

Flowing Space

A New/Old Program for Physics and Cosmology

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Which Physics Do You Want?

A: One that theorizes about the Cosmic entities and processes that cause our existence, experiences, and measurements?

Natural philosophy, Cosmism, physical theory

Which Physics Do You Want?

A: One that theorizes about the Cosmic entities and processes that cause our existence, experiences, and measurements?

(Natural philosophy, Cosmism, physical theory)

OR

B: One that only describes our experiences and measurements, and produces mathematical models (“laws”) to predict future measurements?

(Positivism, Relativity, Quantum Mechanics, “Science”)

**PRINCIPIA
IN MODERN ENGLISH**

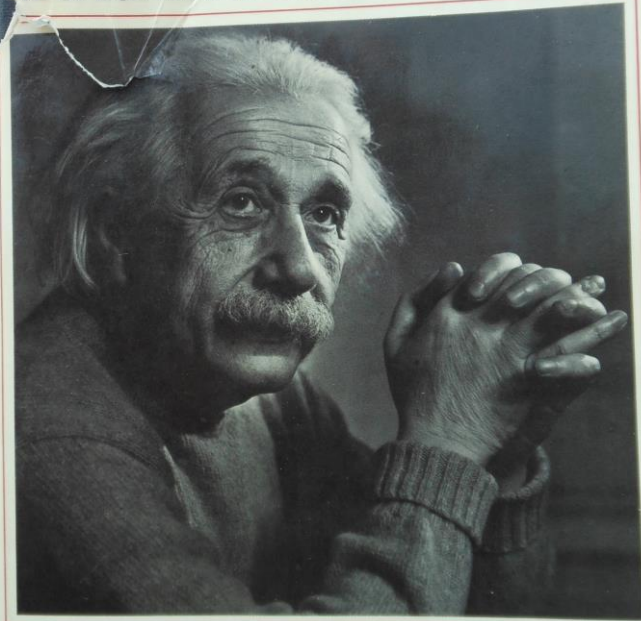
Isaac Newton's
MATHEMATICAL PRINCIPLES
OF NATURAL PHILOSOPHY
& HIS SYSTEM OF THE WORLD

