Macroscopic Geometric Resonance: The Case of the Water Molecule (H_2O)

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Abstract

Previous applications of the geometric mass scaling law $m(n) = m_e(n/2)^2$ have focused on fundamental particles. This brief note extends the theory to composite molecular structures. We demonstrate that the water molecule (H_2O) behaves as a coherent geometric resonance, corresponding to the integer quantum number $n = 362$ with an accuracy of **99.8%**.

1 Methodology

To test if composite matter adheres to the harmonic scaling law, we calculate the integer n required to reproduce the rest mass of a single water molecule.

1.1 Experimental Target Mass

The molar mass of water (H_2O) is approximately 18.015 unified atomic mass units (u). We convert this to the energy scale (MeV) used in our quantum geometric formula.

- Mass of H_2O: 18.015 u
- Conversion Factor: 1 u $\approx$ 931.494 MeV

$$M_{exp} = 18.015 \times 931.494 \approx \mathbf{16,781} \text{ MeV} \tag{1}$$

1.2 Geometric Calculation

We solve the fundamental scaling equation for n:

$$m(n) = m_e \times \left(\frac{n}{2}\right)^2 \implies n = 2 \times \sqrt{\frac{M_{exp}}{m_e}} \tag{2}$$

Substituting the values ($m_e = 0.511$ MeV):

$$n = 2 \times \sqrt{\frac{16,781}{0.511}}$$

$$n = 2 \times \sqrt{32,839.5}$$

$$n = 2 \times 181.21$$

$$n \approx 362.43$$

The geometry constrains the system to the nearest integer resonance: $n = 362$.

2 Verification

We calculate the theoretical mass of a pure $n = 362$ resonance to compare with the experimental value.

$$m(362) = 0.511 \times \left(\frac{362}{2}\right)^2 = 0.511 \times (181)^2 \tag{3}$$

$$m(362) = 0.511 \times 32,761$$

$$M_{theo} = \mathbf{16,741} \text{ MeV} \tag{4}$$

3 Conclusion

- **Experimental Mass:** 16,781 MeV
- **Predicted Mass ($n = 362$):** 16,741 MeV
- **Accuracy:** 99.8%

This result suggests that the geometric quantization of spacetime is not limited to subatomic particles but scales upward to stabilize molecular structures. The water molecule represents a coherent $n = 362$ standing wave on the metric.