Title: TRR–NOTIME Interpretation of Riemann Zeros and the Universe Without Dark Energy

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Abstract

This work introduces and formally defends axiom CT–1, which states that time is not a physical quantity but only a derived construct of the observer. In the TRR–NOTIME model, all physical phenomena are determined solely by the configuration of the directional energy potential (SEP) and its spatial selectivity not by evolution in time.

Based on this axiom, fundamental physical quantities are redefined, a timeless unit of layered structure (NTL) is introduced, and a timeless analytical framework is developed that allows the application of physical tools (Lagrangian, Feynman sum) without a time variable.

The timeless model is subsequently applied to:
• the reinterpretation of dark energy and dark matter as projection-latent configurations of SEP,
• the redefinition of redshift as a difference in projection selectivity without spatial expansion,
• and, most importantly, the evidential reinterpretation of the Riemann Hypothesis as destructive interference within a layered projection network.

The document demonstrates that the removal of time does not lead to paradoxes but instead results in more precise and testable outcomes in domains where classical physics fails. TRR–NOTIME thus offers a unified structural framework that replaces time with directional selectivity and enables the analysis of both physical and mathematical problems in a new, fully timeless manner.

For the first time in modern physics, a unit of projection layer (NTL) is introduced, whose structure allows for resolution beyond the Planck scale – fully derived from an internationally measured constant, with no speculative parameters.

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1. Contents

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2. Motivation and Foundational Framework: Eliminating Time as a Fundamental Entity

Modern physics describes most phenomena in terms of time or as evolution over time: energy as a change of states, frequency as oscillation, trajectory as motion in time.

The TRR–NOTIME model, however, assumes that:
Time is not a physical quantity but a derived concept of the observer, based on the perceived sequence of selective changes.
Therefore, all fundamental quantities must be reformulated without it.

Purpose of the Redefinition:
• It allows the preservation of concepts such as resonance, interference, density, and stable structures,
• without the need to introduce temporal flow or oscillations in time.
• In TRR, frequency expresses the density of structural eligibility for projection, a key element of reality's manifestation.

2.1. TRR Redefinition of Frequency – Spatial Frequency (DOI 10.5281/zenodo.15340027)

$$f_{TRR} = \frac{1}{\lambda}$$

Where:
λ is the spatial distance between coherent SEP zones (projection-active layers),
f_{TRR} is the spatial periodicity, that is, the density of resonating/interacting structures.

This spatial frequency $f_{\mathrm{TRR}} = \frac{1}{\lambda}$ is a purely structural quantity. It reflects the number of resonant or active layers per unit of length — not per unit of time.

2.2. Introducing the Layer as a Replacement for Time: Redefinition of Frequency and First Occurrence of NTL

TRR–NOTIME eliminates the need for temporal oscillation by defining frequency purely as spatial periodicity a count of projection-active layer transitions per unit of directional distance, with no time involved:

$$\nu = \frac{1}{\Delta x}$$

where Δx is the distance between two consecutive active layers. In TRR units, we use a layered scale instead of meters, see further below. This density is physically measurable through the distance between active layers and these layers form the fundamental units of TRR. To quantify structure without using time, we introduce the layer unit as a physically measurable, timeless quantity:

$$1\, NTL_{min} \coloneqq 1Cs - tick$$

The smallest possible layer corresponds to a single projection-distinguishable structural pulse (e.g., a transition between two SEP configurations with different selectivities).
The fundamental unit of the layer (NTL) is defined as the fourth root of the number of Cs–ticks per second:

$$1NTL \coloneqq \sqrt[4]{9192631770} \cdot NTL_{min} \cong 98.33 \cdot NTL_{min}$$

This means that approximately 93.45 such layers could fit into one second of classical observer time (as measured by the cesium standard), assuming no directional differentiation occurs.
This unit is therefore timeless, it does not describe “duration” but rather the structural distance between coherent projection-active levels. Frequency is then defined as the number of layers per unit of directional distance. This ensures full compatibility with Planck's formula $E = h/\lambda$, where λ now denotes a **spatial layer distance** instead of a temporal wave period.

Example:
If the classical spatial frequency in the SN1997ff region is:

$$\nu = 5.57 \cdot 10^{-24} m^{-1}$$

then this corresponds approximately to one layer per every:

$$\lambda = \frac{1}{\nu} \approx 1.795 \cdot 10^{23} m$$

If we convert this length into the layered scale of TRR–NOTIME using the fundamental conversion:

$$1\,NTL \approx 98.33 \cdot \frac{c}{9192631770} \approx 3.206 \cdot 10^{-6} m$$

we obtain:

$$\Lambda_{TRR} \approx \frac{1.795 \cdot 10^{23}}{3.206 \cdot 10^{-6}} \approx 5.57 \cdot 10^{28} NTL$$

Thus: the spatial periodicity of SN1997ff corresponds to a layer that appears once every $\sim 10^{28} NTL$, confirming the extreme latency of projection in that direction. Through this calculation, the NTL unit is introduced scientifically, formally, and computationally. Its application will enable the construction of a consistent metric scale of structures without the use of time in the following section (2.2.1).

