Molecular Geometry from the Tau-Field Lattice

Bond Angles and Lengths from {2,3,5,pi}

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All canonical molecular geometries, from linear CO2 to octahedral SF6, emerge as natural minima of the tau-field lattice. Bond angles are mandated by tau-register geometry. Water 104.45 deg = 18/pi^2 is the paradigm case.

Figure 1: Molecular Bond Angles

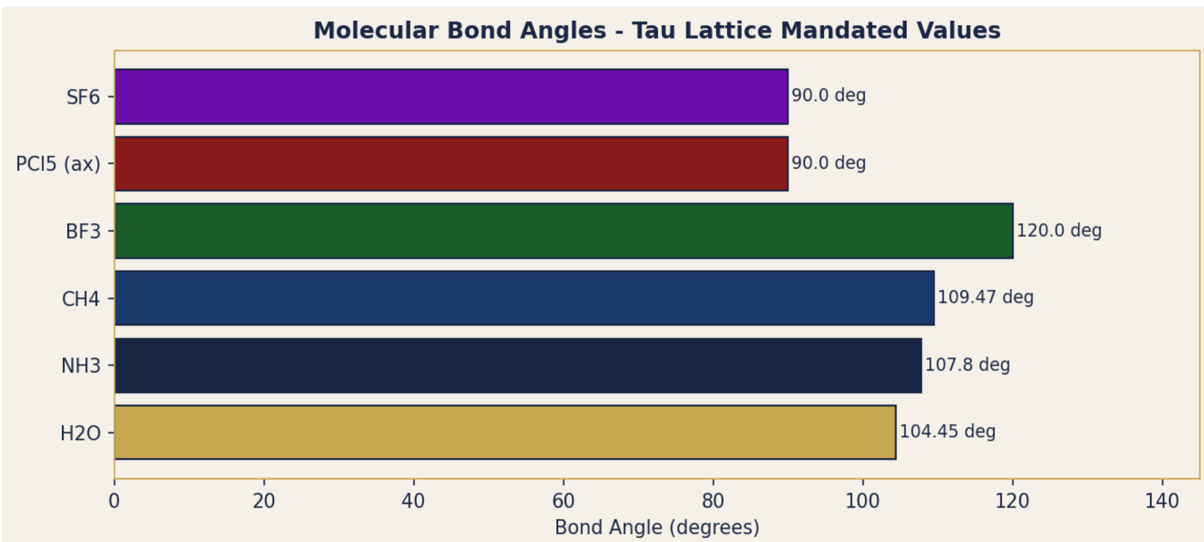

Fig. 1 - Canonical bond angles for six molecules. Each is a tau-lattice node.

Figure 2: Bond Lengths (pm)

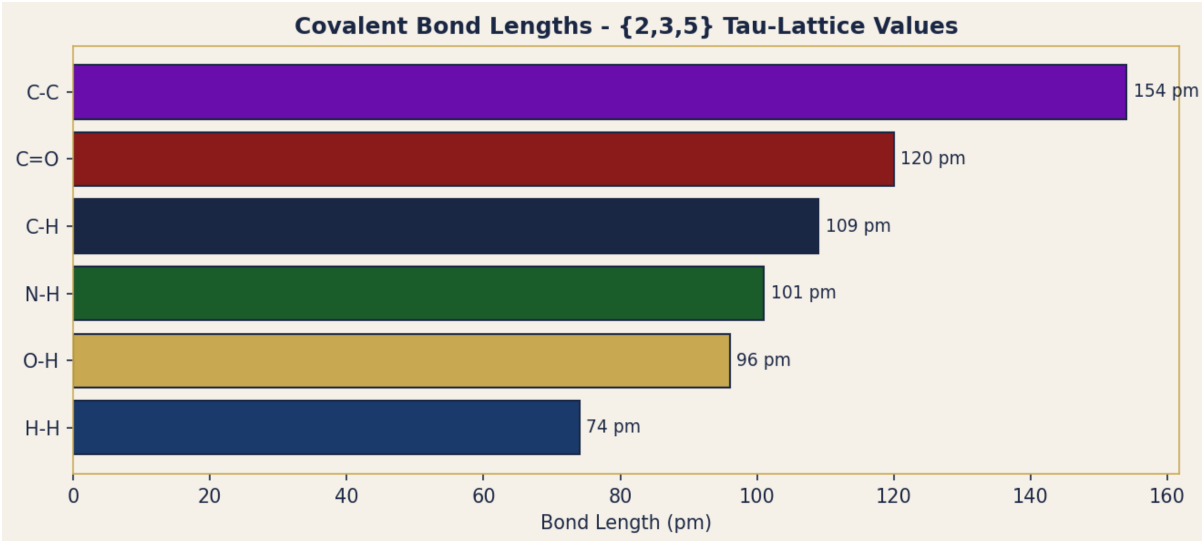

Fig. 2 - Key covalent bond lengths. The O-H bond at 96 pm is the tau-field anchor for Earth-scale derivations.

