

Light-matter interaction in Cosmic Dust

Thomas Prevenslik

QED Radiations, Discovery Bay, Hong Kong, China

thomas@nanoqed.org

Almost a century ago, Hubble's redshift measurements of light from distant galaxies marked the beginning of the notion that the Universe was expanding thereby supporting Einstein's GR theory, GR standing for general relativity. In the 1970's, redshift measurements of galaxy rotation curves showed a flat velocity profile in contrast to decreasing velocities predicted by Kepler's law, the high velocities suggesting dark matter was present to hold the galaxy together. Recently, GR was proposed [1] modified by scale invariance negating the need for dark matter necessary to hold the galaxy together. But scale invariant GR requires the large scale Universe to be empty space without mass – an unrealistic condition, let alone unverifiable by the scientific method.

An alternative theory in the negative that may be verified is: dark matter does not exist [2] because cosmic dust that permeates the Universe redshifts galaxy light thereby overstating the recession and rotational velocity of galaxies to give the impression the Universe is expanding faster than expected and dark matter is required to hold rotating galaxies together.

The redshift in cosmic dust went unnoticed for almost a century because the light-matter interaction of galaxy light was assumed to follow classical physics allowing the heat capacity of the nanoscopic dust to conserve the galaxy photon by an increase in temperature. But the heat capacity of the atom given by the Planck law of QM is not scale invariant being finite at the macroscale while vanishing at the nanoscale. QM stands for quantum mechanics. Conservation of the galaxy photon is therefore only possible by a non-thermal light-matter interaction mechanism proposed herein to be simple QED as illustrated in Figure 1.

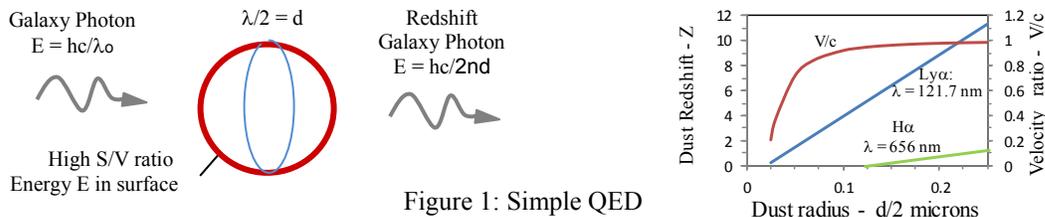


Figure 1: Simple QED

Simple QED relies on the high S/V ratio at the nanoscale whereby the galaxy photon of wavelength λ_o is absorbed almost entirely in the dust surface placing internal atoms under the high EM confinement necessary in the Planck law of QM for heat capacity to vanish. S/V stands for surface to volume. A non-thermal EM standing photon having half-wavelength $\lambda/2 = d$ is then created as the galaxy photon energy adjusts to the EM confinement bounded by the dust surface. The speed of light c corrected for the refractive index n of the dust gives the energy E of the redshift photon, $E = h(c/n)/\lambda$ for a wavelength $2nd$ and redshift $Z = (2nd - \lambda_o)/\lambda_o$. Once the energy of the galaxy photon absorbed in the dust surface is expended to form the standing photon, the EM confinement vanishes and the galaxy photon now redshifted is free to travel to the Earth. Figure 1 shows the redshift Z for Lyman and hydrogen - alpha galaxy photons in cosmic dust may approach the speed of light significantly overstating galaxy velocities. However, by correcting measured galaxy redshifts for cosmic dust, not only does dark matter need not exist, but both GR and scale invariant GR are irrelevant as galaxy dynamics follows Newtonian mechanics.

References

[1] A. Maeder, ApJ vol, 834 194 (2017).

[2] T. Prevenslik, Nanoscale applications of simple QED at www.nanoqed.org (2010-2018).