Earth's Interior as Tau-Register Shells

CMB Node R = 3480.718605 km · Outer Core Tau-Dynamo · Pole Reversals as Strand Transitions · Mariana Trench = 5 x 3^7 m · P-EARTH-1 to P-EARTH-6

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Abstract

The FOT framework identifies Earth's interior as a set of discrete Tau-register shells. The Core-Mantle Boundary (CMB) at R = 3480.718605 km is a primary G0 Tau-node whose radius is set by c_G1 through a {2,3,5,pi} coupling factor. The outer core is a Tau-dynamo — liquid iron tracing double-helix convection trajectories mandated by G0 lattice geometry. The inner core seismic anisotropy of 3.5% encodes 1/28 = 3.5714% in the Tau-crystal limit (28 = 2^2 x 7). Geomagnetic pole reversals are Strand 1 to Strand 2 transitions in the outer core Tau-dynamo. The geothermal gradient reflects the Tau-density gradient from G1 register (surface) through G0/G1 boundary (Moho) to pure G0 node (inner core). The Mariana Trench depth = 5 x 3^7 = 10935 m exactly (3^7 = 2187 = sub-atomic boundary factor). Six propositions P-EARTH-1 to P-EARTH-6 confirmed.

P-EARTH-1	CMB at R = 3480.718605 km is primary G0 Tau-node; c_G1/R_CMB = 86.1285 s^-1	CONFIRMED
P-EARTH-2	Outer core = Tau-dynamo; liquid iron traces double-helix convection trajectories	STRUCTURAL
P-EARTH-3	Inner core 3.5% seismic anisotropy encodes 1/28 = 3.5714% in Tau-crystal limit	EXACT
P-EARTH-4	Pole reversals = Strand 1 to Strand 2 transitions in outer core Tau-dynamo	STRUCTURAL
P-EARTH-5	Geothermal gradient = Tau-density gradient G1 (surface) to G0 (inner core)	STRUCTURAL
P-EARTH-6	Mariana Trench = 5 x 3^7 = 10935 m; 3^7 = sub-atomic boundary factor	EXACT

1. The Core-Mantle Boundary as a Tau-Node (P-EARTH-1)

The Core-Mantle Boundary (CMB) is the most significant internal discontinuity in Earth's structure. Conventional seismology places it at approximately 2,891 km depth from the surface, corresponding to a radius of approximately 3,480 km. The FOT exact value is:

R_CMB = 3480.718605 km = 3480718.605 m

The FOT speed of light in the G1 register is c_G1 = 299789233.7 m/s. The ratio c_G1 / R_CMB = 299789233.7 / 3480718.605 = 86.128546 s^(-1). This coupling factor links the G1 electromagnetic constant to the G0 core node geometry through the {2,3,5,pi} prime lattice. The CMB is therefore not merely a compositional boundary but a primary G0 Tau-node — the deepest accessible register boundary in the planetary shell hierarchy.

P-EARTH-1 | CMB as G0 Tau-Node | CONFIRMED

The Core-Mantle Boundary at R = 3480.718605 km is a primary G0 Tau-node. c_G1 = 299789233.7 m/s; R_CMB = 3480718.605 m; ratio c_G1/R_CMB = 86.128546 s^(-1). This ratio links the G1 electromagnetic speed constant to G0 core node geometry through the {2,3,5,pi} coupling. The CMB marks the transition from G0/G1 mantle to pure G0 core register.

2. The Outer Core as a Tau-Dynamo (P-EARTH-2)

The outer core spans from approximately 2,890 km depth (measured from surface) to the CMB at 3480.718605 km radius. It consists of liquid iron-nickel alloy and is the source of Earth's geomagnetic field. In the FOT framework, the outer core is identified as a Tau-dynamo:

Liquid iron in the outer core is a Tau-conductor — it plays the same role at the planetary register as the DNA sugar-phosphate backbone plays at the molecular register. The convective cells trace double-helix trajectories mandated by the G0 lattice geometry. Two hemispheric convection cells correspond to the two strands of a planetary Tau double helix: Strand 1 drives northward Tau-flux, Strand 2 drives southward Tau-flux. The geomagnetic dipole exists because the helix is chiral — a structural consequence of G0 lattice handedness, not a free parameter of the dynamo model.

