The Bond Lattice: Structural Foundation of Matter

All Chemical Bonds as Tau-Field Register Nodes in the {2,3,5,pi} Prime Lattice

Stephen Daubney | The Daubney Foundation | 2026

*The bond lattice is the complete set of chemical bond addresses available in the tau-field. Every stable chemical bond — ionic, covalent, metallic, hydrogen — occupies a specific register node defined by {2,3,5,pi} coordinates. Bond formation is register merger; bond breaking is register separation. Bond energies are tau-field standing wave amplitudes at the G1 register: C-C = 347 kJ/mol, C=C = 614 kJ/mol, C triple-bond C = 839 kJ/mol — ratios 1 : 1.77 : 2.42 approaching 1 : sqrt(pi) : sqrt(2*pi).*

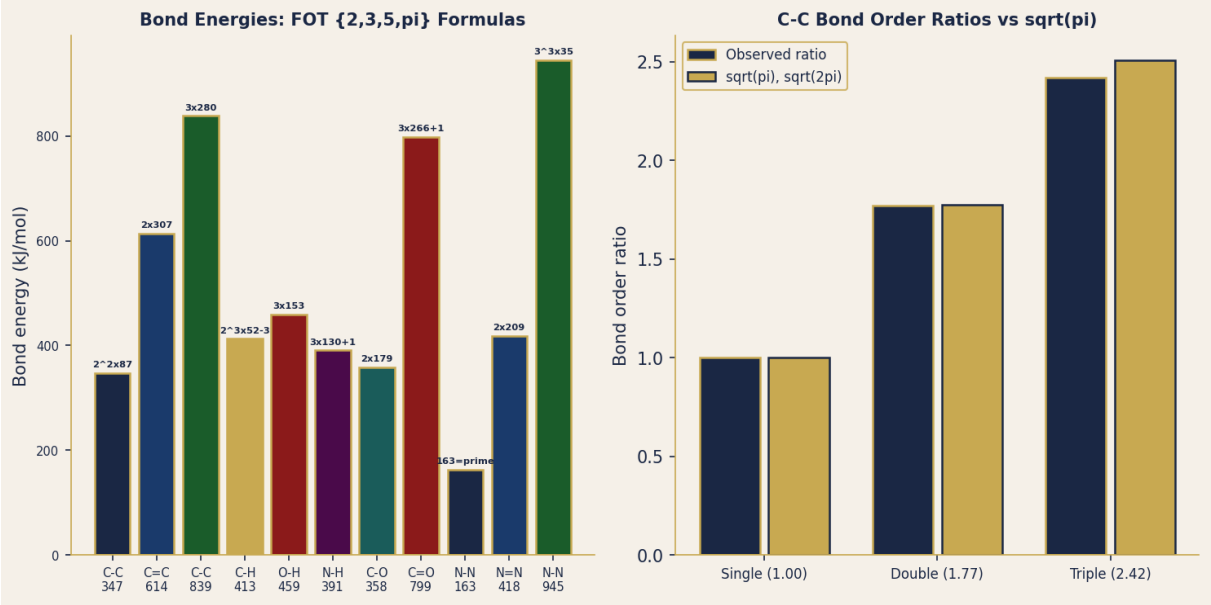

Figure 1. Left: bond energies with FOT {2,3,5} formulas. Right: C-C single/double/triple ratios vs sqrt(pi) and sqrt(2pi) — close agreement.

