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RECEIVED 16 May 2024

ACCEPTED 04 December 2024

PUBLISHED 06 January 2025

CITATION

Bulyzhenkov IÉ (2025) Instantaneous correlations of Shannon's big data in nonlocal cosmos.
Front. Astron. Space Sci. 11:1433214.
doi: 10.3389/fspas.2024.1433214

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Instantaneous correlations of Shannon's big data in nonlocal cosmos

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The etheric energy in Umov's thermomechanical transport through material space changes reversibly within a limited band of hidden rest energy in accordance with Lorentz transformations. Umov's continuum of field masses allows the local embedding of stored information in accordance with the Shannon distribution law to describe nonlocal hierarchies. The information guidance for the nonlocal mass integral nullifies its volumetric rest energy by self-gravity. Shannon entropy for big data can describe both macro- and mega-entanglement of correlated densities. Lomonosov's interpretation "from here to there" for measured Newtonian forces supports instantaneous correlations in the matterspace informatics continuum of Umov, Kotelnikov, and Shannon. Field mechanics of Russian cosmism proposes conceptual probes of monistic hierarchies with nonlocal entanglement for prospective use in energetics, engineering, informatics, life sciences, and astronomy.

KEYWORDS

Shannon matterspace, field monism, self-assembly, cosmic nonlocality, energy confinement, Russian cosmism

1 Introduction

The discovery of Neptune "on the tip of a pen," due to postulated interactions by the inverse square of distances, led many to mistakenly believe in the dual worldview of localized bodies and force fields in the void. The material space-plenum of Plato and Aristotle does not deny Newton's law of gravity. The ancient Greeks and modern Cartesian thinkers could not demonstrate numerical applications due to the lack of monistic mechanics for material fields. The aim of the present research is to fill this gap and to derive the law of distance interactions between dense material volumes based on the requirements of Shannon's theory for optimal rates in information exchange under noise. By relying on the available information laws, physicists can better understand the nonlocal nature of cosmic hierarchies, which, in practice, demonstrates the phenomenon of gravitation with measurable acceleration between the centers of observed concentrations of mechanical energy.

Since 1914, Einstein used the geodesic law $c^2 u^\nu \nabla_\nu u_\mu = 0$ for the free fall of the small (probe) body, whose specific inertia or mass density is constant in the metric field environment with the covariant derivatives $\nabla_\nu u_\mu \equiv \partial_\nu u_\mu - \Gamma_{\nu\mu}^\rho u_\rho$. The corresponding geometrization of local 4-accelerations in terms of metric tensions "here" conceptually revises Newton's idea of gravity "from there," which is initiated as "divine action-at-a-distance" between localized carriers of active (heaviness) and passive (inertial) masses. However, why do the local metric push of Einstein and the distant pull of Newton over the void still coexist in the modern theory?

There were no information theories in 1915, and at that time, the original version of Einstein’s metric fields (Einstein, 1916) was (erroneously) referenced by Newton’s gravitational theory for separated masses supposedly observed in empty space. Newton’s gravitational forces (later massless force fields) were not material. The empty space between the Earth and the Moon can be filled by divergence-free waves but not by big information data related to local material densities. Information exchange was traditionally associated with electromagnetic waves between macroscopic transmitters and receivers, i.e., with a very narrow and dissipative (distractive) channel with retardation. In this historical way, negative gravitational energies were imperceptibly accepted by the dual model of localized sources and retarded massless fields for “the first fundamental force” with the intuitively expected time delay.

Einstein’s metric fields were not timely associated by modern physics with inertial densities of mass–energy or material ether from the physical world of Plato and Aristotle, who recalled “matter and space are the same says Plato in the Timaeus.” By trying to reject the inertial ether and save the empty-space dogma for dualistic models in physics and informatics, the proponents of point masses and metric singularities led Einstein’s revolutionary geometrization of ponderable fields to black holes, dark matter, and other quite objectionable notions.

In order to restart field mechanics and big data informatics for visible (macroscopic) bodies and the first fundamental force of interactions from the very beginning, we propose to mathematically restart the theory of inertial motion from “Philosophiae Naturalis” in 1644 by Descartes but not from “Philosophiae Naturalis Principia Mathematica” in 1687 by Newton. The geodesic law of motion and informatics-geometric organization of local pushes in general relativity (GR) are in good agreement with the Cartesian ontology of matter-extension (Garber, 1992) and the super-penetrating gravitational matter-fluid of Lomonosov et al. (1950). Continuous densities of masses and charges are equally inherent in the informatics-metric fields of Shannon–Einstein and in Maxwell’s equations (or identities in monistic field theory) due to similar analytical solutions (Bulyzhenkov, 2008) for strong fields. In the metric theory of nonlocal inertia, the continuous matter extension without void regions should suggest a correlated distribution of monistic densities in the multi-vertex system of inertial matter with self-gravitation.

The visible motion of dense mass–energy with a very high concentration of vertexes may not obey the Newtonian action at a distance but may instead follow the nonlocal self-assembly of the correlated kinetic densities and informatics-metric stresses in the nonlocal sub-hierarchies of continuous mass–energy–information. For the monistic metaphysics of material space (or matterspace in our terminology), Lomonosov proposed local pushes from the so-called super-penetrating gravitational fluid (Lomonosov et al., 1950) to explain the laboratory phenomenon of gravity in the material pan-unity of visible and invisible inertial densities. The nonequilibrium motion of dense regions near traceable vertexes may better correspond to the universal tendency of a closed system to its quasi-static equilibrium or self-oscillations around the equilibrium with equipartition of kinetic chaos and kinetic order (Bulyzhenkov, 2018). Nonlocal matterspace has adaptive geometric fields with elastic feedback, preventing the gravitational collapse of cosmological formations in the Bentley paradox for Newtonian physics.

The negative gravitational energy coming from interaction partners (or pulling gravitation in a multi-body system of the dualistic world) appears only as a palliative model to describe kinetic self-organization of the holistic reality without partners. Negative gravimechanical energies or gravitons with negative momentum should not exist at all in the kinetic world of Cartesian matter extension or in the correlated self-assembly of the continuous matterspace with locally embedded information. Extra (potential) fractions of energy should not be employed in the 1644 monistic approach to nature through the endless kinetics of inertial densities with local pushes due to mechanical stresses. Hegel, a thinker unique in genius, considered the primary kinetic repulsion (with positive pressure and energy) as a prerequisite (Hegel, 2010) for the observed attraction in macroscopic and megascopic distributions. Not the potential energy coming from the so-called partners but the local self-action of active mass densities on passive mass densities can lead to negative energy imbalances anywhere within the inhomogeneous formation of the nonlocal energy integral. We find, quantitatively, that the volume energy integral of the self-gravitating distribution with the Shannon informational content for optimal (equilibrium) organization of continuous masses corresponds to zero system energy.

According to the monistic distribution of wave matter in quantum physics, the Cartesian worldview correctly associated physical reality with non-dual matter-extension without separated partners and massless fields in the empty space. In this mathematical article, we will explore the “old” mechanics of etheric mass–energy in the Umov spatial transport and the “absolute” monistic worldview of Russian cosmists to avoid the postulated gravitation with negative potential energies. The attracting action at a distance “from there to here” will be replaced by information directives for local accelerations “from here to there” in the self-contained field mechanics of correlated inertial densities formed by the nonlocal mass organization with the distributed Shannon entropy.

