Title -
General Relativity eliminates Dark Energy, Dark Matter and Universal Expansion

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Abstract -
This letter is suggesting that dark energy, dark matter and universal expansion are intimately related. However, they aren't viewed as revolutions in cosmology which are essential to a complete understanding of the modern universe. They are instead viewed as properties which need to be added to the cosmos when Einstein's theory of gravity (General Relativity) is apparently still not thoroughly comprehended a little over a century since it was published.

Keywords -
Universal expansion, dark energy, dark matter, General Relativity

Letter to the Editor -

General Relativity says gravity is a push exerted by the curvature of space-time. "(Bodies) merely follow the line of least resistance through the hills and valleys of the curved space that surrounds other bodies. Objects that fall to the earth, for example, are not "pulled" by the earth. The curvature of space-time around the earth forces the objects to take the direction on toward the earth. The objects are pushed toward the earth by the gravitational field rather than pulled by the earth." (1) (I've also heard the modern
physicist Michio Kaku agree that gravity is a push.)

So the Dark Energy giving the universe a push just doesn't seem necessary. Why doesn't the push of gravitation simply replace the push of dark energy ... and continue to expand the universe? This question relates to the entire universe, not merely our gravitationally-bound local part of it. The acceleration known as cosmic expansion is offset by the relativistic proposal that the space-time composing the cosmos IS gravitation. According to James Overduin, a physicist at Towson University in Maryland, USA who specializes in gravitation - gravity is just another term for the curvature of space-time. (2) In astrophysics, gravitational redshift or Einstein shift is the process by which electromagnetic radiation originating from a source that is in a gravitational field is reduced in energy and in frequency, or redshifted. Since gravity is just another term for the curvature of space-time, the gravitational field which electromagnetic radiation originates from - see letter's final two sentences - is not limited to a particular galaxy or galaxy cluster but spans (indeed, is) the whole of space-time, in agreement with general relativity.

The further away a galaxy is, the greater is the amount of gravitation which any electromagnetic radiation has to traverse. So the electromagnetism weakens more than expected and the gravitational redshift, which is larger than anticipated, naturally increases with distance. All of the distance-indicating redshift not due to the Doppler effect is always grounded in gravity and is gravitational redshift. It never indicates universal expansion, which would make it what is called cosmological redshift and would require space-time and gravitation to be separate things. This gravitational redshift can be applied to anything and everything, including the type 1a supernovae used by the Supernova Cosmology Project and the High-Z Supernova Search Team when they supposedly discovered accelerating expansion of the universe in 1998 (they compared the stars' brightnesses with their measured redshifts, and attributed the apparent expansion to dark energy). (3) Dark Energy is only required if we continue clinging to the Newtonian view that, instead of pushing objects together, gravity is a mysterious force whereby objects pull themselves together.

Nor does Dark Matter seem to be necessary. The first formal inference about the existence of dark matter (4,5,6,7) said that some unseen matter provided the mass and associated gravitation to hold the Coma cluster of galaxies together. A minority of astronomers, motivated by the lack of conclusive identification of dark matter, or by observations that don't fit the model, argue for various modifications of the standard laws of general relativity (eg, 8). A galaxy or galaxy cluster would indeed tend to fly apart if its gravitation is considered to be a pull from its centre that weakens with the distance to its edge.* But thinking of general relativity's definition of gravity as a push means the galaxy's or cluster's edges are being accelerated towards its centre** (this is offset by the orbiting speeds of outlying
stars), thus holding it together.

* The inverse-square law says that if stars A and B emit light of equal intensity but star B is twice as distant, it will appear one quarter as bright as star A i.e. as the inverse square of 2 (1/4).
It also says the gravity between any 2 objects is only one quarter as strong if the distance between the objects doubles.

** Since gravity is the weakest force in the universe, it's entirely reasonable to think that this acceleration towards the centre requires the 10^36 times more powerful electromagnetic force. In that

case, the phrase in the second paragraph "the gravitational field which electromagnetic radiation originates from" could be interpreted as G (gravitation) and EM (electromagnetism) constituting a unified GEM force.

REFERENCES

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(2) "What If There Were No Gravity?" by Natalie Wolchover | January 9, 2012 <https://www.livescience.com/17809-gravity.html>

(3) Overbye, Dennis (20 February 2017). "Cosmos Controversy: The Universe Is Expanding, but How Fast?". New York Times

(4) Some details of Zwicky's calculation and of more modern values are given in Richmond, M., Using the virial theorem: the mass of a cluster of galaxies, retrieved 10 July 2007
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(6) English translation by David Parker, August 2014 - (http://spiff.rit.edu/classes/phys440/lectures/gal_clus/zwicky_1933_en.pdf)

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Astrophysical Journal, vol. 86, p.217, 10/1937, a second paper by Zwicky, was more widely read

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