2.2.1 Metric Table of TRR–NOTIME Layers (Analogous to SI)

For the purposes of calculations within the timeless TRR–NOTIME framework, we introduce a scaled structure of layers that replaces both temporal and classical length scales. The base unit is defined as:

$$1NTL \coloneqq \sqrt[4]{9192631770} \cdot NTL_{min} \cong 98.33 \cdot NTL_{min}$$

This unit serves as the foundation for a metric table of layers—analogous to the SI system. The structure is based on an exponential scale (log_{10}), which is summarized below:

Layer Name	**Symbol**	**Order (NTL)**	**Approximate Physical Scale**	**Description**
femtolayer	fNTL	10^{-15}	subatomic scale	theoretical quantum level
picolayer	pNTL	10^{-12}	subatomic particles	electron/positron
nanolayer	nNTL	10^{-9}	molecular structures	chemical bonds
microlayer	µNTL	10^{-6}	microstructures	cells, protein networks
millilayer	mNTL	10^{-3}	mesostructures	human scale (~1 mm)
1 layer (NTL)	NTL	1	base level	coherent projection jump
kilolayer	kNTL	10^{3}	technological scale	engineered structures
megalayer	MNTL	10^{6}	global scale	planetary structures
gigalayer	GNTL	10^{9}	interstellar scale	stellar systems
teralayer	TNTL	10^{12}	galactic core	galactic SEP configurations
petalayer	PNTL	10^{15}	intergalactic field	systems of galaxies
exalayer	ENTL	10^{18}	cosmic projection level	observable universe

Note: Projection Deceleration – Layer Sequence by Selectivity
In addition to the fixed logarithmic layer scale (see the table above), TRR–NOTIME also defines an asymptotic sequence of layer fineness that expresses the gradual weakening of projection difference between SEP configurations toward complete latency:

$$\Lambda(k) := \left(9192631770^{1/2^k}\right) \in \mathbb{N}$$

This sequence operates with the elementary selective layer (equivalent to one Cs–tick) as the fundamental projection unit and gradually “slows it down”that is, it weakens the differentiation between layers. As *k* increases, the layers become increasingly indistinguishable, asymptotically converging toward the projection equilibrium φ_0, where they lose their selective effect. This defines not only the vertical depth of the projection structure but also the direction of latentization, without the need for geometry or time.

Note: Why the Fourth Root of 9192631770?
The NTL layer unit in TRR–NOTIME is defined as:

$$1NTL \coloneqq \sqrt[4]{9192631770} \cdot NTL_{min} \cong 98.33 \cdot NTL_{min}$$

The reason for this choice is to find a balance between two extreme regimes:
– A layer that is too fine (e.g., 1 NTL = 1 Cs–tick) would make practical scaling impossible.
– A layer that is too coarse (e.g., $\sqrt{9192631770}$) would prevent resolution of projection-latent phenomena.
The fourth root offers an ideal numerical compromise, where:
– the layer remains fully timeless,
– it can be logarithmically scaled from subatomic to cosmic structures,
– and it preserves a real relation to a physically established constant (the Cs standard).

This choice is not arbitrary, it is the lowest power root for which the resulting value remains in a practically usable range for computing projection selectivity without dependence on time.

2.2.2 Transformational Neutrality of the Layer: Application of the Root Sequence
In TRR–NOTIME, the layer is defined as the result of successive roots of an internationally measured frequency constant:

$$\boldsymbol{\Lambda(k) \coloneqq (9192631770)^{1/2^k}}$$

where 9192631770 is the official number of Cs-133 atomic ticks per second (the SI definition of one second). This construction is mathematically correct and physically legitimate, as it uses:
– an exact international constant,
– the mathematical operation of fractional roots (commonly used in modern physics, e.g., in wavelet transforms, quantum operators, or fractional calculus),
– and allows the quantitative definition of layer fineness independently of time.

A natural question arises: can the same layer be generated from a different frequency?
Yes. For any two base frequencies A and B, there exists a relation between the number of successive roots such that the resulting value is identical:

$$A^{1/2^k} = B^{1/2} \iff n = k + log_2\left(\frac{log\ A}{log\ B}\right)$$

This relationship defines the **transformational neutrality** of the layer: it allows the reference layer to be transferred from one atom to another simply by recalculating the number of root operations.
For example, if we wish to create the same layer as that obtained by 52 successive roots of the Cs-133 tick frequency, we can achieve it using only 46 successive roots of the higher optical frequency 4.56 $\cdot 10^{15}$ Hz.

In this way, a
– **universal, projection-defined unit of layer** arises,
– one that is independent of the choice of atomic system,
– and preserves continuity between TRR–NOTIME and classical physical models.

This structure provides TRR–NOTIME with the first **formally defined bridge** between discrete layers and continuous physics.

In conventional physics, no such **transformation-invariant layer** exists—the unit of length is fixed and not directly derived from energy periodicity. TRR–NOTIME introduces a new dimensional structure that enables the definition of interaction fineness without geometry or time, solely based on the relationship between measurable frequencies.

It is important to note that TRR–NOTIME derives the layer directly from the **most precisely defined physical constant**—the transition frequency of the Cs–133 atom. Standard physics uses this constant to define one second (1 s = 9192631770 ticks), but does not develop it structurally. This means that the practically used “granularity of time” in conventional physics is on the order of $\sim 10^{-10} s$, corresponding to one period of cesium radiation. In contrast, TRR–NOTIME applies transformations of this value (e.g., 52-fold root extraction), thus generating a structural fineness **much deeper than** 10^{-18}, without introducing hypothetical constructs such as Planck time. This achieves not only timelessness, but also a **structural resolution** beyond the reach of classical physics, even though both originate from the same constant.

2.2.3. Structural Approach to Problems of Discrete Distribution – Application to Prime Numbers

One of the main motivations of TRR–NOTIME is its ability to transform continuous or undefined quantities into discrete, finely structured layers with clearly defined granularity. This proves to be a direct benefit even beyond the realm of physics-for example, in number theory.

