Analogy of Weber's Formula for Gravitation may Explain Dark Matter, Dark Energy and Pioneer Anomaly

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Abstract

Weber's formula for the force of interaction between charged particles, which is a modification of Coulomb's law, may solve many of the paradoxes and puzzles in classical and relativistic electromagnetism. In this paper we propose modification of Newton's law of gravitation according to Weber's formula. This may solve many of the outstanding problems in cosmology such as dark matter, dark energy and the Pioneer anomaly.

Introduction

In my paper [1], I have proposed a new theory known as Apparent Source Theory that can explain many of the light speed experiments, such as the Michelson-Morley experiment, Sagnac effect, moving source, moving observer and moving mirror experiments and the Silvertooth experiment. However, I was unable to solve the problems of classical magnetism theory in terms of Apparent Source Theory.

This led me to adopt Weber's formula [2] , which is a modification of Coulomb's law. I have found Weber's formula promising, not only in view of the failure of classical and relativistic electromagnetism to resolve the puzzles of magnetism, but also because of its own successes [2]. Weber's formula gets rid of magnetic force as a separate phenomenon and explains it as a form of electrical force. However, Weber's formula cannot explain some exotic phenomenon such as the Biefeld-Brown effect, which is one of the profound predictions of Apparent Source Theory. Therefore, I have combined Weber's formula with Apparent Source Theory in my paper [1] .

I have proposed that gravity is an electrostatic phenomenon [1], based on interpretation of astronomical experiments, according to Apparent Source Theory. This assertion is also supported by the fact that gravitational and electrostatic forces have some common characteristics such as inverse square distance law and instantaneous action at a distance. Therefore, if gravity is an electrostatic phenomenon, then it is possible to formulate analogous Weber's formula for gravitation that may explain many of the problems in gravitation such as 'dark matter', 'dark energy' (or cosmological acceleration) and Pioneer anomaly.

Weber's formula

The Weber's formula for electrostatic attraction between two point charges is given by [2] :

$$F = \frac{Q_1 Q_2}{4\pi\varepsilon_0 r^2}\left[\ 1 + \frac{u^2}{c^2} - \frac{3}{2}\frac{\dot{r}^2}{c^2} + \frac{\vec{r}\,.\,\vec{a}}{c^2}\ \right]$$

where *u* is the relative velocity of the charges, *r* is the distance between the charges, $\dot{r} = \frac{dr}{dt}$

is the rate of change of distance between the charges, *a* is the relative acceleration of the charges.

We may formulate analogous formula for gravitation as follow.

$$F = G\frac{Mm}{r^2}\left[\ K_0 + K_1\frac{u^2}{c^2} + K_2\frac{\dot{r}^2}{c^2} + K_3\frac{\vec{r}\,.\,\vec{a}}{c^2}\ \right]$$

where $K_0 = 1$

The first term with coefficient K_0 is the usual Newton's law of gravitation. The second, third and fourth terms with coefficients K_1 , K_2 and K_3 , respectively, may be related to the cosmological phenomena of 'dark matter', Pioneer anomaly, Hubble’s law and 'dark energy ' .

Each component may cause an attractive or repulsive gravity depending on the sign of the respective coefficient.

The first component of the force, which is Newton's law of gravitation, varies inversely with the square of the distance *r*.

From Hubble's law we know that:

$$\dot{r} = Hr$$

where *H* is Hubble's constant.

Therefore, the third component of the force *F* will be:

$$G\frac{Mm}{r^2} * K_2\frac{\dot{r}^2}{c^2} = G\frac{Mm}{r^2} * K_2\frac{H^2 r^2}{c^2} = G\ Mm\, K_2\frac{H^2}{c^2}$$

This component is independent of distance *r* !

The acceleration due to this component is :

$$\frac{G\,\frac{H^2}{c^2}\,Mm\,K_2}{m} = G\ \ M\,K_2\frac{H^2}{c^2}$$

which is constant independent of distance !

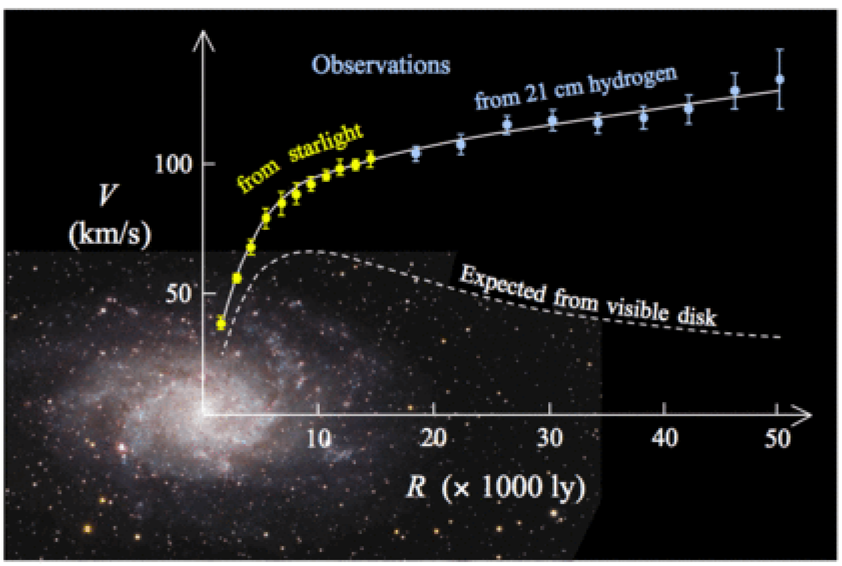
Therefore, the third component is related to Hubble's law.