Motte's Translation Revised by Cajori

UNIVERSITY OF CALIFORNIA PRESS

RELATIVITY

THE SPECIAL AND THE GENERAL THEORY

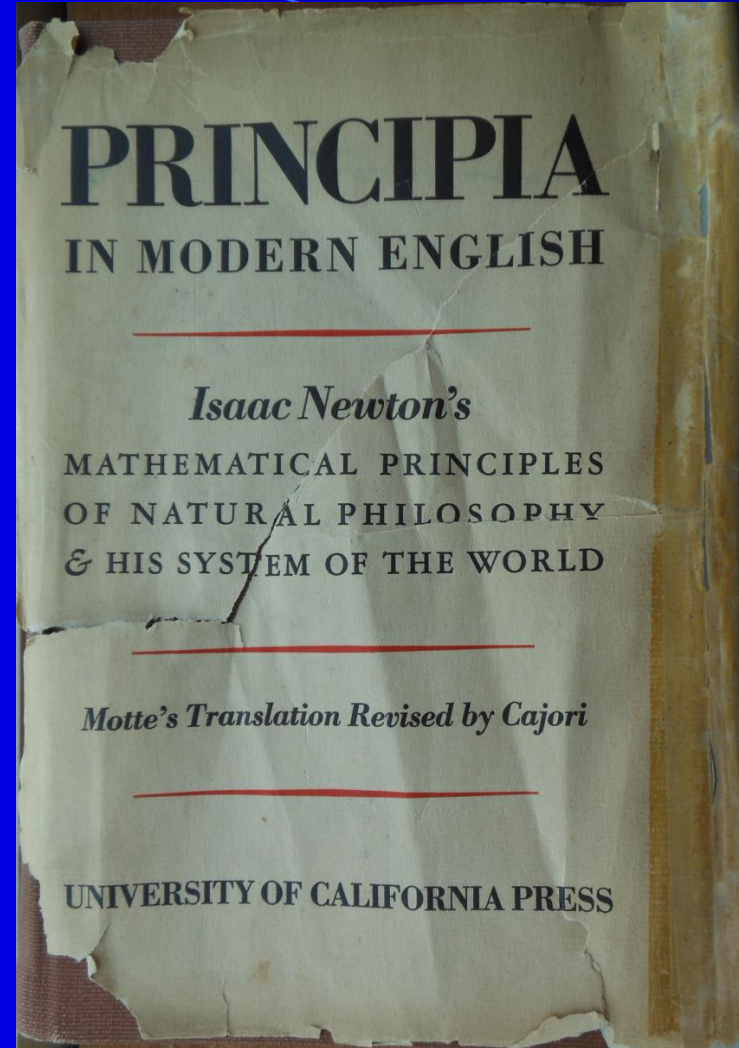


A CLEAR EXPLANATION
THAT ANYONE CAN UNDERSTAND

ALBERT EINSTEIN

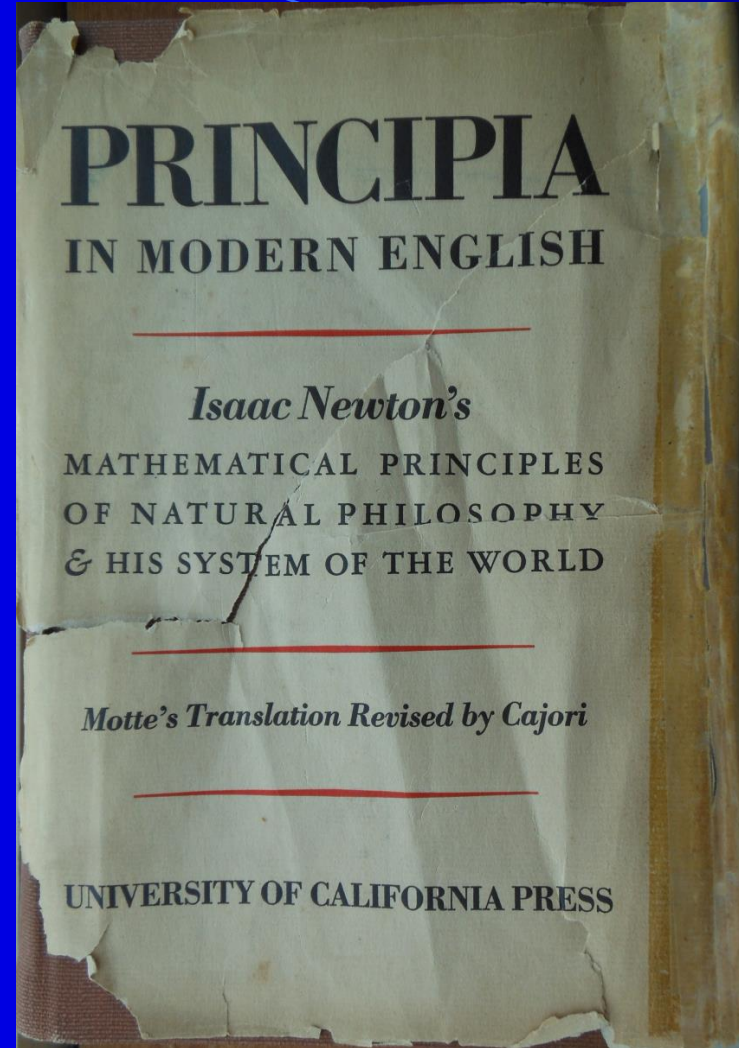
*“In philosophical disquisitions
we ought to abstract from our
senses and consider things
themselves, distinct from what
are only sensible measures of
them”*

Definitions, Scholium, para. 8



“In philosophical disquisitions we ought to abstract from our senses and consider things themselves, distinct from what are only sensible measures of them”

Definitions, Scholium, para. 8



Cosmic Model

Related motion to an observer-independent Cosmic-physical space

Did not theorize about the cause of inertia or gravity

“Hypotheses non fingo”
"I frame no hypotheses"

Newton's Space: Cosmic Inertial Medium

A single, pan-Cosmic, Euclidean geometric solid—an inertial ether

Resists matter's acceleration but allows uniform motion without resistance at any velocity.

