Frame Dragging, Redshift, and Gravitational Quantization in a Discrete Spinning Medium and Universe

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1 Causality, Frame Dragging, and the Role of Discreteness

Causality in this framework is preserved not through continuous spacetime curvature, but through the structure and finite interaction speed of the discrete spinning medium. Every interaction—gravitational or electromagnetic—is constrained by the speed of propagation of angular momentum changes through the Planck and Kaluza spheres, which is limited by the speed of light. This guarantees that no effect can precede its cause and that no signal can travel faster than light, maintaining causal order in all frames.

Frame dragging, a hallmark of general relativity near rotating massive bodies, appears in this theory not through geometric warping, but as a mechanical effect. Objects embedded in the rotating medium are locally entrained by the collective spin state of nearby spheres. As such, the rotation of the universe sets a preferred frame in which matter and light propagate, while still preventing causality violations such as closed timelike curves.

Importantly, this model avoids the problematic notion of point particles. All particles are instead modeled as extended configurations of rotational defects or density variations within the spinning granular lattice. This naturally regularizes quantities like charge and mass at the Planck scale and removes the infinities encountered in point-based field theories.

The discreteness of the medium does not break general relativistic behavior—it replaces it with a mechanism. Gravitational and inertial effects arise as emergent phenomena from directional biases in angular momentum exchange. This approach aligns with the spirit of emergent gravity theories, offering a concrete physical substrate instead of a purely thermodynamic or information-theoretic one.

2 Sphere Packing and Defect Structures

The use of cuboctahedral packing is justified by its optimal density and vector equilibrium properties. Defect structures formed by concentric spherical packing lead to emergent forces. The Planck sphere is seen as hollow not in mass but in active angular momentum transmission, with gravitational influence resulting from interaction with imperfect packing regions.

3 Implications and Extensions

This model provides insight into:

- The quantization of charge and gravity from geometric and mass-related parameters

- Predictions of neutrino mass influence on angular momentum
- Estimations of universal structure size and mass based on defect propagation

4 Model Summary Comparison

Feature	GR	Sempiternal Theory
Gravity Origin	Spacetime curvature	Angular momentum gradient
Redshift Source	Metric expansion	Doppler + spin attenuation
Causality Enforcement	Light cones in manifold	Light-speed limit in spin lattice
Point Particles	Allowed	Forbidden (only extended defects)
Frame Dragging	Curved spacetime near mass	Mechanical entrainment in spin medium

Table 1: Comparison of GR and Sempiternal Spinning Sphere Theory

5 Preliminary Gravitational Predictions

We hypothesize that light passing near massive rotating sphere clusters will experience redshift and lensing effects arising from localized angular momentum gradients, potentially approximated by:

$$\Delta z \sim \frac{1}{N}\left(\frac{\omega R}{c}\right)^2 \tag{1}$$

where ω is the rotational frequency of the medium and R is the radial distance of the defect cluster. This expression offers a framework for modeling gravitational influences in discrete spin-based geometries. While this redshift approximation does not replicate the Schwarzschild deflection formula of general relativity, it instead reflects a distinct mechanism: discrete entrainment of light by local rotational gradients in the granular spin medium. The apparent deviation from GR's $\Delta\theta = 4GM/c^2R$ could be reconciled in the continuum limit if angular momentum distributions reproduce effective mass-energy curvature.

6 Limitations and Future Directions

While the Sempiternal Spinning Sphere Theory offers a coherent and causally consistent foundation for gravity and charge, several open questions and challenges remain:

- **Experimental Evidence:** There is currently no direct observational confirmation of Planck or Kaluza-scale granular structure or universal tri-axial spin. Future cosmological surveys or anisotropy analyses could offer potential clues.
- **General Relativity Correspondence:** The model treats Einstein's equations as emergent but does not yet derive them from first principles. A key objective is to show how the Einstein tensor arises statistically from spin gradients.
- **Effective Metric Formalism:** The theory currently lacks a metric tensor or geodesic framework. Introducing an emergent effective metric could help bridge this gap.

- **Redshift Mechanism Derivation:** While the hybrid redshift equation matches observations well, its exponential correction is empirical. A deeper derivation from photon–medium interactions is needed.
- **Observable Predictions:** Predictions for gravitational lensing, time dilation, and galaxy rotation curves remain to be formulated from the theory's first principles.

Continued development of simulations, effective field models, and empirical testing will be essential to validate and refine the theory.

References

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