2 Band of reversible energies in Umov’s matterspace

The time-varying elastic ether of Plato, Aristotle, Descartes, Lomonosov, Umov, and others has much to gain from the relativistic physics of the 20th century. By the amazing logic of Kuhn, “Einstein’s theory can only be accepted with the recognition that Newton was wrong” (Kuhn, 1962). Unlike Newton, Einstein’s metric–kinetic energies were never based on negative values. Special relativity (SR) introduced positive (kinetic) rest-energy $E_o \equiv m_o c^2$ and allowed general relativity (GR) to work only with positive kinetic densities $\mu_o c^2 \sqrt{g_{oo}} / (1 - \beta^2) > 0$ of real bodies at the positive metric potential $g_o \equiv \sqrt{g_{oo}} > 0$. By promptly building SR on the formal postulates but not on the Lorentz transformations for the energy–momentum four-vector $\{E; \mathbf{P}\}$, where

$$\begin{cases} E_o = \frac{E - \mathbf{vP}}{\sqrt{1 - \beta^2}}, & \mathbf{P}_o = \frac{\mathbf{P} - E\mathbf{v}}{\sqrt{1 - \beta^2}} = 0, \\ E = E_o \sqrt{1 - \beta^2} + \mathbf{vP} \equiv \left\{ E_o \sqrt{1 - \beta^2} \right\}_{Umov} + \left\{ \frac{\beta^2 E_o}{\sqrt{1 - \beta^2}} \right\}_{Lei} \equiv \left\{ \frac{E_o}{\sqrt{1 - \beta^2}} \right\}_{Ein}. \end{cases} \quad (1)$$

Einstein initially saw no theoretical need for ponderable ether. In 1920, however, the author of GR began to think of the metric

field as “another kind of ponderable matter” but still without independent motion (Einstein, 1922): “...this ether may not be thought of as endowed with the quality characteristic of ponderable media, as consisting of parts which may be tracked through time. The idea of motion may not be applied to it.” Einstein also rejected the particle-like interpretation of the ponderable ether but allowed for other etheric possibilities in the SR: “The special theory of relativity forbids us to assume that the ether consists of particles observable through time, but the hypothesis of the ether in itself is not in conflict with the special theory of relativity.” This statement clearly denies the kinetic gravitation of Fatio (1690) and Le Sage (1748) with ultrafine etheric particles. The latter would lead to irreversible heating and burning of the planets, as Poincaré calculated in his well-known criticism of separated etheric particles (but not of an etheric continuum or space-plenum without voids of the ancient Greeks, Descartes, and Lomonosov).

Einstein’s 1920 statement about the metric field as a kind of ponderable matter seems to be complementary to Lomonosov’s time-varying ethereal fluid, completed by Umov (1874) with inertial heat fraction in addition to the local pressure of elastic ether. In 1873, Umov distinguished the etheric (hidden) energy contribution kmc^2 (with the speed-dependent factor $k = 1 - \beta^2/2 \approx \sqrt{1 - \beta^2} \equiv 1/\gamma$ in the low-speed energy transfer) from the total inertial energy with etheric (unmeasurable) and thermal (measurable) fractions. Looking today at Umov’s legacy in monistic physics of continuous energy transport, the full relativistic energy E in Lorentz transformations (Equation 1) contains the inner (ethereal) degree of kinetic freedom for the Umov–Lagrange energy $mc^2\sqrt{1 - \beta^2}$ and the outer (measurable, thermal) degree for the Leibniz “living force” $\nu P \equiv mc^2\beta^2/\sqrt{1 - \beta^2}$. Umov’s ethereal energy changes reversibly on the kinematic order with the macroscopic speed $\nu \equiv c\beta$ and can sustain the elastic self-assembly of time-varying energies on the competing inner (ethereal) and outer (“living,” thermal) degrees of kinetic freedom.

According to Umov, increasing the speed of motion decreases the inner energy of the moving mass and favors its kinematic self-cooling (or the proper time–frequency change in SR). In this sense, the rest energy mc^2 is the maximum internal energy of the mechanical charge $\sqrt{G}m$. In addition, the kinetic potential c^2/\sqrt{G} is the universal band of the internal energy spectrum. Needless to say, the speed-dependent etheric fraction of Umov mc^2/γ in the full kinetic energy $mc^2\gamma$ of Einstein corresponds to the SR relations (Equation 1). Therefore, the additional degree of ethereal freedom can be very beneficial for the further development of kinetic self-organization beyond Newtonian mechanics.

In the monistic physics of field masses or in field mechanics of Russian cosmists (Lomonosov, Umov, Stoletov, Tsiolkovsky, Vernadsky, Chizhevsky, Vlasov, etc.), the kinetic interplay of etheric chaos and kinematic order of inertial energies determine both the geodesic fall and the strong-field rebound in the metric organization of Einstein’s space–time (Bulyzhenkov, 2018). There is no need to postulate the observable gravity as an independent phenomenon in the monistic interplay of kinetic energies. The monistic pan-unity of matterspace in the Cartesian worldview and Russian cosmism has conceptually denied dualism of kinetic energies and independent gravitational potentials of (non-existent) partners. The standard model of contemporary physics used the dualism of particles and their field-mediators, which, for a while, stopped the cosmic monism

of charged material continuums of Umov (1874) and Vlasov (1978) at Moscow State University and of Gustav Mie (1912) at Universität Greifswald. Rarely published, Vlasov had even been suspended from teaching students his nonlocal electrodynamics with the currently famous Vlasov–Maxwell equation for plasma-like media.

The most unique requirement of Umov’s monistic mechanics is the kinematic self-heating/self-cooling of inertial media due to the reversible release/absorption of etheric energy. The anti-etheric physics of the last century did not accept Umov’s revolutionary options of reversible transformation of the inner energy of invisible ether into thermal densities of inertial elements with reversible energy, entropy, and structural self-organization of continuous matterspace with embedded information of Shannon. Therefore, the ethereal approach of monistic cosmists to Lorentz transformations (Equation 1) and Leibniz’s “living force” was abandoned in many countries for a while. In Russia, not only the reversible transformations of Umov’s inertial ether into measurable heat of “living” densities and *vice versa*, but also Vlasov’s computational methods for nonlocal self-organization of extended charges in a collision-less plasma were collectively rejected by leading academicians (Ginzburg et al., 1946). However, after the second quantum revolution and the 2022 Nobel Prize in Physics, the nonlocal material continuum and its big data informatics may be allowed not only for the quantum microcosm but also for the macro-scale and mega-scale entanglement of correlated distributions.

3 Method of Shannon information for equilibrium self-assembly

In the equilibrium macro-organization of material fields, the kinetic pressure of etheric micro-oscillations and fluctuations is accompanied by the emerging metric counter-pressure, which is a secondary or auxiliary notion (used only for macroscopic measurements and observations) according to Lomonosov et al. (1950) and Hegel (2010). The kinetic pressure has informative value and significance for local events. The local balance of primary kinetic-informatics pressure and secondary metric consequences in the dialectical pair of Hegelian struggle and unity of opposites corresponds to the introduction of existing heat and auxiliary (non-existent) cold on the basis of common thermal properties (or formally competing concepts of light and darkness with only one material basis—the positive light energy of photons). In order to avoid sophisticated philosophical reasoning and unravel the relativistic energy balances for the accompanying internal (etheric) and observable (thermal) interplay of inertial flows in Umov’s continuous medium, we will try to find clues in the established theory of information.

Newtonian mechanics is true for forced accelerations under external action on volumetric masses. The latter are independent hierarchies or bodies that can gain/lose finite integrals of energy, momentum, and angular momentum. Such dissipative mechanics can be related to the wave information exchange between distant partners and can use the entropy growth to erase information data. In the former USSR, wave signal informatics began with the famous Kotelnikov’s theorem on sampling theory (Kotelnikov, 1933), which laid the foundation for data processing in radio and telecommunications since 1933. Some cryptographic works by

Kotel'nikov were not unclassified for open publications even after the Second World War. According to his collaborators, Kotel'nikov suggested many applications based on his secret theory of potential noise immunity, which determines the maximum amount of interference that can be allowed in a communication channel so that information is not lost. In the U.S., Shannon also studied optimal transmission lines with noise and obtained government permission to publish his mathematics of communications, including the sampling theorem, 3 years after the Second World War. To avoid indirect citations of the certified results of Kotel'nikov mentioned in Kotel'nikov (2008), Molotkov (2006), and other sources, we refer below only to the open set of Shannon's achievements during the Second World War period.

After the initial insight of Lewis in 1930: "gain in entropy always means loss of information and nothing more" (Lewis, 1930), it was only a matter of time to connect information flows in thermal distributions with local energy changes through the thermodynamic concept of total (extensive) entropy $S = k_B \ln P = N h k_B \ln 2 = Q/T = E/T$, which is related to the total number of possible states P . For local processes of corresponding energy and information changes, it turned out to be convenient to represent the system energy E by Shannon's (intensive) entropy h in "bits per substance unit N " (Shannon C. E., 1949). Here, Nh is the amount of information in bits needed to describe the state of a closed system with total entropy S . Brillouin was one of the first to use the power of Shannon's mathematical publications for physical applications. He derived a general equation (Brillouin, 1953), which states that a bit of information requires at least $k_B T \ln 2$ of electromechanical energy in physical joules.

