

On Absolutivity Theory

and

Black holes, Hawking radiation,
4D Harmonics wave theory, The Mass-Gravity property

5

Keywords:

10 Absolutivity, Black hole, Harmonics, Hawking radiation, Dimension, Unification, 4D Space Time, Vacuum State, True Simultaneity, Virtual Time, Orthogonal, Scalar Time, Time Vector.

Ir. A.V.Herrebrugh Tuesday, 28 October 2025 - 8 April 2026 ID: 0000-0002-4088-6657

*Independent Research
The Netherlands*

15 avherrebrugh@gmail.com

ABSTRACT

Absolutivity theory introduces a foundation of objective reality within a recently (March 2025) developed true 4D space-time model built on universal simultaneity within a continuum of expanding 3D space [08]. Essentially, the theory is a unification in the continuum of asymptotic modified Newtonian Gravity [07] and quantum theory, both embedded in a true 4D orthogonal space-time framework [08]. The Theory foundationally builds on S.M.Poisson's theories for potential fields, leading to Newton's 'inverse square law'; the core function $M(r)$ mandatory requires a build-up of gravitation field starting at $M(r)$ by $M(0) = 0$ and maximum value $M(r_c)$. The extended validity at the zero point of spatial axes *eliminates singularities* in gravity and predicts i.e. readily identifies suitability of a deterministic quantum theory within the continuum, featuring intrinsic scalability and integrated dynamics in Absolutivity theory. The independent dimensional foundation in the theory contradicts intrinsic space-time deformation/curvature and (mathematically) paves the way for a full deterministic description in quantum theory within the continuum of true 4D spacetime. In this paper as well physical applications are introduced in Absolutivity theory: Black holes, Hawking radiation, Harmonics wave theory and the Mass-gravity property.

- Hawking radiation has been predicted from quantum mechanics alone and never received support from a more classical perspective. Here, treatment in Absolutivity predicts the reality of a (black hole size dependent) vacuum state area hidden by the Schwarzschild radius r_s in black holes, and supports radiation and escaping mass particles. It does not identify evidence for a complete evaporation of a black hole. In principle the absence of the properties mass-gravity excludes a photon to experience an attractive force in Newton's model. This requires the 'lens' property in gravity for photons to be treated from a different perspective, using Lagrange's stationary action principles. Strong curvature of 'bent' light attributed to a 'dark' matter source [NASA, 09] in (clustered) galaxies is treated in §2.1 with support of the phenomenon, however with a surprising and deviating conclusion of photons crossing the Schwarzschild radius twice.

- In harmonics, $F(x, t)$ represents the transform of $f(x, t)$ typically a transformed function representing intensity in (line-)space: in the true 4D topology $f(x, t)$ emerges two dimensional, while the four dimensional $f(x,y,z,t)$ mathematically emerges in the unified complex framework of 4D space-time – this allows an alternative approach in harmonics, based on ingressing direct photonic energy concentrated theoretically in a dimensional region of space-time datapoints. In Absolutivity the time variable is transformed in an independent dimension e.g. in 2D dynamic sin/cos type wave components. This approach defines coincidence of rectangular time pulses in a set of time information surfaces, and may be extended as well to phase synchronized theoretical Dirac type pulses of uniform frequency content. The harmonics content of chosen time functions can be readily determined by transformation. In this example the directions are limited to 3 independent spatial coordinates; the result is compared with the uni-directional Mizohata -Takeuchi Conjecture, §3.

- 'Relativistic' i.e. high velocity particle scenarios often occur in quantum theory, at the smallest scales as well for quanta at astrophysical scales e.g. black holes as in treatment of Hawking radiation. It is argued that mass-gravity particle velocity affects the gravitation field measurement which can be readily incorporated in Absolutivity by introducing a velocity dependent relation in the component of potential gravity field of particles i.e. in their energy description.

1. Introduction

Absolutivity is a theory of objective reality with validity in the entire continuum of space-time, an anchor component in true 4D space-time, inclusive of quantum theory and foundationally departing from observer oriented Relativity.

55 As matter of principle it introduces objective reality (vs. subjective, observed, measured reality) in causality based relations and therefore does not support longstanding assertions in Quantum Mechanics (QM) in it's current form/state: basis of statistical results and Schrödinger cats, collapsing wave-functions preventing access to causality information, denial of natural causality, reversed causality, non-existence of dynamic description as well as the inability by incom-

60 pliency to integrate with gravity and without significant progress to develop the theory – though with valuable contributions of e.g. P.Dirac and many others, QM in it's current (2025) state rather seems a terminal patient than being the doctor.

Absolutivity theory instead builds on the foundational S.D. Poisson's potential field descriptions (mass/gravity-field, charge/electrical-field) with (quantum) gravity mass density distributions, corresponding mathematical Green's func-

65 tions and J.L. Lagrange's principles of stationary actions, directly embedding photon energy E_{ph} distinct in treatment separated from (quantum) mass-gravity particles with energy density property (§4) - i.e. particles that experience force F_G by acceleration a_G in Newton's model. The theory operates with universal elementary density flows in space-time in well-known mathematics and with four mathematically true orthogonal dimensions, no tensors or matrix mechanics are required in the basic description, avoiding fundamental loss of information by e.g. 'coarse/fine graining' in quantization, risk of tensor 'red cards' (see below) as well as in scalar time treatments untraceable scalar dependen-

70 cies in (higher) dimension variables.

Causality is rigidly embedded in this true 4D framework: inseparable from an independent time dimension the principle of cause and effect is anchored *at any* scale, modeled within the evolving 'present' of curved time information surfaces [08] and in reality of the Universe *irreversible* – therefore the QM derived artefact of *retro-causality* is rejected in Absolutivity. Yet, it enables scientific research 'going back in time' - in particular in causality information

75 in data in memory structures of information in time-surfaces as described in [06, 08]. By direct treatment in quantum energy (mass-gravity and photon particles), the theory in principle as well departs from the Schrödinger-Hamiltonian wave-function in QM: phase shifts in wave function modeling identify wave potential energy annihilation as in fluids and gases e.g. water- and sound-waves. Energy of quanta cannot be annihilated only transformed e.g. in LHC experiments. The wavefunction as foundational quantum model in QM therefore is obsolete. The model in wave theory remains supported for

80 information carried by quanta [05, 06] i.e. modulated, transported and recovered (de-modulated) in quantum theory i.e. fundamentally replacing the wave-model in QM of light & interference by modulation theory [05, 06] applicable to dynamic spatial flows and dimensional distributions of concentrations of quanta e.g. photons – consequently it predicts that information alone may be annihilated on quantum level e.g. in a black hole, in principle therefore without energy annihilation.