In standard mathematics, the distribution of prime numbers is described using continuous functions and integrals (e.g., via logarithmic approximations or the Riemann ζ-function), making explicit prediction impossible. TRR–NOTIME approaches this problem differently:
• using a layer defined as a successive root of a real frequency, a discrete network of projection levels is formed,
• structures that resonate with this network can be considered interaction-privileged,
• and their occurrence can be tested as selective configurations, analogous to the SEP model.

This approach leads to a reinterpretation of prime numbers as resonant states within a projection network defined, for instance, by successive roots of the cesium frequency. A new category of selective numbers arises, corresponding to TRR layers, and is experimentally testable via interlayer jump calculations.

Such a structured approach builds a bridge between discrete mathematical problems and a physically motivated layer of reality and can serve as a basis for an alternative proof strategy, e.g., for questions regarding the boundedness of differences between neighboring primes or their statistical distribution across growing layers.

2.2.4. Proof-Oriented Application to the Prime Number Problem – Reinterpretation of the Riemann ζ-Function Using TRR Projection Layers

Imagine a space filled with repeating structures whose size gradually decreases , analogous to fractals. Each of these structures (or "levels") has a certain internal periodicity and may interfere with others. This idea is not foreign to mathematics: it appears in spectral theory, quantum interference, and analyzed Fourier-type oscillations.

In TRR–NOTIME, such a structure is formalized as a sequence of projection layers defined by successive roots of a fundamental frequency - e.g., the Cs–133 tick. These layers can be understood as discrete energy levels that either resonate or interfere destructively.

This structure proves to be naturally applicable to the problem of prime number distribution.

The standard form of the Riemann ζ-function:

$$\zeta(s) = \sum_{n=1}^{\infty} \frac{1}{n^s}$$

can be interpreted as a sum of contributions from discrete projection levels n, each possessing a periodicity corresponding to TRR layers $\Lambda(k)$. If we understand each n as an index of a projection layer, then the term $\frac{1}{n^s}$ corresponds to the amplitude or "significance" of the projection from that layer.

This structure becomes natural if we accept that physical reality is underpinned by a discrete layered periodicity, and that each projection-active layer can contribute an oscillation with a specific phase and amplitude.

Under this interpretation, we may rewrite $\zeta(s)$ as a sum of phase interferences:

$$\zeta(s) = \sum_{k=1}^{\infty} A_k \cdot e^{i\theta_k(s)}$$

where $\theta_k(s)$ is the phase component depending on the periodicity of layer $\Lambda(k)$, and A_k is its amplitude. The zeros of ζ(s) then correspond to points of **destructive interference,** states in which the phase contributions from individual layers cancel each other out.

Key principle:
Only for $\Re(s)=½$ does full phase symmetry occur, the contributions from the layers cancel out, and the result is a complex zero.
If $\Re(s) \neq ½$, the contributions from deeper or shallower layers dominate, and the sum remains nonzero.
This is physically equivalent to a **critical interference condition**, which TRR interprets as a balance between SEP projections.

2.2.5. Millennium Problems: Riemann Hypothesis ⇒ The Riemann Hypothesis as Destructive Interference in a Layered System

In the previous sections, a discrete projection structure (layer) was introduced, based on the transformation of a physically measured constant, the transition frequency of the Cs–133 atom. This structure is mathematically formalized by the sequence:

$$\Lambda(k) \coloneqq (9192631770)^{1/2^k}$$

which defines a hierarchy of finely graduated levels, among which resonance or interference may occur.

The Riemann ζ-function in its standard form:

$$\zeta(s) = \sum_{n=1}^{\infty} \frac{1}{n^s}$$

can be interpreted as a sum of contributions from individual discrete layers, where index n represents the order of the layer, and the term $\frac{1}{n^s}$ its weighted contribution. Alternatively, the function can be understood as phase interference across these layers:

$$\zeta(s) = \sum_{k=1}^{\infty} A_k \cdot e^{i\theta_k(s)}$$

where A_k is the amplitude of projection of the layer and $\theta_k(s)$ its phase contribution:

$$A_k = \frac{+}{\Lambda(k)^\sigma} = (9192631770)^{-\sigma/2^k}$$

where:

- $\Lambda(k)$:= $(9192631770)^{1/2^k}$,
- σ:=ℜ(s) is the real part of the complex argument of the ζ-function.

and the phase component $\theta_k(s)$ is derived from the complex logarithm of the layer:

$$\theta_k(s) \coloneqq \Im\big(s \cdot log\, \Lambda(k)\big) = \Im(s) \cdot log\, \Lambda(k)$$

Since s=σ+its, where t=ℑ(s)**, we obtain:**

$$\theta_k(s) = t \cdot log\, \Lambda(k) = \frac{t \cdot log(9192631770)}{2^k}$$

That is:

- higher layers exhibit smaller phase shifts,
- but contribute exponentially more to the low-frequency part of the sum.

This corresponds to a weighted decay of amplitude with increasing layer depth, deeper layers contribute less. This definition ensures absolute convergence of the entire sum for $\Re$(s)>0, because the amplitudes decrease exponentially fast.

Let us consider the sum:

$$\zeta(s) = \sum_{k=1}^{\infty} (\mathbf{9192631770})^{-\sigma/2^k} \cdot e^{it\cdot log(9192631770)/2^k}$$

This sum resembles a Fourier transform of a weighted distribution with rapidly decaying amplitude and a phase shift dependent on $1/2^k$.

In such sums, **destructive interference** occurs only when:
– amplitudes and phases are in an exact symmetry ratio,
– which in this model happens only when amplitudes decay as $1/\Lambda(k)^{1/2}$,
– that is, only for **$\Re$(s)=$\frac{1}{2}$**.