All matter has a definite velocity in Newton's space, but unknowable.¹

Newton considered Flowing Space,² but instead added gravity as a magical "force".

¹Newton, I. *Mathematical Principles of Natural Philosophy*, Definitions, Scholium, para. 9, London (1686), Univ. of California Press (1946)

²Burt, E.A. *The Metaphysical Foundations of Modern Physical Science*. Doubleday, Garden City, New York (1924)

Newton's Space and Acceleration

In uniform motion (free fall) in Newton's inertial space you feel no force

What if your region of inertial space were to accelerate in some direction?

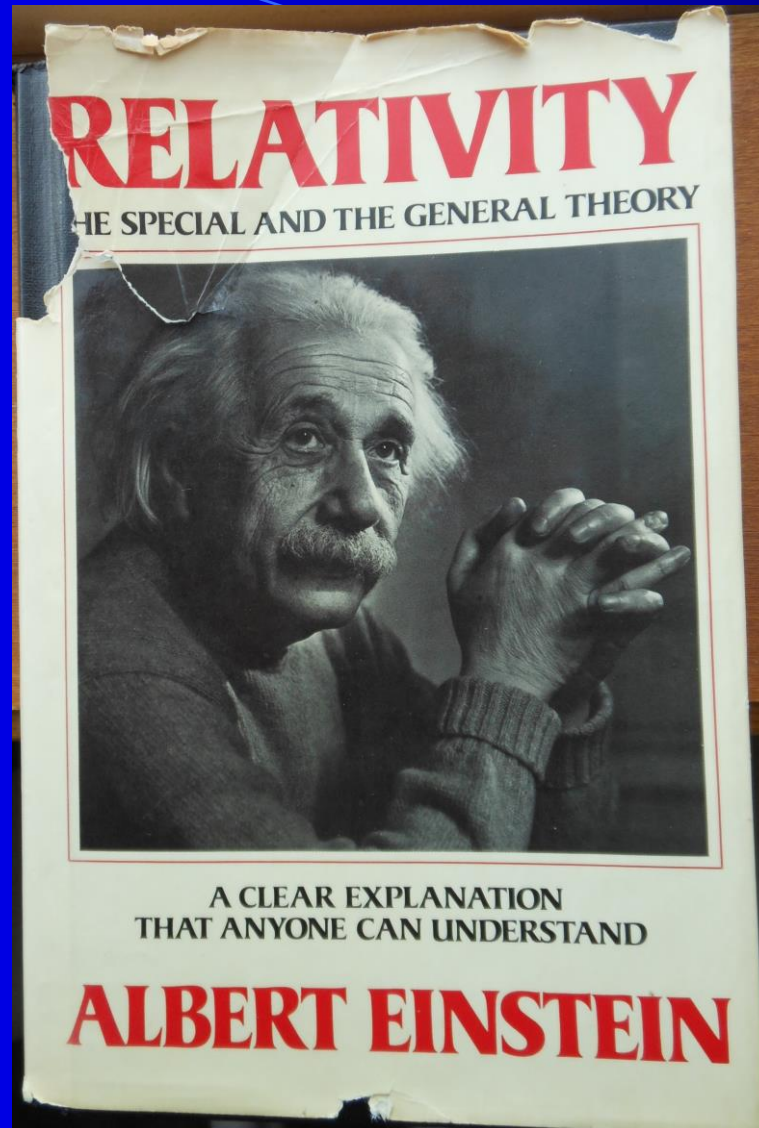
Would you accelerate with it?