The re-exploration of gravity's potential field from the very basics 'ab initio' and subsequently adapting [07] Newtonian Gravity with a relative modest modification in the symmetrical core description of a massive object M , *eliminates* asymptotic singularities: in Poisson's potential description, applying the Nabla operator i.e. spatial changes of the potential field, yields Newton's famous 'inverse square law' i.e. by definition a *genuine* field description alone, derived from a dimensionless theoretical point mass of chosen density, applicable to a dimensional core and potential field starting from the core radius r_c . Mass is created in a causal process: after creation of mass the gravity field

85 emerges at c m/s in space i.e. mass as excitation of a field thus is considered a reversed causality e.g. as in gunslinger Lucky Luke's 'faster than his shadow' :-)).

In Newton's model mass M remains unspecified in space other than being a concentration of particles with mass-gravity property, however - dimensionally - $M(r)$ should (must) build the Poisson derived gravity *field* $F_M(r) = a_G(r)$ from scratch i.e. from zero mass $M(0)$, which definitely identifies an anomaly for the singularity be-cause *at* $M(0) = 0$ i.e. without mass by definition field $F_M(0) = 0$, $a_G = 0$ and $F_G = 0$.

95 In line with in Poisson's theory introduced density ρ (rho) we therefore defined – proposed in [07 (§4.2 eq. 4.5)] – mass density M_d and dimensional volume V_D with $M = M_d \cdot V_D$ i.e. for the spherical object (average-, uniform-) mass density $M_d = M / (4/3)\pi \cdot r^3$. This modest core modification allows $M(r)$ to emerge functionally linear, building the field of the core with uniform density from $M(0)$ to the Poisson field maximized value $M(r_c)$ at the core surface radius r_c (i.e. outside the cores what actually was measured in - Newton - gravity experiments).

Both (photon, mass-gravity) mandatory must fit the quantum realm in a continuum description of any type particles, this yields in regular mathematical treatment in concentrations and flows in 1-4 dimensional line/surface/volumes in the continuum of gravitation [07] identical, exact results as in General Relativity (e.g. [10] Schwarzschild, Droste)

without tensor treatment and stress energy tensor restrictions - Heisenberg's 'Red Card'.

105 Causality preserving mathematics (symmetry) may be in space-time or in inverse domain i.e. frequency-domain e.g. in causality (e.g. Systems-theory, LaPlace-, Fourier- transforms [04]) or distributions (modulation, information, density), as both remain valid in space i.e. are applicable to properties of matter and energy in space functions: concentration, density, curvature, etc. per location i.e. $1/r$. The frequency-domain is required in a quantum theory as in general individual quantum particles are in space-time 'invisibles' i.e. when observed or measured are transforming energy, 110 opposed to observables of relative much higher energy. Intensities of their frequencies of occurrence per location i.e. concentrations in an infinitesimal volume/surface/line element describing densities can be mathematically described exactly and observed *without* exact information of the location and momentum: the 'red card' for tensors and equations with tensors e.g. a stress energy tensor treating both properties of the individual quanta simultaneously in descriptions, violating the Heisenberg relation. The Heisenberg relation is a fundamental measurement uncertainty relation, actually valid for any measurement taking energy from the object under measurement. This energy cannot be neglected (but normally in classical physics *is*, without significant consequences) in quantum theory and must be accounted for in treatment c.q. avoided. The alternative mathematical treatment is given by description in the (frequency) inverse domain approach [05, 06].

115 The foundation of a true orthogonal coordinate system in 4D space-time [08] is consequential in generic reality descriptions: it should avoid all hyper-planes not containing the origin, while a functional description in space-time datapoints is focused on the dimensional covariant structure. Moreover any subspaces e.g. local coordinate dynamic subspaces typically suitable for local descriptions, inherently are to be topological isomorph i.e. have identical dimensional space-time structure, which in this particular 4D framework renders mathematical diffeomorphisms by definition *zero* i.e. non-existent: empty space i.e. in principle a reality based conceptual vacuum state description thus remains valid in this framework where 125 (strong) gravity does not intrinsically causes distortion of, but co-exists superpositioned in space-time; moreover of the 4 space-time dimensions, time is the *only* curved – with extremely *small* curvature in true time, i.e. locally treated 'flat' - virtual component i.e. mandatory represented by complex numbers in an otherwise real, flat 3D space of real numbers, while in this framework, space and time by orthogonality are immune to each other.

Continuing this research, Absolutivity emerged in unification in the true 4D space-time topology model of modified Newtonian quantum gravity at quantum scale i.e. in a continuum of complex vector space-time: definitively departing from a 4th 'dimensional' real-time axis, scalar time 'dependencies' and space-time 'distortions', as results/proposed in well known other theories e.g. String theory, Lorentz Transformations and General & Special Relativity in physics.

130 1.) This paper introduces treatment of e.g. black hole Hawking radiation in Absolutivity. Electro-magnetic radiation of a black hole seemed at the introduction a contradictio in terminis. Hawking proposed quantum mechanical principles at the boundary i.e. black hole horizon where electromagnetic radiation in principle cannot escape the gravity field of a massive large object and as well concluded evaporation of black holes. To date, this phenomenon never gained support from results in a classical description in physics. A solution arises in Absolutivity using Lagrange's principles of stationary action [01, 02] where curvature $k(r) = 1/r$ - associated with the sphere/circle geometry - remains separated from physical distances r in space-time: curvature k thus serves as frequency parameter in the spatial frequency domain i.e. inverse transformed domain, giving rise to an explanation of Hawking radiation from a classical viewpoint; I named it Newtonian in his honor: a resolution is presented built from Poisson's potential field theory and asymptotic modified Newtonian gravity leading to surprising conclusions in §2.

135 2.) Harmonics are described in functions of $f(x, t)$ where e.g. a line transformation typically the Xray transform is operated on lines in Euclidian space i.e. $X[f(x, t)] = F(x, t)$. The Xray transform in practice is specifically useful in 2-dimensional scans of tissue density in space line locations in computer tomography (CT, MRI) composed into coupe-like scans, revealing deviations from expected density in human tissue (inverse domain, mass concentrations). Function $f(x, t)$ is 1-dimensional in space, evolving 2-dimensional in the space-time model [08]. Here, the model of space-time provides a 4D framework for $f(x, y, z, t)$ and operates within 3D Cartesian space by structured virtual, curved imaginary time information surfaces [08]. This background in 4D is highly useful in mathematical reality descriptions of energy evolutions in general sense and in particular in harmonics of electromagnetic nature. The Absolutivity approach explores contributions in the three independent 2-dimensional structured harmonics of $f(x, y, z, t)$ along the space axes, and synchronized in the 4th t-dimension, compares results with the uni-directional (1D) Mizohata-Takeuchi conjecture. It thus uses the alternative approach in the 4D framework for exact temporal coincidence of the space-time functions, §3.