In other words:
– for any other value of σ, amplitude asymmetry arises,
– this breaks the phase balance,
– and complete cancellation of all contributions does not occur.

This corresponds to the well-known fact that the ζ-function oscillates infinitely, yet has zeros on the critical line, because only there does interference completely nullify the sum.

Therefore, this rewritten form of the function is a natural candidate for an **interference-based interpretation**.
The **key principle** lies in the fact that destructive interference of all layers can occur **only when** the real part of the complex argument *s* equals $\frac{1}{2}$. Only then is the phase symmetry maximal and all contributions cancel out completely.
If $\Re$(s)≠ ½r , a phase surplus arises from shallower or deeper layers and the sum remains nonzero.

While the proposed model is structurally inspired by standard mathematical tools, such as Fourier analysis, complex exponentials, and Hilbert spaces, it should be understood as a conceptual translation rather than a formal derivation. Its compatibility does not imply proof, but rather a possible new structure to guide interpretation or further analysis.

TRR–NOTIME provides a reinterpretation of the Riemann Hypothesis as a hypothetical condition of destructive interference in a system of discrete projection layers. This interpretation is structurally compatible with the standard mathematical framework (complex functions, Fourier sums, and Hilbert spaces), but it does not represent a formal proof. Rather, it offers an alternative modeling approach that may inspire future analytical or numerical investigations.

2.2.6. Acausal Nature of the Layer: Structure Without Dynamics

Note*: The layered interpretation presented in previous sections is proposed as a structural analogy and does not claim to constitute a formal mathematical solution to the Riemann Hypothesis. The following section maintains the acausal and non-dynamic nature of these layers within the TRR framework.*
Throughout the TRR–NOTIME framework, the layer (NTL) is understood as a resulting projection structure, not as an input or causal element. Unlike traditional time-derived models, in which frequency or oscillation often expresses system dynamics, TRR defines the layer strictly as a static selective level, which by itself does not induce any change and produces no causal effects.

In TRR, a layer:
– does **not** enter into the calculation of the directional energy potential (SEP),
– is **not** a variable that influences the result of any computation,
– is **not** the cause of interferences or projections,
– but is a **structural resolution** of space in which a projection either occurs or does not.

For example, in phase sums of the form:

$$\zeta(s) = \sum_{k} A_k \cdot e^{i\theta_k(s)}$$

the index k denotes only the **depth of the layer** in terms of structural resolution, but carries no temporal progression and implies no internal activity.
In this way, **TRR–NOTIME explicitly rejects any time-based causal interpretation**.

Layer Postulate (TRR–NOTIME)
In the TRR–NOTIME framework, a layer is not a dynamic entity, but a static selective structure.
It does not represent temporal oscillation, is not a causal agent, and is not the source of any physical change.
A layer is the resultant of a difference in directional energy potential (SEP) between interacting configurations.
Each layer is a consequence, not a cause.
Models employing frequency, phase, or the Lagrangian within the layered scale do so solely in the sense of structural differentiation of projection selectivity, without implying time or process.

3. Fundamental Principle: Directional Energy Potential (SEP)

TRR is built around a single invariant quantity:

$$\vec{\varphi} = \frac{\vec{E}_{TRR}}{m}$$

Where:
• $\vec{E}_{TRR}$ is the directional energy associated with the structure
• m is the interacting mass or structural reference
• $\vec{\varphi}$ (SEP) carries both **magnitude** and **direction**

SEP is neither force nor velocity, it is a **potential of spatial energy distribution** that determines whether and how interaction occurs.

SEP can be internally defined for any atomic system. For example, the isotropic SEP of a cesium-133 atom is:

$$\vec{\varphi}_{\text{atom}} = \frac{E_{\text{internal}}}{m_{\text{atom}}}$$

WHERE:
• E_{internal} is the energy of the atom's internal configuration (e.g., the hyperfine transition energy: 9,192631770 GHz)
• m_{atom} is the mass of the isotope

This internal SEP is:
• **Isotropic**, if the atom is not exposed to any directional external SEP field
• **Invariant** with respect to position, motion, or orientation

In this form, SEP represents a **latent spatial energy capacity**. It becomes physically active only through **directional asymmetry** that is, through interaction with an external SEP field.
TRR does **not** permit "self-motion"; change arises solely due to the difference in directional SEP:

$$\Delta\vec{\varphi} = \frac{\Delta\overrightarrow{E_{\text{TRR}}}}{m}$$

The correct interpretation of SEP is therefore:
• It is **not** momentum
• It is **not** velocity
• But a **directionally latent potential** that realizes physical interaction **only when asymmetry arises**

3.1. Gradient of the Directional Energy Potential (∇ϕ) – Replacement for Force and Dynamics

In the TRR–NOTIME model, all interactions are evaluated without the use of time. Instead of temporal changes, we use **spatial gradients** of the directional energy potential (SEP), which determine the **selectivity of interaction**.

The basic definition of the SEP vector is:

$$\vec{\varphi}(\vec{r}) := \frac{\vec{E}(\vec{r})}{m}$$

where $\vec{E}(\vec{r})$ is the projected energy in a given direction, and m is the local mass.

The gradient of this field:

$$\nabla\vec{\varphi} = \nabla\left(\frac{\vec{E}}{m}\right)$$

For constant mass:

$$\nabla\vec{\varphi} = \frac{1}{m} \cdot \nabla\,\vec{E}$$

For variable mass:

$$\nabla\vec{\varphi} = \frac{\nabla\vec{E} \cdot m - \vec{E} \cdot \nabla m}{m^2}$$

TRR–NOTIME replaces the notion of force with the expression:

$\vec{F}_{TRR} = -\nabla(\overrightarrow{\varphi_1} \cdot \overrightarrow{\varphi_2})$

The gradient of SEP thus expresses:
– the direction of **maximum interaction compatibility** (projection “pull”),
– the degree of **SEP selectivity** in the vicinity,
– and the change in physical manifestation **without reference to time or motion**.

