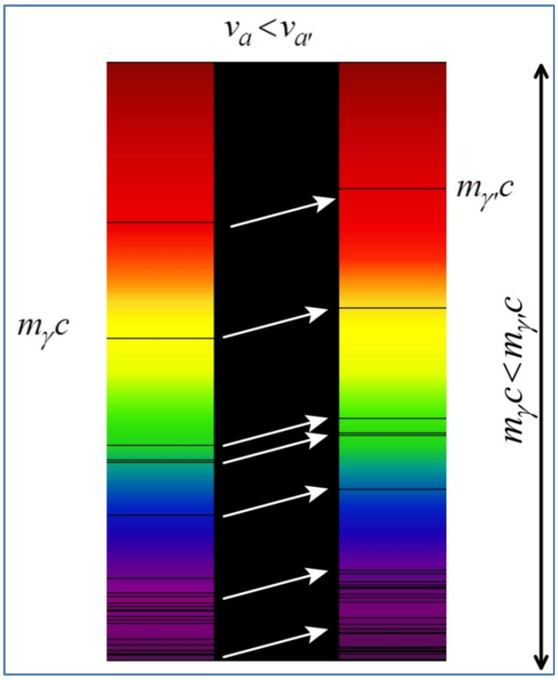
QGD interpretation of the redshift effect

Quantum-geometry dynamics tells us that the energy of a photon is given by $E_\gamma = \sum_{i=1}^{m_\gamma} \left\| \vec{c}_i \right\| = m_\gamma c$ were $\vec{c}_i$ is the momentum vector of a component $preon^{(+)}$. The energy of a photon is proportional to its mass.



Applying the laws of transfer of momentum for a photon γ to a particle, structure or other target a, we find that the momentum transferred is $\left\| \Delta \vec{P}_a \right\| = (c - v_a) m_\lambda$ where v_a is the intrinsic speed of a relative to γ . For a second photon γ' coming different direction but where $m_{\gamma'} = m_\gamma$ but $\vec{P}_{\gamma'} \neq \vec{P}_\gamma$, then $(c - v'_a) m_\gamma \neq (c - v_a) m_\gamma$ and the different in the momentum imparted is given by $(v_a - v'_a) m_\gamma$. That is: $\left\| \Delta \vec{P}_{a_{\gamma'}} \right\| < \left\| \Delta \vec{P}_{a_\gamma} \right\|$.

If the light from a is used as a reference then if $v_a < v_{a'}$ then we would observe a redshift of the absorption band. If $v_a > v_{a'}$ then we would observe an blueshift of the absorption band (figure on the right).

Therefore, we have shown that QGD explains the observations of shift in absorption bands (and emission bands since allowable changes in momentum obey the same laws) and does so using a model of light that is singularly corpuscular. Unlike the wave-particle model, QGD's mechanisms of the redshift and blueshift effect conserve energy since $\sum_{i=1}^{m_a} \left\| \vec{c}_i \right\| + \sum_{j=1}^{m_\gamma} \left\| \vec{c}_j \right\| = \sum_{i=1}^{m_a + m_\gamma} \left\| \vec{c}_i \right\|$.

It is important here to keep in mind that the speed v_a and $v_{a'}$ are the intrinsic speed of the atomic electrons from the sources and not the speed of the sources themselves. If to a given quantum state of an atomic electron corresponds a specific momentum, then the shift must be due difference in the speed of the sources themselves. That is $v_a = v_{e^-} + v_x$ and $v_{a'} = v_{e^-} + v_{x'}$ where x and x' are the astrophysical bodies emitting the light so that $\left(c - \left(v_{e^-} + v_x\right)\right) m_\gamma = \left(c - \left(v_{e^-} + v_{x'}\right)\right) m_{\gamma'}$.

QGD's description is consistent with the observation of the redshift and blueshift, yet there are important distinctions. For instance, since the energy of a photon is intrinsic, it is independent of the frame of reference in which it is emitted, travels or absorbed.

