Summary: Neutron Decay as Electric Field Separation

Background:
In neutron decay, an energy of $0.782\,\mathrm{MeV}$ is observed. In the Standard Model, this value is explained as a mass difference between the neutron, proton, and electron, with an additional unobserved particle (the antineutrino) added to conserve energy and momentum.
The alternative view presented here avoids new particles: the decay represents the separation of two balanced electric fields confined within the neutron's structure.

---

1. The Initial State – Balanced Neutron:
In the bound state, the proton's internal positive field is neutralized by an adjacent negative field.
The two fields almost completely overlap, resulting in no external electric field. Their separation distance is:

$$R_0 = 0.00077\,\mathrm{fm}$$

This represents the radius of the inner field.

---

2. The Decay Process:
As the two fields separate, work must be done against their mutual attraction.
When the distance reaches about $1.8\,\mathrm{fm}$, the balance breaks — the positive field becomes exposed (forming the proton), while the negative field is released as the electron.

The work required to separate these fields is given by:

$$E = \frac{Q^2}{8\pi\varepsilon_0}\left(\frac{1}{R_0} - \frac{1}{R}\right)$$

For $Q = e$, $R_0 = 0.00077\,\mathrm{fm}$, and $R = 1.8\,\mathrm{fm}$, the result matches the measured decay energy:

$$E \approx 0.782\,\mathrm{MeV}$$

---

3. Physical Interpretation:
The $0.782\,\mathrm{MeV}$ energy is not "emitted" from nowhere—it represents the exact work required to break the equilibrium between two confined electric fields inside the neutron.

After separation, the fields reach a new equilibrium at a much larger distance—the Bohr radius of hydrogen $a_0 = 5.29 \times 10^{-11}\,\mathrm{m}$—forming a stable open-field system (the hydrogen atom).

---

4. Significance:
This model provides a direct physical explanation for the neutron decay energy without invoking unobserved particles or weak-force transitions.

The energy arises purely from the separation of balanced electric fields—not from mass difference, nor from probabilistic quantum interactions.