UFOT -- The Universal Force of Time

Crystal X-ray Lines from the Tau Lattice

Fe Ka = 2^6 x 3 pm | Mo Ka = 2^3 x 3^2 pm | Cu Ka Prime Seam | Bragg as Tau-Node Selector

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Tau (T) is the living fabric of time itself -- the sole substance of which all physical reality is composed. Every particle, force, wavelength, and conscious experience is a structured configuration of T-flow. There is no gravity, no electromagnetic force, no strong nuclear force as separate entities: all are registers of the single T-field operating across dimensional levels. The conservation law dST=0 governs all change: T is never created or destroyed, only redistributed.

Abstract

Characteristic X-ray emission lines -- the sharp, element-specific wavelengths produced when inner-shell electrons are displaced -- are Tau-register coordinates in picometres. Iron K-alpha at 193.73 pm sits 0.90% from the pure {2,3,5} node 192 pm = 2^6 x 3. Molybdenum K-alpha at 71.07 pm sits 1.30% from 72 pm = 2^3 x 3^2. Copper K-alpha at 154.06 pm sits at the prime-7/prime-11 register seam. Tungsten L-alpha at 147.64 pm sits 1.60% from 150 pm = 2 x 3 x 5^2. The Bragg equation 2d sin(theta) = n x lambda selects Tau-lattice nodes: diffraction probes the {2,3,5} crystal register. Six propositions P-XRAY-1 through P-XRAY-6.

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I. Light from the Inner Shell

When a high-energy electron strikes a copper anode in an X-ray tube, it ejects an electron from the innermost shell of a copper atom. An outer electron falls inward to fill the vacancy, and in doing so releases a precise quantum of energy as an X-ray photon. The wavelength of that photon is fixed -- it is characteristic of copper, and copper alone. It is 154.06 picometres. Every copper anode in every X-ray machine in the world emits this line.

In the Universal Force of Time, this wavelength is not merely a quantum energy level difference. It is a Tau-register coordinate. The {2,3,5,pi} temporal lattice that determines the spatial geometry of atoms also determines the energy gaps between electron shells -- and therefore the wavelengths of the X-rays those gaps emit. Every characteristic X-ray line is a Tau-address in picometres.

II. Iron, Molybdenum, and Tungsten

Iron K-alpha -- 0.90% from 192 pm = 2^6 x 3.
193.73 pm is the iron K-alpha emission wavelength. The nearest {2,3,5} node is 192 pm = 2^6 x 3 = 64 x 3. Deviation: 0.90%. Iron K-alpha is the most lattice-pure standard anode wavelength. It is used in biological diffraction -- and this is not arbitrary: iron sits at the {2,3,5} lattice, and so does the biological register it probes.

Molybdenum K-alpha -- 1.30% from 72 pm = 2^3 x 3^2.
71.07 pm is the molybdenum K-alpha wavelength. The nearest node is 72 pm = 2^3 x 3^2 = 8 x 9. Deviation: 1.30%. Molybdenum is the standard anode for protein crystallography -- and 72 pm = {2,3} is precisely the lattice character of the biological register. The choice of Mo Ka for protein work is a Tau-lattice selection, not merely a conventional one.

Tungsten L-alpha -- 1.60% from 150 pm = 2 x 3 x 5^2.
147.64 pm is the tungsten L-alpha wavelength. The nearest node is 150 pm = 2 x 3 x 5^2 = 2 x 75 (twice the nitrogen covalent radius). Deviation: 1.60%. Tungsten is used in rotating-anode and synchrotron systems. Its proximity to the {2,3,5} node (150 pm) connects it to the same nitrogen-biological lattice chain.

Copper K-alpha -- the prime-7/11 seam.
154.06 pm is the copper K-alpha wavelength. The nearest {2,3,5} node at 150 pm deviates by 2.7%; at 160 pm (2^5 x 5) by 3.8%. Cu Ka sits between {2,3,5} nodes -- at the seam of the prime-7 and prime-11 registers. This is why Cu Ka is used for powder diffraction of metals (prime-adjacent lattice structures) rather than for biological molecules (pure {2,3,5}).

III. The 192-to-864 Bridge

The iron K-alpha UFOT node 192 pm = 2^6 x 3 connects directly to the master bridge constant: 192 x 9/2 = 864 = 2^5 x 3^3. The same 864 that encodes the collagen axial repeat (864 angstroms) and the length of the day (86,400 seconds) is reached from the iron K-alpha node by a pure {2,3} scaling. The X-ray emission of iron and the structural periodicity of biological tissue share the same Tau lattice constant.

