Other Consequences of QGD's Gravitational Interaction Equation

Effects Attributed to Dark Matter

Another implication of the axiom set of QGD which will be discussed in detail in the cosmology section of this book follows what the initial state of the universe it predicts. In its initial state, the only matter was in the form of free $preons^{(+)}$ which were isotropically distributed throughout quantum-geometrical space.

During the isotropic state, $preons^{(+)}$, as a consequence of the attractive force acting between them, started to form the simplest of all particles; low mass photons and neutrinos. And because $preons^{(+)}$ were distributed isotropically, so was the distribution of these newly formed photons. If QGD's description of the early stages of the universe is correct, then these isotropically distributed photons have been first observed in 1964 by Arno Penzias and Robert Wilson and correspond to the cosmic microwave background radiation.

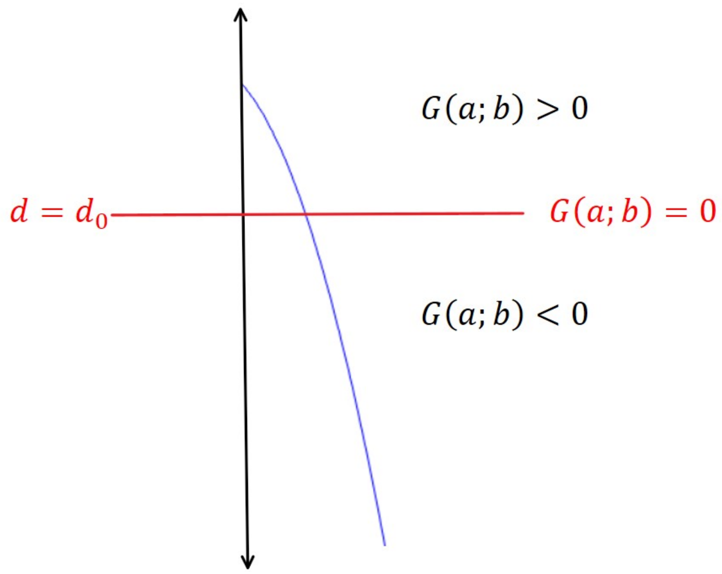
If, as QGD predicts, most $preons^{(+)}$ in the universe are still free, their gravitational effect on particles and structure may account for the dark matter effect.

That $preons^{(+)}$ interact too weakly with matter, hence with instrumentation, to be directly observed may explain why dark matter hasn't been detected directly. Individually, their mass is too small to have an effect on structures (or instruments) and their momentum insufficient to impart any measurable change in the momentum of larger particles or structures. But collectively, over a large enough regions of space, their cumulative mass will strongly interact with large structures or systems.

Effects Attributed to Dark Energy

QGD's equation for gravity allows for either attractive gravitational interaction, $G(a;b) > 0$ when $k > \frac{d^2+d}{2}$, and repulsive gravitational interaction, $G(a;b) < 0$ when $k < \frac{d^2+d}{2}$. For distances shorter than the threshold distance d_Λ where $k = \frac{d^2+d}{2}$, where $G(a;b) = 0$ regardless of m_a and m_b, p-gravity overcomes n-gravity , but at distances beyond d_Λ, gravity is repulsive and increases proportionally to the square of the distance. And acceleration being proportional to the derivative of gravity, QGD predicts a linear increase in acceleration as a function of distance.

QGD equation for gravity's prediction of repulsive gravity beyond the threshold distance may explain the acceleration we attribute to dark energy.



To resume, we have shown that the same equation 1., describes at very short distances the number of p-gravity interactions, hence the attractive gravity, is over a hundred orders of magnitude greater than gravity at large scale, 2., describes gravity at scales at which we apply Newtonian gravity, and 3., that at very large scale the equation accounts for the effect we attribute to dark energy.

It follows that for distances between material structures greater than the threshold distance d_Λ, and assuming there is no matter in the space that separates them, the gravitational interaction will be repulsive and proportional to the square of the distance beyond d_Λ, resulting in a gravitational acceleration proportional the distance.

We have also shown that the effect we attribute to dark matter can be the gravitational effect of free $preons^{(+)}$ over large regions of space.