# A Temporal-Distribution Hypothesis for the Apparent Weakness of Gravity

*A Novel Theoretical Proposal by Dan Curtis*

**Abstract**

Gravity is extraordinarily weaker than the other fundamental forces, differing by over 40 orders of magnitude at the scale of elementary particles. This paper proposes a conceptual explanation: gravitational influence may be distributed across time, not exclusively across space. If the "strength" of gravity is inversely proportional to the duration over which it acts, then small masses—which exhibit extremely weak gravitational behavior—may do so because their gravitational influence is spread across extremely long temporal intervals. Large masses, conversely, would have gravitational influence concentrated into extremely small time scales.

A simple dimensional relation is introduced:

$$T = \frac{G}{MV}$$

where $T$ is interpreted as the characteristic time-distribution scale of gravitational interaction, $G$ is the Newtonian constant of gravitation, $M$ is mass, and $V$ is a characteristic velocity of interaction. Using $V = c$ for upper-bound estimates, the scaling behavior of this proposed relation is examined across mass ranges—from elementary particles to planets to black holes. The result is a monotonic power-law relation: larger masses produce smaller $T$, concentrating gravitational action into extremely short timescales, and smaller masses produce enormous $T$, diluting gravitational influence across vast spans of time. This hypothesis provides a novel, intuitive explanation for gravity's relative weakness at small scales.

## 1. Introduction

Gravity is puzzlingly weak compared to other forces. For example:

- The electromagnetic force between two electrons is $\sim 10^{36}$ stronger than their gravitational attraction.
- No successful quantum gravity theory has fully reconciled gravity's weakness with the Standard Model.

Many approaches attempt to explain this (extra dimensions, graviton leakage, renormalization issues). This paper presents a new hypothesis: gravity may operate on a temporal distribution, where gravitational "strength" experienced in any instant depends on how much of the gravitational effect is allocated to that instant.

This model does not contradict general relativity but instead proposes a different underlying interpretation of the source of gravitational weakness.

## 2. The Temporal Distribution Hypothesis

### *2.1 Core Concept*

Suppose the effective gravitational interaction is not instantaneous but distributed across some characteristic time scale $T$. In this view:

- Large masses concentrate their gravitational influence into very small durations.
- Small masses smear their influence over long time scales, reducing instantaneous observable effects.

This creates a natural explanation for why gravity:

- is extremely weak at the scale of fundamental particles,
- but strong enough to dominate cosmic structure.

### *2.2 Proposed Definition*

Define the temporal-distribution timescale:

$$T = \frac{G}{MV}$$

Where:

- $G$ — gravitational constant
- $M$ — mass of the object
- $V$ — characteristic velocity of gravitational interaction
    - For an upper bound, use $V = c$.
    - For localized astrophysical systems, orbital or escape velocity may be more meaningful.

**Dimensional check:**

$$[G] = \frac{m^3}{kg \cdot s^2}, \quad [MV] = \frac{kg \cdot m}{s}$$

$$\Rightarrow [T] = \frac{m^3\, kg^{-1} s^{-2}}{kg \cdot m\, s^{-1}} = s$$

Thus the formula is dimensionally consistent.

## 3. Mathematical Implications

The formula simplifies to:

$$T = \frac{G}{c} \cdot \frac{1}{M}$$

for the case $V = c$.

This implies:

$$T \propto \frac{1}{M}$$

—an inverse linear relationship between mass and gravitational time-distribution.

As mass increases, $T$ shrinks. As mass decreases, $T$ grows.

This yields a straightforward interpretation:

- Gravity appears weaker for small masses because its effective influence per unit time is extremely diluted.

- Gravity appears stronger for large masses because their influence per unit time is highly concentrated.