The second component with coefficient K_1 may be related to the phenomenon of dark matter. Since the third and fourth components depend only on radial motion, they are zero for purely transverse motion, so they may be less related to dark matter, assuming that the velocity u in spiral galaxies is mainly transverse.

The second component must also be constant independent of distance r . This is because the velocities u and $\dot{r}$ in the second and third components, respectively, must have the same relationship with distance r, otherwise a contradiction will arise. Therefore,

$$u = Hr$$

where H is Hubble's constant. The constant H may be the slope of galaxy rotation curve, shown below.



So the second component of the gravitational force will be:

$$G\frac{Mm}{r^2}\ K_1\ \frac{u^2}{c^2}\ =\ G\frac{Mm}{r^2}\ \ K_1\ \ \frac{(Hr)^2}{c^2} = GMm\ \ K_1\ \ \frac{H^2}{c^2}$$

The acceleration due to the second component is:

$$\frac{GMm\ \ K_1\ \ \frac{H^2}{c^2}}{m}\ =\ \ GM\ \ K_1\ \ \frac{H^2}{c^2}$$

which is constant.

Therefore, Hubble's constant may also be related to dark matter.

Observations show that the red shift of distant galaxies deviates from Hubble's law. Perhaps the fourth component with coefficient K_3 may be somehow related to dark energy.

As we have noticed so far, the first component varies inversely with r^2, the second and the third components are constant independent of r. The fourth component may be some function of r.

The fourth component is given by:

$$G\frac{Mm}{r^2}\ K_3\ \frac{\vec{r}\,.\,\vec{a}}{c^2}$$

For receding motion, the fourth component can be written as:

$$G\frac{Mm}{r^2}\ K_3\ \frac{r\ a}{c^2}$$

For example, for the fourth component to be proportional to r , the acceleration must be a function of distance as follows:

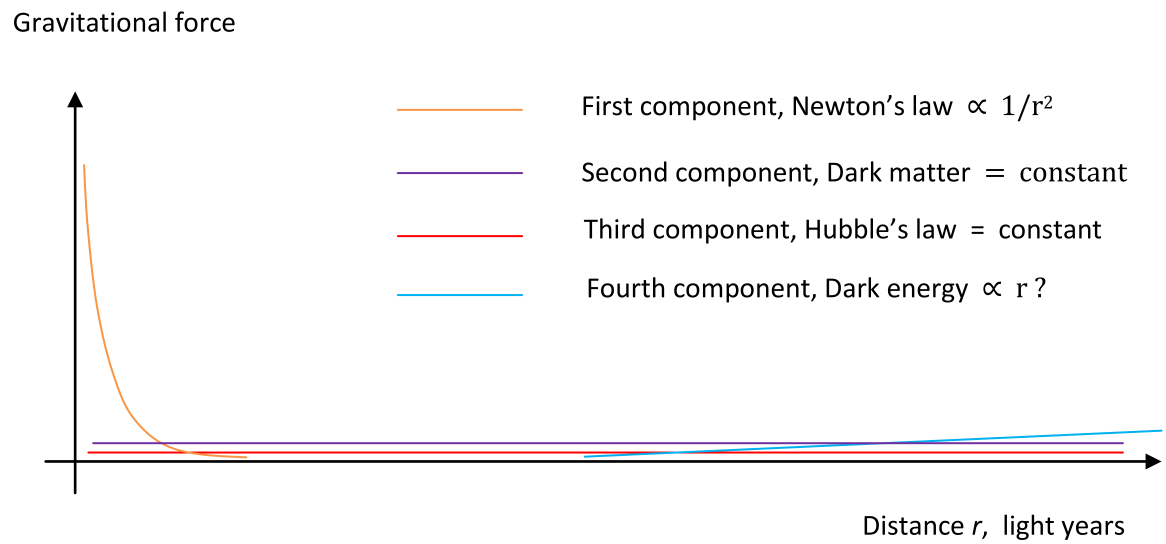
$$a\ \propto\ \ r^2$$

$$\Rightarrow a =\ b_2\, r^2$$

where b_2 is some constant.

The four components of gravitation act at different distances. Newton's law of gravitation will act up to some distance, diminishing towards zero at sufficiently large distances. Then the second and third components take over, both of which are constant independent of distance. Finally, at great cosmological distances, the fourth component will dominate.

What about the Pioneer anomaly ? Since an unexplained attractive force has been observed in the Pioneer anomaly, it may be related to the second component, which is also responsible for dark matter. Since we have stated above that Hubble's constant may also be connected with dark matter, it must be connected with the Pioneer anomaly also.



Conclusion

We have seen how Weber's formula can be applied to gravitation to solve many of the outstanding problems in cosmology, such as dark matter, dark energy and Pioneer anomaly. In this paper we have presented only a preliminary qualitative treatment. However, we have seen that this approach is promising to resolve these long standing problems in cosmology.

Thanks to God and His Mother Our Lady Saint Virgin Mary

References

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