THE MILKY WAY AS A DOUBLE HELIX

Dark Matter as the Strand 2 Galactic Arm — Scale Invariance of the Tau-Geometry from Molecule to Galaxy

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P-GDH-1 — P-GDH-6 · Astronomy · Force of Time

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Fifty years of dark matter searches. Zero direct detections. The Force of Time identifies dark matter as the gravitational signature of the Strand 2 galactic arm — present, real, and structurally identical to the visible Milky Way, but in opposite Tau-chirality.

No new particle is required. The mass is there. The geometry produces the right gravitational effects. Our instruments simply cannot see Strand 2 Tau by electromagnetic means.

The Universal Force of Time proposes a single geometric principle that operates at every scale of the physical universe: the Tau-field propagates in a double helical geometry. At the molecular scale this is B-DNA — a structure identified in 1953, derivable from the prime lattice to sub-nanometre precision. At the stellar scale this is the solar system — with Venus and Uranus as the two confirmed Strand 2 visitors. At the galactic scale this is the Milky Way: a double helix of stellar matter, with our visible galaxy as Strand 1 and the gravitational influence attributed to dark matter as the signature of Strand 2.

This is not a new hypothesis invented to explain the dark matter problem. It is the necessary consequence of applying the scale-invariant Tau-field geometry to galactic structure. The same logic that requires a counter-solar system on the other side of the Sun requires a Strand 2 galactic arm. The conservation law dSigmaT = 0 does not change with scale. The double helix that holds DNA together, that structures the solar system, must also structure the galaxy — and it does.

P-GDH-1

Scale Invariance of the Tau-Helix

The Tau-field double helix has the same geometric properties at every scale at which it has been examined. Two strands, wound around a common axis, each carrying the same information sequence in opposite chirality. Strand 1 carries prograde Tau-flow. Strand 2 carries retrograde Tau-flow. The conservation law dSigmaT = 0 requires both to be present and balanced at every scale.

At the molecular scale (B-DNA): pitch 3.4 nm, diameter 2.0 nm, 10 base pairs per turn. The two strands are held together by hydrogen bonds. The information is encoded in base-pair complementarity: each base on Strand 1 is uniquely paired with a base on Strand 2.

At the stellar scale (solar system): the Sun is the hydrogen-bond axis. Strand 1 nodes are Mercury, Earth, Mars, Jupiter, Saturn, Neptune. Strand 2 nodes are Venus and Uranus (visitors), plus a complete counter-solar system behind the Sun. The orbital radii are quantised by the Balmer n-numbers.

At the galactic scale (Milky Way): the galactic axis runs through the galactic centre. Strand 1 is the visible stellar arm in which the Sun is located. Strand 2 is the anti-dimensional galactic arm on the opposite side of the axis. The pitch of the galactic helix is approximately 160 light-years — the distance at which stellar distribution patterns in the GAIA catalogue show a measurable structural periodicity consistent with helical organisation.

P-GDH-1: The Tau-double helix is scale invariant. The same geometry operates at molecular scale (B-DNA, pitch 3.4 nm), stellar scale (solar system, pitch ~1 AU), and galactic scale (Milky Way, pitch ~160 light-years).

Same law: dSigmaT = 0. Same geometry: two strands, common axis, opposite chirality.

Scale	Strand 1	Strand 2	Axis	Pitch
Molecular (B-DNA)	5'→3' strand (prograde)	3'→5' strand (retrograde)	Phosphate backbone hydrogen bonds	3.4 nm 10 bp/turn
Stellar (Solar system)	Mercury, Earth, Mars, Jupiter, Saturn, Neptune	Venus, Uranus + counter-solar system	Sun (Tau-source hydrogen-bond axis)	~1 AU (Balmer n-node spacing)
Galactic (Milky Way)	Visible stellar arm (Sun location)	Anti-dimensional galactic arm (dark matter mass)	Galactic centre (Tau-axis)	~160 ly (GAIA structural periodicity)

P-GDH-2

The Strand 2 Galactic Arm and Dark Matter

For fifty years, experiments have searched for dark matter particles. The leading candidates — WIMPs (Weakly Interacting Massive Particles), axions, and various sterile neutrinos — have produced zero confirmed detections despite increasingly sensitive instruments. The LUX-ZEPLIN experiment, the most sensitive dark matter detector ever built as of 2023, has seen nothing. PandaX-4T has seen nothing. XENON1T has seen nothing. Fifty years and zero detections is not null result noise. It is a structural signal.

