A Helical Solar-System-Inspired Atomic Model: Nucleus Motion in 4D Time as a Mechanism for Decay

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Abstract

This paper introduces a novel atomic model inspired by the dynamics of the solar system. It proposes that the atomic nucleus moves through a fourth temporal dimension, causing electrons to follow helical orbits reminiscent of planetary paths. This motion is theorized to drive atomic decay via entropy and temporal displacement. The model attempts to reconcile classical orbital concepts with modern quantum mechanics, offering a new visual and mathematical approach to atomic behavior in spacetime.

1 Introduction

Traditional atomic models, including Bohr's and quantum mechanical frameworks, treat the nucleus as largely stationary in three-dimensional space. This work proposes a different view: the nucleus moves steadily through a fourth dimension—time—which induces a helical motion in orbiting electrons. This dynamic may provide a new perspective on atomic decay, linking it to temporal progression and disorder.

2 Theoretical Framework

2.1 Nucleus Motion in 4D Time

In this model, the nucleus moves at a constant velocity v_t along a fourth temporal dimension t. This is not the conventional scalar time of classical physics but a directional progression through a 4D spacetime manifold. As the nucleus advances along this dimension, it acts as a moving anchor point for electrons.

2.2 Helical Electron Orbits

Electrons are modeled as following 3D helices around the nucleus's path. The orbital path is not confined to a plane but extends in a spiraling motion along the direction of temporal drift.

Mathematically, the position of an electron is defined as:

$$\vec{r}_e(t) = \vec{R}_n(t) + R \begin{pmatrix} \cos(\omega t + \phi) \\ \sin(\omega t + \phi) \\ h \cdot t \end{pmatrix}$$

where:

- $\vec{R}_n(t)$: Position vector of the nucleus along time
- R: Radius of the electron's orbit
- ω: Angular velocity
- h: Helix pitch (vertical rise per unit time)
- ϕ: Phase angle (allowing multiple electron paths)

3 Decay Through Temporal Drift

As time progresses, the spatial path of electrons lengthens due to the nucleus's movement in 4D time. This increased path length may statistically destabilize the atom, increasing entropy and leading to decay.

We propose that the entropy $\Omega(t)$ grows as:

$$\Omega(t) \propto \int_0^t \left(\frac{d\vec{r}_e}{dt} \right)^2 dt$$

This signifies energy dispersion and potential quantum decoherence over time.

4 Comparison to Existing Models

- **Bohr Model:** Fixed circular orbits, no temporal progression.
- **Quantum Model:** Probabilistic clouds, stationary nucleus.
- **Proposed Model:** Deterministic helical electron paths with nucleus in motion along a fourth temporal axis.

5 Philosophical and Physical Implications

This model integrates classical mechanics, quantum structure, and time as a directional force. While speculative, it offers a metaphoric and mathematical avenue to understand atomic decay, emphasizing time's role as a driver of entropy and structure degradation.

6 Future Work

- Simulating this atomic model in 3D visualization frameworks.
- Exploring how this motion may align with particle physics observations.
- Linking this model to known decay modes (alpha, beta, gamma).
- Evaluating compatibility with quantum field theoretical constraints.

7 References

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