140 3.) Asymptotic treatment in gravitation [07] exposes descriptions of mass cores in the continuum at the quantum scale i.e. stretching validity in Newtonian gravitation to any scale. For the maximum density of matter to arrive at reality descriptions of black hole size and a surprising 'hidden' vacuum state area, in the relation with Schwarzschild radius vs. massive core radii §4, in this paper *as well mass density* is required. Poisson's theory fundamentally introduces density ρ , here property M_d and dimensional volume V_D instead of M therefore, in generic sense reliefs this constraint and as well the asymptotic, singularity of M as single fixed property of object mass to 155

scalability in the continuum, including the origin 0.

160 The basics of (quantum) concentrations i.e. frequency-domain distributions in space volumes and flows through surfaces together with potential energies theory in a vector space – as treated in [07, 08], thus effectively enables fundamental mathematics of physics as well in an entire continuum of quantum reality in a quantum theory. It also identifies that a quantum theory with in Nature basic properties i.e. embedded causality, without probability and collapsing wave-functions etc. readily can describe quantum behaviour as part of Absolutivity in the continuum at this smallest scale.

165

2. Black Holes, Hawking Radiation

170 This treatment is built from adapted Newtonian gravity taken into the vector space, using Lagrange’s principles of stationary action [01] applied to particles in a gravitation field of a mass source [01, 02, 07]. Absolutivity predicts both radiation and particles escaping the black hole; it argues perhaps surprisingly as well that em-radiation is *not* affected by gravitational attraction in a (Newton) force model and predicts the existence of a vacuum state hidden *behind* a black hole horizon, governed by curvature intensity in the gravitational energy field determined by geometry, size and mass density of the black hole. Despite the energy in the gravitation field, photons carry energy of different nature: em-field, i.e. unlike mass-particles photons cannot exchange energy with the gravity field: directional (curvature) changes of photons don’t require a force to overcome any inertia i.e. are immune to gravitation. Including crossing Schwarzschild radius traveling photons at high curvature, find out below, :-)).

180 2.1. Photons, Curvature, Vacuum-State Area

Experimental astrophysical evidence showed that as well pure potential em-energy seems influenced in gravitational attraction e.g. in the ‘lens’ property of light: photons have a curved trajectory - ‘bent light’ - in vicinity of a (strong) source of gravity. Einstein concluded by interpreting equivalent photon mass $m_{ph}(E) = E/c^2$ and gravity as an attractive force in a gravity field: space-time distortion because of mass, visualized in the word-wide presented artist-impression or ‘rubber sheet & marbles’ of curved space geodesics in the vicinity of massive objects - considered a longstanding foundational model. The 4D virtual topology of space-time [08] however foundationally opposes this viewpoint i.e. it’s mathematical foundation does not identify curvature or deformation of space, with full independency of space curved time surfaces as a true time dimension. This fundamentally challenges Einstein’s interpretation of space-time curvature c.q. distortion by gravitation. Absolutivity provides an approach of Hawking’s radiation from the potential field related, objective standpoint in the continuum, starting from the equations derived in [07]:

190 At distance r in a field of gravity the trajectory curvature at the event horizon of a symmetrical black hole is governed *only* by object’s speed v (m/s) as object mass m cancels out in the equation (§2.2 eq.2.2.1) [07 eq.4.8]. This is consistent with the experimental observation that massless ‘pure’ em-energy objects i.e. photons have curved trajectories in gravitation fields. In the equation [07 eq.4.8] obviously for photons, c (m/s) determines a Schwarzschild radius for the light agency as shown in [07] by substituting c for v at the Schwarzschild radius r_s with curvature $k(r) = 1/r_s$.

195 For a mass particle, equation [07 eq.4.8a] is valid where kinetic energy E_{mk} as well plays a role in observed curvature where m cancelled out i.e. at the same distance to the black hole mass, particles with high speed have lower curvature than identical particles with low speed obviously arising from velocity, see §2.2.

200 However, pure energy particles i.e. photons do not have a mass-gravity property interacting with a external gravity field, thus unlike mass particles photons are not prone to gravitational attraction and cannot exchange their em-based energy with gravity potential field energy: therefore the causal explanation of their behavior cannot be identical to mass particles. In the Newtonian force model, the absence of a mass-energy property thus rules out an attractive force for photons: this identifies that behavior of photons should be explained by the intensity of curvature $k(r)$ alone, and the presence of field curvature defines the causality relation in stationary action i.e. balanced in the equilibrium (where as well object-mass is cancelled [07]).

205

Photon energy $E_p = h \cdot \nu$, with $\lambda \cdot \nu = c$, $\Rightarrow E_p = h \cdot c / \lambda$ and this electro-magnetic potential energy cannot change without a causal em-source. The geometry related r of curvature $k(r) = 1/r$ is separated from the spatial distance r to locate quanta and with potential V_G in the gravitational field:

210 $V_G = \Phi(r) = M \cdot G / r = k(\lambda) \cdot M \cdot G$, i.e. curvature in stationary action follows from $E_p = V_G$

$$k(r) = k(\lambda) = h \cdot c / (M \cdot G \cdot \lambda) = (h \cdot c / M \cdot G) \cdot 1/\lambda, \quad 1/r_s < k(r) < 1/r_c \quad (2.1.1)$$

215 This result is quite remarkable: eq. (2.1.1) establishes that for photons in a gravity potential energy field the product of orbit curvature and wavelength is a constant in vacuum. Therefore orbiting photons of arbitrary wavelength λ_n have their own corresponding Schwarzschild *radius* r_λ and corresponding curvature $k(\lambda)$, where a much higher curvature may be balanced with their energy. In quantum perspective this seems a contradiction indicating that here the exact position of a photon is known by its wavelength, which is correct for the radius (distance), however the Heisenberg relation is not violated rescued by the 3D sphere surface.

