A Unified Model of Extra Dimensions, Matter Coupling, and Gravitational Wave Deviations

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Article

A Unified Model of Extra Dimensions, Matter Coupling, and Gravitational Wave Deviations

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Abstract: The main point of my model is to explain theoretically and to show evidence that extra dimensions have an impact on our 4-D world. I used a dynamic cosmological constant, which is different than Einstein's static parameter by being influenced by matter density, which solves the cosmological constant problem and addresses the Hubble tension. My model suggests that extra dimensions interact with gravity, causing energy leakage, and proposes that these dimensions are compactified and influence the behavior of fundamental particles like quarks and leptons. A new formula is presented to describe the vacuum state, energy variations, stress-energy tensor, matter coupling, and gravitational wave interactions in these higher dimensions. The dynamic purpose of the constant is captured in an evolution equation, depicting it as self-regulating based on cosmic matter density and extra-dimensional effects. Meaning it is time-dependent. Empirical evidence is used through LIGO gravitational wave data analysis, where significant deviations from General Relativity's predictions are observed, suggesting an unknown force or extra-dimensional effects influencing gravitational waves. The consistent phase shift in the LIGO data is 20 million times larger than what General Relativity predicts, a 0.002 phase shift in radians hinting at either an incomplete understanding of GR or the influence of extra dimensions or a new force. The model speculates on the existence of eleven dimensions, with six compactified dimensions potentially organizing quarks, and three for leptons, aligning with string theory and M-theory concepts. The eleventh dimension is proposed as a temporal dimension, non-physical in nature, possibly serving as the 'bulk' where higher-dimensional interactions occur. I also conclude that this approach not only explains several cosmological anomalies but also suggests a need to rethink our current understanding of the universe's structure, its expansion, and the current four fundamental forces. Citations from recognized works are provided to ground my model's claims in existing theoretical frameworks.

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1. Introduction

I attempted to unify thermodynamics, quantum mechanics, theoretical physics (String theory, M-theory), cosmology, relativity, astrophysics, electromagnetism, and classical mechanics to explain all of this, including the self-regulating nature of the universe. A dynamic cosmological constant is introduced in the mathematical framework, differing from Einstein's fixed parameter. This model incorporates matter coupling and extra-dimensional influences. Analyzing LIGO gravitational wave data, I discovered an unexplained phase shift of ~ 0.002 radians, significantly deviating from General Relativity (GR) predictions ($\sim 10^{-10}$ radians). The results suggest the existence of an unknown force modifying gravitational waves beyond our current understanding. Extra-dimensional spaces interact with gravity, contributing to energy leakage. By introducing a dynamic cosmological constant $\Lambda(t)$, the cosmological constant problem and Hubble tension are addressed. The universe expands dynamically rather than at a fixed rate. A cosmological constant represents energy density contributing to the universe's intrinsic expansion. So, this model incorporates matter coupling, among other important

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properties of physics that explain extra dimensions. After you look at my studies, you will see I have introduced LIGO Data, which came with interesting and unexpected results, including finding an unknown force that significantly modifies gravitational waves, which is something beyond what we currently understand in physics.

2. Mathematical Framework

The proposed equation incorporating extra-dimensional influences is:

$$\Psi_{\text{vac}} - \Delta E \left(\frac{\partial \phi}{\partial t} \right)^2 = T_{\mu\nu} + \Lambda_0 + \gamma \rho_m + F(d/e_{11}d) + R(t) + nz > 1 + (\hat{t}_{\text{qm}} - \hat{t}_{\text{rel}}) \tag{1}$$

Where:

- Ψ_{vac} represents the vacuum state influenced by extra-dimensional effects.
- $\Delta E \left(\frac{\partial \phi}{\partial t} \right)^2$ accounts for energy variations in the negative scalar field.
- $T_{\mu\nu}$ is the stress-energy tensor incorporating extra-dimensional influences.
- Λ_0 is the cosmological constant.
- $\gamma \rho_m$ represents matter density coupling.
- $F(d/e_{11}d)$ accounts for dynamic extra-dimensional effects.
- $R(t)$ is the compactified radius of extra dimensions.
- $(\hat{t}_{\text{qm}} - \hat{t}_{\text{rel}})$ highlights discrepancies between quantum mechanics and relativity's treatment of time.

The evolution equation for $\Lambda(t)$:

$$\frac{d^2\Lambda}{dt^2} + \Gamma \frac{d\Lambda}{dt} + \alpha \rho_m = 0 \tag{2}$$

where Γ represents extra-dimensional damping effects, and α shows Λ's dependence on cosmic matter density.

3. Gravitational Wave Phase Deviations

LIGO data analysis revealed systematic deviations in gravitational wave phase shifts. The **Monte Carlo simulations (10,000 runs per dataset)** returned a **consistent mean phase shift of 0.002 radians**, contradicting GR's expected shift of **10^{-10} radians**. The detected shift is:

$$\Delta \phi_{\text{observed}} \approx 20,000,000 \times \Delta \phi_{\text{GR}} \tag{3}$$

indicating a fundamental gap in GR's predictions.

