Maxel Theory and Rational Bipolynomials

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A Summary Of The Rational Quantum & The Arithmetic of Physics

I. The Core Philosophical Conflict

The Status Quo: Modern physics and engineering rely heavily on **Imaginary Numbers (*i*).**

- **Practical View:** As presented by Ali Al Carulli, *i* is not "fictitious" but a practical tool for describing **rotation (90˙)** and **oscillation** in a 2D plane. It is essential for standard wave mechanics.

- **The Problem**: Philosophically, "Natural numbers begin at 1." Relying on an "imaginary" concept (one that Descartes termed "impossible" and Leibniz called "a hiding place for gods") to describe the foundational reality of the universe feels like a twisted joke.

- **The Hypothesis:** We struggle to unify Quantum Mechanics with Number Theory (specifically **Prime Resonance 1/p**) because we are viewing the quantum world through a "continuous, imaginary lens" rather than a "discrete, rational lens."

II. The Rational Alternative: Harmonic Analysis

To fix the foundations, we looked to **Norman Wildberger's** critique of infinite/transcendental mathematics.

- **The Critique**: Standard trigonometry relies on angles (θ) and functions (sin,cos) defined by infinite series that cannot be exactly computed.

- **The Solution**: **Rational Harmonic Analysis**. Instead of transcendental functions, we use **Harmonic Bipolynomials** (e.g., $\alpha^2 - \beta^2$).

- **The Result:** This allows us to model circular motion and wave mechanics using **exact**, **finite algebraic formulas** restricted to the unit circle ($x^2 + y^2 = 1$), removing the need for infinite approximations.

III. The New Computational Engine: Maxel Theory

If the universe is not a continuous complex plane, what is the "machine code" of physics? We

identified **Maxel Theory** as the candidate for a **Quantum Arithmetic.**

- **Matrix vs. Maxel**:

  - **Matrix (Standard)**: A rigid "Grid." You must define empty space and dimensions must match (NÅ~N) to calculate.

  - **Maxel (Wildberger):** A dynamic "List" (Multiset of Pixels). It represents **active interactions** rather than static space. It frees algebra from rigid dimension constraints.

- **The "Handshake"**: Multiplication in Maxel theory is not a "row scanner" but a connection of matching indices. This matches the **Non-Commutative** nature of Quantum Mechanics (where Order of Operations matters) but roots it in **Discrete Arithmetic.**

IV. Prime Resonance & The Boundary Layer

We synthesized how this discrete arithmetic explains the connection between Primes and Quantum states.

- **The Sequence:** (1/5,1/3,1/2,1/1,2/1,3/1,5/1).

- **The Mechanism:**

  - **1/1 (The Unit):** The "Boundary Layer" or mirror between the inner and outer worlds.

  - **1/p (The Quantum Interior):** These represent distinct "resolutions" or "frequencies" of the Maxel grid.

- **The Insight:** In a discrete universe, you cannot just "add" waves arbitrarily; you need a **Common Denominator.** The **Prime Numbers** define the fundamental, indivisible grid sizes required for specific interactions to occur.

- **Conclusion:** The "Resonance" seen in 1/p is not an accident of complex analysis, but the physical requirement of a discrete, pixelated universe aligning its "gears" (denominators) to allow interaction.