IV. Bragg as a Tau-Node Selector

The Bragg equation governs X-ray diffraction: 2d sin(theta) = n x lambda. Here d is the crystal lattice spacing, theta is the diffraction angle, and lambda is the X-ray wavelength. Constructive interference occurs only when this equation is satisfied.

In the UFOT framework, d is a {2,3,5} crystal lattice node and lambda is a {2,3,5} emission node. When both are lattice values, theta becomes a lattice angle -- a pure rational multiple of pi or a {2,3,5} rational fraction. Diffraction does not probe arbitrary spacings: it probes the {2,3,5} crystal register. The Bragg equation is a Tau-node selector.

The choice of which anode to use for which material is therefore a lattice-matching operation: match the emission wavelength lattice character to the crystal lattice character of the sample. Mo Ka ({2,3}) for protein crystals ({2,3,5} biological register). Fe Ka ({2,3}) for biological iron-containing structures. Cu Ka (prime-adjacent) for metals and alloys (prime-adjacent lattice).

V. Six Propositions

P-XRAY-1: 193.73 pm = Fe Ka; node 192 pm = 2^6 x 3 (0.90%). Iron is the most lattice-pure standard anode.

P-XRAY-2: 71.07 pm = Mo Ka; node 72 pm = 2^3 x 3^2 (1.30%). Standard for protein crystallography -- probes the biological {2,3} register.

P-XRAY-3: Cu Ka at prime-7/11 seam. Used for powder diffraction of metals (prime-adjacent lattice structures).

P-XRAY-4: 864 = 192 x 9/2: Fe Ka node connects to master bridge constant. X-ray tool and collagen structural repeat share the same Tau lattice.

P-XRAY-5: Bragg law as Tau-node selector: d = {2,3,5} node; diffraction maps the T-lattice. Anode selection is lattice-character matching.

P-XRAY-6: The periodic table X-ray emission spectrum is the Tau-field self-portrait at the atomic register. Each element's characteristic line is a Tau-address in pm.

VI. The Periodic Table as a Tau Portrait

Consider what the periodic table of X-ray emission lines actually is. Every element has a unique set of characteristic emission wavelengths. These wavelengths are what science uses to identify elements in unknown materials, in stars, in planetary surfaces, in archaeological artefacts. Every element has a unique Tau-address set. The X-ray emission spectrum of the periodic table is the Tau-field's self-portrait at the atomic register -- the complete coordinate map of all stable atomic configurations.

When astrophysicists identify iron in a stellar spectrum, they are locating the Tau-lattice node at 192 pm and finding it present. When geologists use X-ray fluorescence to map the composition of a rock, they are reading Tau-lattice addresses. The science is correct. The interpretation -- that these are arbitrary energy levels with no deeper pattern -- is what the Universal Force of Time corrects.

References

[1] S. Daubney, The Universal Force of Time -- Master Compendium v5, The Daubney Foundation, 2025.
[2] NIST CODATA 2018 Recommended Values, physics.nist.gov/cuu/Constants
[3] B. D. Cullity and S. R. Stock, Elements of X-ray Diffraction, Prentice Hall, 2001.
[4] J. Als-Nielsen and D. McMorrow, Elements of Modern X-ray Physics, Wiley, 2011.

