Lattice Superfluid Vacuum (LSV): Hydrodynamic Unification of Physics in a Porous Medium and the Relativistic Illusion

Artemiusz Emil Palla
Independent researcher, Poland
physics.reinterpretation@gmail.com
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Abstract

The paper presents the **Lattice Superfluid Vacuum (LSV)** model – a deterministic theory unifying the fundamental interactions on the basis of advanced hydrodynamics of porous media. The model postulates the existence of absolute time and a rigid, three-dimensional Euclidean space filled with a **Crystalline Lattice** of helical structure and a **Superfluid Substrate** flowing through it. The foundation of the theory is a rigorous distinction between physical reality and the result of measurement. I show that relativistic effects (time dilation, Lorentz contraction, mass increase) are not ontological features of the Universe, but a **measurement illusion**. It arises from the fact that humanity and its research apparatus are built from subsignal matter and use signals of finite propagation speed (c). The model introduces nucleons as composite topological vortices and a table of experimental verification.

1 Foundations of the Architecture: Absolute Reality

The LSV model rejects the concept of 4-dimensional Minkowski spacetime as a physical entity, recognising it only as a convenient mathematical map for an observer using light. Reality is based on three unchanging pillars:

1. **Absolute Time (t):** Time is a scalar, invariant parameter of the system's evolution. It flows at an identical, constant rate at every point in the Universe. It is not subject to dilation, cannot be reversed or stopped. All observed differences in the passage of time are errors of clock mechanisms, not a change in the nature of time.

2. **Rigid Euclidean Space (Lattice):** Space is filled with a stationary crystalline structure – the **Lattice** – with cells of Planck length size (L_P). This lattice is the "skeleton" of the Universe and defines the absolute reference frame.

    - **Chiral Topology:** The flow channels inside the Lattice have **chiral (threaded)** geometry. This mechanical enforcement of twist explains the breaking of parity symmetry in weak interactions (why neutrinos are always left-handed).

3. **Superfluid Substrate (Medium):** The pores of the Lattice are filled with a compressible quantum fluid composed of fundamental particles – **ETOMs**. They are orders of magnitude smaller than the lattice cell and move chaotically at supersignal speeds ($v \gg c$). This fluid is the carrier of energy and matter.

1.1 Kinematic Classification

In the LSV model, the speed of light (c) is not an insurmountable causality barrier, but a physically defined **speed of the pressure wave in the Substrate**.

I propose the following terminology:

- **Subsignal particles ($v < c$):** Standard matter (electrons, protons). These are stable vortices of laminar flow.
- **Signal ($v = c$):** Density wave in the Substrate (photon, graviton). Because this wave is the carrier of information for our senses, it determines our perception of reality.
- **Supersignal particles ($v > c$):** Background particles (ETOMs) and stable solitons (neutrinos). They move in the supercavitation regime, outrunning their own interaction field.

2 Mechanism of the Relativistic Illusion

This is the most important point of the model. The mathematics of Lorentz transformations is correct, but in LSV it describes **errors of the measuring apparatus** resulting from the use of a finite-speed signal in absolute space.

2.1 Illusion of Length Contraction

Physically, objects are rigid, made of atomic bonds and **do not undergo contraction** in the direction of motion (as relativity explains).

- **Mechanism of the Illusion:** Lorentz contraction ($L = L_0\sqrt{1 - v^2/c^2}$) is a **synchronisation artefact**. An observer trying to measure the length of a flying object uses light. The light signal sent from the "rear" of the object has to catch up with the observer, while the signal from the "front" escapes (or vice versa, depending on the configuration).
- The brain or detector assembles these time-shifted signals into a single image that is distorted (compressed). This is a temporal perspective, not a deformation of space. The object physically remains intact.

2.2 Modified Lorentz Formula

From LSV I introduce a mathematical correction that also allows the measurement error to be described for supersignal speeds:

$$\gamma_{\text{LSV}} = \frac{1}{\sqrt{\left|1 - \frac{v^2}{c^2}\right|}} \tag{1}$$

- **Interpretation:** For $v > c$ the value under the square root is taken in absolute value. This means that the γ factor decreases as speed increases above c.
- **Consequence:** In the supersignal zone drag forces drop (supercavitation phenomenon – breaking the light c barrier in the Substrate), and optical illusions reverse – the object appears stretched, and clocks may "tick" faster (or in reversed order, which an observer may perceive as a causality disturbance).

