

Dark Matter May Be Light

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(Dated: September 8, 2025)

We attempt to provide a theoretical basis for Renzo's Rule in order to clarify a long-standing misunderstanding in physics and conjecture that Photons are Dark Matter.

Keywords: Renzo's Rule, Photon Mass, Dark Matter

I. MISUNDERSTANDING SPECIAL RELATIVITY

We conjecture that the theory that photons have zero mass is not completely true. If a photon is traveling along the z axis, then the photon's energy looks like momentum in the (t,z) plane. But what about the (t,x) and (t,y) planes? Since these planes are at rest, photon energy in these planes looks like mass see figure(1). Furthermore, if we tilt the (t,z) plane by theta from the z axis, then the Einstein Energy-Momentum equation in the tilted plane looks like equation (1). It is well-known that computing the gravity of a photon requires a correction factor. It follows that gravity only acts on energy that looks like mass.

$$E^2 = \cos(\theta)^2 * \vec{P}^2 c^2 + \sin(\theta)^2 * m^2 * c^4 \quad (1)$$

II. PHOTONS ARE DARK MATTER

We conjecture that photons are dark matter and we use a simple model to help understand why photons are dark matter (see Figure 2). Near (or in) a galaxy cluster, photons have high luminosity but the photons are not collinear rather they are chaotic. We would expect these photons to contribute to the energy of the cluster, but the apparent mass of the photons would be less than normal matter due to the averaging of the incoherent photon masses. Near Earth, the photons that we see from a galaxy cluster are collinear but very dim. Here we do not expect the photons received at earth to have much if any effect.

The Dark Matter band is where we expect to see the dramatic effects of photon mass. Note that this dark matter band encloses the galaxy cluster forming a shell. This band starts as the photons reach sufficient collinearity and ends as the luminosity is no longer sufficiently high. The emergent mass of photons appears when many momentarily comoving reference frames (MCRFs) combine their gravitational effects to produce a substantial

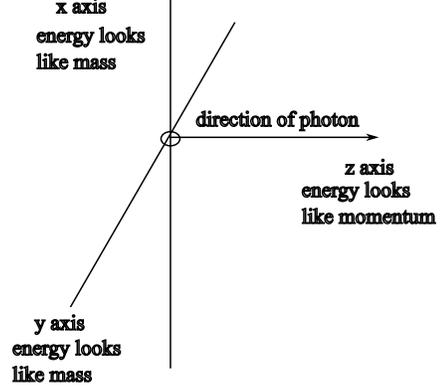
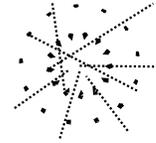


FIG. 1. What photon energy looks like.

Galaxy Cluster



Dark Matter Band



Earth

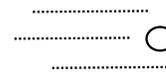


FIG. 2. Three regions showing different effects of Dark Matter.

photon mass. We call this Emergent Photon Mass. As the luminosity declines outside this band, the emergent photon mass declines.

We expand the dark Matter Band shown in Figure(3). Because this region has both collinear photons and high luminosity, there are a substantial number of photon masses effecting a star passing through this region. In

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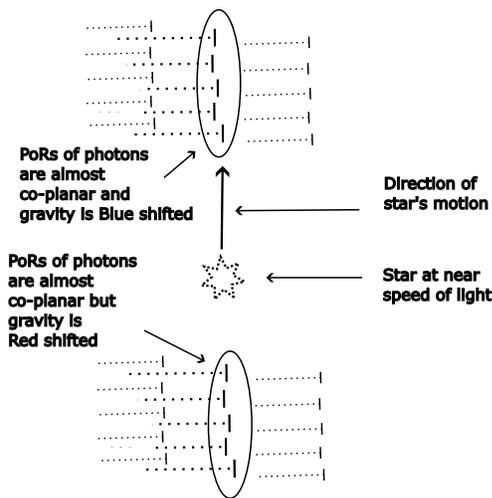


FIG. 3. Showing how emergent gravity could accelerate stars.

addition, because gravity experiences shifts, the gravitational force of the mass in front of the star is greatly increased due to gravitational blue shift while the gravitational force of the mass behind the star is greatly reduced by red shift. As a result, the star experiences acceleration in its direction of travel. This agrees with the fact that stars tend to be moving faster than expected around Galaxies. The fact that this emergent mass depends on luminosity agrees with Renzo's Rule [3] which states that light and dark matter correlate. It also agrees with the Tully-Fisher relationship [4].

The gravitational effect of photons at distance is greatly weakened at distance by the $\sin(\theta)$ factor. See equation (2).

$$F = \sin(\theta)G \frac{Mm}{R^2} \quad (2)$$

Denoting the distance of closest approach by A , we get equation (3).

$$F = \sin(\theta)G \frac{Mm}{R^2} = \frac{A}{R}G \frac{Mm}{R^2} = G \frac{MmA}{R^3} \quad (3)$$

At the photon's point of closest approach to a body of mass will find the body of mass in the Plane of Rotation

(PoR) of the Photon and thus experiencing maximum gravitation. The photon could account for a virtual particle suddenly appearing and disappearing as it flies by at light speed. This suggests that photons could account for dark energy. We believe that photons could be considered as WIMPs since photons are weakly interacting (weaker than normal Newtonian Gravity by the $\sin(\theta)$ factor) and transparent.

We expect that a test for dark matter might be performed here on earth. Dark matter band could be simulated using a laser or a bright light source focused to have collinear beams. The star traveling at high speed could be simulated with a beam of particles. The particle beam would be expected to come out of the Laser beam going faster than when it went in.

III. CONCLUSIONS

The belief that photons have zero mass is deeply embedded in the minds of physicists and their textbooks. Correcting this misconception provides immediate insight into some of the current open questions in physics. In particular, this understanding leads to a theoretical basis for Renzo's Rule.

IV. BIBLIOGRAPHY

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