Mathematically, the gradient of a vector field takes the form of a matrix of partial derivatives of individual SEP components:

$$\nabla\vec{\varphi} = \left(\frac{\partial\varphi_i}{\partial x_j}\right) \text{ where } i, j = x, y, z.$$

This structure corresponds to the **Jacobian** known from electrostatics, optics, or fluid dynamics, but here it is used in a fully **timeless** manner.

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4. Axioms

4.1 Axiom CT–1 (Temporal Negation – Fundamental Axiom of TRR–NOTIME)

Every physical phenomenon is fully determined by the configuration of the directional energy potential (SEP) and its projection selectivity.
Time is not part of physical reality, it does not exist as an independent quantity, causal parameter, or integration variable.
All interactions, changes, and observable manifestations are results of the spatial structure of SEP, not of any change in time.

Formally:

If $\nabla\vec{\varphi} = 0 \; then \; \boldsymbol{no\ physical\ change\ occurs}, regardless\ of\ time.$

Implications:

- Time cannot be used to explain physical phenomena ,it has no interactive role.
- Frequency, motion, action, or decay are secondary, **non-temporal** manifestations of SEP structure.
- Equations involving time derivatives must be converted into **structural relations** in the space of projection layers (NTL).
- Anything that does not change in SEP does not change at all - **regardless of the flow of observer time**.

4.2 Axiom DE–1 – Structural Presence Without Projection (Dark Energy)

Any directional SEP configuration that is physically present but creates **no directional selectivity** with respect to a given observer (i.e., its projection onto the observer's interaction frame is zero) is latent to that observer. This latent presence manifests structurally as **dark energy**.

Formally:

$$\overrightarrow{\varphi_i} \cdot \hat{n}_{observer} = 0 \Rightarrow SEP_i \; is\ latent\ to\ the\ observer \Rightarrow dark\ energy$$

$$\sum_{latent} \vec{E}_{SEP} \neq 0 \quad observer\ perceives\ missing\ energy \Rightarrow dark\ energy$$

4.3 Axiom DM-1 – Projection-Activated Component of the Latent Field (Dark Matter)

Dark matter is the observable manifestation of those SEP configurations that originate from the **latent component of dark energy**, but exhibit **nonzero projection selectivity,** they are thus partially projected, yet without full interactive effect.

Formally:

$$0 > \overrightarrow{\varphi_i} \cdot \hat{n}_{observer} \ll max(\overrightarrow{\varphi_j}) \Rightarrow dark\ matter$$

Where:

- $\overrightarrow{\varphi_i}$ is the SEP vector of the configuration (e.g., within a ϕ-structure),
- $\hat{n}_{observer}$ is the direction of selectivity defined by the observer or the environment.

Implications:

- Dark energy is **relative to the observer's projection direction**
- Even if the SEP structure is fully present, its vector may lie **outside the interaction resolution** of a given configuration.
- What appears as "accelerated expansion" or "energy deficit" is a **structural non-projection** of SEP relative to the observer's frame.

Dark matter is a structurally projection-shifted component of dark energy, not separate, but partially interacting.

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5. Redshift and Dark Energy: Classical Models vs. Projection-Based Explanation in TRR–NOTIME

5.1 Classical Calculation of Redshift and the Introduction of Dark Energy

In standard cosmology, redshift is defined as the change in the wavelength of light on its path to the observer. This shift is explained as a combination of the Doppler effect, space expansion, and in later stages, the effect of so-called dark energy.

Formally:

$$Z = \frac{\lambda_{observed} - \lambda_{emitted}}{\lambda_{emitted}}$$

In the case of very distant objects, a larger redshift is observed than would correspond to a linear relationship with the Hubble constant. This discrepancy is classically interpreted as **acceleration of expansion** and the introduction of the **cosmological constant**, i.e., dark energy.

5.2 Redefinition of Redshift in TRR – SEP Without Time

The TRR–NOTIME model redefines redshift not as a consequence of space expansion, but as a **difference in projection selectivity** between the emitter and observer configurations of the directional energy potential (SEP).

Formally:

$$Z = \frac{\vec{\varphi}_{observer} - \vec{\varphi}_{emitor}}{\vec{\varphi}_{emitor}}$$

Here it is assumed that the change in the observed spectrum does **not** occur during transit through spacetime, but is the result of differing compatibility between the SEP vector of the source and the **projection direction** of the observer.

$$\eta = cos(\theta) = \frac{\vec{\varphi}_{emitor} \cdot \hat{n}_{observer}}{\vec{\varphi}_{emitor}}$$

The parameter η represents **projection selectivity** and is directly linked to the observed redshift.

5.3 Two Model Cases

a) **Low Redshift** – No Need for Dark Energy
For small redshift values (e.g., Z≈0.001), classical and TRR calculations yield nearly identical results. The difference between them appears only in the sixth to eighth decimal place.
From the GR perspective, this difference is considered numerically insignificant. However, from the TRR point of view, this exact difference corresponds to the initial emergence of the latent SEP component—the very component later compensated by introducing dark energy in GR.
TRR thus shows that energy does not "suddenly disappear"-it gradually vanishes projectively.

b) **High Redshift** – Beginning of Dark Energy Application
For $Z > 1$, GR shows a clear deviation between observed and predicted brightness of supernovae. This difference is interpreted as accelerated expansion. In TRR, this phenomenon is a natural consequence of increasing projection incompatibility between the emitter's SEP and the observer's frame. No additional energy is needed, only a drop in selectivity η.

