Star Gate Physics According to Einstein's 1916 Theory of General Relativity

Star Gates are traversable wormholes held open by anti-gravitating repulsive quantum vacuum virtual positive zero point energy density with equal and opposite negative pressure. When the negative pressure dominates the positive energy density we get the blue shifting universal repulsive field that prevents the pinching off of the wormhole allowing time travel even to the past. Evidence for this is found in the UFO data.

Einstein's theory in the weak field slow speed limit says that the bending power of any energetic source, real or virtual, is proportional to the energy density plus the sum of the pressures in the three directions of space.

$$\begin{aligned}\nabla^2 V_g &\approx 4p G\left(r + \frac{p_x}{c^2} + \frac{p_y}{c^2} + \frac{p_z}{c^2} \right) \\ &= 4p G\left(r + 3\frac{\langle p \rangle}{c^2} \right) \\ &= 4p G r \left(1 + 3w\right)\end{aligned} \qquad (1.1)$$

Where V is the Newtonian gravitational potential energy per unit test particle mass, G is Newton's gravitational constant, r is the effective source mass density, c is the vacuum speed of light, the averaged source pressure $\langle p \rangle$ is

$$\langle p \rangle \equiv \frac{1}{3}\sum_{i=x,y,z} p_i \qquad (1.2)$$

The source equation of state parameter w is

$$w \equiv \frac{\langle p \rangle}{r c^2} \qquad (1.3)$$

Therefore, when $w < -1/3$, the average source pressure $\langle p \rangle$ dominates the source energy density $r c^2$. In that counter-intuitive case, positive energy density antigravitates and negative energy density gravitates as if it were Cold Dark Matter (CDM) real particles whizzing through space. The gravity lensing and redshifts would look the same. You could only tell the difference by sending a probe directly to the dark matter region. When $w > -1/3$ the situation reverses and positive energy density gravitates as one expects in Newton's theory. Cold ordinary atoms have $w_{atoms} \sim 0$. Real photons forming radiation with only two polarization vibrations at right angles to their propagation direction have $w_{radiation} = +1/3$. All zero point vibrations isotropic in 3D space have $w = -1$ because of Lorentz group covariance of the laws of nature and the equivalence principle that we will discuss in more detail later. Virtual bosons of spin 0, 1, 2 in 3D space have positive zero point energy density and, therefore, they antigravitate inside the vacuum setting up a repulsive universal dark energy field. Virtual fermion-antifermion pairs of spin ½, 3/2 have negative zero point energy density because of the Pauli exclusion principle and, therefore, they gravitate attractively as dark matter. The big mystery is why there is so little zero point energy density. We shall see later that this is because of the macro-quantum cohering of the pre-inflation false vacuum into the GeoMetroDynamic (GMD) field for the fabric of curved torsioned spacetime at the moment of inflation leading to the hot Big Bang shown by the WMAP NASA space probe. This is the same kind of large-scale coherence that we see in superfluid helium, in electrical superconductors and in masers and lasers. The zero point fluctuations in a 2D quantum well and in a quantum wire are dominated by the boundary conditions as shown in the quantum electrodynamic Casimir force and so we cannot use the 3D $w_{zpf} = -1$ in those nanotechnology cases where the quantum statistics changes. We have fractional statistics, neither, fermion nor boson in 2D nanometer quantum wells, and we have fractional angular momenta analogous to quark electric charges of $\pm 1/3 \,\&\, \pm 2/3$ in the Fractional Quantum Hall Effect (FQHE).

Quantum field theory says there are two kinds of sources real and virtual. Real particles are excited states outside of the physical vacuum. They are said to be "on mass shell", this means that their total energy E is tied to its linear momentum p and its rest mass m by the Pythagorean theorem equation for a right triangle

$$E^2 = (pc)^2 + (mc^2)^2 \tag{1.4}$$

This implies that the particles actually move through space and that they can be detected directly. Technically, the Feynman propagator has a "pole in the complex energy plane" in the limit where gravity is not too large. Roger Penrose's book "The Road to Reality" has a good discussion of the background mathematics needed to understand these advanced physics commentaries. Virtual particles are "off mass shell" and do not obey the above equation. A virtual particle is inside the physical vacuum and can have any energy and any momentum. For example, Coulomb's law of electrostatics, in the rest frame of the electron says that the potential energy per unit test charge[1] e is separated from the source charge by distance r in flat space where gravity is small, is

$$V_e \approx -\frac{e}{r} \tag{1.5}$$

This is the result of the motion of virtual spacelike photons of infinite speed in the rest frame connecting the source and test charges. The photon's electric field vibrates longitudinally polarized along r. These virtual photons have zero energy and all possible momenta in the rest frame. You can see this from the zero gravity Minkowski spacetime model's Fourier transform

$$\tilde{V}_e \sim \int_{-\infty}^{\infty} d^4x e^{\frac{i}{\hbar}(\vec{p}\cdot\vec{r}-Et)} V_e \sim \frac{e\hbar^2}{p^2} \tag{1.6}$$

Virtual photons cannot make an electrical detector click directly, but they do create a gravitational field because of Einstein's equivalence principle. Vacuum will directly gravitate attractively with a redshift on signals passing through it as "dark matter" if its zero point pressure dominates and is positive. Vacuum will directly anti-gravitate repulsively with a blue shift on signals passing through it as "dark energy" if its zero point pressure dominates and is negative.

Why do opposite electrical charges attract?

Note that the field momentum on the charge is $e\vec{A}/c$, where $\vec{A}$ is the virtual photon's vector potential. Imagine a virtual photon leaving a positive charge moving over to the negative charge, the vector $e_{emitter}\vec{A}/c$ points toward the negative charge, but when it reaches the negative charge the impulse $e_{absorber}\vec{A}/c$ is back towards the positive charge because the direction of the impulse is the product of the local charge with the vector potential. Similarly, if the virtual photon leaves the negative charge heading for the positive charge now $e_{emitter}\vec{A}/c$ is pointed back at the negative charge and so the impulse at the positive charge is directed back towards the negative charge.

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[1] Test charges do not act as sources of the field they are measuring. This is an approximation ignoring their back-reaction.