Also, the laws and mechanisms used to describe and explain the redshift effect also explain all other optical effects, even the observed fringe patterns in double-slit experiments and that without the wave-particle duality concept.

The Measurement of Physical Properties and Frames of Reference

According to QGD:

- m_a, the mass of an object a, is equal to the number of $preons^{(+)}$ that compose it;
- E_a , its energy, is equal to its mass multiplied by the fundamental momentum of the $preon^{(+)}$; that is: where $\vec{c}_i$ is the momentum vector of a $preon^{(+)}$ and $c = \|\vec{c}_i\|$ is the fundamental momentum, then $E_a = \sum_{i=1}^{m_a} \|\vec{c}_i\| = m_a c$.
- $\vec{P}_a$, the momentum vector of an object, is equal to the vector sum of all the momentum vectors of its component $preons^{(+)}$ or $\vec{P}_a = \sum_{i=1}^{m_a} \vec{c}_i$ and P_a , its momentum, is the magnitude of its momentum vector. That is: $P_a = \|\vec{P}_a\| = \left\| \sum_{i=1}^{m_a} \vec{c}_i \right\|$ and finally
- v_a , its speed, is the ratio of its momentum over its mass or $v_a = \frac{P_a}{m_a} = \frac{\left\| \sum_{i=1}^{m_a} \vec{c}_i \right\|}{m_a}$.

All the properties above are intrinsic which implies that they are qualitatively and quantitatively independent of the frame of reference against which they are measured. We must however make the essential distinction between the measurement of a property of an object and its actual intrinsic property.

Take for instance the speed of light which we have derived from the fundamental description of the properties of mass and momentum and shown to be constant. That is: $v_\gamma = \frac{P_\gamma}{m_\gamma}$ and since, for momentum vectors of photons all point in the same direction we have $P_\gamma = E_\gamma$ and $v_\gamma = \frac{P_\gamma}{m_\gamma} = \frac{E_\gamma}{m_\gamma} = \frac{m_\gamma c}{m_\gamma} = c$.

If we were to experimentally measure the speed of light, or more precisely, the speed of photons, we would set up instruments within an agreed upon frame of reference. We would map the space in which the measurement apparatus is set and though the property of speed is intrinsic, thus independent of the frame of reference, the measurement of the property is dependent on the frame of reference. But if, as we know, the speed of light has been observed to be independent of the frame of reference, then how can this be reconciled with QGD's intrinsic speed?

Before moving forward with the experiment it is important to consider what it is that our apparatus actually measures. Speed is conventionally defined as the ratio of displacement over time, that is $v = \frac{d}{t}$ where d the distance is and t is time. Space and time here are considered physical dimensions and as a consequence the conventional definition of speed is never questioned.

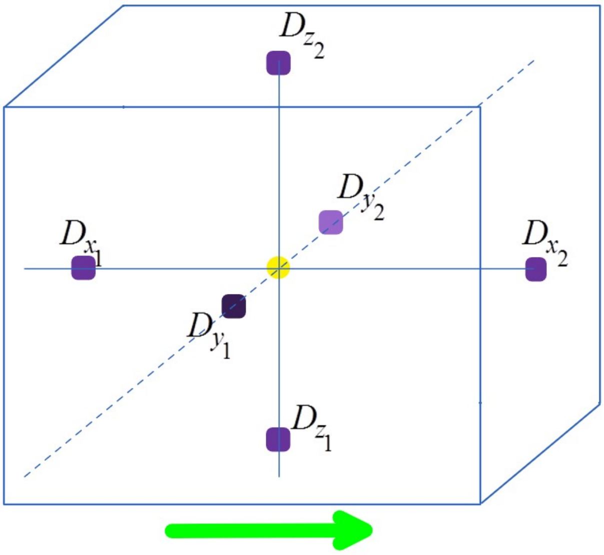
Distance can be measured by something as primitive as a yard stick and its physicality is hard to argue with. Time and its physicality pose serious problems. Time is assumed to be measurable using a clock of some sort but, it is easily shown that clocks are simply cyclic and periodic systems linked to counting devices and they do not measured time but merely count the number of repetitions of arbitrarily chosen states of these systems.