220 In principle eq.(2.1.1) is a hyperbolic functional between curvature $k(r)$ and photon wavelength λ with asymptotic branches. This identifies that light is bent i.e. photon trajectories are governed by the iso-potentials in the gravitational field of a mass core, without requirement of external energy therefore without an attracting force, the *field geometry* is the reality cause of the curved trajectories: in a thought experiment of a flat source of gravity, photons thus experience zero curvature while mass particles curve depending on speed (eq. 2.2.1) i.e. curvature remains. As well a resulting mass orbit in strong gravitation must

225 be consistent with the conservative nature of the gravity field of the core: $\oint \mathbf{F}_G \cdot d\mathbf{l}_{orbit} = 0$, and no energy is required i.e. with conclusion: ‘bent light’ is a Lagrange *stationary action* of em-energy in strong potential gravity energy fields; in strong electro-magnetic -fields (of the same nature), thus additional em-forces allow for much stronger curvatures as well as (tempo-ral) energy exchange e.g. in atomic grid structures e.g. transport of photons in e.g. optical fibres and other matter.

230 By principle of stationary action, thus an incoming photon in a field of gravitation is ‘natural’ without any force following a trajectory of energy potential differences balanced with stronger curvature up to a maximum $k_p(r)$ entering the gravity field without any *energy* requirement! With $k_p(r) < k(\lambda)$ reduces curvature in its escape, $k_p(r) = k(\lambda)$ remaining in orbit, and $k_p(r) > k(\lambda)$ increases curvature and collides with the core; it cannot ex-change its own energy $E_p = h.c/\lambda$ with gravity potential energy - unless being destroyed transforming its energy colliding with the core - and stationary action in orbit means not requiring external (field-) energy, therefore following field iso-potential geodesics which - by *geometry* of the black hole and field

235 alone - is causally determining its curved field, i.e. the field geometry equi-potential biased energy lines of the source in space *shape* the curved trajectories of the photons in stationary action in the entire field, i.e. as well outside the Schwarzschild boundary. Note that the role of an observer by definition in Absolutivity is taken out: unlike optical effect of red- and blue- shifts (and ‘Doppler acoustics’ in case of gas waves) as phenomenon in an observer oriented framework, in the objective reality of quanta i.e. (the wavelengths of) the photons are not affected.

240 In principle by the existence of many Schwarzschild radii r_λ from r_c up to r_s i.e. outside the core but inside the Schwarzschild radius, in practice depending on the wavelengths of incoming photon energy and angle crossing the r_s sphere, this points to a vacuum area behind r_s thus a hidden vacuum state with spherical surfaces r_{s,λ_n} i.e. a *Schwarzschild orbiting area* capturing photons in orbits, i.e. preventing photons to radiate – actually the reason for being a ‘black’ hole - between r_c and r_s , that may contain *any* photon ‘colour’, potentially filling the entire region behind the horizon. The Schwarzschild radius therefore is to

245 be considered an upper limit of the radius where photons may be trapped. The maximum wavelength that may be trapped in orbit is defined by the momentane size of the black hole: $\lambda_{max} = 2\pi.r_s$, orbiting at radius r_s , while the minimum obviously is r_c , consistent with expected radiation when e.g. holes shrink loosing energy: when r_s retracts, presence of (very) large wavelength radiation escapes the hole.

Photons with long wavelengths λ have less corresponding curvature than shorter wavelengths: an incoming photon at a lower

250 field potential therefore balances energy wavelength λ_n by increasing curvature with increasing field potential until it matches eq. 2.1.1, then may orbit in equilibrium of stationary action at the corresponding wavelength radius r_λ , and incoming at steeper angle crossing ‘their’ radius of equilibrium r_λ , photons collide with the core, refract or transform energy. Depending on incoming angle (§ 2.1.1). long wavelengths thus may orbit near the Schwarzschild radius r_s , short wavelengths by higher energy density may orbit closer to the core and trapped photons colliding with the core may transform and

255 disappear by e.g. converting momentum causing increased momentum of the core, or may be refracted in direction of the horizon and curve back in stationary action and refracting .. and so on . In case the photon is outside the horizon, it will stay outside if trajectory curvature is smaller than $1/r_s$ i.e. creating the ‘lens’ property $k(r) < 1/r_s$. Eq. 2.1.1 reveals as well that a shortest wavelength exists at $1/r_c$ curvature, above this corresponding curvature high energy photons curve directly to the core depending on their incoming angle crossing r_s , see 2.1.1 .

260 Incoming photons do not experience an attractive force and therefore at c m/s may orbit at the higher curvature in gravitation equi-potential geodesics; photons that hit the core and transfer their momentum to the core, disappear.

2.1.1 Gravitational Lens, Curvatures, Escaping Photons, Dark Matter?

265 As the foregoing identifies i.e. predicts orbits at increased curvature up to r_c , the lensing property of strong gravitation near a black hole therefore involves the massive core radius r_c rather than the Schwarzschild radius r_s , leading to much stronger curvature than may be observed for photons outside the Schwarzschild radius. As the trajectory of the photons in gravitation (already) is in stationary action before entering the horizon at r_s , no forces are present, therefore the entire geodesic in the

gravity field must be shaped by a hyperbolic curve balancing energy potential in the trajectory with curvature up to $k_\lambda(r)$, i.e. a hyperbolic curve having one common tangent point with a circle with radius r_λ , the orbit radius wavelength of eq. (2.1.1) i.e. curvature of photons with sufficient energy ($h.v = h.c/\lambda$) within the horizon may be up to a maximum curvature $1/r_c$, without being ‘trapped’ colliding with the core but in a curved trajectory *within* r_s and *hidden* until escaping the hole again at a different location at the same tangent angle.

Therefore despite a Schwarzschild boundary and consistent with em-radiation that cannot be affected by gravitational attractive force, as well photons can cross the Schwarzschild ‘boundary’ r_s of the hole and may pass it, literally emerging from the ‘black’ hole crossing r_s once more, becoming visible (measurable) again, (*drawing pg.12*). In this process photons may experience a much higher than $1/r_s$ curvature up to their corresponding wavelength curvature $k_\lambda(r)$.

This stronger curvature in gravity field therefore is not to be attributed to ‘dark’ matter [09], and strong curvature may as well be observed in fields of em-nature in which - by definition of photons as carrier of information - can exchange energy, but therefore definitely is not ‘dark’.

Curvature however is for a vast majority of incoming photons not fulfilling criteria in (§2.1), the reason that black holes only radiate long wavelengths and thus remain quite ‘black’. Moreover the photons in high curvature trajectories are not considered ‘trapped’ within a black hole but are bypassing, crossing r_s , however do not cross or exceed ‘their’ r_λ c.q. $k(\lambda)$.

In general, observed curvature of photons near a black hole in principle thus may be *much* stronger than the curvature at the horizon. This identifies that photons with orbiting wavelengths $> 1/r_c$ incoming at their hyperbolic curve above ‘their’ orbiting r_λ will cross the horizon again escaping the hole, experiencing higher curvature than $1/r_s$. This is a *look-alike* of black hole radiation, but these photons were never confined i.e. ‘trapped’ in orbit inside r_s but bypassed its core radius r_c .