To repeat Brillouin's fundamental result for the minimum energy cost of a bit of distributed information, one can divide the average signal power P_s by the optimal capacity $C = w \log_2 [1 + (P_s/Nw)]$ of the Shannon transmission line with white thermal noise $Nw = k_B T w$ in the frequency bandwidth w (Shannon C. A., 1949), as shown in the following equation:

$$\frac{P_s}{C} = \frac{k_B T w}{C} \left[(e^{\ln 2})^{C/w} - 1 \right] \rightarrow k_B T \ln 2, \quad C/w \rightarrow 0. \quad (2)$$

Equation 2 shows that the informatics entropy/capacity C , unlike the Gibbs entropy, should keep the number 1 in the logarithm for low field data when $P_s/Nw \ll 1$. Since the spatial transfer of information is inextricably accompanied by corresponding variations in energy, information theory should suggest mutually consistent profiles, at least for equilibrium energy information distributions. In the non-empty space, information traffic can be related not only to dissipative waves with emission and absorption, as in the modern telecommunications, but also to elastic waves of matterspace itself. Even static distributions of equilibrium matter are constantly related to the instantaneous information integral of all standing waves of massive densities. In the material space of Russian cosmism, the cosmic information can not only flow but also stay statically or be stored, which is impossible in empty space. In addition, the standing information pattern represents the big data content of the relativistic rest energy in equilibrium compared to the relatively small information emitted/absorbed with low energies of retarded EM waves.

Advance waves in the mechanics of empty space seem to come from the future, and dualistic physics rejects them as unphysical

according to the principle of causality. In the monistic concept of continuous material filling, the advance waves do not come from the future. In the pure field physics of Russian cosmism, for example, the solution of the advance wave in Maxwell's equations is interpreted as a delayed echo to the center of rarefaction after the wave energy densities have previously diverged from it. Static equilibrium distributions do not contain running wave excitations within the general profile of standing waves of continuous matter. In addition, such equilibrium densities are correlated by metric stresses throughout the material volume of the nonlocal mass. In quantum language, coherently distributed material densities are in a macro-entangled state with instantaneous reduction of the wave function over the whole volume after perturbations.

Despite the fact that macroscopic mechanics and electrodynamics have not yet switched to the monistic language of field masses, information theory has, in recent decades, been engaged in advanced studies of material waves (wavelets, splines, etc., in the review Michaël Unser, 2000) due to many unexpected possibilities offered by the Kotel'nikov–Shannon sampling theorem (Kotel'nikov, 1933; Shannon C. A., 1949). The latter has been updated for multi-frequency bands and applied to a family of novel function and physical objects that classical field theory can hardly handle. Thematic conferences on modern informatics have revealed the coherent need for complex functions in the mathematical analysis of positively defined wavelets and other distributions (Guariglia et al., 2016). This engineering mathematics implies the search in physical reality for analogs of new functional manifolds, such as Sobolev and Morrey–Campanato spaces and fractional L^p spaces. It is observed that it is the mathematics of information organization that will help macroscopic physics to get rid of the dogma of empty space and, possibly, to proceed to the monistic self-organization of the cosmic continuum, according to the criterion of double unification. The latter was predicted by many cosmists in the middle of the last century—a substance should be unified with its interaction field and mass with electric charge.

There is a tendency to informational description of the space–time fabric in the dualistic convention of particles and fields (Gogberashvili, 2022). Below, we also begin to use advantages from some informatics laws, but only for the monistic mechanics of field masses in Russian cosmism. After the macroscopic averaging of microscopic (etheric) fluctuations, the equilibrium self-assembly of Umov's matterspace around one center of spherical symmetry maintains a radially distributed mass integral $\int \mu(r, m) 4\pi r^2 dr = m$ with the time-independent densities $\mu(r, m) = Gm^2/4\pi c^2 r^2 [r + (Gm/c^2)]^2$ (Bulyzhenkov, 2008). The nonlocally organized stress in equilibrium densities in kinetic mass–energy $mc^2 \equiv r_o c^4/G \equiv r_o \varphi_G^2$ is locally balanced by the metric field strength $\hat{r}D(r) = -\hat{r}\partial_r W_{met}(r) = -\sqrt{Gm\hat{r}}/r(r+r_o)$ from the logarithmic potential $W_{met}(r) = \varphi_G \ln \sqrt{g_{oo}(r)} = -\varphi_G \ln [1 + (\sqrt{Gm}/r\varphi_G)]$ in the considered mass–energy–information–matterspace with Euclidean 3-geometry, where $(g_{oi}g_{oj}/g_{oo}) - g_{ij} = \delta_{ij}$, $g^{ij} = -\delta^{ij}$, and $g_{oo} = 1/g^{oo} = r^2/(r+r_o)^2$.

The information content of dissipative transitions and instantaneous elastic processes has different physical meanings. The macroscopic entanglement of a closed material hierarchy requires big data to preserve its elementary, radial structure, and the first integrals of motion (nonlocal rest energy with spherical symmetry

of densities) at all values of the running world parameter x^0 . Short external perturbations or measurements with low information traffic can instantly reassemble the big data entanglement over the whole cosmic self-assembly with affine (geometric) connections. In the language of quantum physics, the equilibrium wave function for big data on the macrostatic system can be instantaneously modified by small data at all spatial points (due to the 3D normalization of the density integral at all time moments).

Russian cosmists do not relate gravitation to external Newtonian forces “from there to here” but, starting from Lomonosov, to internal (etheric) autostresses “from here to somewhere there.” This alternative approach corresponds to a universal tendency of nonlocal distributions toward their optimal information and energy states. Umov’s internal energy kmc^2 , with $k = 1/\gamma \leq 1$ in the relativistic transformations (1), has the potential bandwidth $\varphi_G \equiv c^2/\sqrt{G} = 1.1 \times 10^{22} \text{kg}^{1/2} \text{m}^{1/2} \text{s}^{-1}$ for the scalar probe charge $\sqrt{G}m$, which remains constant under spatial transport. Information, locally embedded in the structural self-organization of auto-gravitating masses, drives the energy densities toward the metric–kinetic equilibrium—static states, stationary rotations, or auto-pulsations around the dynamical equilibrium of the material patterns.

For practical calculations, we associate the optimal capacity for Shannon’s information lines with white noise, $w \log_2 [1 + (P_s/Nw)] = W_{inf} \equiv W_{kin}$, with the information potential $W_{inf}(x)$ or the primary kinetic potential of Hegel, $W_{kin} = W_{inf}$, which locally shapes the metric field under the equilibrium organization of active and passive mass densities with self-gravity. A static metric solution for multi-vertex fields with continuous mass–energy densities has also been described (Bulyzhenkov, 2008) by the logarithmic potential $W_{met}(x) = -\varphi_G \ln(1 + \sum_1^n Gm_k/R_k) = -W_{inf}(x)$. This geometric potential generalizes the optimal information rate for the sum of the signal-to-noise contributions $P_k/N_k w \Rightarrow \varphi_k/\varphi_G$ within the correlated information distribution of elementary extended masses m_k :

$$W_{sys} \equiv \varphi_G \ln \sqrt{g_{00}} = -\varphi_G \ln \left(1 + \frac{1}{\varphi_G} \sum_1^n \frac{m_k \sqrt{G}}{|x - a_k|} \right) \equiv -W_{inf} \quad (3)$$

For weak information signals, if $\sum_1^n m_k \sqrt{G}/|x - a_k| \ll \varphi_G$, the metric potential $W_{sys} = -W_{inf} < 0$ is independent of the universal band φ_G for the variable energies $k(\beta)m\sqrt{G}\varphi_G$ of Umov’s etheric masses. In this weak field limit, the Newtonian potential for mechanical charges, $-\sum_1^n m_k \sqrt{G}/|x - a_k|$, still corresponds from Equation 3 to the information potential W_{inf} . For intensive information signals, the system interaction potential can be described by the Shannon entropy, $W_{sys} = -W_{inf} \approx -\varphi_G \ln[(\sum_1^n \varphi_k)/\varphi_G]$. This entropic approach allows one to consider Newtonian potentials for energy interactions as information potentials and develop methods of information theory even for relatively weak fields.