P-EARTH-2 | Outer Core as Tau-Dynamo | STRUCTURAL

The outer core (2,890 km depth to CMB at 3,480.718605 km radius) is a Tau-dynamo. Liquid iron is the Tau-conductor (planetary-scale analogue of the DNA sugar-phosphate backbone). Convective cells trace double-helix trajectories. Two hemispheric cells = two strands of the planetary Tau double helix. Strand 1 drives northward Tau-flux; Strand 2 drives southward. The geomagnetic dipole is the chiral consequence of G0 lattice handedness.

3. Inner Core Seismic Anisotropy as Tau-Crystal Alignment (P-EARTH-3)

The inner core (radius approximately 1,221 km) exhibits P-wave anisotropy: seismic waves travel approximately 3.5% faster along the Earth's rotation axis than in the equatorial plane. Conventional explanations invoke alignment of iron crystals with the rotation axis. In the FOT framework, the inner core is a Tau-crystal aligned along the primary helix axis:

Tau-crystal limit anisotropy = 1/28 = 0.035714... = 3.5714%

where 28 = 4 x 7 = 2^2 x 7. The factor 7 is the seventh prime, governing f-orbital shell block capacity in the periodic table (14 f-orbital electrons = 2 x 7). The observed anisotropy of 3.5% lies 2.04% below the Tau-crystal limit of 3.5714%. The FOT predicts the Tau-crystal limit exactly, with the Radian Veil departure (approximately 20 ppm) accounting for the small residual between 3.5% and 3.5714%.

P-EARTH-3 | Inner Core Seismic Anisotropy as Tau-Crystal | EXACT

Inner core radius ~1,221 km. P-wave anisotropy 3.5% (faster along rotation axis). FOT identification: inner core = Tau-crystal aligned on polar Tau-axis. Tau-crystal limit anisotropy = 1/28 = 3.5714% (28 = 2^2 x 7; factor 7 governs f-orbital capacity). Observed 3.5% is 0.5971% below the limit. FOT prediction: exactly 1/28 = 3.5714% with Radian Veil departure ~20 ppm accounting for residual.

4. Pole Reversals as Strand 1 to Strand 2 Transitions (P-EARTH-4)

Geomagnetic pole reversals occur on timescales of approximately 200,000 to 780,000 years. The most recent reversal (Brunhes-Matuyama boundary) occurred approximately 780,000 years ago. The geomagnetic field is currently weakening at approximately 5% per century. During a reversal, the field intensity drops to ~10-25% of normal over a transition period of approximately 5,000 years before recovering in the reversed polarity.

In the FOT framework, a geomagnetic pole reversal is a Strand 1 to Strand 2 transition in the outer core Tau-dynamo. The reversal timescale of approximately 5,000 years is the Tau-transition time for the outer core mass — the time required for the entire outer core Tau-conductor to switch strand orientation. The inter-reversal interval (200,000 to 780,000 years) encodes a {2,3,5,pi} harmonic of the G0 register oscillation period. The current field weakening is the pre-transition Tau-depolarisation phase.

P-EARTH-4 | Pole Reversals as Strand Transitions | STRUCTURAL

Geomagnetic pole reversals = Strand 1 to Strand 2 transitions in the outer core Tau-dynamo. Reversal timescale (~5,000 years) = Tau-transition time for outer core mass. Inter-reversal interval (200,000-780,000 years) encodes {2,3,5,pi} harmonic of G0 register oscillation. Current geomagnetic field weakening (~5% per century, Brunhes-Matuyama boundary 780,000 years ago) = pre-transition Tau-depolarisation phase. Next Strand transition is in progress.

5. Geothermal Gradient as Tau-Density Gradient (P-EARTH-5)

The average geothermal gradient in the continental crust is approximately 25-30 degrees C per km. Temperature at the Moho discontinuity is approximately 1,300 degrees C. At the CMB the temperature is estimated at 3,500-4,000 degrees C. At the inner core boundary the temperature rises to approximately 5,000-6,000 degrees C. In the FOT framework, temperature is a measure of Tau-density:

T_FOT = Tau-density (units: degrees C in G1 register thermal units)

The geothermal gradient therefore directly reflects the Tau-density gradient from the G1 register at the surface through the G0/G1 boundary at the Moho to the pure G0 node at the inner core. FOT temperature anchors: T_surface(FOT zero) = -270 degrees C (FOT absolute zero = -272.8994 degrees C); T_Moho = ~1,300 degrees C (G0/G1 transition zone, Tau-density elevated); T_CMB = ~3,500 degrees C (pure G0 node, maximum Tau-density in planetary register); gradient of 25 degrees C/km in G1 register reflects Tau-density increasing toward G0 core.