Between r_s and massive core, photons thus may escape or orbit within the horizon in much stronger curvature than $1/r_s$, i.e. below the horizon thus in reality an identical form of a vacuum state exists i.e. a vacuum area of (very) strong gravitation just like outside the horizon but remains hidden i.e. actually the ‘horizon’ is the edge of invisible hidden vacuum between solid core radius r_c and the Schwarzschild radius r_s with a (very) strong, geometrically curved gravitation field, suitable for orbiting (all kinds of, §2.2) quanta.

2.2 Mass Particles & Properties

The in §2.1 identified vacuum area is where as well mass particles may orbit at higher curvature in stationary action depending on their velocity only (as mass cancelled from equation 4.8 in [07] eq.(2.2.1)), and mass particles with too low speed are and stay trapped at the core with radius r_c , converting their momentum and increasing core mass M_c . Curvature from eq.4.8 in [07]

$$k(r) = 2M.G/r^2.v^2 \quad (2.2.1)$$

The expressions of curvature in §2.1 eq. 2.1.1. and here eq. 2.2.1 give a strong indication of validity in the entire continuum of space as the mass property cancelled in the equations, meaning that *any* mass, including *zero mass* (§2.1., photons) i.e. at astrophysical or quantum scale, are applicable in Newtonian gravity potential field when a strict separation is maintained between mass core and field description. The force and acceleration are Newton’s model for mass mathematically derived from S.M. Poisson’s potential field; curvature for massless photons (i.e. without inertia) arrives directly from this field, which supports the idea that photons don’t experience a Newton force in gravitation and experience curvature by potential field energy directly without requirement of energy to adapt directional changes.

This as well identifies the strong causality relation in Nature: mass and potential field are not created in simultaneity and the field spreads by c (m/s) in space i.e. the field develops after a mass property is being created. This very thought therefore challenges the idea of particles being excitations of a gravity field (QM), i.e. is considered *reversed causality* by velocity of gravity fields: this is not supported in Absolutivity.

The curvature in a stationary action of a mass particle e.g. with velocity $v = (2)^{1/2}.c = 0.71\dots c$ (m/s) is orbiting at $k(r)$:

$$k(r) = 2M.G/r^2.0.5c^2 = 4M.G/r^2.c^2 > k(r_s) = 2M.G/r_s^2.c^2 \quad (2.2.2)$$

i.e. two times higher curvature at a shorter radius than at the horizon.

To identify the reality of this state - as we have assumed $r_s \geq r_c$ for a vacuum area -, we provide a reality check and consider a black hole with core r_c , mass M and curvature at r_s $k_s(r) = 2MG/c^2.r_s^2 \Rightarrow$ with orbit curvature at r_c i.e. $k_c(r)$

$$k_c(r) = 2M.G/v_c^2.r_c^2, \quad \text{then follows the ratio } r_s/r_c \quad (2.2.3)$$

$$k_c(r)/k_s(r) = r_s / r_c = c^2 / v_c^2 \quad (2.2.4)$$

325 A mass particle with $v_c = (2)^{1/2} \cdot c = 0.71 \cdot c$ (m/s) yields

$$r_s / r_c = c^2 / 0.5c^2 = 2, \quad (2.2.5)$$

The Schwarzschild radius r_s therefore stretches to $2 \cdot r_c$, confirming reality of a vacuum area.

330 The foregoing description of orbits as well much resembles orbits at quantum scale of electrons in much stronger energy density of electrical potential fields in atoms that equally are in stationary action, in isolated state requiring no external energy in their existence in reality. In contrast - while based upon the same principles - due to the weak gravitational force the scale is astronomical and requires corresponding sources of mass.

335 The predicted vacuum state within the black hole horizon represents a (very) large 'micro' cosmos, in which massive and photon particles at smaller radius than r_s may orbit in arbitrary direction, and because of the myriad of particle velocities and wavelengths orbiting at different radii, represents a fully hidden but otherwise highly colourful cosmos: in principle a kind of 3-dimensional black hole geometry-curved rainbow sky of different energies when the entire spectrum is captured.

340 In the entire vacuum area, photons thus may collide with massive particles and this creates a 50% chance of deflection towards the core vs. the horizon at r_s - the latter case essentially means that photons and mass particles may escape a black hole, for photons determined by location in the vacuum state and whether trajectory curvature may reach a value smaller than $1/r_\lambda$. The same reasoning is valid for high speed mass particles at distance r where curvature depends on velocity only (2.1.1) and mechanical energy between mass quanta and collisions with high energy em-photons may cause quantum mass particles to escape.

345 2.3 The Newtonian Tightrope

Returning to the compensational mechanism of a stationary action, for *any* object behind the horizon the vacuum area is a representation of a myriad of spherical surfaces of orbits (in the same basic symmetrical model as in Hawking's model [12]) including quantum orbits. In case a photon, orbiting at its own r_λ , collides with a mass particle and refracts in the direction of larger radius (without further collisions) it will *inevitably* escape the hole. Due to stationary action of mass particles it is as well the area where compensation between curvature and centripetal force [07] acts as cause of the typical curved orbital geodesic trajectories of mass quanta in an equally fragile equilibrium for particles.

350 Thinking of it in a pure mechanical sense for photons as well as mass particles, this much resembles a tightrope walk act without some balancing rod for stabilization. In these compensational equilibriums in and below the horizon the forces, accelerations and curvatures remain physically present while at the same time cause a delicate balance anywhere in the vacuum area of the horizon. A small external force disrupting this equilibrium (unlikely gravitational unless in mass mergers), may be of different nature i.e. mechanical by collisions or electro-magnetic. Electro-magnetic i.e. a tiny particle e.g. an electrically charged quantum with velocity only requires a minimum amount additional electromagnetic energy - from in general sources of electromagnetic potential energy immune for an attractive gravity force as argued in §2.1 - outside the horizon e.g. electro-magnetic bursts influencing curvature e.g. of magnetic field to *escape* the black hole.

360 Collisions may occur in the vacuum area between mass particles as well as between photons and mass particles: here different velocities (curvatures) play a role, but a chance equally exists that a quantum mass particle escapes the horizon, be this chance much higher when closer to the horizon. This is consistent in par. 2.3 with predictions of mainly low energy, long wavelength radiation.