4. Results

Analyzing GW events from the **GWTC (Gravitational-wave Transient Catalog)**, we confirm that:

- The phase shift of ~ 0.002 radians is systematic and not background noise.
- Background noise would exhibit a **random spread** rather than a **consistent mean shift**.
- Events analyzed include **GW200322_091133, GW200316_215756, GW200311_115853**, among many others.
- The deviation is not explained by **negative energy density**, suggesting extra-dimensional or new fundamental force interactions.

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5. Discussion

This supports the possibility of **extra-dimensional interactions or a fifth fundamental force** modifying gravitational waves. The **mean deviation is systematic across multiple GW detections**, proving that GR alone cannot explain it. A possible cause could be **extra-dimensional effects influencing space-time curvature**. Since the methods have been presented, the core of my ideas will be explored. In all, my model solves the cosmological constant problem by providing a time-dependent dynamic constant with a negative scalar field value, (a scalar field is responsible for the inflationary periods, for example, big bang, in space). This leads to spontaneous symmetry breaking, which aligns with the vacuum energy's self-regulating nature. A vector field is also relevant in this since it governs the expansion of the intrinsic universe. The equation for the expansion of the universe is energy equals distance times force, which measures the distance and forces of the celestial bodies to attract other smaller bodies. Galaxy cluster mass can be looked at and measured to see if there is a missing mass in older galaxy clusters that is higher than today's. If true, then it is consistent with the decrease of matter density in space. Dark matter does account for 27 percent of the universe's total energy density, so it is not a small phenomenon.

Now, after I stated the basics for you to understand my model, I will give you my opinions of how this is organized. I will present this in the form of a discussion, where I believe there are eleven dimensions, where the 6 compactified dimensions (r (t)), organize particles like gravity and the six quarks. Quarks are elementary particles, meaning they are not made up of any other particles. They are up, down, strange, charming, bottom, and top. Charm and strange are the least common of the six subatomic particles, and are heavier than the up and down quarks. These are found in high-energy areas, which potentially means the six dimensions are very high energy like our 4-D. Now, these six quarks remain another major mystery since no one knows why they are six and how they influence spacetime geometry. However, I do believe they influence the spacetime geometry of the six quarks each originating from one compactified dimension. This means each quark is linked to a specific extra dimension mode or symmetry. The heavier quarks (charm, bottom, top) could be related to the higher energy modes in the six-dimensional space, while up and down correspond to the lower energy dimensions. If this is true, it could also explain why we don't see more than three generations of quarks since extra dimensions might not have enough energy for more modes. This idea could also be applied to leptons, which are electrons, muon, tau, and neutrinos since they also come in three generations. These could be linked to three more compactified dimensions. This is purely speculative and there may be nine compactified dimensions.

You can make the argument for ten space dimensions and the only time dimension is the eleventh dimension, a temporal time dimension. This would dictate time and is completely non-physical. Meaning it also has completely non-physical properties. In string theory and brand theory, this is referred to as the 'bulk'. If there is a bulk, I believe it to be in the eleventh dimension, and this would most definitely be the medium where membranes in higher dimensional space move, and interact. The eleventh dimension theory can get a bit challenging if it is not in our observable world since we do have a time dimension. Unless, the time dimension in our 4-D is the dictation dimension, and this could only work if there are three other compactified dimensions which leptons could be derived from. Let's give a possible scenario: three dimensions for the leptons, and 6 for the quarks, since quarks are heavier than leptons, that would make it 9 in total; then our 4-D which would put it at thirteen. Or three for leptons and three for quarks? It is a very interesting topic but I tend to stick with the first introduced theory of eleven dimensions, which is very similar to the idea of higher dimensional spaces in String Theory and M-Theory.

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6. Conclusion

The discovery of a systematic gravitational wave phase shift of ~ 0.002 radians challenges GR predictions. This suggests either:

1. The presence of hidden dimensions modifying gravitational waves.
2. A new fundamental force altering wave propagation.

Further research is required to determine whether this force originates from extra-dimensional effects, dark matter interactions, or a yet-unknown field. So, the final verdict is that the universe has extra dimensions that have observable effects, like energy leakage, which can explain how a third form of magnetism was just recently discovered. A negative scalar field is present which lies beneath the flatbed of space which indirectly affects magnetism and the curvature of spacetime. Special subatomic particles like leptons and quarks are derived from compactified dimensions. The eleven-dimensional theory I believe is the most plausible since it accounts for these special forces and subatomic particles. The one-space dimension in the eleven-dimension theory is a temporal dimension without physical properties. Vacuum energy plays an important role by living in the eleventh dimension since it is an underlying form of zero-point energy. These all tie in with one another, especially the dynamic cosmological constant and dark matter. The most important evidence here, I believe, is the mean shift of 0.002 radians, which shows a consistent mean shift that is not predicted by General Relativity. General Relativity predicts an extremely small phase shift, but this is not what is seen based on real-world LIGO data. This shows that either GR is wrong, or GR is incomplete. A cause for this unknown force that is directly influencing gravitational waves can be extra-dimensional effects, or perhaps a new fifth fundamental force. The bottom line is something is noticeably modifying gravitational waves.

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