2.3 Mechanism of Apparent Clock Slowing (Not Time!)

In LSV time flows normally (Δt = const), but **measuring devices slow down**. This is not magic, it is mechanics. It results from two physical factors:

1. **Signal Path Extension (Lag):** Every clock is based on the cyclic exchange of signals (forces) between the elements of the mechanism. If the clock is moving in the Substrate, the internal signal has to travel a longer path to "catch up" with the elements of the mechanism (it follows from the Lorentz contraction illusion). This lengthens the operating cycle of the device.
2. **Viscous Drag of the Substrate:** At speeds close to c, the Substrate exerts a drastically increasing aerodynamic drag (analogous to the sound barrier). The clock mechanisms (e.g. atomic vibrations) are physically damped, thus "ticking" less frequently.
    - **Conclusion:** The observer sees a slower clock and wrongly concludes that time has slowed down.

3 Equations of State and the Fine-Structure Constant (α)

The dynamics of the Substrate inside the Lattice is described by the modified **Gross–Pitaevskii Equation (GPE)** [1, 2]:

$$i\hbar\frac{\partial\psi}{\partial t} = \left(-\frac{\hbar^2}{2m}\nabla^2 + \mathbf{V}^{\alpha}_{\text{grid}}(r) + g|\psi|^2\right)\psi \tag{2}$$

3.1 Explanation

The key innovation is the physical interpretation of the **Fine-Structure Constant** ($\alpha \approx 1/137$). The behaviour of the Substrate is described by the modified (GPE) in a chiral potential:

$$i\hbar\frac{\partial\psi}{\partial t} = \left(-\frac{\hbar^2}{2m_{\text{etom}}}\nabla^2 + \mathbf{V}^{\alpha}_{\text{chiral}}(r) + g|\psi|^2\right)\psi \tag{3}$$

- $\mathbf{V}^{\alpha}_{\textbf{chiral}}(r)$ Lattice potential. The parameter $\alpha \approx 1/137$ (fine-structure constant) represents the **coefficient of geometric porosity** of the lattice walls.

$$\alpha = \frac{A_{\text{opening}}}{A_{\text{wall}}} \tag{4}$$

  Only this part of the Substrate stream penetrates through the lattice barriers, which defines the strength of electromagnetic interactions.

3.2 Interpretation of α as Porosity

The constant α is not a magical number, but a geometric parameter of the Planck Lattice. It defines the **porosity (permeability) coefficient** of the walls of the cubes.

- Only 1 part in about 137 parts of the Substrate stream is able to squeeze through the lattice barriers.
- This "throttling" of flow is responsible for the relative weakness of electromagnetic interactions compared to the rest energy of the vacuum and limits the pressure wave speed (light) to the value c.

4 Structure of Matter: Vortices in the Substrate

Elementary particles are stable topological solutions (**solitons** [4]) of the flow equation in the Substrate.

4.1 Table of Particles and Interactions in LSV

Table 1: Particles and interactions in the LSV model

Object / Phenomenon	Interpretation in LSV (Hydrodynamics)	Mechanism of action and stability
Electron	Fundamental Vortex	Stable, laminar toroidal flow of the Substrate.
Proton	Composite Vortex (Knot)	Stable, complicated hydrodynamic knot (e.g. trefoil knot). Consists of three main circulation loops (quarks).
Neutron	Hybrid Vortex	Proton structure with an "embedded" electron that neutralises the external flow. It is metastable (undergoes beta decay).
Strong Force	Bernoulli Underpressure	Fluid flowing between the loops of the proton vortex (quarks) has enormous speed. According to Bernoulli's law, the pressure there drops, generating a powerful "gluing" force for the loops. Gluons are simply streams of this flow.
Muon (μ)	Sealed Vortex	An electron that at $v \approx c$ sucked in excess Substrate. **Illusion of Time:** It lives longer not because of dilation, but because of **Dynamic Pressure**. The rushing Substrate acts like a corset, mechanically sealing the vortex and blocking its decay.
Tau (τ)	Critical Vortex	A state in which the internal pressure of the sucked-in Substrate exceeds the strength of the vortex structure. It bursts almost instantly.
Neutrino	Supersignal Soliton	Decay remnant. Ring vortex with "self-lubricating" geometry (no shock wave). It can move at speed $v \geq c$.
Relativistic Mass	Illusion of Drag	The particle does not gain weight. The increase in mass in experimental results is an illusion resulting from the fact that the accelerating magnetic field signal(c) loses efficiency ("spins its wheels") when the particle approaches c.

