

3D Energy Distribution and Its Impact on Proton Stability

1. Core Concept

In this model, energy is distributed in a 3D spherical space rather than being constrained to a surface. The total energy is expressed as:

$$E = \frac{4}{3} \cdot m \cdot c^3$$

Here:

- m is the mass of the energy source,
- c is the speed of light.

This equation emphasizes 3D volume and energy interactions rather than the classic $E=mc^2$, which mainly considers 2D planes.

2. Energy Density

The energy density, defined as energy per unit volume, is:

$$\rho(r) = \frac{m \cdot c^3}{\pi \cdot r^3}$$

This formula implies that as the radial distance (r) from the center increases, the energy density decreases sharply ($\propto \frac{1}{r^3}$).

3. Total Energy Across a Spherical Volume

To calculate the total energy, we integrate the energy density across the entire sphere. Using spherical coordinates:

$$E_{total} = 4 \cdot m \cdot c^3 \cdot \ln(R)$$

Here R represents the radius of the sphere. The total energy rises logarithmically as R increases. This logarithmic growth reflects how energy spreads out less intensely over larger spaces.

4. Proton Stability and Negative Energy Density

Protons are composed of quarks bound together by gluons within the framework of Quantum Chromodynamics (QCD). The model introduces negative energy density as a stabilizing factor for protons:

$$\rho(r) = \frac{m \cdot c^3}{\pi \cdot r^3} - E_b$$

- E_b is the binding energy, representing the attractive forces holding quarks together.
- Negative energy regions stabilize the proton by countering repulsive forces, ensuring a compact and stable particle structure.

This negative energy concept aligns with quantum field theory, where binding interactions involve dynamic balances of energy.

5. Importance of Logarithmic Trends

The logarithmic relationship between total energy and the sphere's radius highlights a gradual distribution over vast areas. At atomic scales, where r is small, energy is densely packed, leading to high interaction forces. Conversely, at larger r , energy disperses more evenly, reducing intensity.

6. Key Insights

- **3D Perspective:** Unlike 2D energy surface models, this approach examines energy's behavior within a volume, offering a more realistic understanding of physical systems.
- **Negative Energy's Role:** Provides a theoretical basis for explaining proton stability and the binding of particles at atomic scales.
- **Logarithmic Distribution:** Demonstrates energy's spread in both macroscopic (cosmological) and microscopic (quantum) frameworks.

This simplified explanation captures the essence of the model and its relevance to energy distribution and proton stability.