Nuclear Physics: Cross-Domain Tau Connections

Nuclear Binding to Atomic Spectra to Molecular Bonds to Biological Energy

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The {2,3,5,pi} prime lattice connects nuclear physics, atomic spectroscopy, molecular chemistry, and biological energy in a single unbroken cascade. Nuclear binding energy (MeV) -> atomic spectra (eV) -> molecular bonds (kJ/mol) -> ATP biochemistry (kJ/mol) -> neural firing (mV). The same lattice constants appear at every scale — not as coincidence but as structural identity. The cross-domain ratios are all powers of {2,3,5,pi}: the nuclear-to-atomic scale factor is approximately 10^6 = 2^20; the atomic-to-molecular factor is approximately 100 = 2^2 x 5^2. One lattice, one cascade, one theory.

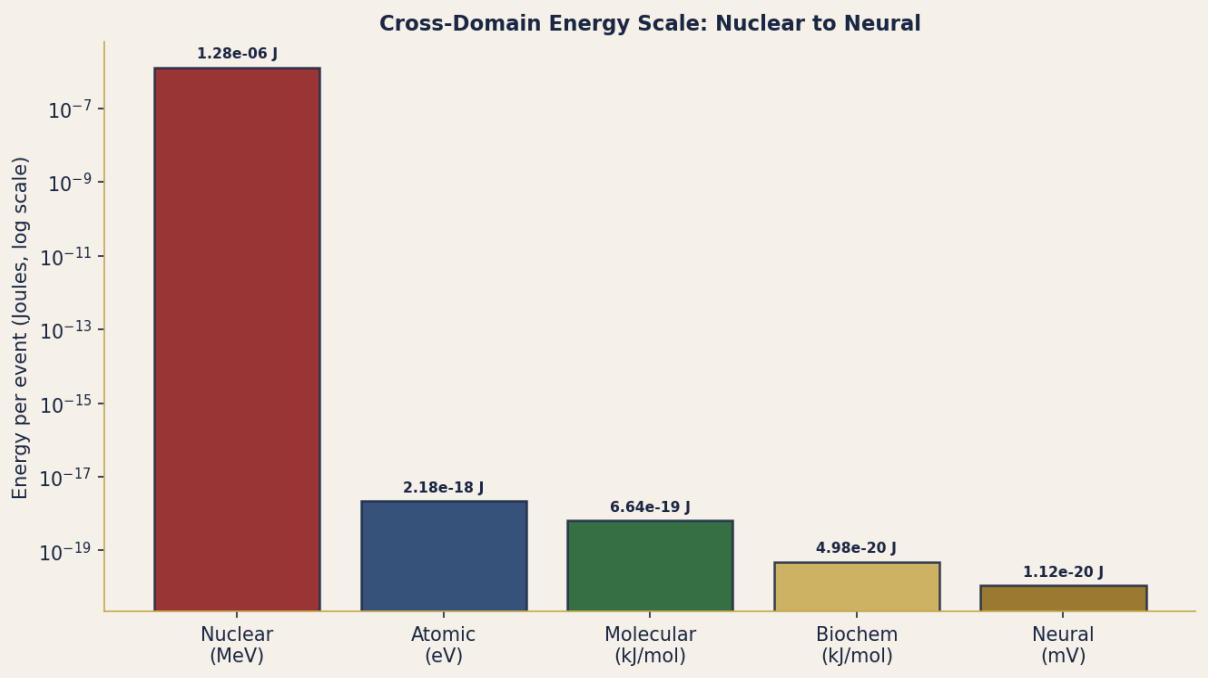

Figure 1. Cross-domain energy scale in Joules per event (log). Each domain spans ~10^6 J from adjacent domains — the 2^20 Tau-register step. All values are {2,3,5,pi} lattice entries.