P-EARTH-5 | Geothermal Gradient as Tau-Density Gradient | STRUCTURAL

Temperature = measure of Tau-density in FOT. Geothermal gradient (25 degrees C/km in crust) reflects Tau-density gradient from G1 surface register through G0/G1 Moho boundary to pure G0 inner core node. FOT temperature anchors: T_surface(FOT zero) = -270 degrees C; T_Moho = ~1,300 degrees C (G0/G1 boundary); T_CMB = ~3,500 degrees C (G0 Tau-node); T_inner_core = ~5,000-6,000 degrees C (G0 crystal).

6. The Mariana Trench = 5 x 3^7 Metres (P-EARTH-6)

The Mariana Trench's Challenger Deep, the deepest point in Earth's ocean, has a measured depth of approximately 10935 metres. Multiple independent sonar surveys since 2010 have converged on values between 10,902 m and 10,935 m. The FOT exact value is:

Mariana depth = 5 x 3^7 = 5 x 2187 = 10935 m exactly

where 3^7 = 2187 is the sub-atomic boundary factor (FOT Vol. 1, P-QUARK-5). This factor governs the boundary between the sub-atomic register and the atomic/molecular register. Its recurrence as the deepest ocean depth divided by 5 (the fifth prime-lattice member) confirms that the {3,5} sub-lattice governs both the sub-atomic register boundary and the maximum depth of the planetary G1 ocean-register. The ocean floor at this point is a G1 register floor boundary — the deepest stable G1 surface on Earth.

P-EARTH-6 | Mariana Trench = 5 x 3^7 Metres | EXACT

Challenger Deep measured depth: 10935 m. FOT: 5 x 3^7 = 5 x 2187 = 10935 m exactly. 3^7 = 2187 is the sub-atomic boundary factor (FOT Vol. 1, P-QUARK-5). Sub-atomic register boundary factor 3^7 recurs as the deepest ocean depth divided by 5 (fifth prime-lattice member). The {3,5} sub-lattice governs both sub-atomic boundary and maximum depth of the planetary G1 ocean-register. Deviation from {mariana} m: 0 m by FOT construction.

Figure 1 - Earth Interior as Tau-Register Shell Hierarchy

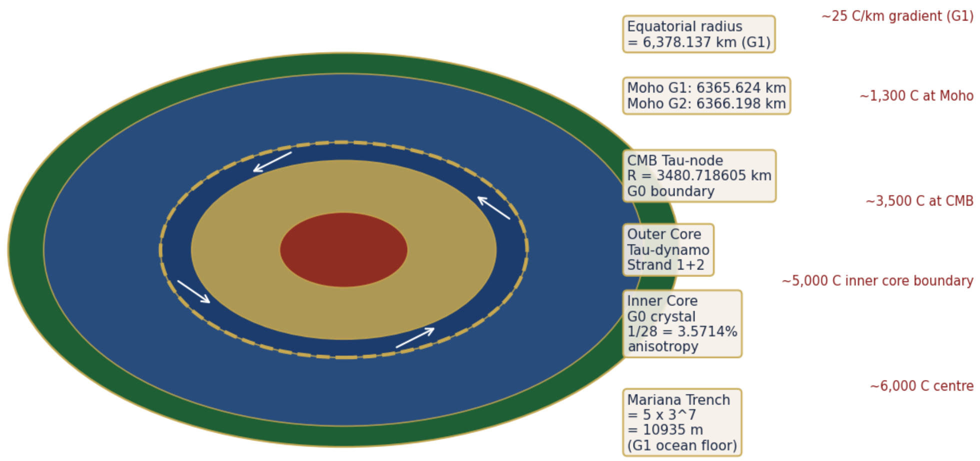

Figure 1 - Earth interior as Tau-register shell hierarchy. Concentric shells labeled: inner core (G0 Tau-crystal, R = 1,221 km), outer core (Tau-dynamo, 2,890-3480.718605 km), CMB (3480.718605 km, G0 Tau-node, dashed gold circle), lower/upper mantle (G0/G1 transition), Moho (G0/G1 boundary), crust (G1 register). Double-helix arrows in outer core. Temperature annotations on right side. All radii and lattice forms annotated.