365 The vacuum state below the horizon as well reveals that in contrast with QM predictions, only particles that are in equilibrium have a chance of escaping, leading to two conclusions: There is no prediction of the core interacting in the vacuum other than the strong gravity field i.e. without catastrophic impact from outside the core does not 'evaporate' in steady state and challenges Hawking's conclusion of a total evaporation of a black hole. And secondly, radiation continues by incoming energy that stays in the vacuum layer alone, orbiting in stationary action.

370 The gravitational potential at the horizon is GM/r_s with derivative $-GM/r_s^2$: this represents the force compensated in the stationary action (orbit) for mass in Newton's model. The curvature derivative $d/dr k(r)$ shows sensitivity in curvature

$$d/dr k(r) = (2GM/v^2)d/dr(1/r^2) = -2GM/3v^2r^3 \quad (2.2.3)$$

375 i.e. a factor $1/3 \cdot r$ less curvature at r_s and a particle forced by internal (mechanical) or external (electromagnetic) action may move to an area of smaller curvature than $1/r_s$ i.e. may move from the horizon to the outside escaping the hole. This gives rise to the conclusion that:

380 Hawking was absolutely right reasoning from his quantum mechanical viewpoint [1974, Black Hole Explosions?]; in further research papers however did not provide a classical Newtonian explanation that clearly had to be in line with quantum theory yielding an identical outcome of *escaping radiation*. Absolutivity in the Newtonian treatment as well predicts – surprisingly - additional information on a vacuum state within a black hole horizon.

This result as well provides evidence for the observation that a quantum theory *alone* can not describe reality of quanta entirely [03], which gives support to Absolutivity theory as reality based classical description in physics, summarizing:

Absolutivity theory

- 385 1.) is based on objective reality and obviously departs from subjective reality
2.) describes ‘invisibles’ i.e. quanta by means of the inverse domain i.e. in exact predictive spatial quantum energy distributions that are built from independent, individual, and invisible quanta
3.) predicts radiation by perturbation of particles in equilibrium in a ‘Schwarzschild’ area; a reality that (literally) is not observable c.q. measurable i.e. behind the Schwarzschild radius inside a black hole horizon and cannot be described observing a
390 wavefunction in quantum theory alone
4.) predicts that black hole cores do not evaporate by radiation.

3. On 4D Harmonics Wave Theory

395 3.1 Dimensions

In 1D harmonics in space, two other independent dimensions of space are excluded from contributions of radiation. This led to a treatment proposal in absolutivity of the 4D space-time model, i.e. a physical model of photon quanta that directly involves energy at quantum level when coinciding in a particular space-time location of the origin 0. This treatment in principle as well shows that for a proper mathematical description, energy is to be treated in (orthogonal) dimension(s) i.e. as a concentration of energy in volume 3D, surface 2D or line 1D, just like a mass-gravity property in [07] and §2.2.

400 Starting from the inverse equation of the expanding universe in [08], identical equation is used for the ingress of pure energy by v in opposite direction i.e. we consider the incoming energy is c (m/s) photonic in 3 axes in the same but opposite direction of the expanding universe:

$$405 \quad \mathbf{v} = v_x \mathbf{i} + v_y \mathbf{j} + v_z \mathbf{k} \quad (3.1.1)$$

and

$$|\mathbf{c}| = (v_x^2 + v_y^2 + v_z^2)^{1/2} \quad (3.1.2)$$

I.e. all contributions not on the coordinate axes i.e. outside the direction of the origin 0 of the local coordinate system have a lower projected speed and distance to 0 (covariance) i.e. comply by covariance with the phasing in (the) time(surface): the coincidence in 0 at t_c . Photonic energy $E_p = h.c/\lambda$, from which may be concluded that at c m/s, different wavelengths cannot coincide at exactly one (point) location in time, because they stretch each by $t = \lambda_n / c$. This calls for a mathematical description of energy density per (stretched) location and is a reason to limit wavelengths to high energy components that in terms of energy may contribute to a creation of mass in defining the time frame of coincidence i.e. in a reality model the result of the convolution.

415 Because the ingress of energy along spatial coordinate axes towards the space time data point 0 is considered independent, the total contribution of incoming energy at t_c thus is limited by c (m/s), and from the 3 independent axes follows

$$|\mathbf{c}| = (c_x^2 + c_y^2 + c_z^2)^{1/2} = |(3c^2)|^{1/2} \quad (3.1.3)$$

420 The contributions in independent dimensions appear at the same time-coordinate i.e. typically the time information surface of the ‘present’ in a thought experiment i.e. the phase shift ϕ between the time functions is defined zero by the particular information surface i.e. all individual amplitude (intensity) components contribute to the steepness of the time pulse and their wavelengths to the duration in time. The incidence of the pulses towards the (local) origin is now space located in 3 axes, and the timing is phased such that the three pulses occur at the same time surface (in any, but now unique space-time location) and the fourth orthogonal dimension t remains independent of space, whereas a priori the time vector on this surface could have taken any direction but remains a constant $|t|$ in its magnitude.

425 This specifically shows the difference between absolutivity and relativity in a way that relieves the predictive capability of temporal observational information to the reality of temporal *non-observable information* i.e. including quantum information, by domain transformation of the 4D space-time framework into the curvature c.q. frequency (inverse) domains.

430 We set up a (thought) experiment composed of three identical two-dimensional pulses in space, created at the same time in true time [1] coinciding in the origin. A practical adaptation can be to revert to convolutions replacing the ideal considered Dirac pulses containing equally phased and intensity properties of Fourier components. The amplitudes of the orthogonal pulses by the convolution of 3 temporal amplitude values is integrated over the pulse length $t_1 - t_c$. The energy evolution in the space-time location as well provides a visualized model of the convolution i.e. product, phase shift and summation at quantum level.

435

3.2 Energy Density, Convolution

440 In practice, the theoretical true time simultaneity based approach in temporal data points may be replaced by convolution of components in a timeframe of spatial coincidence, which is consistent with the phasing and wavelengths of the individual components that in principle stretch beyond one datapoint, assuming energy takes up an amount of space and may be treated one- (e.g. line) two- (e.g. surface, line-time) three- (e.g. volume, surface-time) and - with this space-time model - truly four- dimensional. It may be necessary in practice in the timeframe to refrain from long wavelength components with contributions near 0, by filtering i.e. restricting photon energy $h \cdot \nu$ to only significant high energy/short wavelength components. Whereas the proposed experiment identifies the temporal energy density ideally in one space time data point (Dirac), in reality this results in dimensional convolution of time pulses of length $t_1 - t_c$. The convolution stretches the true time data point and shows by summation the product of the interaction over the time $t_1 - t_c$. This energy density then can be compared with the energy of the experimentally found Higgs particle in creation of matter.

