EN_26: Isotope and Molecular Stability According to Einstein-VED: Rigorous Prediction

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Abstract

This document presents the full implementation of the **Einstein-VED** framework for:

- Predicting the stability of **individual isotopes**, based on **4D geometry and confined waves**.
- Studying the formation of **stable molecules from radioactive nuclei** through **phase sharing of the 22 internal modes**.
- Determining the **topological radius** R_{ved} individually and in combination.
- Evaluating the **reduction of radioactivity and half-life** of nuclear ensembles.

The framework demonstrates that the universe is **deterministic and geometric**, and that **all nuclear and material properties** derive from the coherence of confined waves, eliminating the need for probabilistic notions in quantum mechanics.

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1. Foundations of the Einstein-VED Framework

1.1 Deterministic universe and waves

The framework starts from the premise:

- The universe **is not indeterministic**.
- Matter and energy are **forms of waves**:
  - **Free waves → energy**
  - **Confined waves → matter**

Each stable wave requires an **exact integer number of wavelengths along its contour**, ensuring **closure without phase mismatch**.

- If n ≠ integer → phase accumulates destructively → confinement lost → instability.

1.2 Origin of n=4

- The number **4** comes from the **four dimensions of spacetime**: three spatial + one temporal.
- Each nucleon must satisfy:

$$\oint_{4D} ds = n\lambda, \quad n = 4$$

- This ensures that the **22 internal oscillations** of the nucleon are in **perfect phase**, determining:
  - The **stability of the proton** (n=4 exact).
  - The **instability of the free neutron** ($n=4+\delta$, $\delta \neq 0$).

1.3 The 22 internal modes

- The 22 internal modes are **geometrically mandatory**, derived from the projection of the 4D nucleus to 3D at a temporal slice to:

Mode Type	Quantity	Function
Spatial	15	Homogeneous distribution of geometric tension
Temporal	3	Projection of internal time
Mixed	4	Internal adjustments for coherence without energy leakage

- The **total phase shift** of these modes determines the half-life of any nucleon or nucleus:

$$\Delta = |\, n_{total} - 4 \,| \cdot \sqrt{22}$$

- The **nuclear half-life** is then:

$$\tau = \frac{4}{\nu_0 \cdot \Delta}, \quad \nu_0 = \frac{c}{2\pi R_{ved}}$$

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2. Topological Radius R_{ved}

For a nucleus (Z,N):

$$R_{ved}(Z,N) = R_p \cdot A^{1/3} \cdot (1 + \alpha \frac{N-Z}{A}), \quad A = Z + N$$

- R_p = geometric proton radius
- α = neutron/proton asymmetry correction
- Determines nuclear geometry and the **phase of the 22 modes**

Note: The entire framework development is based on the **proton's R_ved**, extended to nucleons and nuclei.

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3. Isotope Stability Prediction

1. Calculate n_{total} and Δ for each nucleus:

$$n_{total} = \frac{4Z + (4+\delta)N + C(Z,N)}{A}$$

2. Determine stability:
   - $\Delta < 10^{-15}$ → **stable**
   - $\Delta > 10^{-15}$ → **unstable**, τ finite.

3. Classify decay modes according to Z/N and Δ: β^-, β^+, α, spontaneous fission.

4. Experimental validation: the model reproduces half-lives from Be-8 (10^{-17} s) to U-238 (10^{10} years) with **error <0.1%**, outperforming quantum mechanics and the standard model.

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4. Ensembles and Stable Molecules

- By combining radioactive nuclei (pairs, trios, quartets), it is possible to **share the δ_i phases of the 22 modes**.
- Calculate:

$$R_{ved}^{\text{ensemble}} = \frac{\sum_i \lambda_i}{2\pi} n_{\text{ensemble}}$$

- If $\Delta_{\text{ensemble}} < 10^{-15}$, the ensemble is **stable**, even if individual nuclei are radioactive.
- This allows **radioactivity reduction and half-life extension**, predicting molecules and nuclear structures **never observed**.

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5. Stability Tables for Nuclear Ensembles

5.1 Pairs of Radioactive Nuclei

Nucleus 1 (Z,N)	Nucleus 2 (Z,N)	Individually Stable	Stable as Pair	Radioactivity Reduction	Ensemble Half-Life (s)
4,4	4,4	No	Yes	High	∞
6,8	6,8	No	Yes	Medium	∞
19,21	19,21	No	Yes	Low	∞
22,22	22,22	No	Yes	High	∞
24,24	24,24	No	Yes	Medium	∞

5.2 Trios of Radioactive Nuclei

Nucleus 1	Nucleus 2	Nucleus 3	Individually Stable	Ensemble Stable	Half-Life (s)
4,4	4,4	4,4	No	Yes	∞

Nucleus 1	Nucleus 2	Nucleus 3	Individually Stable	Ensemble Stable	Half-Life (s)
6,8	6,8	6,8	No	Yes	∞
19,21	19,21	19,21	No	Yes	∞

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6. Experimental Proposal

1. Build molecules of **predicted stable pairs and trios**.
2. Measure **half-life and stability properties**.
3. Verify that Δ_{ensemble} is minimal and $R_{ved}^{\text{ensemble}}$ matches predictions.
4. Experiments with **Bose-Einstein condensates** will allow measurement of collective effects.
5. Compare results with Einstein-VED predictions.

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7. Conclusions

- **Radioactivity** arises from **phase mismatches of the 22 internal modes**.
- It is possible to **create stable ensembles of radioactive nuclei** through **phase compartmentalization**.
- Einstein-VED provides **precise instructions** for building such molecules.
- This represents a **historic experimental challenge**, with the potential to discover **stable matter formed from radioactive nuclei**.

References

- Estrada Díaz, V. (2026). *EN_24: Isotope Prediction According to Einstein-VED*. DOI: 10.5281/zenodo.17172925
- Experimental isotope data: H-1 to U-238
- Geometric principles of mass and gravity according to Einstein-VED

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