4.2 Small speculation

The neutrino is the smallest stable vortex (always spinning in one direction) and may be the basic structure of other (larger) elementary particles (including the electron). I suspect that electric charge somehow depends on whether we have an even or odd number of neutrinos in the building material of a larger matter particle. This would explain where neutrons come from. Determining the neutrino mass could explain the **1/1836** mass dependence between the electron and the neutron and proton.

5 Electromagnetism as a Hydrodynamic Artefact

In the LSV model there are no **"fields"** in the abstract sense. There are only states of pressure and flow.

1. **Electric Field ($\vec{E}$):** It is the gradient of dynamic pressure of the Substrate generated by the vortex (electric charge). It propagates at Signal speed (c):
$$\vec{E} \propto -\nabla P \tag{5}$$
2. **Magnetic Field ($\vec{B}$ – Illusion):** It does not exist as a physical entity. It is an artefact resulting from the propagation delay of the $\vec{E}$ vector. The Lorentz force $\vec{F}$ is not the sum of two fields, but the result of hydrodynamic interaction taking delay into account:
$$\vec{F} = q(\vec{E}_{\text{local}} + \vec{v} \times \vec{B}_{\text{illusion}}) \tag{6}$$
For $v > c$ the magnetic term disappears because the field information does not catch up with the object.

- The Lorentz force is the result of **aberration of the Electric Field**.
- When a charge moves, information about its position reaches another charge with delay (c). The force vector points at the "old" location of the source (where the charge was a moment ago).
- This angular difference between the actual position and the position "seen" by the field generates an apparent lateral force that we call magnetism.
- **Prediction:** For supersignal objects ($v > c$) that outrun their own signal, the magnetic effect disappears completely.

6 Compatibility with Quantum Theory

The LSV model maintains compatibility with quantum experimental results, interpreting them in the spirit of realism (**The theory of the pilot wave** [5]) .

- **Duality:** The particle is a physical object (vortex core) that generates waves in the Substrate. These waves "pilot" the particle.
- **Two-slit interference:** The particle passes through one slit, but the Substrate waves it generates pass through both. The particle follows the path determined by the interference of its own waves behind the obstacle.

7 Gravity and Hydrodynamic Cosmology

Gravity in LSV is not curvature of geometry (space is rigid), but a statistical effect in the Substrate.

7.1 Gravitational Force (Pressure Gradient)

The presence of matter (vortices) disturbs the local energy density of the Substrate (via centrifugal effect in vortices or "shadow" effect for background flow). This generates a macroscopic pressure drop around the mass. The gravitational force is the tendency of bodies to move towards lower pressure (Bernoulli effect or inverted Archimedean buoyancy).

$$\vec{F_g} = -V \cdot \nabla P_{\text{substrat}} \tag{7}$$

This corresponds to Newtonian attraction, but the mechanism is pushing by external pressure.

7.2 Galaxy Rotation and "Dark Matter"

LSV explains flat galactic rotation curves without introducing new particles.

1. **Density Halo:** Around a galaxy the Substrate is denser (gravitational condensation). The mass of this "condensed vacuum" is added to the mass of the stars.

$$M_{\text{eff}} = M_{\text{baryonic}} + \int \rho_{\text{substrat}}(r)\, dV \tag{8}$$

2. **Viscous Dragging:** A rotating galaxy mechanically drags the viscous Substrate along (like a stirrer in honey). Stars do not move in static vacuum, but in a co-rotating medium ("river"), which reduces the required centripetal force.

8 Mechanism of Inertia and Thermodynamics

8.1 Inertia as Added Mass

The inertia of a body is not an internal property, but the result of interaction with the Substrate (Mach's principle in hydrodynamic terms). To accelerate a body, the surrounding fluid must also be accelerated (Added Mass):

$$F = (m_{\text{body}} + m_{\text{added}}) \cdot a \tag{9}$$

Where $m_{\text{added}} = C_m \cdot \rho_{\text{substrat}} \cdot V_{\text{body}}$. This explains why mass is equivalent to energy ($E = mc^2$ is the energy stored in the flow field around the particle).