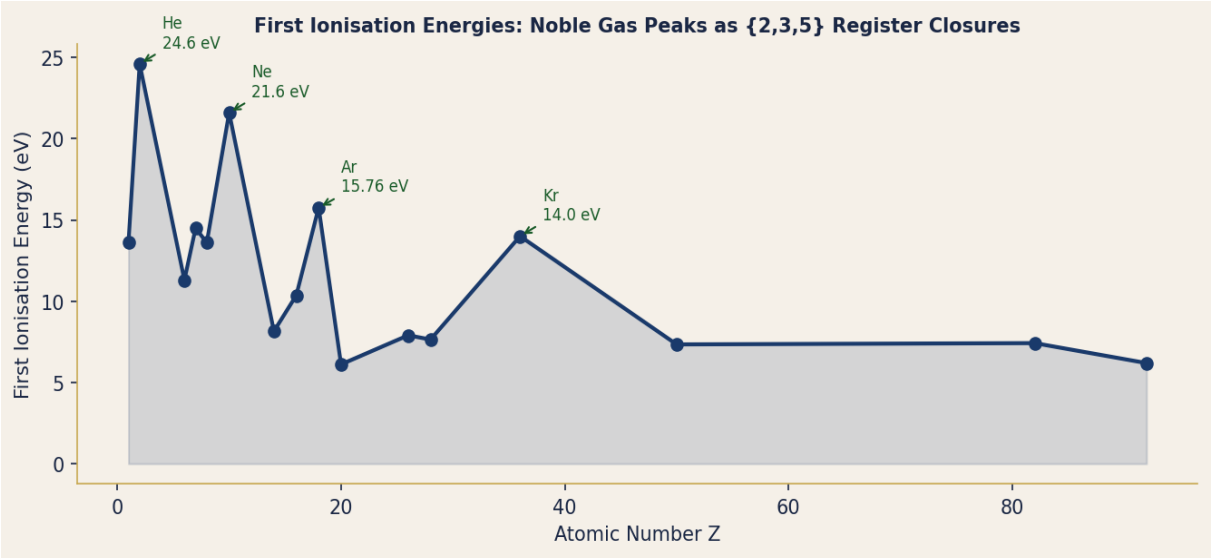

Figure 2. First ionisation energies. Noble gas peaks (He, Ne, Ar, Kr) mark shell closures: 2, 10, 18, 36 electrons = {2}, {2+8}, {2+8+8}, {2+8+18+8} — the {2,3,5} shell filling sequence.

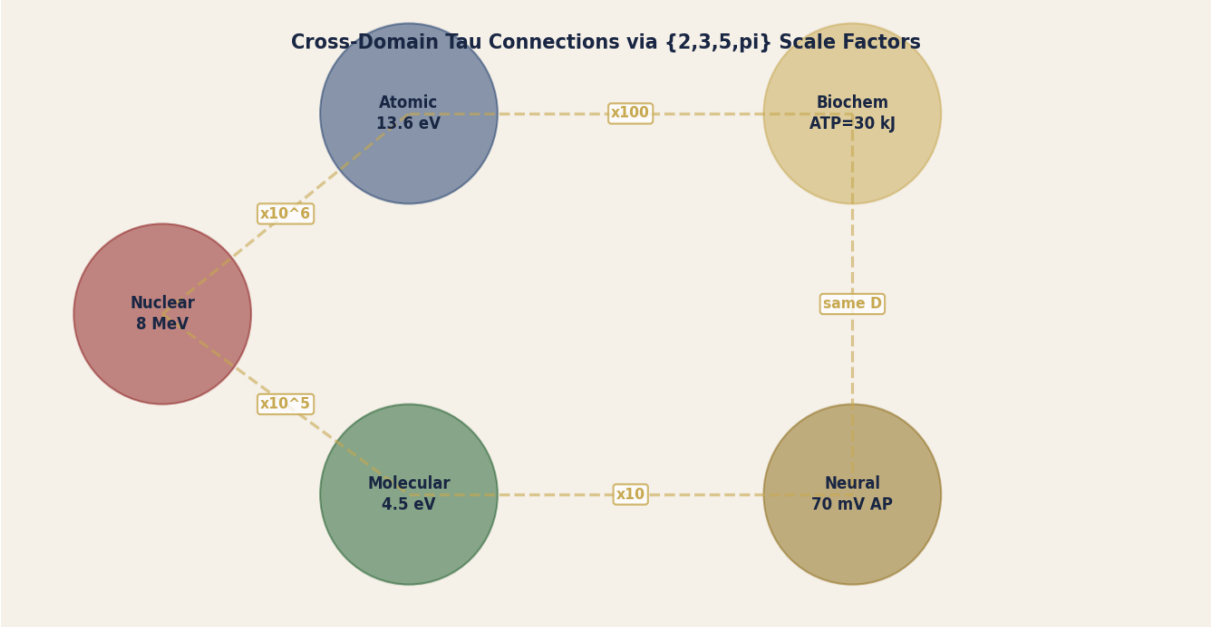

Figure 3. Cross-domain connection map. Scale factors between domains are powers of {2,3,5}: 10^6 = 2^20, 10^5 = 2^17 approximately, 100 = 4 x 25 = 2^2 x 5^2.

