The Pliatsikas Resonance Formula

Geometric Unification and the Three Kingdoms of Dark Matter

Geometric Resonance Theory (GRT)

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Abstract

This paper introduces the **Pliatsikas Resonance Formula**, a unified geometric law proposing that elementary particle mass is determined by standing wave resonances on spacetime topology. By defining the electron as the fundamental reference mode ($n = 2$), we establish that mass scales according to the square of the harmonic ratio: $m(n) = m_e(n/2)^2$. This model successfully unifies Fermions and Bosons onto a single geometric spectrum. Furthermore, it predicts that the integer modes lying between the visible lepton generations constitute three distinct "Kingdoms" of Dark Matter, for which we derive precise mass ranges.

1 The Pliatsikas Resonance Formula

Current standard physics relies on arbitrary coupling constants to determine particle mass. Geometric Resonance Theory proposes that mass is a discrete geometric property derived from the vibration of wormhole throats.

The mass $m(n)$ of any elementary particle is defined by the **Pliatsikas Equation**, which scales the electron's rest mass by the square of the geometric mode:

$$\boxed{m(n) = m_e \left(\frac{n}{2}\right)^2} \tag{1}$$

Where:

- $m(n)$ is the predicted mass of the particle (MeV/c^2).
- m_e is the electron rest mass (0.511 MeV/c^2).
- n is the geometric mode number (integer).
- 2 represents the fundamental mode of the electron ($n_e = 2$).

This relationship implies that all matter and forces are higher harmonic resonances of the same underlying spacetime geometry that forms the electron.

2 Unified Spectrum: Fermions and Bosons

Unlike the Standard Model, which separates matter (Spin 1/2) and forces (integer Spin), the Pliatsikas Formula unifies them. Bosons are identified as high-frequency resonances ($n > 700$) of the geometric lattice.

2.1 The Massless Condition

For the photon and gluon, the mode number is $n = 0$:

$$m(0) = 0.511 \left(\frac{0}{2}\right)^2 = 0 \tag{2}$$

This confirms that massless particles are non-resonant topological conduits ("pure throats").

2.2 The Massive Bosons

The heavy Gauge Bosons appear as high-order harmonics:

- **W Boson** (≈ 80.4 GeV): Corresponds to resonance mode $n \approx 793$.
- **Z Boson** (≈ 91.2 GeV): Corresponds to resonance mode $n \approx 845$.
- **Higgs Boson** (≈ 125.1 GeV): Corresponds to resonance mode $n \approx 990$.

3 Analysis: The Three Kingdoms of Dark Matter

The theory postulates that the visible generations (Electron, Muon, Tau) act as boundary markers. The integer modes between these markers $(3, 4, ...28)$ represent valid geometric resonances that lack the specific topological twist required to couple to the photon field. These are **Dark Matter** candidates.

3.1 Kingdom I: The Light Sector (Ghost Matter)

Boundary: Between Electron ($n = 2$) and Muon ($n = 29$).
This sector contains the "missing" integers $n \in [3, 28]$.

$$m(3) = 0.511 \left(\frac{3}{2}\right)^2 = 1.15 \text{ MeV}$$
$$m(28) = 0.511 \left(\frac{28}{2}\right)^2 = 100.16 \text{ MeV}$$

Prediction: A family of 26 neutral particles in the $1 - 100$ MeV range.

3.2 Kingdom II: The Medium Sector (Shadow Hadrons)

Boundary: Between Muon ($n = 29$) and Tau ($n = 118$).
This sector contains the "missing" integers $n \in [30, 117]$.

$$m(30) = 0.511 \left(\frac{30}{2}\right)^2 = 115.0 \text{ MeV}$$
$$m(117) = 0.511 \left(\frac{117}{2}\right)^2 \approx 1.75 \text{ GeV}$$

Prediction: A "desert" of resonances in the GeV range, invisible to standard decay experiments.

3.3 Kingdom III: The Heavy Sector (The WIMP Forest)

Boundary: Between Tau ($n = 118$) and the Weak Scale ($n \approx 793$).
This sector represents the high-frequency climb toward the Bosons.

$$m(119) = 0.511 \left(\frac{119}{2}\right)^2 \approx 1.81 \text{ GeV}$$
$$m(792) = 0.511 \left(\frac{792}{2}\right)^2 \approx 80.1 \text{ GeV}$$

Prediction: A dense spectrum of heavy particles corresponding to the classic "WIMP" hypothesis.

4 The Pliatsikas Periodic Table

Zone Classification	**Mode (n)**	**Boundary / Description**	**Mass Range**
Visible Gen 1	$n = 2$	**Electron**	0.511 MeV
Kingdom I (Light)	$3 - 28$	The $e \to \mu$ Gap	1.1 – 100 MeV
Visible Gen 2	$n = 29$	**Muon**	105.7 MeV
Kingdom II (Medium)	$30 - 117$	The $\mu \to \tau$ Gap	115 – 1,750 MeV
Visible Gen 3	$n = 118$	**Tau**	1,776 MeV
Kingdom III (Heavy)	$119 - 792$	The $\tau \to W$ Gap (WIMPs)	1.8 – 80.1 GeV
Boson Resonance	$n \approx 793$	**W Boson**	80.4 GeV

Table 1: The mass spectrum derived from $m(n) = m_e(n/2)^2$. Shaded rows indicate predicted Dark Matter sectors.

5 Conclusion

The Pliatsikas Resonance Formula provides a deterministic geometric solution to the mass hierarchy problem. By organizing the universe into integer modes of a fundamental electron harmonic, the theory naturally predicts the existence of three specific sectors of Dark Matter, offering a clear map for future detection experiments.