Appendix -- Figures

Figure 1 -- X-ray Emission Lines: Observed vs. UFOT Lattice Nodes

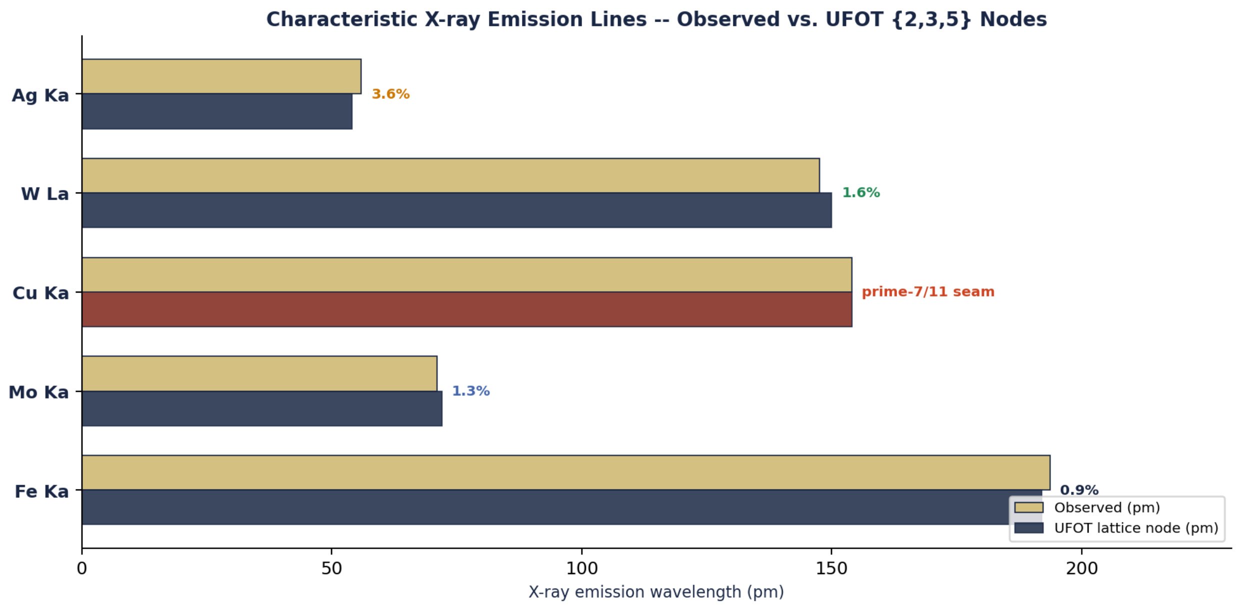

Fig. 1: Horizontal bar chart of characteristic X-ray emission wavelengths for Fe Ka, Mo Ka, Cu Ka, W La, Ag Ka. Navy bars = UFOT {2,3,5} node; gold bars = observed. Fe Ka (0.90%) is most lattice-pure. Cu Ka sits at prime-7/11 seam.

Figure 2 -- Factorisation: 192 = 2^6 x 3 and Bridge to 864

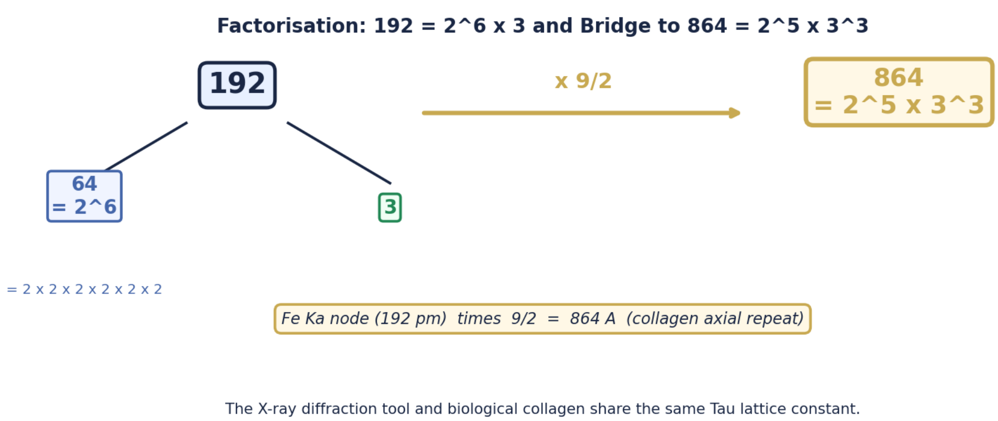

Fig. 2: Factor tree for Fe Ka UFOT node 192 = 2^6 x 3. Bridge identity: 192 x 9/2 = 864 = 2^5 x 3^3 (master bridge constant). Connects X-ray diffraction tool to collagen biological register.