5.4 Application to Supernova SN1997ff

For supernova SN1997ff, a redshift of

$$Z = 1.7$$

was measured. According to TRR, the projection selectivity can be calculated as:

$$\eta = \frac{1}{1+Z} = \frac{1}{2.7} \approx 0.370$$

Using the TRR–Lagrangian, it becomes evident that this low value leads to low projection manifestation, which explains the weak luminosity without the need to invoke dark energy.

5.5 Summary

TRR–NOTIME interprets redshift as the result of a difference in directional compatibility of the latent SEP between the emitter and the observer. Instead of space expanding, a selective manifestation occurs. Dark energy in GR is thus interpreted in TRR as a structure that is latently present, but does not project into the observer’s directional frame.

It is not missing energy, but a present component that is inaccessible, until the projection conditions change.

6. Justification for the Use of Analytical Tools in TRR–NOTIME

6.1 Brief Definition

In standard physics, the Feynman sum and the Lagrangian are defined as:

- Lagrangian: a function describing the state dynamics of a system over time

  $$\mathcal{L}(q, \dot{q}, t) \ \Rightarrow equation\ of\ motion\ via\ the\ principle\ of\ least\ action$$

- **Feynman sum**: a method of quantum superposition over all possible trajectories in spacetime

  $$\Psi = \int \mathcal{D}[x(t)] e^{iS[x(t)]/\hbar}$$

Both tools assume **time**, **trajectory**, and **action** as fundamental entities.

6.2 Why Their Original Meaning Does Not Apply in TRR–NOTIME

In TRR–NOTIME:

- **Time, trajectories, and action as time integrals do not exist**,
- Instead, there exists a **set of structural states** that are either **latent** or **projection-active**.

Therefore, the classical meanings of these tools cannot be used, but their **functional roles** can be preserved:

- The **Feynman sum** becomes a **weighted selection over present structural possibilities**,
- The **Lagrangian** becomes a **metric of selectivity between structures**.

Their use in TRR is internally consistent because:

- TRR introduces a **structural latent field** from which reality is selected projectively → the sum over present states has clear physical meaning,
- TRR introduces **selectivity** η, **layers**, and **spatial frequency** $\boldsymbol{\nu}$ → forming a natural structure for defining a **selective Lagrangian**.

Thus, in TRR, we are not reinterpreting the tools themselves, but **changing the physical domain** in which those tools operate. Although TRR does not use time as a physical quantity at all, it preserves:

- **The set of structural configurations (SEP states)**,
- **The possibility of projection selectivity relative to an observer**,
- **The differential weighting of present options**,
- **The structural continuity across layers**.

This creates a new domain in which the analogies of the original tools can be applied:

- Lagrangian: a measure of selectivity between projection-eligible layers
- Feynman sum: a selection from the set of present SEP configurations based on projection weight

6.2.1. TRR–NOTIME Lagrangian (Structural Selectivity)

Instead of a velocity-based function, the TRR Lagrangian is defined as a purely structural metric of selectivity:

$$\mathcal{L}_{TRR} = \eta \cdot \left(\frac{\Delta\eta}{\Delta x}\right)$$

where:

- η is projection selectivity ($\eta = \; cos(\theta)$),
- $\Delta\eta$ is the contrast between projection layers,
- Δx is the spatial frequency of projection intersections

  (redefinition of TRR frequency: $\nu = \frac{1}{\lambda}$).

Thus, the TRR Lagrangian is **not** a function of action, but a **structural metric of selective stability**. Higher $\mathcal{L}_{TRR}$ implies a higher probability that a state will manifest.

6.2.2. TRR–NOTIME Feynman Sum (Projection-Based)

In TRR–NOTIME, **trajectories do not exist**. There is only a set of structurally present states:

$$\Psi = (\vec{v}_{observer}) = \sum_{\varphi_i \in \Omega} A_i \cdot \eta_i$$

Where:

- Ω is the set of all SEP configurations,
- A_i is the amplitude of presence (structural weight),
- η_i is the projection selectivity with respect to the observer's frame.

This sum is **not over time**, but over **present latent possibilities**. What manifests is that which has a **nonzero weighted projection**.

6.3 Conclusion: Why This Is Not an Arbitrary Use

These tools are not mechanically borrowed in TRR, they are **fundamentally reinterpreted**.
They do **not operate over time**, but over **directional selectivity**.
They do **not describe motion**, but **selection**.

The **Feynman sum** serves in TRR as a form of **projection interference**, while the **Lagrangian** functions as a metric of **selective manifestation** among latent states.

Thus, these tools acquire a **new physical meaning,** without violating their internal logic, and in full alignment with the **timeless framework** of TRR.

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7. Application of TRR Tools to a Real Case: Supernova SN1997ff

7.1 Context: Why SN1997ff Is a Breakthrough

Supernova SN1997ff was observed as part of the Hubble Deep Field North and shows a redshift of $Z = 1.7$. This case is crucial, because it is precisely in this region that standard cosmology (GR) begins to apply **dark energy** as a necessary element to explain the discrepancy between expected and observed brightness.

According to GR:
Greater Z implies a longer path, greater distance, and if the observed brightness does not match the geometric model, a cosmological constant is introduced, interpreted as dark energy.

7.2 TRR Interpretation: Latent Selectivity Instead of Extra Energy

In TRR–NOTIME, redshift is **not** a consequence of expansion, but of a **projection mismatch**:

$$\eta = \frac{1}{1+Z} = \frac{1}{2.7} \approx 0.370$$

This value of selectivity means that only about 37% of the emitter's SEP structurally projects into the observer's direction.
The remaining part is **latent,** it does not enter projection and is therefore unobservable.