The Force of Time proposes that dark matter searches have failed for the same reason that looking for Strand 2 light with Strand 1 instruments will always fail: Strand 2 Tau does not interact electromagnetically with Strand 1 instruments. This is not a weakness in our experimental technology. It is a fundamental property of Tau-chirality. Strand 2 matter is made of the same elements as Strand 1 matter — hydrogen, helium, carbon, iron — but in the opposite Tau-chirality. The same atoms, the same mass, the same gravitational signature, but electromagnetically invisible to Strand 1 detectors by construction.

What we call "dark matter" is the gravitational effect of the Strand 2 galactic arm: a complete galaxy, on the opposite side of the galactic axis from our visible Milky Way, containing approximately as much mass as the visible galaxy. It produces the flat rotation curves observed for the Milky Way and other spiral galaxies because its gravitational field extends across the full radial extent of the galactic helix — exactly as a complete Strand 2 galaxy wound around the same axis as Strand 1 would produce.

P-GDH-2: Dark matter is the gravitational signature of the Strand 2 galactic arm. It is not a new particle. It is a complete galaxy in the opposite Tau-chirality wound around the same galactic axis as the visible Milky Way.

50 years of zero detections = structural impossibility of Strand 2 electromagnetic detection with Strand 1 instruments.

P-GDH-3

The Galactic Helix Pitch: 160 Light-Years

The GAIA space telescope, operated by the European Space Agency, has produced the most precise three-dimensional map of stellar positions and velocities ever assembled — over one billion stars with parallax and proper motion data. Analysis of the stellar distribution in the solar neighbourhood (within approximately 300 light-years) reveals a subtle but measurable oscillation in stellar density with a characteristic scale of approximately 160 light-years.

The Force of Time identifies this as the pitch of the galactic Tau-helix — the distance along the galactic travel axis at which the helical winding completes one full turn at the Sun's galactic radius. At a pitch of 160 light-years, the Sun travels approximately 160 ly along its galactic orbit between each complete Strand 1 / Strand 2 crossing of the helix. The stars in the GAIA catalogue that show this density periodicity are tracing the helical structure of the galactic Tau-field at stellar scale.

The predicted distribution of stellar masses and velocities in the Strand 1 arm (visible stars within roughly 100 light-years) should show a consistent asymmetry relative to the Strand 2 side — because Strand 2 contributes gravitational but not electromagnetic mass to the measurement. Stars near the Strand 1 / Strand 2 boundary should show systematically elevated transverse velocities due to the combined Tau-field gradient from both arms. The GAIA data provides sufficient precision to test this prediction. The investigation is the subject of a forthcoming analysis.

P-GDH-3: The galactic Tau-helix pitch at the Sun's galactic radius is approximately 160 light-years. The GAIA stellar density oscillation in the solar neighbourhood is consistent with this value.

Testable prediction: Strand 1/Strand 2 boundary stars should show elevated transverse velocities in GAIA proper motion data.

P-GDH-4

Galaxy Rotation Curves: A Structural Explanation

The galaxy rotation curve problem is one of the oldest unsolved problems in astrophysics. Stars in the outer disc of the Milky Way and other spiral galaxies orbit at approximately constant velocity out to very large radii — far beyond where the visible mass alone would produce Keplerian decline. The standard resolution is a dark matter halo: a roughly spherical distribution of dark matter extending to large radii that provides the additional gravitational mass.

In the FOT double helix model, the flat rotation curve has a structural explanation that does not require a dark matter halo. The Strand 2 galactic arm is wound around the same axis as Strand 1. At each galactic radius, the total gravitational mass acting on a Strand 1 star includes both the Strand 1 visible mass at that radius and the Strand 2 mass at the corresponding position on the opposite arm of the helix. The combined Tau-field extends to the full radial extent of the helical structure — which is larger than the visible disc.

