

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:
 $\square \psi + \lambda \mid \psi \mid^2 \psi = 0$ with **self-confinement** conditions.

2. DEDUCTION OF SELF-CONFINEMENT

2.1. Field Energy

For $\psi(\vec{r}, t) = \phi(\vec{r})e^{-i\omega t} : E[\phi] = \int_{\mathbb{R}^3} [\mid \nabla \phi \mid^2 + \frac{\lambda}{2} \mid \phi \mid^4] d^3 x$ subject to:
 $\int_{\mathbb{R}^3} \mid \phi \mid^2 d^3 x = 1$

2.2. Variational Principle

$$\mathcal{A}[\phi] = E[\phi] - \mu (\int \mid \phi \mid^2 d^3 x - 1) \delta \mathcal{L} = 0 \Rightarrow -\nabla^2 \phi + \lambda \mid \phi \mid^2 \phi = \mu \phi$$

3. SOLUTION FOR FREE PARTICLE

3.1. Spherical Ansatz

$$\phi(r) = A \cdot \operatorname{sech}(\frac{r}{R})$$

3.2. Quantization Condition

$$E = \mu = mc^2 \text{ As } r \rightarrow \infty : -\nabla^2 \phi \approx m^2 \phi \Rightarrow \phi \sim \frac{e^{-mr}}{r} \quad R_C = \frac{1}{m} = \frac{\hbar}{mc}$$

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

$$\oint \vec{p} \cdot d\vec{r} = 2\pi n \hbar \quad E_n = -\frac{\alpha^2 m}{2n^2}$$

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

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

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.