In order to understand the optimal (equilibrium) organization of the distributed mass–energy, according to the information theory guidance in (3) for a multi-line data traffic with white noise, we first analyze the elementary stress contribution D_k from the static sub-energies $m_k c^2 \equiv \sqrt{G}m_k \varphi_G \equiv r_k \varphi_G^2$, which are concentrated near the vertexes a_k in the material 3-space x with Euclidean

geometry:

$$D_{sys}(\mathbf{x}) \equiv -\nabla W_{sys}(\mathbf{x}) = \sum_{k=1}^n \frac{(-\varphi_G r_k)}{\left(1 + \sum_1^n \frac{r_p}{|x - a_p|}\right)} \frac{(\mathbf{x} - \mathbf{a}_k)}{|\mathbf{x} - \mathbf{a}_k|^3} \equiv \sum_{k=1}^n D_k(\mathbf{x}). \quad (4)$$

Here, $D_k \equiv (\mathbf{a}_k - \mathbf{x}) \sqrt{G}m_k/|\mathbf{x} - \mathbf{a}_k|^3 [1 + \sum_1^n (r_p/|x - a_p|)]$ is an elementary asymmetric field, which, unlike the radial fields of Newton/Coulomb point particles, depends on positions of all system vertexes a_p (in the common denominator). “Elementary” sub-densities $\sqrt{G}\mu_k$ of the system charge density, $\sqrt{G}\mu_{sys} \equiv D_{sys}/4\pi\varphi_G \equiv -div D_{sys}/4\pi \equiv -\sum_1^n div D_k/4\pi \equiv \sqrt{G}\sum_1^n \mu_k$, also depend on all vertexes a_p in the nonlocal organization.

By referring to the Poisson equation for gravitational potentials, we define $\mu_{sys}^{ac} \equiv -div D_{sys}/4\pi\sqrt{G} = -\nabla^2 W_{inf}/4\pi\sqrt{G}$ as the active (heavy) mass density. The passive (inertial) mass density is defined as quadratic field intensity, $\mu_{sys}^{pa} \equiv D_{sys}^2/4\pi\sqrt{G}\varphi_G = (\nabla W_{inf})^2/4\pi\sqrt{G}\varphi_G$, with the local equivalency of active and passive mechanical densities (Bulyzhenkov, 2008):

$$\sqrt{G}\mu_{sys}^{ac} \Rightarrow \frac{-\nabla^2 W_{inf}}{4\pi} = \frac{(\nabla W_{inf})^2}{4\pi} \varphi_G \Rightarrow \sqrt{G}\mu_{sys}^{pa} \quad (5)$$

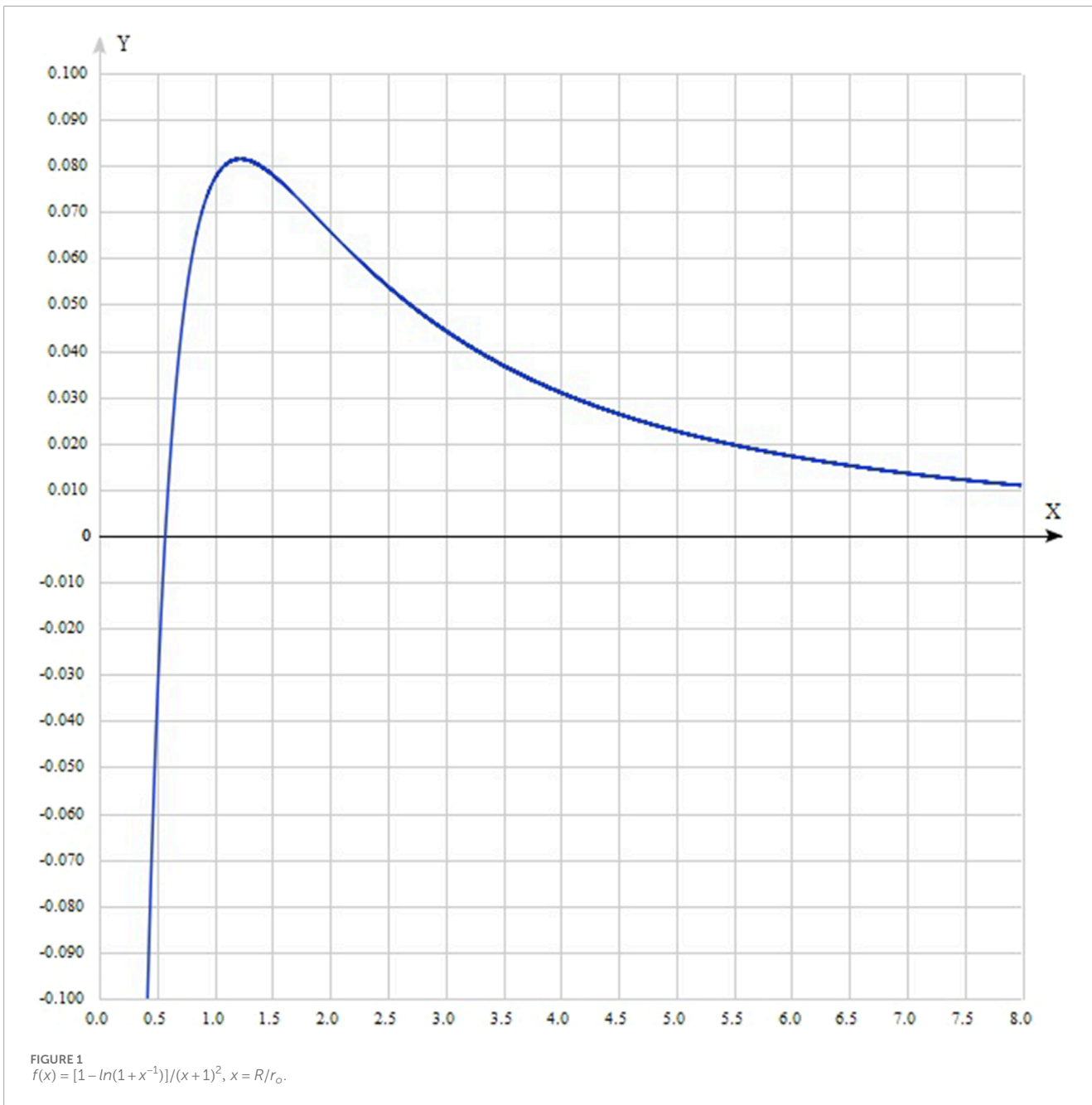
Thus, information scientists deduce from Shannon entropy with the long logarithm, W_{inf} , the equality of active and passive mass densities and, hence, Einstein’s equivalence principle for three-dimensional bodies. If, on the other hand, physicists prefer to postulate the equality of active and passive mass (or mechanical charge) densities and consider it a condition for finding unknown potentials $W_{sys} = -W_{inf}$, they could offer optimal rates of information transmission in Shannon’s noise lines by analyzing admissible solutions of Equation 5.

The information balance in Equation 5 for equilibrium active and passive charge densities in monistic physics allows the calculation of strong field energies without integral divergences. The positive kinetic energy of the static distribution, $\int \sqrt{G}\mu_{sys}^{ac}\varphi_G d^3x > 0$, and the negative energy integral of the local interactions of the passive charge density with the metric self-potential, $\int \sqrt{G}\mu_{sys}^{pa}W_{sys} d^3x < 0$, result in the zeroing of the total mechanical energy for the Shannon equilibrium:

$$E_{sys}^{equ} \equiv \int d^3x \left[\frac{-\nabla^2 W_{inf}(\mathbf{x})}{4\pi} \varphi_G - \frac{[\nabla W_{inf}(\mathbf{x})]^2}{4\pi\varphi_G} W_{inf}(\mathbf{x}) \right] = 0. \quad (6)$$

A similar confinement of the total mechanical energy of a secluded self-gravitating star was first argued by Pascal Jordan in 1939 (Jordan, 1939). However, it has not yet been possible to obtain a numerical analog of the yin-yang result in Equation 6 in the warped 3-space of the dualistic GR, especially without the attraction of information theory.