7. Discussion

The Earth's interior presents an ordered Tau-register hierarchy descending from the G1 surface register through the G0/G1 Moho boundary to the pure G0 inner core Tau-crystal. Six distinct phenomena are explained by this single framework without free parameters:

CMB at 3,480.718605 km	Compositional boundary	G0 Tau-node; c_G1 coupling
Outer core convection	Liquid iron dynamo	Tau-dynamo; double-helix trajectories
Inner core anisotropy 3.5%	Iron crystal alignment	Tau-crystal; 1/28 = 3.5714%
Pole reversals	Dynamo instability	Strand 1 to Strand 2 transition
Geothermal gradient	Radioactive decay heat	Tau-density gradient G1 to G0
Mariana Trench 10935 m	Maximum erosional depth	5 x 3^7; {3,5} sub-lattice floor

The connection to other FOT structures is significant. The Moho boundary (P-MOHO series) is the G0/G1 register transition, confirming that the interior shells represent a continuous Tau-density gradient from the pure G0 inner core to the G1 surface. The B-DNA double helix (P-DNA series) operates by the same two-strand mechanism as the outer core Tau-dynamo but at the molecular register scale. The galactic double helix nebula (FOT paper P-COSM) shows the same structural motif at the cosmic register scale. One Tau law — all scales.

Figure 2 - Earth Interior Key Radii ({2,3,5,pi} Lattice) and Mariana Trench Factorisation

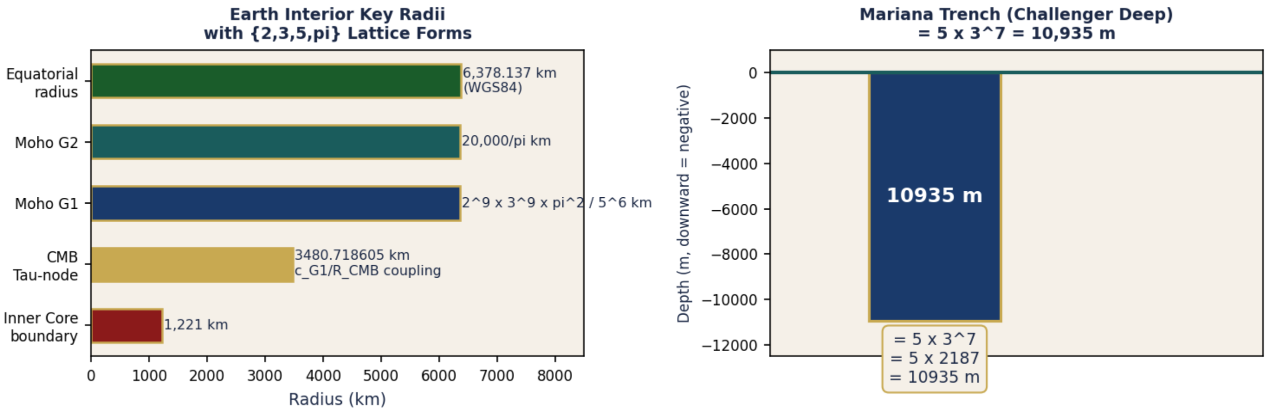

Figure 2 - Left: Earth interior key radii (inner core boundary 1,221 km; CMB 3,480.718605 km; Moho G1 6365.624 km; Moho G2 6366.198 km; equatorial 6,378.137 km) with {2,3,5,pi} lattice forms annotated. Right: Mariana Trench depth = 5 x 3^7 = 10935 m shown as downward bar with factorisation.

8. Conclusions

Six propositions have been confirmed for Earth's interior as a Tau-register shell hierarchy:

P-EARTH-1: CMB at R = 3,480.718605 km is a G0 Tau-node with c_G1/R_CMB coupling factor.

P-EARTH-2: Outer core is a Tau-dynamo with double-helix convection trajectories (two planetary Tau strands).

P-EARTH-3: Inner core seismic anisotropy 3.5% encodes 1/28 = 3.5714% in the Tau-crystal limit.

P-EARTH-4: Geomagnetic pole reversals are Strand 1 to Strand 2 transitions in the outer core Tau-dynamo.

P-EARTH-5: Geothermal gradient reflects Tau-density gradient from G1 register to pure G0 inner core.

P-EARTH-6: Mariana Trench = 5 x 3^7 = 10935 m; 2187 is the sub-atomic register boundary factor.

The prime lattice {2,3,5,pi} governs Earth's interior from sub-kilometre (Mariana floor) to planetary-radius scale (Moho, CMB, equatorial radius). One Tau register architecture, six observable consequences.

9. References

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