Tension per Mesh

The Solar Corona Read from the Vacuum.Net Model

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Abstract

The solar corona reads at more than a million kelvin. The surface below it reads at 5,800 K. The standing literature treats this as a heating problem and searches for a mechanism that carries energy upward. This article reads the inversion from the Vacuum.Net model instead. In that model the sun is a knot in one continuous strand. Temperature is not energy per volume. It is tension per mesh. A direct calculation shows that the corona holds about 300,000 times *less* energy per cubic meter than the surface. There is no energy paradox. There is a distribution fact: the same knot tension, carried by 100 million times fewer meshes. Read this way, three further observations fall into place without a mechanism. The transition layer is thin because closure is binary. The corona cannot cool because radiative loss scales with the square of mesh density. The solar wind is the runoff of tension that does not close. All steps and all numbers are given in the text.

1. The Inversion

The visible surface of the sun, the photosphere, radiates as a body of about 5,800 K. Directly above it lies the corona. Its spectral lines come from iron atoms stripped of nine to thirteen electrons. Such ionization states require temperatures above one million kelvin. The identification is settled since 1943.

So the reading is: 5,800 K below, more than 1,000,000 K above. A factor of roughly 350, in the wrong direction. Heat is supposed to flow from hot to cold. A surface cannot heat a layer hotter than itself. This is called the coronal heating problem. Eighty years of proposed mechanisms have not closed it.

The Vacuum.Net model does not offer a new mechanism. It removes the question that demands one.

2. The Model in Brief

This article is self-contained. The model it uses rests on five statements, set out in full in the Foundational Paper (Konstapel 2026a). Here is what is needed.

Reality is one continuous strand. The strand crosses itself. Where crossings close into stable windings, we speak of matter. Where the strand runs open, we speak of vacuum. The whole is a fishnet: knots and meshes, one material.

Tension lives in the net. A knot is held closed by tension. That tension does not stop at the knot's edge. A strand has no end, so the tension runs on into the open meshes around it.

The state of the net at any place is written χ. What physics calls constants are state functions of χ: they take their local value from the net, as elastic moduli do in a material. Relations between quantities are constitutive. They hold simultaneously. They are not arrows from cause to effect.

Explanation, in this model, is replaced by description at the right winding depth. We do not ask what heats the corona. We ask what a thermometer reads at the edge of a knot.

3. Step 1 — Temperature Is Tension per Mesh

A thermometer never measures energy per volume. It measures energy per degree of freedom. Kinetic theory says the same: T stands for the mean energy per particle, not per cubic meter. In net terms: temperature is tension per mesh.

Now calculate both layers. The thermal energy density of a gas is

$u = (3/2) \cdot n \cdot k \cdot T$

with n the particle density and $k = 1.38 \times 10^{-23}$ J/K.

Surface (photosphere). $n \approx 10^{23}$ particles per m^3. $T \approx 5{,}800$ K.

$u = 1.5 \times 10^{23} \times 1.38 \times 10^{-23} \times 5{,}800 \approx \mathbf{1.2 \times 10^{4}\ J/m^{3}}$

Corona. $n \approx 10^{15}$ particles per m^3. $T \approx 2 \times 10^{6}$ K.

$u = 1.5 \times 10^{15} \times 1.38 \times 10^{-23} \times 2 \times 10^{6} \approx \mathbf{4 \times 10^{-2}\ J/m^{3}}$

The ratio is $1.2 \times 10^{4} / 4 \times 10^{-2} \approx \mathbf{3 \times 10^{5}}$.

The corona holds three hundred thousand times less energy per cubic meter than the surface it supposedly out-heats. Energetically it is almost empty. There is no reservoir of heat sitting above a cooler one. The paradox is not about energy. It is about division.

Write it as a division. Mesh density drops by a factor of 10^{8} from surface to corona. The tension per mesh — what the thermometer reads — rises by a factor of 345. Multiply: total tension per volume drops by $10^{8} / 345 \approx 3 \times 10^{5}$. The two numbers are the same fact seen twice. Same tension, fewer meshes to carry it.

4. Step 2 — One Knot, No Arrow

The question "how does the surface heat the corona" places two objects side by side and draws an arrow between them. The model has no two objects here.

The sun is a knot. The photosphere is its last densely wound layer. The corona is the same strand, running out into wide meshes. Nothing is handed over from one thing to another, because there is only one thing at two winding depths. This is identity across scale: the same winding, read at smaller depth.

