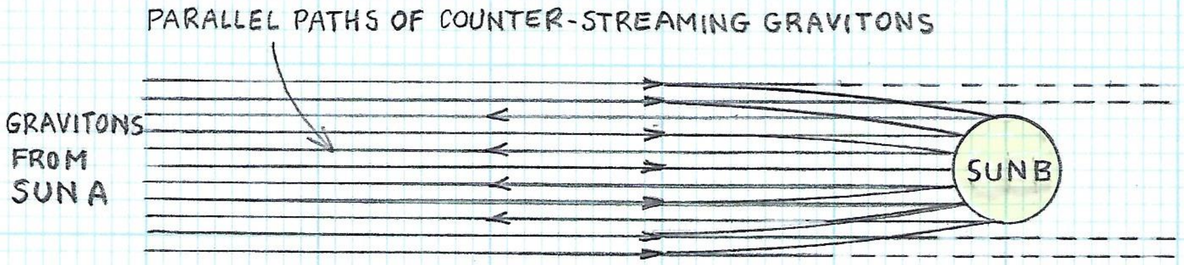

FIG. 1

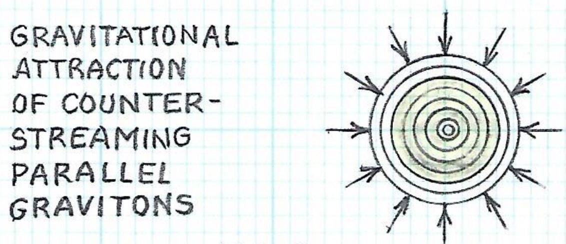

FIG. 2

References:

Ref. 1 **Graviton**, Theory; Wikipedia

Ref. 2 **Graviton**, Energy and wavelength; Wikipedia