The effective gravitational mass at radius r in the FOT model is $M_{eff}(r) = M_1(r) + M_2(r)$ where M_1 is the Strand 1 (visible) mass enclosed within r and M_2 is the Strand 2 (dark) mass at the corresponding helix position. Since Strand 2 is the mirror image of Strand 1 wound around the same axis, $M_2(r) \approx M_1(r)$ at each radius. The effective enclosed mass is therefore approximately $2 \times M_1(r)$, which modifies the rotation curve in the direction of flattening — without requiring a separate dark matter halo profile.

P-GDH-4: Galaxy rotation curves are flat because the effective gravitational mass at each radius includes both Strand 1 (visible) and Strand 2 (dark) contributions: $M_{eff}(r) = M_1(r) + M_2(r) \approx 2 \times M_1(r)$.

No halo profile required. No free parameters. The double helix geometry determines the mass distribution automatically.

P-GDH-5

The Cosmic Web and the Universal Tau-Helix

At the largest scales of the observable universe, matter is distributed in a network of filaments, sheets, and voids: the cosmic web. The filaments connect galaxy clusters at distances of hundreds of millions of light-years. In 2020, researchers published a quantitative comparison between a slice of the observable cosmic web and a cross-section of human neural tissue. The structural parameters matched: filament density, node clustering, the fraction of space occupied by voids versus connections.

The Force of Time identifies the cosmic web as the Tau-relay architecture at cosmological register — the same helical structure that appears at molecular scale (B-DNA phosphate backbone), stellar scale (solar helix), and galactic scale (Milky Way double arm), now expressed at the scale of galaxy filaments. The filaments are the inter-node connections of the Tau-helix at the highest register accessible to current observation. The voids are the spaces between helix turns. The galaxy clusters at filament junctions are the T-nodes.

The structural equivalence to neural tissue observed in 2020 is not coincidence and not mere analogy. It is the same geometry appearing at different scales because the underlying Tau-field operates by the same conservation law at every scale. The brain is a T-node complex enough to model its own information flow. The cosmic web is the Tau-relay architecture at cosmological scale. The geometry is invariant. The scale is not.

P-GDH-5: The cosmic web is the Tau-relay architecture at cosmological register. The structural equivalence between the cosmic web and neural tissue (measured quantitatively in 2020) is the same Tau-geometry appearing at different scales.

One geometry. Five scales: atomic, molecular, stellar, galactic, cosmological.

P-GDH-6

Falsification: The GAIA Test

The FOT galactic double helix model makes a specific, testable prediction that distinguishes it from conventional dark matter halo models. In the halo model, dark matter is distributed roughly spherically, with no structural relationship to the visible stellar distribution. In the FOT model, Strand 2 mass is distributed helically, wound around the same axis as the visible galaxy. At the Sun's galactic position, the Strand 2 mass is concentrated on the opposite side of the galactic axis — not uniformly distributed in a sphere.

This produces a specific directional prediction: the gravitational acceleration of the Sun and nearby stars toward the galactic centre should have a component from the Strand 2 arm that is displaced 180 degrees in galactic longitude from the visible galactic centre. Stars near the Strand 1 / Strand 2 helix boundary should show statistically elevated perpendicular (vertical to the galactic plane) velocity components compared to stars well inside the Strand 1 arm, because they are closer to the Tau-field crossover zone.

The GAIA Data Release 3 (2022) provides proper motions, parallaxes, and radial velocities for 1.5 billion stars. The spatial resolution and velocity precision of GAIA are sufficient to detect the predicted asymmetry in stellar kinematics if it exists at the amplitude the FOT model predicts. A null result — stars near the predicted helix boundary showing no elevated perpendicular velocities — would constitute evidence against the FOT galactic model. A positive result would distinguish it from the dark matter halo model, which predicts no such directional asymmetry.

P-GDH-6: Falsification test — GAIA DR3 kinematic analysis. Stars near the Strand 1/Strand 2 helix boundary (approximately 80 light-years from the Sun toward the predicted boundary) should show elevated perpendicular velocities compared to stars well within Strand 1.

Positive result: distinguishes FOT helix model from dark matter halo model. Null result: falsifies the FOT galactic double helix model.

The same geometry that makes hydrogen glow also places planets, powers stars, and weaves galaxies into helices.

B-DNA (3.4 nm) → Solar system (1 AU) → Milky Way (160 ly) → Cosmic web. One conservation law: dSigmaT = 0. One geometry: the double helix.