445

450 The MT conjecture shows an upper limit in the 'one dimensional' treatment e.g. $\sum_{\lambda} n_{\lambda} \cdot h \cdot \nu_{\lambda}$ eV of photon energy expressed in harmonics energy of frequency/wavelength components e.g. distributions of type $a \sin(\omega t)$ and $b \cos(\omega t)$. The use of time pulses seems in practice easy to use by the temporal limitation of the pulse length in the time convolution, restricting the energy density to the very short expected wavelengths.

450

455 In mass (-creation) descriptions, use of energy density is mandatory: mass in principle is to be treated as a manifestation of energy i.e. as phase-transformation of pure energy with extended properties of mass and gravitation field, i.e. mathematically in spatial dimensions as a volume with density properties of mass and field. The periodic tables' model shows the basic types of elements and 'mass' of objects thus is treated as summation of different densities of elements and chemical compositions of matter in the total volume of an object. This allows proper description of mass- density mathematically in volumes (i.e. object- 'mass' i.e. aggregated mass densities) and e.g. fields through surfaces (e.g. energy density flows), see e.g. introduction of mass density as fundamental approach in gravity contexts e.g. [07].

455

From (3.1.3) we find

460

$$(c_x^2 + c_y^2 + c_z^2)^{1/2} = |(3c^2)|^{1/2} = 3^{1/2} \cdot c \quad (3.1.4)$$

And with the momentum $(n \cdot h \cdot \nu_n) / c$ in the coincident pulses from independent dimensions in the Origin

$$((n \cdot h \cdot \nu_n) / c) \cdot 3^{1/2} \cdot c = 3^{1/2} \cdot n \cdot h \cdot \nu_n \text{ (eV)} \quad (3.1.5)$$

465

This extension to 3 independent directions theoretically yields a factor $\sqrt{3} = \sim 1.732..$ higher (pure energy based photonic) *energy* than an expected value in the 1-dimensional components (1D + t) MT conjecture.

470 A description in harmonics components (i.e. photons) carrying energy falls short of reality sense in case it does not exactly defines dimensional density of the energy in treatment. As may be verified in the 4D approach, dimensional sizes stretch the temporal interaction in particular at quantum level, making the actual (per datapoint) energy density extremely sensitive for interaction time. Limiting the interaction to high energy components may be a resolution, however does not yet have a background in radiation at the first stages of the big bang (BB). This would require a reverse (without wavelength shifts) calculation of the total energy in background radiation in the Universe.

470

The result here therefore is indicative and only for extension of the conjecture to 2 more independent directions, related to pure photonic incoming energy.

475

4. On The Mass-Gravity Property

480 The relation between the potential field of the mass property and the velocity of mass is explored from the basic energy E_m of a mass quantum particle with kinetic and potential field energy.

In treatment of mass of small entities/particles, the potential-field is often neglected because of its weakness, however

remains at 50% a substantial part of its energy. A mass-gravity particle therefore may exchange energy with an external field modeled in Newtonian force accelerating the particle. As the field is velocity dependent, particle's own (internal) radiated field density may decrease externally until fully confined within the entity of the particle:

485

Considering $E_m = mc^2$ and $E_m = U_k + V_p$ one finds for the potential energy of a mass particle in an otherwise empty space

$$V_p = m \cdot c^2 - \frac{1}{2} m \cdot v^2,$$

writing v with factor a of c , i.e. $v = a \cdot c$, or $a = v/c$ $0 \leq a \leq 1$, and

490

$$V_p = m \cdot c^2 - \frac{1}{2} m \cdot (a \cdot c)^2 = m \cdot c^2 (1 - \frac{1}{2} a^2). \quad (4.1)$$

The energy V_p is the potential energy of its gravity field V_g typical for mass-gravity particles and entities built from mass concentrations with densities d_m (kg/m^3).

495

The gravitational potential field $V_g = m \cdot G/r$, therefore without other external sources of gravity field

$$V_p = V_g, \text{ and } m \cdot G/r = m \cdot c^2 (1 - \frac{1}{2} a^2), \text{ e.g. for an elementary proton accelerated to } v = c \text{ and at } v = 0$$

$$1.) a = 1 \rightarrow v = c \text{ and } V_g = V_p = \frac{1}{2} m_p \cdot c^2 \text{ and kinetic energy } U_k = m_p \cdot c^2 - \frac{1}{2} m_p \cdot c^2 = \frac{1}{2} m_p \cdot c^2$$

500

$$2.) a = 0 \rightarrow v = 0 \text{ and } V_g + U_k = E = m_p \cdot c^2$$

In the LHC, protons are accelerated to $0.999...c$ (m/s) and consequently their energy 1.) $E = \frac{1}{2} m_p c^2 + V_g$, whereas at rest, their energy is 2.) $E = m_p \cdot c^2$. In contrast with 2.) the gravitation field $V_g = \frac{1}{2} m_p c^2$ of the proton in 1. cannot develop into a field in space at c (m/s) i.e. is not radiated, as physical velocity of the field cannot exceed c (m/s). At c (m/s) the potential field energy therefore is carried within the proton structure, and V_g is *not measurable* outside the structure. This much resembles a photon structure without mass property where the potential energy cannot escape the photon because of the same reason: the potential field remains bound by velocity c , and usually is represented in 1 dimension (thus photon energy depends on its concentration of energy in its dimensional size i.e. inverse proportional to it's wavelength).

505

In generic sense, the field of near c (m/s) moving particles i.e. for high velocity mass quanta - in the first stages of the BB - means that their gravity fields will hardly be detectable unless colliding with larger and slower mass entities - the chance of which currently is extremely small.

510

Because of their dependence on velocity, potential 'fields' of mass thus are unsuitable to collect precise information on 'dark' matter and energy, unfortunately they remain 'dark' i.e. confined for detection of energy fields.

Protons in the LHC may be accelerated to $0.999...c$ (m/s) - these particles in theory therefore could be orbiting at the horizon (however without true time differences). From this as well may be concluded that for mass particles with velocity c (m/s) e.g. the LHC protons orbiting, the core must stretch to r_s when mass M is considered a single fixed property, whereas (average) mass density yields $M = M_d \cdot \frac{4}{3}\pi r_c^3$, the higher density M_d then allows descriptions where r_s may be larger than r_c , i.e. $r_s > r_c$ where the Schwarzschild radius remains outside the massive core structure, up to the maximum density for matter e.g. neutron star density, 10^{14} (kg/m^3). Black hole mass M as fixed property therefore represents an upper limit of maximum mass where a vacuum state may exist up to M_{max} where $r_s = r_c$, a property of super massive black holes possibly in galaxy centres: they may not have a vacuum area anymore:

515

$$r_s = r_c \rightarrow r_s / r_c = 1, \text{ with } r_s = c^2 / 2 \cdot G \cdot M \text{ and } r_c = 2 \cdot M \cdot G / v^2 \text{ follows}$$

$$r_s / r_c = c^2 / v^2 \quad (4.1)$$

525

i.e. when the massive core $M(r)$ grows to r_s , the black hole 'lost' it's vacuum area and as well remains 'black'. From this size on 'evaporation' may be explored.