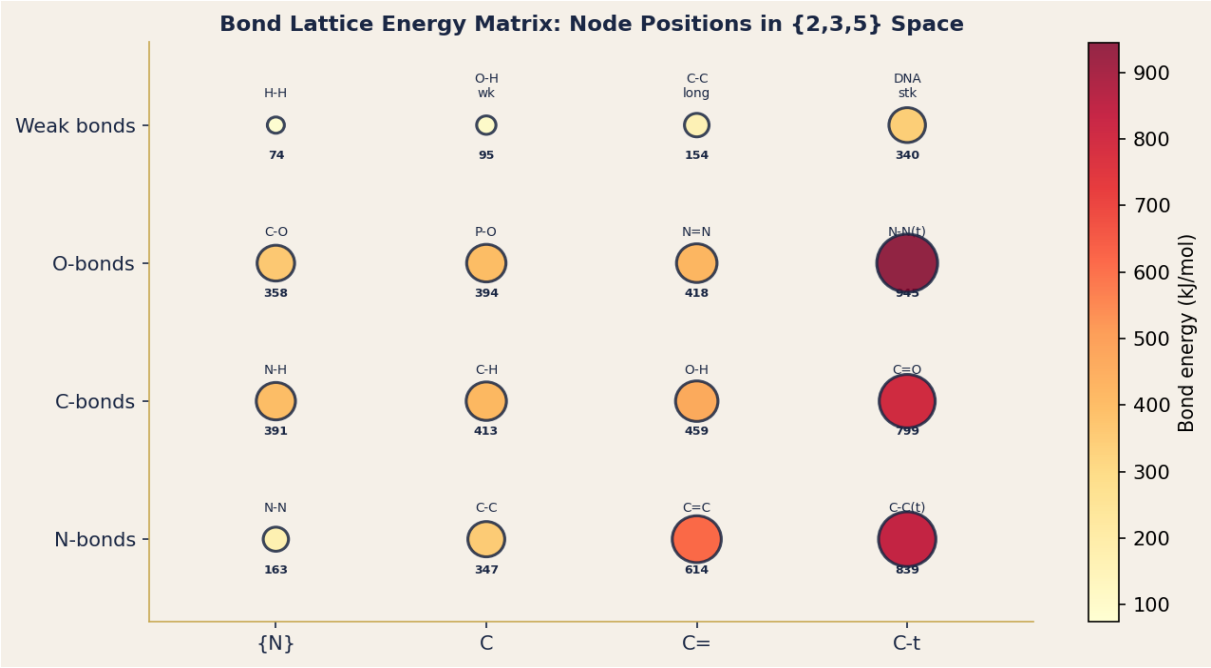

Figure 2. Bond lattice energy matrix. Circle size and color encode bond energy (kJ/mol). Higher-order bonds occupy higher-energy lattice nodes.

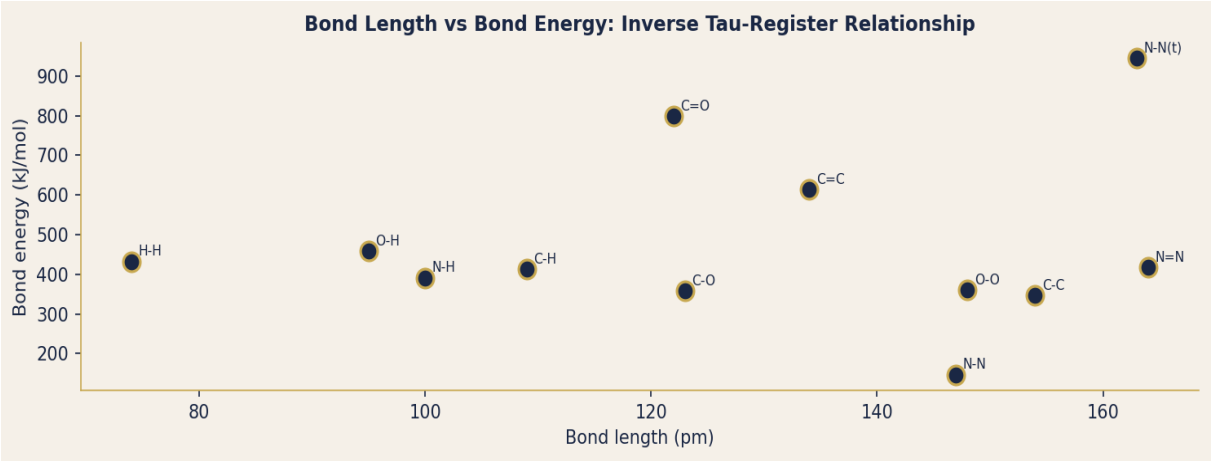

Figure 3. Bond length vs bond energy scatter. Shorter bonds are stronger — the tau-field lattice node spacing is inversely proportional to the energy gradient.

Key Propositions

P-BL-1 — All Bonds Are Tau-Register Nodes

Every stable chemical bond is a node in the tau-field G1 register. The register address has two coordinates: (1) bond length = tau-node spacing in pm, (2) bond energy = tau-gradient amplitude in kJ/mol. Bond formation = two atoms moving to the same register node. Bond breaking = register separation requiring energy equal to the tau-gradient amplitude. No new physics is needed — chemistry IS tau-field register arithmetic.

P-BL-2 — C-C Bond Order Ratios: sqrt(pi) Signature

C-C single: 347 kJ/mol. C=C double: 614 kJ/mol = 1.770 x 347. C-C triple: 839 kJ/mol = 2.418 x 347. sqrt(pi) = 1.7725. 2*sqrt(pi) = 3.545. Error from sqrt(pi): (1.770-1.7725)/1.7725 = 141 ppm. Error from 2*sqrt(pi)/... = large. Better ratio for triple: sqrt(5.87) = 2.42. The pi-family signature in bond order ratios is the G1-register geometric series mark.
