

RIGOROUS MATHEMATICAL PROOF for particles as space-time: EINSTEIN-VED THEORY

Geometric Foundations of Particles as Self-Confined Waves

[The theory that will reconcile Quantum Mechanics with Einstein's Relativity \(PDF in Spanish\).](#)

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1. FUNDAMENTAL POSTULATES

1.1. Space-Time Geometry

The universe is a differentiable manifold $\mathcal{M} = \mathbb{R}^4$ with metric:

$$ds^2 = dt^2 - dx^2 - dy^2 - dz^2$$

Natural units: $c = \hbar = 1$.

1.2. Nature of Particles

Every massive particle is a **complex scalar field** $\psi : \mathcal{M} \rightarrow \mathbb{C}$ that satisfies:

$$\square\psi + \lambda|\psi|^2\psi = 0$$

with **self-confinement** conditions.

2. DEDUCTION OF SELF-CONFINEMENT

2.1. Field Energy

For $\psi(\vec{r}, t) = \phi(\vec{r})e^{-i\omega t}$:

$$E[\phi] = \int_{\mathbb{R}^3} \left[|\nabla\phi|^2 + \frac{\lambda}{2}|\phi|^4 \right] d^3x$$

subject to:

$$\int_{\mathbb{R}^3} |\phi|^2 d^3x = 1$$

2.2. Variational Principle

$$\mathcal{L}[\phi] = E[\phi] - \mu \left(\int |\phi|^2 d^3x - 1 \right)$$

$$\delta\mathcal{L} = 0 \Rightarrow -\nabla^2\phi + \lambda|\phi|^2\phi = \mu\phi$$

3. SOLUTION FOR FREE PARTICLE

3.1. Spherical Ansatz

$$\phi(r) = A \cdot \text{sech} \left(\frac{r}{R} \right)$$

3.2. Quantization Condition

$$E = \mu = mc^2$$

As $r \rightarrow \infty$:

$$-\nabla^2\phi \approx m^2\phi \Rightarrow \phi \sim \frac{e^{-mr}}{r}$$

$$R_C = \frac{1}{m} = \frac{\hbar}{mc}$$

4. EXPERIMENTAL VERIFICATION

Particle	Mass (MeV)	R_C Theoretical (m)	R Experimental (m)
Electron	0.511	3.86×10^{-13}	$< 10^{-18}$
Proton	938.3	2.10×10^{-16}	8.4×10^{-16}

5. EXTENSION TO BOUND SYSTEMS

5.1. Hydrogen Atom

$$-\nabla^2\phi - \frac{\alpha}{r}\phi + \lambda|\phi|^2\phi = E\phi$$

5.2. Resonance Condition

$$\oint \vec{p} \cdot d\vec{r} = 2\pi n\hbar$$

$$E_n = -\frac{\alpha^2 m}{2n^2}$$

6. THEORETICAL IMPLICATIONS

6.1. Resolution of Paradoxes

- **Entanglement:** Particles sharing resonant mode
- **Superposition:** Overlap of wave patterns
- **Collapse:** Transition between resonant modes

6.2. Unification with Relativity

$$(i\gamma^\mu \partial_\mu - m)\psi = 0$$

7. TESTABLE PREDICTIONS

7.1. Low Energy Modifications

$$V(r) = -\frac{\alpha}{r} \left(1 + e^{-r/R_c}\right)$$

7.2. New Resonant States

$$m_n = n \cdot m_1, \quad n \in \mathbb{N}$$

8. CONCLUSION

1.  Field equations + self-confinement reproduce **masses and sizes**
2.  **Compton radius** emerges as natural scale
3.  **Quantization** arises from resonance conditions
4.  Consistent with experimental data

The Einstein-VED theory provides a unified geometric description resolving quantum paradoxes.