For spherically symmetric self-organization, the positive mass densities $\mu(r) = mr_o/4\pi r^2(r + r_o)^2$ of their integral $m = r_o\varphi_G/\sqrt{G}$ monotonically fill the space inside the sphere of arbitrary radius R , $\int_0^R \mu(r)4\pi r^2 dr = mc^2 R/(c^2 R + Gm)$. The corresponding sub-integral function $f(x) = [1 + \ln(1+x) - \ln x]/(1+x)^2$ for energy densities and the definite radial integral $\int_0^{R/r_o} f(x) dx = -[r_o/(R + r_o)] \ln[(R + r_o)/r_o] = E_{sys}^{equ}(R)/mc^2$ from the equilibrium energy (6) with self-gravity for such a spherical mass organization



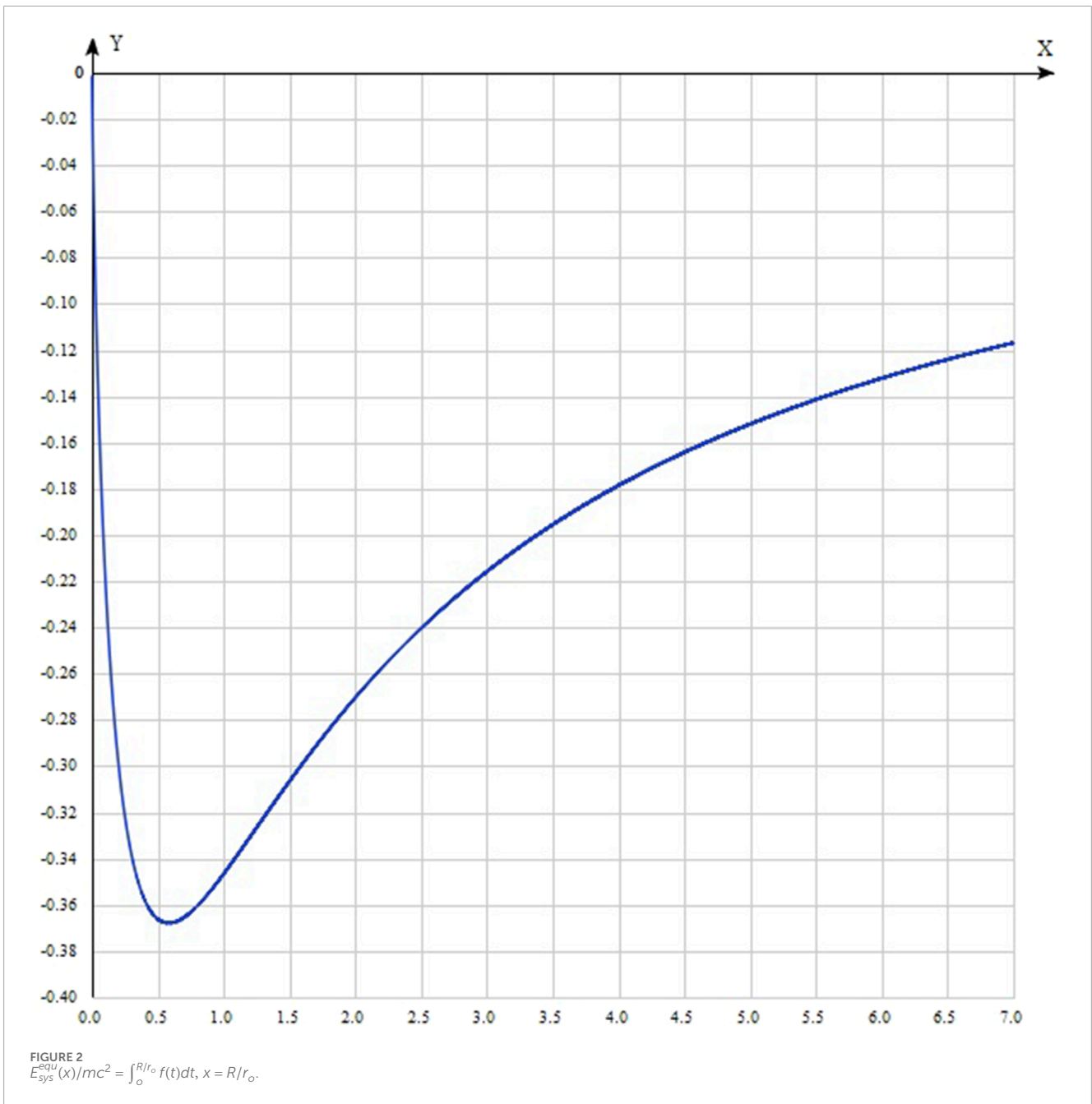
are shown in Figures 1, 2, respectively. Thus, the information-metric self-assembly of equal active and passive field masses leads to sign-variable densities of the yin-yang equilibrium energy with its integral nullification in the entire information-matter volume.

4 Local self-pushes in the information self-assembly of nonlocal distributions

From (3)–(4), one can calculate the continuous mass density μ_{sys} and the kinetic (etheric) rest-energy, $\sum_1^n m_k c^2 = const$, of an isolated system of quasi-equilibrium inertial elements. These elements are bound formations (not isolated geometric hierarchies). They can

contribute to the steady system both with constant “elementary” energies $m_k(x^0)c^2 = C_k$ and with time-varying energy contributions when $m_k(x^0)c^2 = C_k - \hbar\omega_{kl}(x^0)$ and $m_l(x^0)c^2 = C_l + \hbar\omega_{kl}(x^0)$:

$$\left\{ \begin{aligned} \varphi_G \sqrt{G} \mu_{sys}(x) &\equiv \frac{\left(\sum_1^n \mathbf{D}_k\right)^2}{4\pi} \equiv \frac{\left(\sum_1^n \frac{Gm_k^2}{|x-a_k|^4}\right) + \sum_1^n \frac{(a_k-x)\sqrt{G}m_k}{|x-a_k|^3} \left(\sum_{s \neq k}^{n-1} \frac{(a_s-x)\sqrt{G}m_s}{|x-a_s|^3}\right)}{4\pi \left(1 + \sum_1^n \frac{r_p}{|x-a_p|}\right)^2}, \\ \int c^2 \mu_{sys}(x) d^3x &\equiv \int \frac{d^3x}{4\pi} \mathbf{D}_{sys}^2 \equiv - \int \frac{d^3x}{4\pi} \partial_i \left(\varphi_G \sum_1^n \mathbf{D}_k^i\right) \equiv \sum m_k c^2 = const, \\ \int c^2 \mu_k d^3x &\equiv \int \frac{d^3x \mathbf{D}_k \mathbf{D}_{sys}}{4\pi} \equiv \int \frac{\frac{(a_k-x)\sqrt{G}m_k}{|x-a_k|^3} \left(\sum_1^n \frac{(a_s-x)\sqrt{G}m_s}{|x-a_s|^3}\right)}{4\pi \left(1 + \sum_1^n \frac{r_p}{|x-a_p|}\right)^2} d^3x \equiv - \int \frac{d^3x \varphi_G \partial_i \mathbf{D}_k^i}{4\pi} \equiv m_k c^2. \end{aligned} \right. \tag{7}$$



The scalar mass density $\mu_{sys} \equiv (\sum_1^n \mathbf{D}_k)^2 / 4\pi c^2$ of this macrostatic organization is positive at all coordinates of 3D matterspace. There are no Newtonian partners in the monistic holism of continuously distributed matter. In addition, there are no negative potential energies from non-existent gravitational partners in the field reality with the continuous density $\mu_{sys}(x) \neq const$ in the volume integral $\sum_1^n m_k(x^0)c^2 = const$. However, there is a local self-action between the active and passive mass densities, which is ignored by dualistic physics because of volumetric energy divergences near field centers of point masses.

The numerator of the system energy density $\varphi_G \sqrt{G} \mu_{sys} = c^2 \mu_{sys}$ in Equation 7 has two sums, $\sum_1^n \{...\}^2$ and $\sum_1^n \{...\} (\sum_{s \neq k}^{n-1} \{...\})$, of mono-radial and bi-radial functions, respectively. Such different

topologies of “elementary” inertial contributions mean that the elements in the system acquire new physical properties. In addition, the system is always more complex than the sum of the isolated elements. The integrated energy in the last line of (7) takes into account the mono-radial part of the “elementary” density $\mu_k c^2$ and its interference contribution to the system depending on the specific configurations of other elements.

The integral sum $\sum m_k c^2$ of the system kinetic energy does not depend on particular positions of elementary vertexes \mathbf{a}_s in an isolated system. Consequently, quantum exchange of radiation and information between quasi-equilibrium organizations of elementary energies can occur independently of the distances between observed vertexes (or their inverse square law of forces). Exchanges by

quantized mechanical waves (or kinetic photons of inertia) are independent of distance and require common resonance properties or similarities of overlapping receivers and transmitters in a shared material space.

The static mono-vertex solution $D_{met}(r) = -\sqrt{G}m/[r(r+r_0)] = -D_{inf}(r)$ for the time-averaged density $\mu(r) = [D_{inf}^2(r) + \varphi_G \text{div} \hat{r} D_{inf}(r)]/8\pi c^2$ allows the steady coexistence of very dense and rare material regions in the volumetric integral of the continuous mass $m \equiv r_0 \varphi_G^2/c^2$. In the stochastic approach to invisible micro-oscillations behind static macro-shapes of measurable densities, the quasi-equilibrium organization of the elementary integral $m_k c^2$ can participate in nonequilibrium macro- and mega-dynamics of mechanical densities at a higher level of the world energy hierarchy.