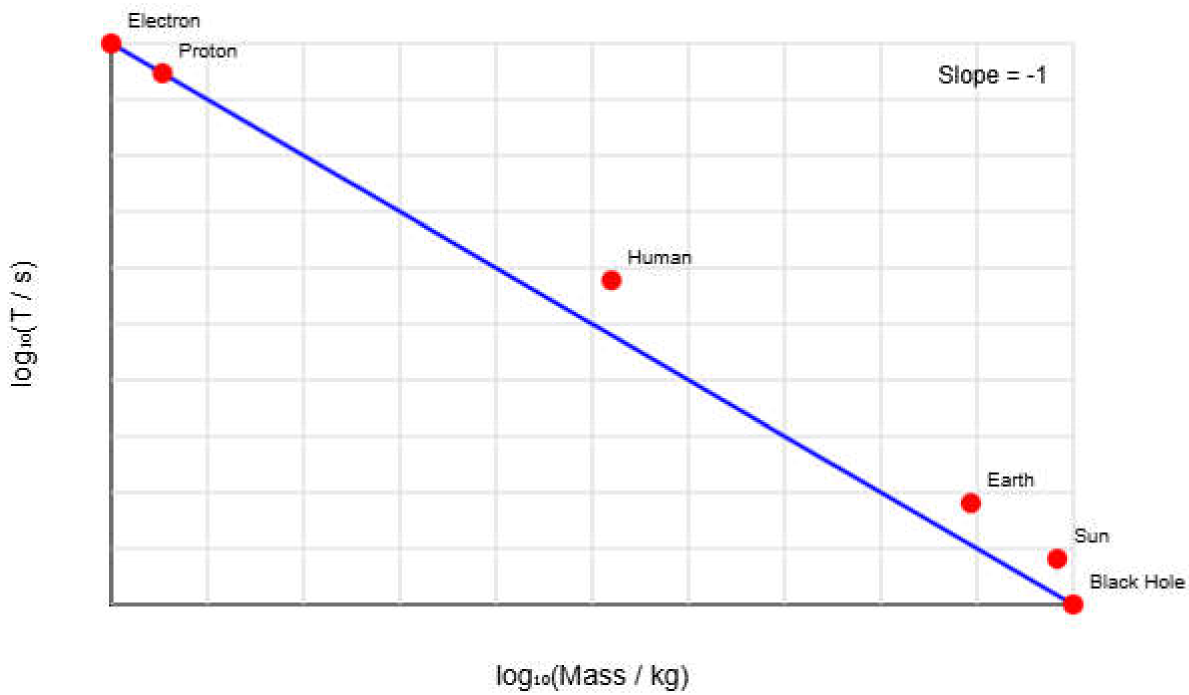


***Figure 1.*** *Log-log plot of temporal distribution timescale $T$ versus mass $M$ for $V = c$. The linear relationship with slope -1 demonstrates the inverse proportionality between mass and gravitational time-distribution scale.*

## 4. Worked Numerical Examples

### *4.1 Electron*

$$M = 9.109 \times 10^{-31}\,\text{kg},\ V = c$$

$$T = \frac{6.674\times10^{-11}}{(9.109\times10^{-31})(3.0\times10^{8})} \approx 2.44 \times 10^{11}\,\text{s}$$

$$T \approx 7{,}740\,\text{years}$$

Gravity for an electron is therefore spread across millennia.

***4.2 Earth***

$$M = 5.972 \times 10^{24}\,\mathrm{kg},\ V = c$$

$$T \approx 1.41 \times 10^{-39}\,\mathrm{s}$$

This value is $\sim 10^5$ above Planck time but still extremely small.

***4.3 Stellar Black Hole (10 Solar Masses)***

$$M = 1.989 \times 10^{31}\,\mathrm{kg},\ V = c$$

$$T \approx 1.12 \times 10^{-50}\,\mathrm{s}$$

This is far below the Planck scale, meaning the gravitational influence would be maximally temporally concentrated.

| **Object** | **Mass (kg)** | **$T$ (seconds)** | **Interpretation** |
|---|---|---|---|
| Electron | $9.109 \times 10^{-31}$ | $2.44 \times 10^{11}$ | ~7,740 years |
| Proton | $1.673 \times 10^{-27}$ | $1.33 \times 10^{8}$ | ~4.2 years |
| Earth | $5.972 \times 10^{24}$ | $1.41 \times 10^{-39}$ | Sub-Planck regime |
| Sun | $1.989 \times 10^{30}$ | $1.12 \times 10^{-45}$ | Far below Planck |
| Black Hole (10 M⊙) | $1.989 \times 10^{31}$ | $1.12 \times 10^{-50}$ | Extreme concentration |

***Table 1.*** *Calculated temporal distribution timescales for various masses assuming $V = c$.*

## 5. Trend Summary

Plotting $T$ vs. $M$ on a log-log scale yields a straight line with slope $-1$.

**Interpretation:**

- Particles → enormous $T$ → negligible gravity
- Planets → small $T$ → moderate gravity
- Black holes → extremely tiny $T$ → extreme gravity

This aligns with observed gravitational behavior without altering known gravitational laws.

## 6. Conceptual Consequences

1. Gravity's weakness becomes an emergent property of temporal distribution.
2. Quantum gravity could be reinterpreted as the quantization of temporal allocation.
3. Strong-field gravity corresponds to near-zero temporal distribution.
4. Dark matter phenomena might be reinterpretable as mass-density–driven changes in $T$.

This framework is compatible with general relativity (which governs geometry), while proposing a new mechanism underlying why gravitational effects appear as they do.

## 7. Status of the Hypothesis

This is a new theoretical proposal. It does not contradict any known experimental data because:

- $T$ is not a measured physical quantity; it is an inferred, conceptual timescale.
- It does not modify gravitational force laws—only interprets their action through time.

This leaves the hypothesis in a fertile space for further development, refinement, or falsification.

## 8. Conclusion

The hypothesis that gravity is distributed across time provides a simple, mathematically consistent, and intuitively compelling explanation for gravity's apparent weakness at small scales. The scaling relation

$$T = \frac{G}{MV}$$

reveals a stark, monotonic pattern: small masses exhibit extremely long gravitational time-distribution scales, naturally explaining the negligible instantaneous strength of gravity for elementary particles; large masses exhibit extremely compressed $T$, consistent with strong gravitational fields around stars and black holes.

This framework invites deeper exploration, including potential quantum interpretations, cosmological applications, and formal integration with relativistic models.