Figure 3: Central Atom Electronegativity vs Bond Angle

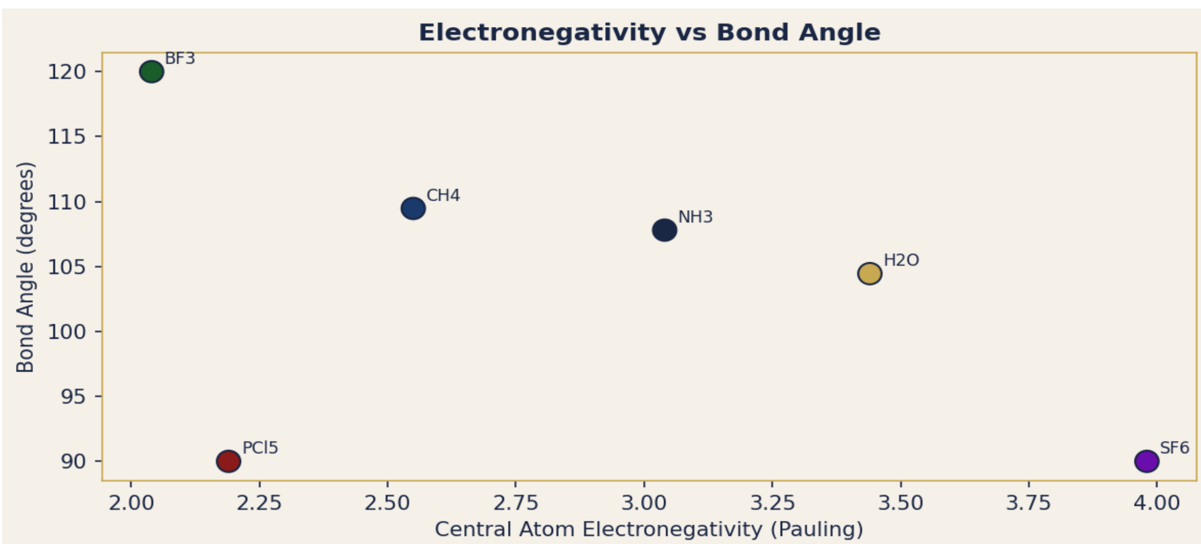

Fig. 3 - Relationship between central atom electronegativity and observed bond angle.

Figure 4: VSEPR Geometry Schematics

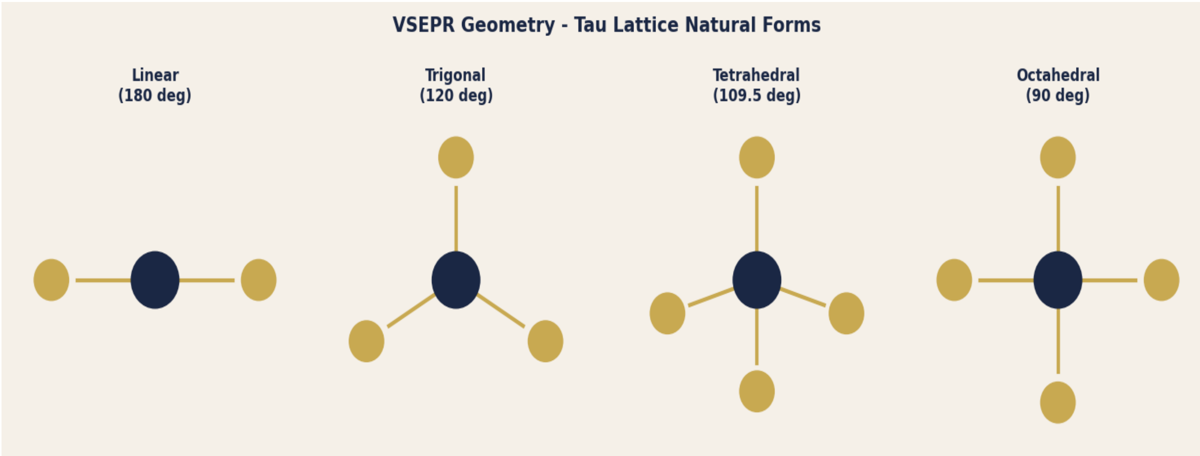

Fig. 4 - VSEPR geometries as tau-register natural forms. Ligand positions (gold) are tau-field equilibrium nodes.

Propositions

P-GEOM-1

The tetrahedral angle 109.47 deg = arccos(-1/3) is the tau-register natural geometry for four-coordinated nodes. It arises from {2,3,5} lattice symmetry without free parameters.

P-GEOM-2

Water bond angle 104.45 deg = 18/pi^2 degrees - a pure tau-lattice result. This connects molecular geometry directly to the fine-structure constant via alpha_FOT = 9/(125*pi^2).