The multi-level hierarchy of almost closed systems with their specific time scales and adaptive autodynamics allows a high concentration of inertia, energy, and information in some 3D regions of matterspace and their invisible rarefaction in others. Continuous densities of nearly constant energy integrals of quasi-equilibrium subsystems have adaptive properties of self-regulated distributions to maintain time-averaged patterns of spatial densities. Thus, the nonlocal self-organization of correlated distributions of energy and information is inherent to all material systems, including atoms, molecules, chemical composition, living matter, and astrophysical organizations.

Let us first consider a two-vertex system with the distributed mass $m_{sys} = m_1 + m_2$ and the kinetic rest-energy, with $m_1 c^2 \equiv \int d^3x (\mathbf{D}_1^2 + \mathbf{D}_1 \mathbf{D}_2)/4\pi = \varphi_G^2 r_1$ and $m_2 c^2 \equiv \int d^3x (\mathbf{D}_2^2 + \mathbf{D}_2 \mathbf{D}_1)/4\pi = \varphi_G^2 r_2$, before discussing the basics of nonlocal correlations in more complex mechanical organizations. The elementary mass-energy integrals in the binary system refer to both vertexes \mathbf{a}_1 and \mathbf{a}_2 . However, why is it possible to measure the force of attraction between the vertexes, $\propto L^{-2} = |\mathbf{a}_2 - \mathbf{a}_1|^{-2}$, if one requires the constancy, $m_{1/2} c^2 = \text{const}$, of quasi-equilibrium elementary energies during their geodesic falls in the absence of radiation exchange or inelastic frictions? In other words, why and how do the centers of extended masses exhibit the Newtonian action at a distance of alleged gravitational pulls if the energy-information space of positive kinetic densities has no negative mechanical energies at all?

In the case of negligible gyro-metric potentials, one can consider the local self-force $\sqrt{G}\mu_{sys}(x)\mathbf{D}_{sys}(x)$ of massive densities in their metric-informatics field (in the absence of external, non-metric interventions). Integrating these self-force densities over the ultrasmall volume $\Omega_1 \approx 4\pi d^3/3$, $r_1 \leq d \ll L$ around the static vertex $\mathbf{a}_1 = \{0; 0; 0\}$ of dense regions near the coordinate origin,

$$F_1^x(0) = \int_{\Omega_1} \sqrt{G}\mu_{sys} D_{sys}^x dx dy dz = \int_{\Omega_1} \frac{d^3x}{4\pi\varphi_G} (\mathbf{D}_1^2 + 2\mathbf{D}_1\mathbf{D}_2 + \mathbf{D}_2^2)(D_1^x + D_2^x) \approx \int_{\Omega_1} \frac{d^3x}{4\pi\varphi_G} (\mathbf{D}_1^2 D_1^x + \mathbf{D}_2^2 D_2^x + 2\mathbf{D}_1\mathbf{D}_2 D_1^x) = \frac{\varphi_G^2 r_1 r_2}{L^2} \left(\frac{1}{6} + \frac{1}{2} + \frac{1}{3}\right) = \frac{Gm_1 m_2}{L^2}, \quad (8)$$

it is possible to calculate the integral force F_1^x acting on the ultra-small volume Ω_1 toward the second vertex in $\mathbf{a}_2 = \{L; 0; 0\}$, with $r_1, r_2 \ll L$. The similar integration of the system densities $\sqrt{G}\mu_{sys}\mathbf{D}_{sys}$ leads from (4) to the opposite force, $\bar{x}F_2^x = -\bar{x}F_1^x = -\bar{x}Gm_1 m_2/L^2$, applied to an ultrasmall volume around the second vertex in the Cartesian material continuum. The similar informational (logarithmic) potential in the nonlocal electrostatics of charged space leads to the Coulomb interactions of dense material volumes (Bulyzhenkov, 2023).

There is no “divine action-at-a-distance” in the isolated (metric) system of two superimposed distributions with the shared mass integral. In addition, there are no negative gravitational energies behind the inhomogeneous distribution of the kinetic-metric mass-energy density $\mu_{sys}(x, \mathbf{a}_1, \mathbf{a}_2) c^2 > 0$ in continuous matterspace with locally embedded information. The macroscopic rest-energy density under the information self-organization gains interference fraction, $\mathbf{D}_1(x, \mathbf{a}_1)\mathbf{D}_2(x, \mathbf{a}_1)/2\pi$. This equilibrium interference disappears for remote or almost completely isolated formations with the radial density $\mu_{1/2} c^2 = \varphi_G^2 r_{1/2}^2/4\pi(x - a_{1/2})^2(|x - a_{1/2}| + r_{1/2})^2$.

Again, the calculation in Equations 7, 8 claims that the energy-information system is not an ordinary sum of individual elements but always acquires new physical properties after their joint gathering. Due to the common denominator, the information field (4) acquires a nonequilibrium asymmetry near all vertexes of the formerly radial elements. The spatial asymmetry of the almost radial densities in the net force (Equation 8) determines the local self-acceleration of dense regions in the nonlocal organization of a fixed mass-energy integral. Not distant gravitational pulls but local metric-informatics pushes of correlated matterspace cause the apple to fall in the nonlocal organization of visible inertial densities.

The continuous distribution of mass under the metric-informatics potential (3) reveals the inherent asymmetry of the Lorentz force densities around each vertex. By placing one selected vertex at the origin, $\mathbf{a}_1 = 0$, we can calculate the pushing self-action $F_1^i = \int_{\Omega_1} d^3x \sqrt{G}\mu_{sys} D_{sys}^i$ of the ultrasmall sphere $\Omega_1 = 4\pi d^3/3$, $r_1 \leq d \ll |\mathbf{L}_s| \equiv |\mathbf{a}_s - \mathbf{a}_1|$, which conceptually originates from the spatial asymmetry of material densities and the corresponding self-pushes of dense volumes, which is as follows:

$$F_1^i = \int_{\Omega_1} d^3x \frac{\sum_1^n \frac{Gm_k^2}{|\mathbf{x}-\mathbf{a}_k|^4} + \sum_1^n \frac{(\mathbf{a}_k-\mathbf{x})\sqrt{G}m_k}{|\mathbf{x}-\mathbf{a}_k|^3} \left(\sum_{s \neq k}^{n-1} \frac{(x-\mathbf{a}_s)\sqrt{G}m_s}{|\mathbf{a}_s-\mathbf{x}|^3}\right)}{4\pi\varphi_G \left(1 + \sum_1^n \frac{r_p}{|\mathbf{x}-\mathbf{a}_p|}\right)^3} \sum_1^n \frac{(a_k^i - x^i)\sqrt{G}m_k}{|\mathbf{x}-\mathbf{a}_k|^3} \approx \int_{\Omega_1} \frac{d^3x}{4\pi\varphi_G} \left(\mathbf{D}_1^2 \sum_1^n D_k^i + 2\mathbf{D}_1\mathbf{D}_1 \sum_{s \neq 1}^{n-1} \mathbf{D}_s\right) = -\int_{\Omega_1} \frac{d^3x \varphi_G^2 r_1^3 x^i}{4\pi|\mathbf{x}|^7 \left(1 + \sum_1^n \frac{r_p}{|\mathbf{x}-\mathbf{L}_p|}\right)^3} + \int_{\Omega_1} \frac{d^3x \varphi_G^2 r_1^2 \sum_{s \neq 1}^{n-1} \frac{(L_s^i - x^i)r_s}{|\mathbf{x}-\mathbf{L}_s|^3}}{4\pi|\mathbf{x}|^4 \left(1 + \sum_1^n \frac{r_p}{|\mathbf{x}-\mathbf{L}_p|}\right)^3} + \int_{\Omega_1} \frac{d^3x \varphi_G^2 r_1^2 x^i \left(\sum_{s \neq 1}^{n-1} \frac{x(L_s - \mathbf{x})r_s}{|\mathbf{x}-\mathbf{L}_s|^3}\right)}{2\pi|\mathbf{x}|^6 \left(1 + \frac{r_1}{|\mathbf{x}|} + \sum_{p \neq 1}^n \frac{r_p}{|\mathbf{x}-\mathbf{L}_p|}\right)^3} \approx -\int_{\Omega_1} \frac{d^3x \varphi_G^2 r_1^3 x^i}{4\pi|\mathbf{x}|^7 \left(1 + \frac{r_1}{|\mathbf{x}|}\right)^3} \left(1 + \sum_{s \neq 1}^{n-1} \frac{r_s}{\left(1 + \frac{r_1}{|\mathbf{x}|}\right)L_s \sqrt{1 - 2\frac{\mathbf{x}\mathbf{L}_s}{L_s^2} + \frac{x^2}{L_s^2}}}\right) + \int_{\Omega_1} d^3x \frac{\varphi_G^2 r_1^2 \sum_{s \neq 1}^{n-1} \frac{(L_s^i - x^i)r_s}{|\mathbf{L}_s|^3}}{4\pi|\mathbf{x}|^4 \left(1 + \frac{r_1}{|\mathbf{x}|}\right)^3} + \int_{\Omega_1} d^3x \frac{\varphi_G^2 r_1^2 x^i \sum_{s \neq 1}^{n-1} \frac{x(L_s - \mathbf{x})r_s}{|\mathbf{L}_s|^3}}{2\pi|\mathbf{x}|^6 \left(1 + \frac{r_1}{|\mathbf{x}|}\right)^3} \approx \sum_{s \neq 1}^{n-1} \int_{\Omega_1} \frac{d^3x \varphi_G^2 r_1^2 r_s}{4\pi|\mathbf{x}|^4 \left(1 + \frac{r_1}{|\mathbf{x}|}\right)^3 L_s^3} \left(\frac{3x^i r_1 (\mathbf{x}\mathbf{L}_s)}{|\mathbf{x}|^3 \left(1 + \frac{r_1}{|\mathbf{x}|}\right)} + L_s^i + \frac{2x^i (\mathbf{x}\mathbf{L}_s)}{|\mathbf{x}|^2}\right) \approx \sum_{s \neq 1}^{n-1} \frac{Gm_1 m_s L_s^i}{L_s^3}. \quad (9)$$