So conventional speed in general, and that of light in particular, is simply the distance in conventional units something travels divided by the number of cycles a clock goes through during its travel. Therefore the conventional definition of speed of an object, which is the ratio of the distance travelled by an object over the number of cycles, is not the object's speed, but of the distance travelled between two cycles. That goes for the speed of photons.

There is a relation between conventional speed and intrinsic speed and we find that the conventional speed of a photon is proportional to its intrinsic speed, that is $\frac{d}{t} \propto v_\gamma$, but while conventional speed is relational (and not physical since time itself is not physical) , the intrinsic speed is physical since it is derived from momentum and mass, both of which are measurable, hence physical.

Now going back to frames of reference, let us assume a room moving at an intrinsic speed v_a . A source of photons is placed at the very centre of the room which photons are detected by detectors placed on the walls, floor and ceiling. The source and detectors are linked are in turn linked to a clock by wires of the same length. The clock registers the emission and the reception of the photons in such a way that we can calculate the conventional speed of photons. For now, we will assume that the direction of motion of the room is along the x axis.

QGD predicts that even though the intrinsic speed of photons is reference frame independent, their one way conventional speed to detector D_{x_1} will be larger than their one way conventional speed at the detector D_{x_2}. The relativity theory predicts that the conventional speed of photons will be the same at both detectors independently of v_a. So all that is needed to test which theory gives the correct prediction is to make one way measurements of the conventional speed of photons. Problem is; all measurements of the speed of light are two way measurements and since any possible contribution of v_a to the conventional speed of photons traveling in one direction is cancelled out when it is reflected in the other direction. In other words since both QGD and the relativity theory predicts the two way measurements will be equal at D_{x_1} and D_{x_2} such experiments cannot distinguish between QGD and the relativity theory.



However, a similar experiment which measures not speed but momentum can distinguish between the theories. The photons at detector D_{x_2} will be redshifted while those at D_{x_1} would be blueshifted. Both theories predict $P_{D_{x1}} > P_{D_{x2}}$ but their predictions for the other detectors are different.

Assuming that the room's motion is align with the x axis[9], the relativity theory predicts that $P_{D_{x1}} > P_{D_{y1}} = P_{D_{y2}} = P_{D_{z1}} = P_{D_{z2}} > P_{D_{x2}}$. For the same experiment the QGD theory predicts $P_{D_{x1}} = P_{D_{y1}} = P_{D_{y2}} = P_{D_{z1}} = P_{D_{z2}} > P_{D_{x2}}$.

If QGD's prediction is verified, then the intrinsic of the frame of reference can be calculated using the equations we introduced earlier to describe the redshift effect. That is; from our description of the redshift effect, we know that $P_\gamma = \Delta P_{D_{x1}}$ then we have $\frac{c - v_a}{c} m_\gamma = P_\gamma - \frac{v_a}{c} = P_{D_{x1}} - \frac{v_a}{c} = P_{D_{x2}}$ and $v_a = \left(P_{D_{x1}} - P_{D_{x2}}\right)c$.

Once the intrinsic speed of a reference system is known, then it can be taken into account when estimating the physical properties of light emitting objects from within it.

[9] The alignment with the x axis is found by rotating that detector assembly so that the D_{x_2} detector measures the lowest momentum (largest redshift).

QGD's description of the redshift effect implies distinct predictions for all observations based on redshifts measurement but I would like to bring attention to one direct consequence which has been confirmed by observations; the observed orbital speed of stars around their galactic centers .

Quantum-Geometrical Space and Coordinate Systems

The nature of quantum-geometrical space allows us to have a direct correspondence between every individual $preon^{(+)}$ that forms it and the points of reference systems. We can arbitrarily choose a system of axis and their origin, but such choice does not in any way affect the measurements of physical properties or position of an object in quantum-geometrical space. All such reference systems are equivalent only requires the necessary changes in coordinates. So not only are the determination of physical properties from measurements independent of the frame of reference used, but also is their positions.

