How Does QGD Explain the Behaviour of Binary Systems?

by

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Note: The following assumes a basic understanding of quantum-geometry dynamics (QGD) as presented in An Axiomatic Approach to Physics.

General relativity explains that the decay of the orbits of binary systems results from loss of energy emitted as gravitational waves. Gravitational waves are key prediction of general relativity and though they have never been observed directly, the decay of the orbit of binary systems is understood to provide indirect evidence of their existence.

It is then understandable that the most common argument against quantum-geometry dynamics' exclusion the existence of gravitational waves comes in the form of the question: "How then can it explain the observed decay of the orbits of binary systems?"

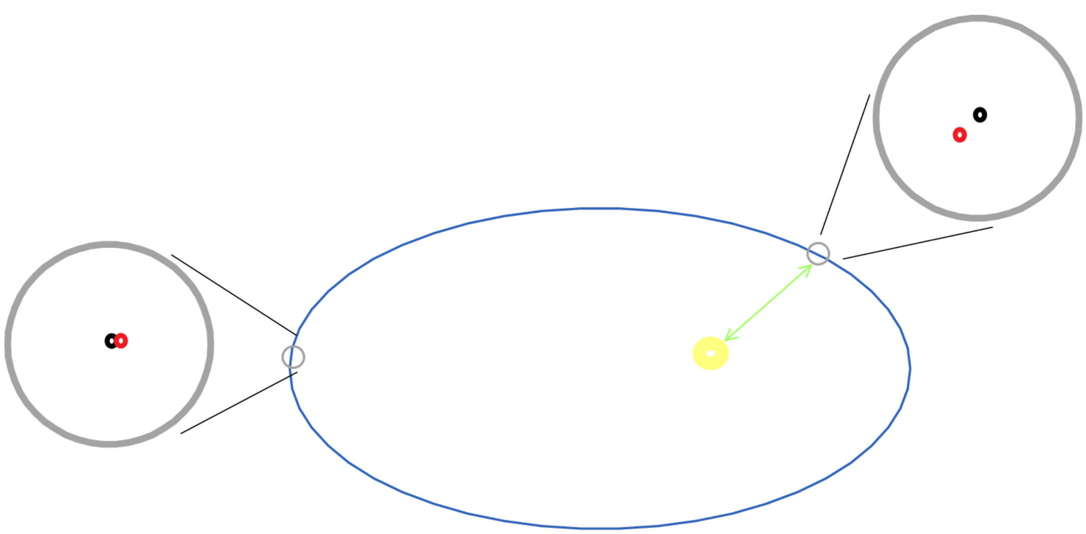
If QGD's description of gravitational interactions is correct, it must account for the behaviour of all gravitationally interacting systems and in particular the dynamics of binary systems.

We will explain here how the observations of the orbital decay of binary systems are consistent with the predictions of QGD.

The Dynamics of Gravitationally Interacting Bodies

From QGD's axiom set we have derived the equation $\left\|\vec{G}(a;b)\right\| = m_a m_b k - \sum_{\substack{i=1 \\ j=1}}^{\substack{m_b \\ m_a}} \frac{d_{i,j}^2 + d_{i,j}}{2}$ which describes the gravitational interaction between two bodies where $d_{i,j}$ the distance in $preons^{(-)}$ (the fundamental units of space) between a $p_i^{(+)} \in a$ and $p_j^{(+)} \in b$ and k is the proportionality constant between the magnitudes of the units of p-gravity and n-gravity, the only two fundamental forces predicted to exist by QGD (the derivation can be found in An Axiomatic Approach to Physics).