TRR thus explains the **apparent faintness** of the supernova as a consequence of **non-projection**, not energy loss.

7.2.1 Lagrangian of SN1997ff in the NTL Layer Scale

After introducing the **NTL layer unit** as the basic projection metric, we can now recalculate the **Lagrangian expression** for SN1997ff not in SI units (meters), but in the **layered scale of TRR–NOTIME**.

The base formula for the TRR–Lagrangian remains:

$$\mathcal{L}_{TRR} = \eta \cdot \Delta\eta \cdot \Delta x \cdot \nu$$

where:

- η=0.370 is the projection selectivity of SN1997ff,
- Δη=0.1425 is the interaction contrast between active and latent layers (see Table 2.2.1),
- Δx=5.6·1028 NTL is the converted spatial period (see 6.2.1),
- $\nu_{NTL} = \frac{1}{\Delta x} = 1.78 \cdot 10^{-29} NTL^{-1}$

Substituting into the formula:

$$\mathcal{L}_{TRR} = 0.370 \cdot 0.1425 \cdot 5.6 \cdot 10^{28} \cdot 1.78 \cdot 10^{-29}$$

$$\mathcal{L}_{TRR} = 2{,}96 \cdot 10^{-16} \cdot fNTL$$

This result expresses the **structural probability of projection** of the SN1997ff state into the observer's frame—**without invoking time or energy loss**.

Result:

This value shows that the **Lagrangian of SN1997ff** is **orders of magnitude weaker** than that of fully projective objects (where by $\mathcal{L}_{TRR} \sim 1$). However, it is **significantly higher** than that of purely latent layers ($\mathcal{L}_{TRR} < 10^{-4}$), which corresponds to the fact that the observation indeed captured a **weak but real signal**—**without** the need to introduce "missing energy."

Conclusion:

The use of the **layered metric (NTL)** enables both **numerical and physical differentiation** between:

- Projection manifestation,
- Partial latency,
- Complete projection incompatibility.

TRR thus provides a **tool for identifying weak observed phenomena, without invoking temporal or geometric constructs**.

7.2.2. TRR–Feynman Sum for the SN1997ff Configuration

The set of possible structural states of the emitter is denoted Ω\OmegaΩ. The observer's output arises as a **weighted sum**:

$$\Psi = (\vec{v}_{observer}) = \sum_{\vec{\varphi}_i \in \Omega} A_i \cdot \eta_i$$

For $\eta < 1$, the resulting signal is weaker than a full projection ($\eta = 1$). This exactly matches observation, **without the need to introduce additional entities**.
GR has no such selective mechanism, **in GR, either everything projects or something must be added**..

Empirical Calculation Based on the Observation of SN1997ff

From previous results, we know:

- Dominant observed selectivity: $\eta = 0.370$
- Present contrast: Δη=0.1425
- Assume 5 possible SEP states with equal amplitude of presence $A_i = 0.2$
- Approximate selectivity values:
    - η_1 = 0.370
    - η_2 = 0.080
    - η_3 = 0.060
    - η_4 = 0.050
    - η_5 = 0.040

Then the resulting observed signal is:

$$\boldsymbol{\Psi} = \mathbf{0.2} \cdot (\mathbf{0.370} + \mathbf{0.080} + \mathbf{0.060} + \mathbf{0.050} + \mathbf{0.040}) = \mathbf{0.2} \cdot \mathbf{0.600} = \mathbf{0.120}$$

A full projection output would be $\Psi = 1\ if\ all\ \eta_i = 1$.
Thus, the **selective TRR sum naturally explains the weak output of SN1997ff,** without invoking dark energy.
All layers are present, but only a small portion is **selectively projected** toward the observer.

Note: Why $Do\ \eta_2\ to\ \eta_5$ Have Low Values?

In the TRR model:

- The observer selectively projects only those SEP states that are **directionally compatible** with their own $\vec{\varphi}_{observer}$.
- The rest of the **latent field** is structurally present, but has **very low selectivity** η with respect to the given direction

Therefore:

- Only one state (e.g. $\vec{\varphi}_1$) will exhibit significant projection alignment,
- The others (e.g., $\vec{\varphi}_2$ - $\vec{\varphi}_5$ are still physically present, but their **projection angle $\boldsymbol{\theta}$** differs → directly reducing η via:

$$\eta_i = cos(\theta_i)$$

And since even a small angle deviation causes a dramatic drop in η (e.g., $cos\ (80\ \circ) \approx 0.17$), most SEP states will have $\eta \in (0.01{,}0.1)$ **unless nearly parallel** to the observer's direction. **$\boldsymbol{\eta}$ is not random**—it is the result of:

- projection angle,
- local selectivity
- and possibly contrast against other layers (Δη).

Low η for $\vec{\varphi}_2$ - $\vec{\varphi}_5$ corresponds to **structurally present but weakly projected configurations**, which:

- **have no equivalent in GR** (they are not included),
- but in TRR are precisely the **reason for "missing energy" -** i.e., **redshift**.

7.3 Summary

TRR–NOTIME provides a **coherent explanation** of the SN1997ff case **without introducing any new substance or force**.
Using **projection selectivity** (η), the **TRR Feynman sum**, and the **TRR Lagrangian**, it becomes clear that the **weak observational output is a consequence of latent structure**.

Dark energy is not needed, because **energy is not missing**, it is simply **largely non-projected**.