The tension that closes the knot is continuous along the strand. Inside, it is shared among an enormous number of meshes, so each mesh carries little: 5,800 K. Just outside, the same tension stands on very few meshes, so each carries much: millions of kelvin.

Observation matches the two readings. The surface radiates as dense matter, a near-blackbody. The corona does not radiate as a body at all. It shows sparse, isolated lines of highly stripped atoms — single strands under high tension, not a hot gas in the ordinary sense. The instruments already report strand behavior. The standing frame translates it back into gas language, and there the paradox is born.

5. Step 3 — Closure Is Binary, So the Edge Is Sharp

Between the two readings lies the transition region. Its measured thickness is of order 100 km. Across that shell the temperature reading jumps from about 2×10^4 K to nearly 10^6 K. The sun's radius is 696,000 km. The jump therefore occupies about one part in ten thousand of the star: a skin.

A heating mechanism must explain why its effect switches on within so thin a layer. Gradual processes make gradual gradients. The observed edge is not gradual.

In the net model the edge is sharp by construction. A mesh closes or it does not close. There is no half-closed mesh. The boundary between the wound interior and the open exterior is therefore a closure boundary, and a closure boundary has no natural width. The thinness of the transition region is not a difficulty to be explained. It is what the edge of a knot looks like.

6. Step 4 — Why It Stands, and Where It Runs

Two more observations complete the picture.

The corona does not cool. Giving off tension requires meshes to share it with. Radiative loss in a plasma scales with the square of the density: two particles must meet for a photon to leave. The corona's density is lower by 10^8, so its radiative loss rate is lower by $(10^8)^2 = 10^{16}$. The wide zone cannot get rid of its tension. It stands permanently strained. No continuous heater is needed to maintain a layer that has almost no way to discharge.

The tension that does not close runs out. In 1958 Parker showed that a static corona is impossible: it must expand. The expansion was then measured as the solar wind. In net terms this is direct: tension that finds no closing mesh runs off along the strand. The corona is not a closed hot shell. It is the open edge of the knot. Inward of the edge, closure — matter. Outward, runoff — wind. On the edge itself, the highest tension per mesh in the whole system.

One structure carries all four facts: the temperature inversion, the emptiness, the sharp edge, the wind.

7. The Constitutive Closing

The model's fourth statement says that constants are state functions of the local net state χ. The corona is a place where χ differs strongly from the interior: mesh density lower by 10^8, directly above a dense knot.

The relation between χ and the temperature reading is constitutive. It holds simultaneously. High tension per mesh and wide mesh are one state, not a cause and its effect. Asking which produces which is asking which side of a coin produces the other.

So the million kelvin is not a mystery of missing heat. It is the correct reading of the wrong question. The right question is not "where does the heat come from." It is "over how many meshes is the knot's tension divided here." At the surface: many. In the corona: almost none. The thermometer reports exactly that.

8. What This Reading Gives

The reading turns three long-standing difficulties into direct consequences.

First, the energy budget. The model predicts no hidden upward energy flux large enough to fill a hot reservoir, because there is no hot reservoir. The corona's total energy content, 4×10^{-2} J/m^3, is the number to balance — five orders below the surface value. Any accounting that balances at that level suffices.

Second, the geometry of the edge. Sharpness is structural. The model expects transition-region thinness wherever a dense winding meets open net, at every scale where the reading can be made: stellar coronae generally, not only the sun's.

Third, the wind. Runoff is not an additional phenomenon requiring its own acceleration story. Corona and wind are one edge, read statically and dynamically.

One point stays open, and it is the same point that is open across the whole program: the quantitative form of the constitutive relation between mesh density and the temperature reading. The two ratios measured here — 10^8 in density against 345 in temperature — are one data pair for that relation. Others can be added from stars with different knot masses.

9. A Note on Units

The model works in dimensionless ratios: mesh density against mesh density, tension against tension. The SI numbers in this article — joules, kelvin, the constant k — are conversions for the reader's convenience. They translate the ratios into the standing bookkeeping. They are not inputs to the model. The physical content is carried by the pure numbers: 350, 10^8, 3×10^5, 10^{16}, one part in ten thousand.

Annotated References

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Konstapel, J. (2026b). "Our Address in the Net." constable.blog. Reads the solar system as a hierarchical knot and computes its winding edge at about 5,350 AU. The present article reads the inner edge of the same knot.

Konstapel, J. (2026c). "The Missing Weight and the Medium." constable.blog. Develops the constitutive relation g(χ) of the vacuum and the reading of constants as state functions. Section 7 of the present article is its application to the temperature reading.

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