We also derived the simplified equation $G(a;b) = m_a m_b \left(k - \frac{d^2 + d}{2} \right)$ which for calculations over a small sequence of causally related states (to describe a few consecutive orbits, for example) is an excellent approximation. But large sequences of causality related states such as those that span the life of systems, the equation $\left\|\vec{G}(a;b)\right\| = m_a m_b k - \sum_{\substack{i=1 \\ j=1}}^{\substack{m_b \\ m_a}} \frac{d_{i,j}^2 + d_{i,j}}{2}$ must be used since the simplified QGD equation for gravity and Newton's law of gravity share the same flaw. They both define d as the distance between the centers of the masses which, for a homogeneous spherical object is assumed to be at their geometrical centers. When we use the simplified equation $G(a;b) \simeq m_a m_b \left(k - \frac{d^2 + d}{2}\right)$ to describe the orbit of an planet around a star or companion star in a binary system we would find that, like the Newtonian equation, it predict that the orbit will remain unchanged indefinitely. But when using $\left\|\vec{G}(a;b)\right\| = m_a m_b k - \sum_{\substack{i=1 \\ j=1}}^{\substack{m_b \\ m_a}} \frac{d_{i,j}^2 + d_{i,j}}{2}$ where $d_{i,j}$ is the distance between a $p_i^{(+)} \in a$ and $p_j^{(+)} \in b$ we find that $m_a m_b \frac{d^2 + d}{2} > \sum_{\substack{i=1 \\ j=1}}^{\substack{m_j \\ m_i}} \frac{d_{i,j}^2 + d_{i,j}}{2}$ so that the magnitude of the gravitational interaction between a and b is larger than that predicted by the simplified QGD equation or Newton's law of gravity. That is, if we assume that the center of gravity is a point within a body at which gravity acts as if its entire mass appears to be concentrated then the QGD equation predicts variable shifts of the relative centers of gravity of the bodies that is dependent on their geometrical distance. We find that the shorter the distance between their centers of mass, the greater the difference between from their centers of gravity and centers of mass.

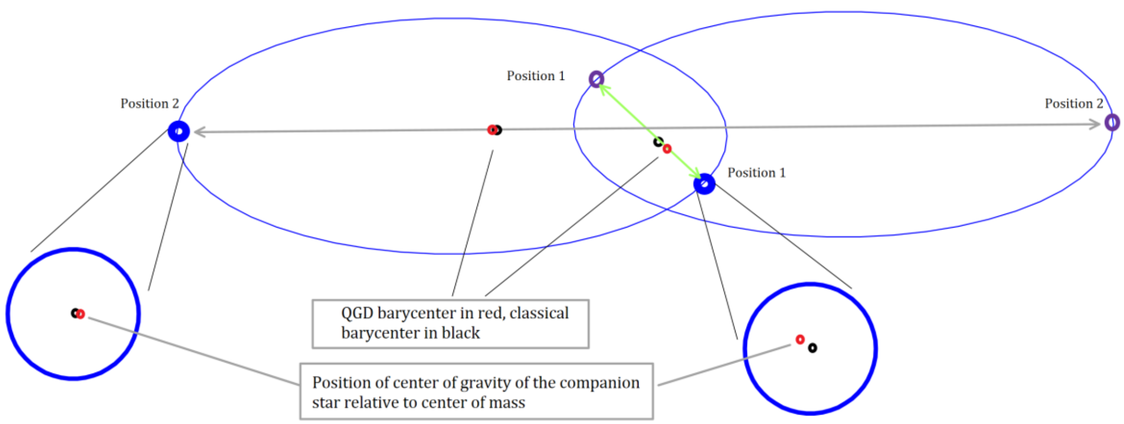


QGD predicted offset between of the center of gravity and center of mass of Mercury as a function of its distance from the sun. The center of mass are in black, the centers of gravity in red.

The figure above shows in red (greatly exaggerated) the shifts from the classical centers of mass at two positions along the orbit of body orbiting a large mass.

It follows that when using the simplified QGD equation for gravity or Newton's law of gravitation to predict $G(a;b)$, instead of the distance between the centers of mass d, we should use d_g the distance between the centers of gravity of a and b. At large distance, the difference in the predicted gravitational interaction between d and d_g can be small to negligible, but the value using d_g becomes significantly larger the closer to the periastron (or perihelion) a and b get. The larger than classically predicted gravity explains the precession of the periastron in binary systems (or any orbital system). In particular, it explains the precession of the perihelion of Mercury.

Also, using the centres of gravity to calculate the position of the barycenter of a system, we find it shifts from its classical position towards the more massive companion (see next figure).



QGD predicted shifts in the centers of gravity in a companion star of a binary system and shifts of centers of barycenter of the system.

We have shown that the observed decay of the orbits of a binary system and the precession of their periastron are perfectly consistent with QGD's description of binary systems.

Distinction between QGD's and General Relativity

Both QGD and general relativity can explain the observations of orbital systems but only QGD predicts the shift in the center of mass of a system (the shift is shown greatly exaggerated on the vector connecting the companions of a binary system in the above figure).

Observation of center of mass shifts in binary systems would confirm QGD's prediction and set it apart from general relativity.

Change in the Rate of Pulses of Binary Systems

QGD also explains the observed variations in the rate of pulses of the pulsar of binary system due to acceleration and gravity. This is explained in some detail in section 11 of An Axiomatic Approach to Physics, under the heading “Special and General Relativity Derivations from QGD.”