At first sight, the information method of calculation leads to the well-known Newtonian pulls between distant vertexes. However, the integration over the localized volume around the origin represents exclusively local self-pushes of asymmetric kinetic densities to all other vertexes in the nonlocal organization of information massive (with geometric space-time and adaptive rate for local time). In this reading of metric inertia through monistic densities of etheric matterspace, there are no negative

energies in primary, kinetic reality, and the distant gravitational attraction is a visual consequence of the invisible kinetic processes (Lomonosov et al., 1950; Bulyzhenkov, 2018; Hegel, 2010). Instead of phenomenological pulls, there are adaptive self-pushes of asymmetric kinetic densities toward other massive volumes in the world-holism of nonlocal mass–energy–matter–information.

Metric-informatics self-pushes in Equation 9 occur simultaneously in the whole big data organization due to an elastic property of the nonlocal system with the constant mass integral $m_{\text{sys}} = \text{const}$ at every x^0 instant. Despite the spatial distance dependence of these elastic interactions in Equation 9, the information-based spatial stresses in long-range distributions have no temporal delay. The internal transfer of running energy waves between extended elements (when $m_k c^2 \neq \text{const}$ and $\sum m_k c^2 = \text{const}$) does not disappear with spatial distances, but these inelastic exchanges depend on retarded “time distances” between elementary vertexes.

5 Brief history of the kinetic-metric counter-stresses

Plato’s theory of forms asserts that the observable world is not the ultimate reality where “matter and space are the same.” The physical organization of etheric densities exists beyond our observations (as in quantum distributions of elementary particles). Aristotle’s cosmos was also an elastic space-plenum. The logical concepts of space-plenum and place ruled out a void, whether on a small (microscopic) or large (macroscopic) scale. In Aristotle’s physics, there were an impressive number of objections to the void. He defined continuous space-plenum as a place devoid of visible bodies but capable of receiving them. Similarly, the essence of Cartesian matter is continuous extension in three dimensions, which is the field form of material distribution.

In 1690, the Geneva mathematician Nicolas Fatio de Duillier wrote a letter to Huygens and, for the first time, criticized Newton’s distant attraction in favor of a local nudging of bodies by tiny invisible particles. Another Geneva mathematician, Georges-Louis Le Sage, in 1748, renamed tiny particles as ultramundane corpuscles. The Fatio–Le Sage kinetic gravitation was cautiously appreciated by Maxwell as “...seems to be a path leading toward an explanation of the law of gravitation, which, if it can be shown to be in other respects consistent with facts, may turn out to be a royal road into the very arcana of science” (Maxwell and Baynes, 1878). Again, Poincaré proved quantitatively that the required energy exchange between Keplerian planets and the assumed streams of inelastic particles or corpuscles would burn the planets almost instantly. Therefore, superfine corpuscles cannot stand behind the observable phenomenon of gravity.

Instead of invisible particles, in 1742, Lomonosov et al. (1950) proposed to describe mutual attractions of visible bodies by the ethereal thrusts of superpenetrating fluid–matter. The above-derived self-accelerations of asymmetric densities in Equations 8, 9 can reinforce Lomonosov’s microscopic pushes behind elastic macroscopic organizations with Kotel’nikov–Shannon informatics. The instantaneous self-pushing in the correlated entanglement of big data in Equation 9 can be accompanied by the parallel information traffic with retardation due to a certain amount of

wave quanta, similar to the inelastic corpuscles of Fatio and Le Sage. These dissipative exchanges with the temporal delay in the system energy balances (Equations 5, 6) can provide low-rate information–energy exchanges between selected elements. More generally, the local relations (3)–(8) for informatics potentials in mechanical matterspace can shed new light on the nonlocal entanglement of big data and field information contents within elastic (correlated) material densities, both inert and living ones, as well as on the inelastic process and wave information exchanges.

In 1756, Lomonosov applied the etheric model with net local pushes of invisible matter–fluid to describe the sequential transmission of a nerve impulse for touch, smell, and sight in the paper “Word on the Origin of Light.” In our informatics view of Einstein’s metric fields, the first Cartesian critics of Newtonian gravitation in Switzerland and Russia were right regarding local pushing for the geodesic acceleration of self-assembling densities. Therefore, the first fundamental force in the inverse square law is, in fact, the self-acceleration of correlated densities “from here to there” despite a visible pull from “a distant body.”

We recall again that the field nature of mechanical matter and electric charges was quantitatively developed by Mie (1912) in 1912 and later. In addition, Hilbert (1915), see also Hergert (2005) first urged physicists in 1915–1916 to combine Mie’s ideas of field matter with Einstein’s geometrization of space–time on the promising path to the unification of modern physics. In static material distributions, complex extended charges with a real mechanical part and an imaginary electrical part allow the necessary unification of a particle with a field and electromagnetic forces with metric forces. In this case, the square of the elementary electric charge $(ie)^2 = -e^2$ not only turns the sign of Newtonian attraction into the observed repulsion but also relieves classical electrodynamics of the annoying problem of the impossible self-acceleration of moving charges by their radiation emission (Bulyzhenkov, 2016). There is no doubt that recent information trends (Michaël Unser, 2000; Guariglia et al., 2016; Gogberashvili, 2022) in the study of complex wavelets and other non-stationary organizations of material waves will allow physicists to construct a covariant theory of unified material fields and revive the monistic conception of the nonlocal cosmos at the post-quantum mathematical level.

6 Experimental falsification of either monistic or dualistic worldviews

The universal law of inverse squares (Equation 9) corresponds to the information logarithmic potential for the equilibrium self-organization of equal active and passive mass densities (Equation 5) with the integral confinement (Equation 6) of relativistic kinetic (yang, positive) and self-acting (yin, negative) energies. By creating local perturbations of self-pushing asymmetrical densities in such a nonlocal organization, one can “here” control Newtonian forces declared “from there.” If experiments actually demonstrate telekinesis or gravitational weight control by local efforts, this would falsify the Newtonian empty-space universe by a direct measurement. There were no methods of gravitation control in dualistic theories. In other words, precise scaling experiments can falsify either the massive fields in the monistic world organization or the massless metric fields in the dualistic theories of gravity.

Once again, there is no empty space in Russian cosmism and the Cartesian universe of nonlocal matter extension. If this is true, then the formal force pull from “there to here” can be falsified by the controlled energy intervention into the asymmetric mass densities “here.” For example, the noncontact fighting technique of Kadochnikov and many Eastern masters can be quantitatively related to the local reshaping of fine asymmetries in the radial densities around the vertices of the mass–energy in Equation 9. In the same way, subtle resonant interference with the asymmetric density of interacting cancer cells can destroy continuous informatics-metric connections between them earlier than between healthy cells. Appropriate wave interventions with information-erasing properties could lead to the irreversible degradation of the tumor as a unified continuum of correlated big data.

