ON DARK MATTER

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ABSTRACT

The subject of dark matter seems to have become a universal solution for any anomaly which arises in cosmology today forcing the proverbial square peg into a round hole. It was suspected that galaxies do indeed obey the conventional laws of Kepler and Newton and subsequently a model was obtained so that a more thorough investigation could be made. Upon completion it immediately became apparent that a somewhat naïve interpretation of the rotational properties of galaxies has been used for decades and that the correct interpretation predicts exactly the rotational curve of spiral galaxies without any need for dark matter whatsoever.

Keywords: cosmology: observations — methods: observational — supernovae: general

1. Introduction

The creation of dark matter came about from observations made of stars by Vera Rubin[i] of distant galaxies in regard to their rotational velocities. It was found that the rotational curve was not a curve at all but rather a straight line. Stars near the center of the galaxy appeared to orbit around the central axis at the same velocity as stars in the outermost orbit. It was immediately compared to the orbits in the solar system which does not have the same properties and almost immediately decided that there must be something wrong with the laws of gravity or else there must be some invisible mass causing the anomaly. Over the following decades this invisible mass became more formally known as Dark Matter [DM]. The question however was never raised that just maybe the original assumptions that galaxies should rotate like solar systems was incorrect. This is in spite of the fact that the dynamics of galaxies are certainly nothing like that of solar systems.

2. Basic Theory

A galaxy differs significantly from a solar system inasmuch as in a galaxy the mass is distributed throughout its radius whereby a solar system has the greater part of the mass at its rotational axis, the star. Galaxies consist of an extraordinary number of stars making analysis of such a great number of data points extremely difficult without the power of modern computers. It is not sufficient to simply work the equations out on paper as the dynamics and the physical quantity of calculations becomes severely prohibitive.

Likewise simply assuming that galaxies do not obey the laws of physics is an unacceptable alternative. Despite this it is customary by many cosmologists to offer the explanation that galaxies do not conform to the laws of Kepler and new laws are needed. This explanation of course is not founded in fact and should be frowned upon by the scientific community. Unfortunately, this is not the case and it would seem that it is more convenient to just go with the flow, as it were, and jump on the bandwagon. This paper will prove without a shadow of doubt that indeed galaxies do conform to Kepler and Newton's laws and the basic laws of physics appear to have been overlooked.

The first consideration pertains to basic Newtonian mechanics. It has been suggested that galaxies have a "Halo" of DM which extends outwards for light years thereby affecting the orbits of stars within the galaxy. As any high school physics student knows this is certainly not how orbital mechanics works. To determine the velocity of the outermost star only the mass contained "within" its orbit can be used in the calculation any mass or "Halo" is effectively cancelled out. If there is any doubt about this a return to the basics of Newtonian mechanics is suggested. Consequently, the theory of a "Halo" of anything can immediately be ruled out. All that is left is the galaxy itself and if DM did actually exist it must therefore be contained within the radius of the outmost star, inside of the galaxy and indistinguishable from the existing mass. It will be shown however that no additional mass is actually needed and that the assumption that galaxies do not obey the laws of Kepler and Newton is simply nonsense. In order to prove this all that is required is a galactic model which can be obtained from NASA, a couple of equations, a computer, software and time to perform the tens of thousands of calculations.

To begin with, the simplest part of all is the equations;

$$v_e{}^2 = \frac{2GM}{r} \text{ and } v_e = \omega\sqrt{2} \qquad (1)$$

The equations in (1) are that of Schwarzschild to calculate escape velocity and the mathematical relationship between escape and orbital velocity. These two equations can be combined to produce;

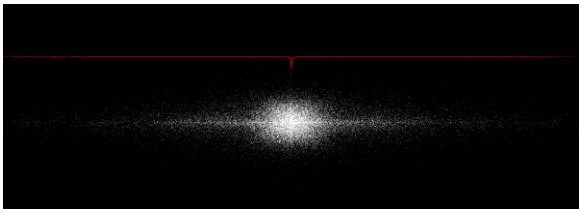
$$\frac{GM}{r} = \omega^2 \qquad (2)$$

This produces the basic equation to calculate the orbital velocity of each star.

Having sorted out the mathematics the model of an orbital galaxy was obtained from NASA which contained almost 50,000 stars. Software was then created to calculate the orbital velocity of each of the stars using only the mass contained within their orbits. The mass of each of the stars was assumed to be on average the same value.

The software was left to run to completion inasmuch as the velocities of each and every star in the model were calculated. The results of the calculation were then mapped dynamically onto the simultaneously created model of the galaxy relative to each stars position in the x-axis.

The results were exactly as anticipated there was no rotational curve the orbital rotational velocity of all of the stars was essentially flat.



The red line shows the rotational velocity of each of the almost 50,000 stars in the model. It should be noted that the to aid the comparison between the rendered galaxy and the velocity the red line representing the velocities was offset in the y-axis, what is more important is the linearity of the velocities.

It should also be taken into consideration that the model supplied by NASA is an actually ideal spiral galaxy in three dimensions whereas if the coordinates of a particular galaxy were available then there would be small variations. However on average the calculation of velocity would be identical and would be linear.

It should also be noted that if the average of the velocities of the outermost stars is calculated eventually the velocity would decrease, inasmuch as the velocity tapers off at a greater distance from the central axis.

3. Summary and Conclusions

Being that the results of the analysis predict exactly the observations, the question should now be asked why DM is required. It would also certainly appear that the current consensus that galaxies do not obey Kepler's law is without foundation and as such should be revised. The results also suggest that the initial presumption that the dynamic properties galaxies should be treated in the same manner as the properties of a solar system also seems to be erroneous.

4. References

Many thanks to NASA for the supply of the spiral galaxy model used in this presentation

[i] *Rubin, V.; Thonnard, N.; Ford, W. K. Jr. (1980). "Rotational Properties of 21 Sc Galaxies With a Large Range of Luminosities and Radii from NGC 4605 (R=4kpc) to UGC 2885 (R=122kpc)". The Astrophysical Journal. **238**: 471–487.*