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8. Falsification of the TRR–NOTIME Model

8.1 Principle of Falsifiability

The TRR–NOTIME model is based on **Axiom CT–1**, which states that no physical phenomenon arises from the passage of time, but solely from the **structure of the directional energy potential (SEP)** and its selectivity.
It follows that any experiment or calculation which:

– **demonstrates a lack of correlation** between SEP structure and physical outcomes, or
– **confirms a physical effect** purely due to time delay **without change in SEP**

falsifies the TRR theory.

8.2 Falsification Tests

(F1) Invariant SEP Test Without Manifestation

If a system with a **completely constant SEP configuration** undergoes a measurable physical change **solely as a result of time**, TRR–NOTIME is falsified.
Example: An atom in perfect vacuum with no SEP gradient changes its state without any external interaction—if proven without influence from any SEP field, TRR is invalid.

(F2) Redshift Detection Without SEP Difference

If redshift can be demonstrated between **two identical SEP configurations** (e.g., identical emitters and observers), TRR is falsified.
Example: Observing redshift between two identical cesium sources with no difference in selectivity η or contrast $\Delta\eta$.

(F3) Phase Interference Outside the Critical Line

If an experimental configuration leads to **destructive interference** at any point other than $\Re(s) = ½$,,
then the **TRR reinterpretation of the Riemann hypothesis** is invalid.
Example: Simulating the phase sum ζ(s) with full cancellation away from the critical line.

(F4) Experimental Measurement of NTL Frequency

If it is proven that **NTL layers cannot be derived** from the cesium standard **without temporal apparatus**, or that **layer granularity has no real measurable effect**, then the model loses its structural basis.

8.3 Falsification vs. Limits of Interpretation

TRR–NOTIME is **not unfalsifiable**. It is explicitly formulated such that:

- Its central axiom CT–1 **can be disproven**,
- Its calculations **can be contradicted** by empirical reality,
- Its units (NTL, η, L_{trr} can be tested experimentally.

Unlike many speculative theories (e.g., multiverse, string theory), TRR–NOTIME has **clear numerical, physical, and formally testable outcomes**, which can be **verified or refuted**.

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9. Conclusion: Directional Causality Instead of Temporal Interpretation

The TRR–NOTIME model is **not an alternative physical theory** in opposition to existing frameworks. It is not a polemic against General Relativity (GR), Quantum Mechanics (QM), or the Standard Model of particles.
Instead, it offers a **unifying framework** that replaces the traditional temporal interpretation with a **causal structure based on the directional energy potential (SEP).**

The core statement is simple:

Every physical phenomenon is the result of projection compatibility between configurations, not evolution in time.

Through this approach, TRR–NOTIME:
– Provides a **mathematically precise replacement** for temporal dynamics,
– Preserves **experimentally confirmed phenomena** (e.g., frequency, interference, decay),
– But explains them structurally, **without requiring time, motion, or action**,
– And also enables the analysis of mathematical problems (e.g., the Riemann Hypothesis) in a **timeless, causally energetic framework**.

9.1 Resolving the Paradox Between Quantum Mechanics and General Relativity

The greatest crisis in contemporary fundamental physics is rooted in the fact that:
– **QM** assumes quantized processes on a fixed **spacetime background**,
– **GR** describes smooth geometric deformation of **spacetime itself**,
– And the two are **mutually incompatible**, as both require spacetime to be **simultaneously static background and dynamic field**.

TRR–NOTIME resolves this paradox **naturally** by removing both **time and space as independent entities**.
Instead, it introduces a **single fundamental quantity**:

$$\vec{\varphi} := \frac{\vec{E}}{m}$$

– a **vector directional energy potential (SEP)**,
which defines all interaction structure, **without geometry, time, or fields.**

– **Gravitational phenomena** arise from **gradients of SEP**
– **Quantum phenomena** result from **interference of projection-selected SEP states**

The **unified framework** becomes:
→ **Projection selectivity between configurations**

9.2 Final Unification

TRR–NOTIME thus provides what no other physical framework does:

Question	TRR–NOTIME Resolution
Who defines the background?	No background exists – all is a **projection relation** in SEP
Can fields be quantized?	No fields exist – only **selective configurations** of SEP
What is the common basis of QM and GR?	A **directional energy space** without geometry
What is the unified cause?	The **gradient of SEP structure**
Why is time unnecessary?	All changes are **structural**, not temporal

9.3 Summary

TRR–NOTIME is **not a speculative construct**—it is a **formally defined framework** that is:
• **Testable**
• **Falsifiable**
• **Computationally explicit**
• **Experimentally comparable**

It introduces:
– a **unit** (NTL)
– a **structure** (SEP)
– **tools** (TRR–Lagrangian, projection-based Feynman sum)
and delivers both **physical** and **mathematical results** that **no other theory has successfully unified**.

Instead of two separate languages - geometric and quantum, we now have one:
the language of **directional energy selectivity**.

9.4 – Millennium Problems

The TRR–NOTIME model is **not just a unifying framework for physics,** it is a **structural apparatus** that enables the analysis and resolution of some of the **most fundamental open problems in modern mathematics**.

Each of the recognized Millennium Problems finds in TRR its:
• **Structural definition** within the SEP space
• **Projection-based representation** in **discrete layered form (NTL)**
• **Concrete, quantifiable expression,** without invoking time, geometry, or field constructs

In TRR–NOTIME, all such problems are systematically:
– **Expressed**,
– **Quantified**,
– and **Tested**
as **interaction configurations** within the **directional energy potential** framework.

This makes TRR–NOTIME not only a **theoretically unifying model**, but also **computationally and experimentally applicable**—across both physics and mathematics.

10. – References

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