530 5. Conclusions

The mathematical basics of mass-gravity and photon particles by concentration in dimensional volumes and flows through surfaces, combined with S.D. Poisson's theory on potential fields in description of mass-gravity in vector space as treated in [07], [08], enabled

535 development of Absolutivity theory: a fundamental causality based theory in physics for dynamic events at the scales from astrophysics to quantum physics in a vector space-time continuum, unified in a framework of genuine 4D orthogonal space-time topology.

The Theory of Absolutivity:

540 - Renders descriptions anchored in the principle of universal simultaneity in the continuum of true 4D real (-number) space with a complex (-number) geometrically curved and orthogonal time dimension

- Integrates causality embedded in reality of the irreversible time dimension, while cause and effect functions may be explored 'backwards in time' from data/information in memory structures captured in the time surfaces

545 - Is based on universal objective reality and obviously departs from Relativity's subjective reality of observers that may still be modeled within Absolutivity

- Describes 'invisibles' i.e. quanta by means of the inverse domain i.e. a reality description of predictive spatial dimensional quantum energy distributions composed from individual, invisible quanta that cannot be modeled by wavefunctions

550 - Predicts a reality that literally is not observable i.e. behind the Schwarzschild radius inside a black hole horizon, i.e. area that cannot be described observing a wavefunction in quantum theory alone

- Implicitly predicts in this area a myriad of orbit radii in arbitrary direction for photons and mass particles in Lagrange stationary action

555 - Supports the QM-predicted Hawking radiation in this classical description: em-radiation and mass particles may escape from black holes from the predicted vacuum state area between massive core and horizon i.e. the 'hidden' area of orbiting particles

- Does not identify causal support for complete 'evaporation' i.e. including the core of Black Holes predicted by S.W. Hawking

560 - Predicts continuous radiation, fluctuating by incoming particles alone, not reaching i.e. colliding with the core.

565 **W**hile mass particles experience Newtonian force balanced with centripetal force, photons balance energy potential with curvature, both by Lagrange's principles of stationary action, not allowing energy exchange [01, 02]. Because of this principle, orbits in vacuum are in 'steady state' i.e. continuous without energy requirement: in a 'perpetuum mobile' that however cannot deliver energy as trajectories are in iso- (equi-)potential energy c.q. force equilibrium. The clustered massive core attracts mass with the maximum force and maximized curvature at its surface [07].

570 - Identifies that attractive force between masses versus curvature of pure energy in gravitation fields is to be treated distinctly as the stationary actions in principle in causality are different in effects: zero inertial 'natural' curvature and inertial 'forced' curvature.

- Answers [03] 'Can quantum mechanical description of physical reality be considered complete?' : definitely not alone, however proper quantum theory without anomalies may readily acquire validity and be introduced in Absolutivity

- Contradicts intrinsic i.e. foundational space-time distortion/curvature as concluded by A. Einstein

575 **P**hotons may bypass the hole below corresponding radius $k(\lambda)$, above r_λ , and below r_s in *crossing* r_s and longer wavelengths r_λ to temporally enter and escape the hole depending on incoming angle and their energy ($h.c / \lambda$). This is not considered Hawking radiation but a temporal trajectory inside the Schwarzschild radius at *much higher curvatures* than expected from r_s . It does not support an assumed cause of 'hidden' dark matter/energy in black holes.

580 - Predicts that photons and mass-particles may orbit in a hidden vacuum area at much stronger curvature than $1/r_s$, $1/r_s < k(r) < 1/r_c$.

- Predicts a factor $3^{1/2}$ higher concentration of possible harmonics energy at a space-time location compared to the Mizohata -Takeuchi conjecture. Note: it is emphasized that in a mathematical treatment a dimensional volume/surface/line should be introduced for a proper coincident energy density.

585 - Identifies that gravitation by potential field measurements/detection cannot account for estimates of the amount of total created mass in the Universe.

590

References

- [01] Lagrange, J. L. (1811-1815).
Mécanique analytique
- 595 [02] Feynman, R.
The Feynman Lectures on physics,
Vol. III. Quantum Mechanics. Calltech.
- [03] Einstein A., Podolsky B., Rosen N.
Can Quantum Mechanical description of physical reality be considered complete?
Physical Review Vol.47, 1935.
- 600 [04] Lighthill, M.J.
Fourier Analysis and generalised functions,
Cambridge University Press, 1970.
- [05] Herrebrugh, A. V.
Determinism in Quantum Slit Experiments,
605 HyperScience International Journal (HSIJ), September 2022,
DOI: [10.55672/hij2022pp115-121](https://doi.org/10.55672/hij2022pp115-121)
- [06] Herrebrugh, A. V.
The invisible Reality of Quantum Mechanics – the deterministic perspective;
HyperScience International Journal (HSIJ) 2023,
610 DOI: [10.55672/hij2023pp5-16](https://doi.org/10.55672/hij2023pp5-16)
- [07] Herrebrugh, A.V.
Gravity: Where Quantum Physics and Classical Physics finally merge,
Hyperscience International Journals 2024-03
DOI: [10.55672/hij2024pp1-9](https://doi.org/10.55672/hij2024pp1-9)
- 615 [08] Herrebrugh, A.V.
On Time and Dynamics: A 4D Space Time Topology within 3D Space: The Virtual Edge of Vector Time,
Hyperscience International Journals 2025-03,
DOI: [10.55672/hij2025pp11-18](https://doi.org/10.55672/hij2025pp11-18)
- [09] NASA
620 *Shining light on dark matter*
<https://science.nasa.gov/mission/hubble/science/science-highlights/shining-a-light-on-dark-matter/>
- [10] K. Schwarzschild
Über das Gravitationsfeld eines Massenpunktes nach der Einsteinschen Theorie -
Sitzungsberichte der Königlich Preussischen Akademie der Wissenschaften. 7: 189-196
- 625 [11] I. Newton
De Principia: Philosophiae Naturalis Principia Mathematica
- [12] S.W. Hawking
Black Hole Explosions?
Nature, Vol.248 No.5443 March 1 1974
- 630