8.2 Thermal Stability (Heating Problem)

Radiation loses energy through friction against the Substrate ("Light Fatigue"), which explains redshift without expansion. Why has the Universe not boiled?

- The heat capacity of the Substrate (Planck density) is of the order of $10^{113}\,\text{J/m}^3$.
- The average energy density of stars is approx. $10^{-14}\,\text{J/m}^3$.
- The ratio of these quantities $\approx 10^{127}$ means that the Substrate is an **ideal thermal buffer**. Absorbing all the energy of the Universe would not raise the temperature of the Substrate to a measurable degree for eons.

9 Verification Table: LSV vs Reality

A comparison of key experiments and their interpretations in the LSV model. It shows which phenomena are consistent (confirm the model) and which constitute a challenge.

Table 3: Verification table: LSV predictions vs experimental reality

Experiment / Phenomenon	Result in Mainstream Physics	Interpretation in LSV (Mechanism)	Status in LSV
GPS System	Satellite clocks run fast (Dilation + GR). Correction required.	Clocks in orbit tick faster because: 1) Viscous drag of the Substrate is smaller (lower background density). 2) The mechanism is less loaded by pressure. **The correction is numerically identical, but mechanical.**	**COMPATIBLE** (Interpretatively)
Michelson-Morley	Speed of light constant in every direction. No ether.	**Illusion of arm contraction.** The interferometer arm aligned against the wind is physically shortened (compression of atomic bonds by Substrate drag) or results directly from the contraction illusion (I still have doubts). The shortening or illusion perfectly compensates the light flight time difference. Result: apparent no wind.	**COMPATIBLE** (Lorentzian Ether)
LIGO (Gravitational waves)	Ripples of spacetime moving at speed c.	**Pressure waves** of gravity in the Substrate. They propagate at **signal(c)** speed because that is the signal speed of this medium. The detector detects pressure/arm length changes.	**COMPATIBLE**
Muon decay in the atm.	Muons live longer thanks to time dilation. They reach the ground.	Muons live longer thanks to **aerodynamic stabilisation**. The momentum of the medium (Substrate) compresses the muon, preventing it from bursting. Time flows normally.	**COMPATIBLE**
LHC collisions	Creation of new particles from energy ($E=mc^2$).	**Hydrodynamic splash.** The collision of two vortices (protons) causes chaos and the creation of thousands of unstable micro-vortices (foam). Only those that fit the Lattice remain stable.	**COMPATIBLE**
Sagnac Effect	Proves absolute rotation (problem for SR in some interpretations).	Proves the existence of the Substrate. Light travelling "against the current" of the rotating device travels a different path in the Substrate.	**COMPATIBLE** (Strong evidence for LSV)
Supersignal speeds	Forbidden. Infinite mass.	**Possible.** They require breaking the pressure barrier (supercavitation). Mass (drag) drops after exceeding the signal(c).	**THEORETICAL** (To be verified)
No magnetism at $v > c$	Not applicable (cannot achieve v>c).	Prediction: A supersignal particle will not bend in a magnetic field (will become "invisible" to Lorentz detectors).	**TO BE VERIFIED**

9.1 Numerical verification of the model

I propose numerical verification of my model using the **Lattice-Boltzmann Method (LBM)** [8, 9], possibly with the **BGK** approximation [6] – it comes from cellular automata [7]. From simple particle hopping rules on a lattice, perfect **Navier-Stokes equations** (fluid mechanics) emerge. I assume that the universe operates on LBM principles, that a lattice of cubes can generate perfect hydrodynamics.

10 Summary

The **LSV** model is a complete theoretical proposal that restores to physics an intuitive, mechanical character.

1. It removes the "magic" of curved time, replacing it with **engineering of measurement errors**.
2. It unifies forces as different manifestations of fluid dynamics in a porous medium.
3. It opens new research horizons towards supersignal physics and vacuum engineering.

For an engineer, LSV is an understandable system: the Universe is hydraulics. What we see as relativity is just the specificity of measuring equipment immersed in the fluid under study.

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