In an elastic material space with metric-informatics correlations for the self-assembly of the static hierarchy, there is always instability near the eigenfrequencies. External excitations at resonant frequencies can reverse the sign of the forced accelerations, which is sometimes interpreted as a linear appearance of negative mass (Bormashenko, 2023). Such a formal sign reversal for the passive resonant masses, while maintaining the positivity of their active masses, always testifies to the presence of elastic self-organization with adaptive feedbacks. These dynamical interactions should be studied to falsify the emptiness of cosmic space in the Newtonian world view. In hydraulic engineering, the resonance of wave oscillations with a reversal of the sign of the lifting force leads to initial self-subjections of vertical-axis HPP rotors. The latter often decreases, but sometimes, they are taken up by the pressure of the upper bank of the hydroelectric station and catapulted out of the turbine shaft, with fountains of water and the destruction of the station’s working zone (Nurek HPP in 1983, Dartmouth HPP in 1990, Grand Rapids GS in 1992, Tianhuangping PSHP in 2001, Pamir-1 HPP in 2007, Sayano-Shushenskaya HPP in 2009, and Toktogul HPP in 2012).

In the nonlocal self-management of macro-mechanical and macro-electrical events in Shannon’s distribution of big data, the demonstrated observation of past/future events seems to be the brain’s hidden ability to track the world’s information traffic at a distance. Monistic field relations (Equations 3–9) can help understand bacteria, plants, and animals in their nonlocal entanglement and remote reading of big data in a correlated continuum of elastic densities with negligible inelastic perturbations. The elastic self-pushes (8) occur simultaneously throughout the entire material organization because Shannon information is instantaneously consistent with all asymmetric densities via the nonlocal system of constant mass integral at the running parameter x^0 .

The dissipation-free dynamics of the elements can take place under the constancy of the elementary kinetic energies in Equation 6, $m_k c^2 = \text{const}$. The corresponding conservation $m_k = \text{const}$ for all and each inertial element is not related to the exchange of wave signals. The nonlocal information system with instantly correlated fields, stresses, and inertial densities in their non-equilibrium organization explains the Laplace paradox of the stability of the solar system over the calculated limit of several centuries (Laplace, 2019). Again, the instantaneous geodesic self-regulation of kinetic energies occurs without radiation exchange. Wave energy exchanges slowly disrupt the metric geodesics of the planets in the time processes

of evolution, which are parallel to the elastic oscillations over the stable Keplerian orbits. It is well known that NASA measurements have shown that the forces in geodesically accelerated satellites are always directed toward the center of gravity, with no parallax effect for delayed waves.

Wave exchanges between the correlated volumes of continuous mass–energy can show delayed diverging signals and delayed converging echoes (advancing the future positions of moving stars) in a nonlocal organization of the pseudo-Riemannian 4D manifold with a flat 3D matterspace and 1D adaptive time. New experimental schemes can be reinvented to study Cartesian matter extension with instantaneous (nonlocal) entanglement of correlated densities. These experiments can open new Shannon channels for instantaneous communication of large amounts of data in addition to wave information traffic with the known delay of light and radio signals.

In 1976, telescopic measurements by Kozyrev (1977) revealed three directions for detectable responses on a distant star. One direction corresponds to regular (retarded, diverging) waves from the past position, the second direction comes from the calculated actual position (instantaneous impacts or nonlocal mega-entanglement for Shannon’s big data informatics), and the third direction appears from the telescope orientation to the future position of that star center due to the converging return of a spherical echo within the stellar radial densities in the system matterspace. The monistic physics of Russian cosmists justifies this world echo of mechanical waves (not advanced, but retarded, converging to the non-equilibrium rarefaction), which return to the center of the auto-pulsating star. This signal echo in Kozyrev’s measurements is the unique experimental evidence of the geometric self-assembly of matterspace with adaptive time for an extended stellar organization with the wave excitation of correlated radial densities.

Converging radial waves are longitudinal oscillations of material densities, and such “pseudo-advanced” waves falsify the Newtonian void in repeatable measurements. Kozyrev’s telescopic discovery of a new channel of instantaneous communication was later confirmed in a series of independent replications (Lavrent’ev et al., 1990). However, this conceptual breakthrough in the nonlocal organization of big data was not accepted by the gravitational community because it falsified Newton’s dualistic references in favor of the Cartesian worldview and instantaneous mega-entanglement. The same resistance to non-Newtonian “advanced” reactions (converging waves) met the short-term prognosis of solar activity at the Baikal deep-sea experiment (Korotaev et al., 2017). In any case, new informatics with instantaneous entanglement of big data at macro- and mega-scales should not be constrained by Newton’s model of emptiness but should be independently validated or falsified in different research centers.

The inward Lomonosov pushes of rotating etheric fluids make the metric 3-potential $c^2 g_i$ very important for the stationary and time-varying self-organization of vortex matterspace. Newton’s one-potential gravity seems to be incomplete in the continuous mechanics of Umov for vector flows and information vortices of inertial energy. The inertial matterspace with four metric potentials $c^2 g_{0\mu}/\sqrt{g_{00}}$ and corresponding Lorentz-type forces in Einstein’s

geodesics can reveal unexpected anomalies of Newton's one-potential model in "gravitational" landings on spinning asteroids and in disk galaxies with "dark matter." In the same way, the metric field informatics of nonlocal matterspace can propose to revisit the "gravitational" tidal waves in a Newtonian potential $c^2 g_o$ by counting the time-varying gyro-potential $c^2 g_{oi} / \sqrt{g_{oo}}$ of eddy flows of correlated densities in the Earth's rotating system.

7 Conclusion

Weak field potentials of Newtonian interactions correspond to the limiting case of the long logarithmic potential for Shannon entropy in Equation 3. Thus, Newtonian gravity, together with Einstein's metric generalizations, is also the theory of large information data on the background of field distributions of energies and their masses. Modern methods of information theory can deal with the problem of super-dense distributions in the vicinity of analytic singularities and, in particular, make it possible to predict the confinement of the total mechanical energy (Equation 6) of a self-gravitating system.

The properties of the system in information theory are not reduced to the algebraic sum of the properties of the elements, which allows information scientists to study strongly non-linear and adaptive formations with feedback reactions. For matter waves in non-empty spaces, information theory has great advantages over mechanical motion in the void and also for those soliton self-organizations of waves and auto-pulsating distributions of matter that modern astrophysics cannot approach on the basis of modern metric models with black holes and hypothetical dark matter.

There are many applied consequences of big data entanglement or elastic correlations through Lomonosov's gravitational fluid in astrophysics and biosciences. Updated by Shannon informatics for timeless correlations in moving inertial fields, it sheds new light on the nonlocal macrophysics of living organisms and the mega-entanglement of astronomical organizations (Hutsemékers et al., 2014; Lee et al., 2019). Instantaneous interactions and timeless information links embedded in nonlocal matterspace should quantitatively comment on the correlated self-assembly of inert and living matter in the holistic hierarchy of "elementary" sub-energies with their superpositions and specific stresses in the monistic pan-unity of geosphere, biosphere, and noosphere of Vernadsky and other cosmists.

The 2022 Nobel Prize in Physics "for experiments with entangled photons, establishing the violation of Bell's inequalities, and pioneering quantum information science" extended the quantum era of nonlocal research from the micro-world to the macroscopic laboratory and the mega-cosmos. The dual model

of matter is a very useful simplification for describing dissipative processes with forced motion of observable bodies under the action of external influences. The energetic processes of the self-organization of mechanical systems are accompanied by big data distributions of Shannon information under the static and dynamic conservations of the first integrals of motion. The monistic macro-mechanics of adaptive fields with Umov's inversion between kinetic order and band-limited etheric chaos in moving hierarchies promises groundbreaking information technologies and nonlocal applications in the holistic matterspace of living and inert bodies.

Data availability statement

The original contributions presented in the study are included in the article/supplementary material; further inquiries can be directed to the corresponding author.

Author contributions

IB: conceptualization, writing—original draft, and writing—review and editing.

Funding

The author(s) declare that no financial support was received for the research, authorship, and/or publication of this article.

Conflict of interest

The author declares that the research was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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