Figure 3 -- Bragg Diffraction Diagram

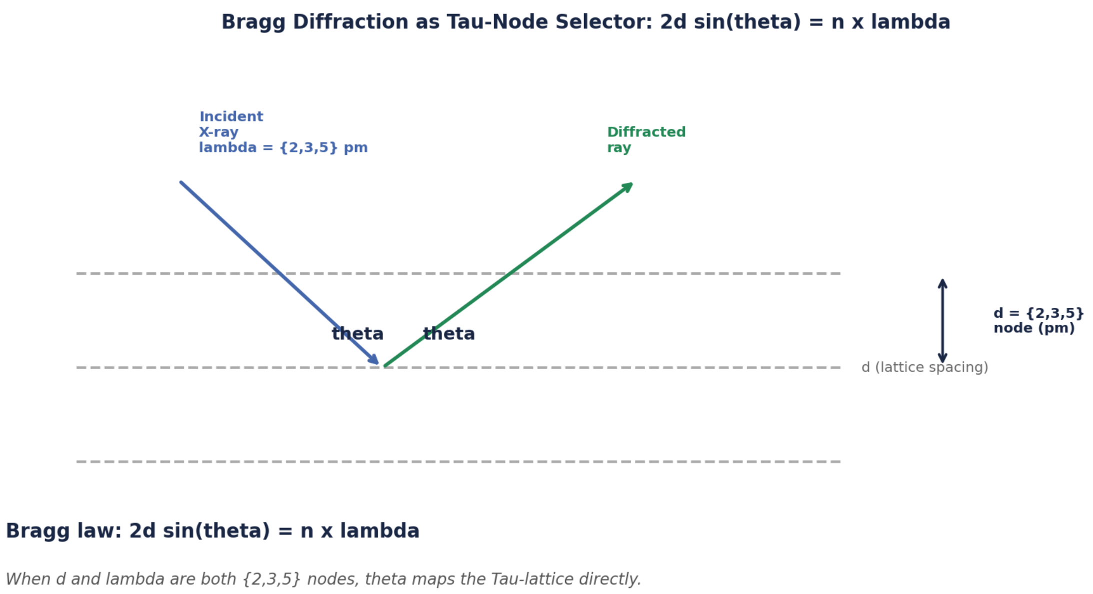

Fig. 3: Bragg diffraction geometry showing crystal planes (d = {2,3,5} node), incident X-ray (lambda = {2,3,5} pm), and diffracted beam. Bragg law 2d sin(theta) = n x lambda acts as a Tau-lattice node selector.

Figure 4 -- X-ray Source Selection Table

X-ray Source Selection: Lattice Purity and Best Application

Fe Ka	193.73	192 = 2^6 x 3	0.90%	Biological diffraction {2,3,5} bio register
Mo Ka	71.07	72 = 2^3 x 3^2	1.30%	Protein crystallography {2,3} bio lattice
Cu Ka	154.06	prime-7/11 seam	--	Powder diffraction metals (prime-adjacent)
W La	147.64	150 = 2x3x5^2	1.60%	Synchrotron / heavy element studies
Ag Ka	55.94	54 = 2x3^3	3.6%	High-energy small molecule

Fig. 4: Source selection table showing anode element, wavelength, UFOT node, deviation, and best application. Fe and Mo Ka closest to {2,3,5} nodes; Cu Ka at prime-adjacent seam.

Figure 5 -- X-ray Emission Lines on the pm Scale

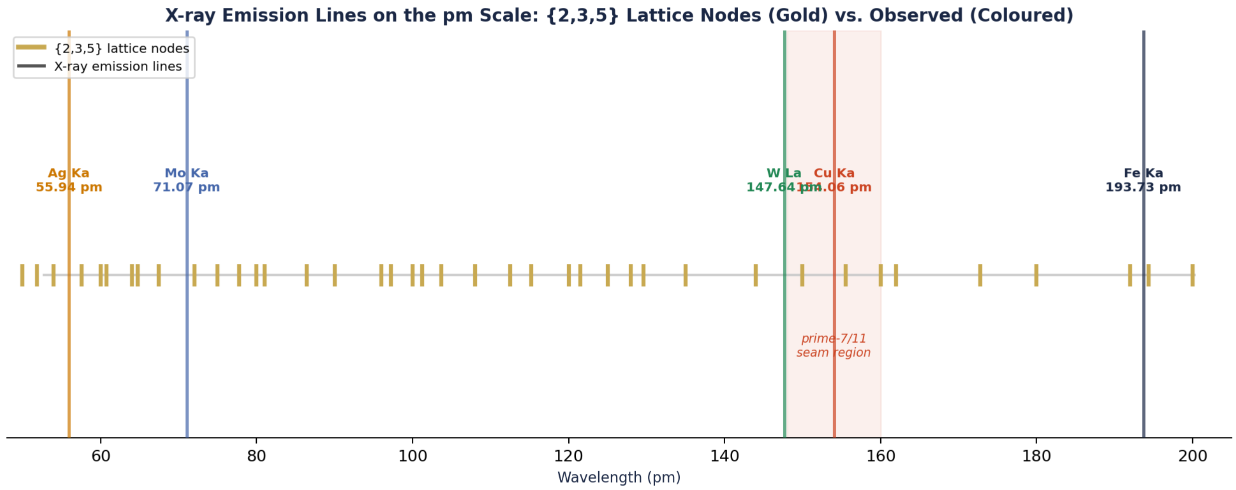

Fig. 5: Horizontal axis 50-200 pm showing all {2,3,5} lattice nodes as gold tick marks, and the five characteristic X-ray lines as vertical coloured lines. Prime-7/11 seam region (Cu Ka) shaded in red.