The Measurement of the Rotation of Galaxies and Redshifts

We have shown that the redshift effect is dependent on the speed of the detector relative to the intrinsic speed of the photon. This provides a very different interpretation of the redshift observations from distant galaxies. The usual theoretical interpretation of the redshift, as dependent on the motion of the source relative to the detector is used to measure the speed of distant objects, including the rotation speed of galaxies.

The classical interpretation of the redshift gives speeds of rotation that are not in agreement our best theories of gravity which predicts the nearer star are to its galactic center, the greater their speeds should be. But that is not what was observed.

The orbital speeds of stars, estimated from their redshifts, are about the same regardless of their distance from their galactic centre. This led to the introduction of dark matter models to explain the discrepancy between predictions and observations. QGD does not dispute the existence of dark matter which existence it predicts and is supported by a number of observations that do not depend on redshifts measurements. However, QGD shows that the redshifts from all stars from a galaxy will be the same independently of their speed. In other words, even if their actual orbital speeds are in agreement with our theories of gravity, their redshifts will be the same. Hence the orbital speeds of stars derived from the accepted redshift interpretation will give similar speeds in agreement with observations.

Prediction

QGD predicts that the angular and axial speeds of stars estimated through their parallax will show them to be dependent on their distance from the galactic center. GAIA , which is underway, will be making such observations which could confirm QGD's prediction.

Distances and Intrinsic Luminosities of 1a Supernovas

First we need to choose a reference type 1a supernova with the largest blueshift and measure its distance d_{ref} from it parallaxes so as to eliminate physical assumptions (such measurement will be possible using the data from the GAIA or similar mission). Based on QGD's explanation of the redshift effect, we understand that the electromagnetic emission from such a supernova is its intrinsic spectrum.

Once the distance is known, we can calculate its intrinsic luminosity using the formula $L_{ref} = Flux_{\gamma_{ref}} * 4\pi d^2$ where the $Flux_{\gamma_{ref}}$ is the number of photons γ_{ref} of a given momentum or energy (since these properties are numerically equal for photons).

In order to measure the distance of another type 1a supernova (*SN*) we must determine its redshift. The redshift is used here to determine the position on the redshifted spectrum of the supernova where we will find photons γ_{SN} that have the same intrinsic energy as the reference photons γ_{ref}. $Flux_{\gamma_{SN}}$ is the number of γ_{SN} photons.

If the luminosities of type 1a supernovas are comparable (the accepted assumption), that is: if $L_{ref} = L_{SN}$, then $L_{ref} = Flux_{\gamma_{SN}} * 4\pi d_{SN}^2$ and $d_{SN} = \sqrt{\dfrac{L_{ref}}{4\pi Flux_{\gamma_{SN}}}}$.

Derivation of the Intrinsic Speed of Earth from Type 1a Supernovas

Also, using QGD's description of the redshift effect, we can calculate $\vec{v}_a$, the intrinsic speed of the Earth (or that of any detector in space), using three non-coplanar reference supernovas.

Since $\left(\vec{c}_{\gamma_{SN_i}} - \vec{v}_{a_{SN_i}}\right) m_{\gamma_{SN_i}} = \Delta\vec{P}_a$, then $\vec{v}_{a_{SN_i}} = \vec{c}_{\gamma_{SN_i}} - \dfrac{\Delta\vec{P}_a}{m_{\gamma_{SN_i}}}$ and

$\vec{v}_a = \vec{v}_{a_{SN_1}} + \vec{v}_{a_{SN_2}} + \vec{v}_{a_{SN_3}}$.

Conclusion

If QGD's explanation of the redshift effect is confirmed, then it will be possible to measure the intrinsic speed not only of the Earth (its absolute speed) but of other observable objects and from it, derive the values of other intrinsic properties such as momentum and mass.