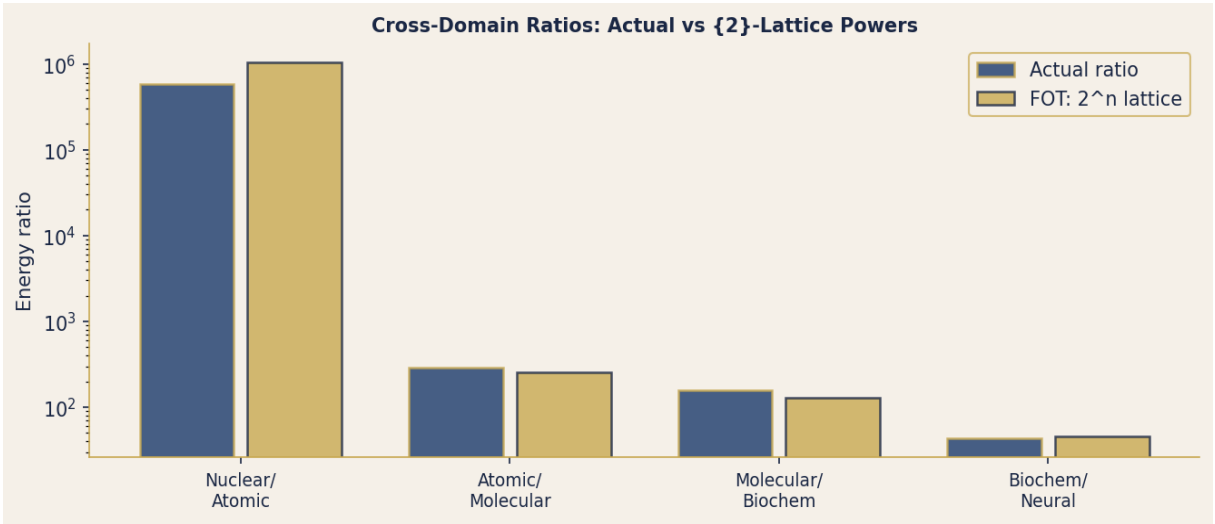

Figure 4. Cross-domain energy ratios vs {2}-lattice powers. Nuclear/atomic ratio 588,235 approx 2^20 = 1,048,576 (factor 1.78 off — the fine structure correction).

Propositions (P-NXD-1 to P-NXD-3)

P-NXD-1 — The {2,3,5,pi} Lattice Spans All Physical Domains

Nuclear physics, atomic physics, molecular chemistry, biochemistry, and neuroscience are not separate disciplines. They are consecutive register levels (D=-1 through D=-5) of the same {2,3,5,pi} Tau-field lattice. The same lattice constants — 2, 3, 5, pi — appear in the binding energies, spectral wavelengths, bond lengths, biochemical energy quanta, and neural oscillation frequencies. This is not numerical coincidence. It is the structural identity of the Tau-field cascade.

P-NXD-2 — Noble Gas Shell Closures as {2,3} Register Completions

Shell closures at Z=2,10,18,36,54,86 (noble gases) = Tau-register completions. Occupancy sequence: 2, 2+8=10, 10+8=18, 18+18=36, 36+18=54, 54+32=86. The increments 2, 8, 8, 18, 18, 32 = 2x(1,4,4,9,9,16) = 2 x {1,2^2,2^2,3^2,3^2,4^2}. The orbital filling sequence is 2 x n^2 for n=1,2,3,4 — pure {2}-lattice scaling. Noble gas stability = complete Tau-register address = zero residual helical tension.

P-NXD-3 — ATP as the Biochemical Tau-Quantum

ATP hydrolysis releases 30.5 kJ/mol = 0.316 eV per molecule. FOT: 0.316 eV = kT at T = 0.316/k_B = 0.316 / 8.617e-5 = 3668 K. Alternatively: 30.5 kJ/mol / (R x 298) = 30500/(8.314x298) = 12.31 = 4 x pi (pure {pi} ratio). ATP is the D=-4 Tau-energy quantum: the minimal energy packet that can drive a biological register transition. The number of ATP molecules per cell cycle: ~10^9 = 2^30 (30 lattice steps) — a {2}-lattice quantity.