Would you feel a force? Would your accelerometer measure acceleration?

“The only justification for our concepts and system of concepts is that they serve to represent the complex of experiences; beyond this they have no legitimacy.”¹

“(there is) no such thing as an independently existing [Cosmic, physical, spatial] trajectory, but only a trajectory relative to a particular body of reference”. [observers’ or arbitrary frames]

p. 10

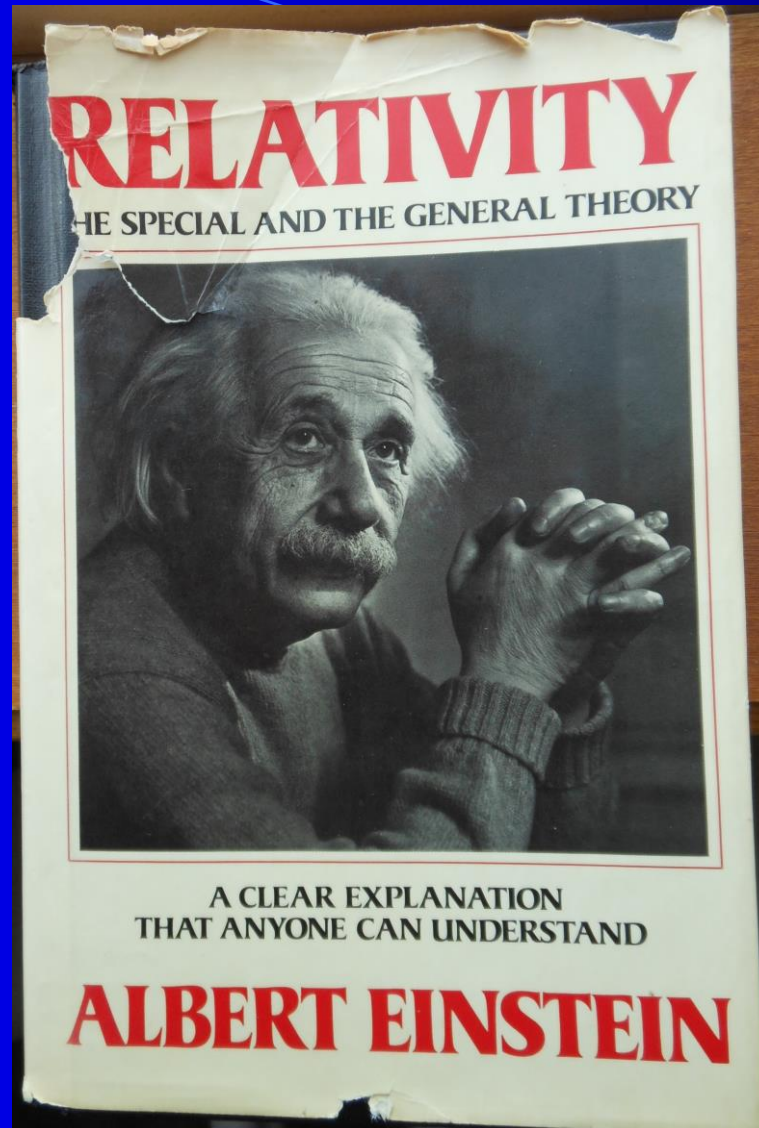


¹Einstein A. *The Meaning of Relativity*, Princeton University Press, Princeton NJ, p.2 (1922)

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[observers’ or arbitrary frames]

p. 10



Attempted to replace inertial-electromagnetic space with observers’ or arbitrary frames

Method: Limit physics to observer-based mathematical modeling:

Space = # of observer’s measuring rods

Time = Observer’s Clock readings

Light = # of observed photomultiplier clicks

¹Einstein A. *The Meaning of Relativity*, Princeton University Press, Princeton NJ, p.2 (1922)

The Source of the Confusion in Physics

Einstein believed that in the field of **epistemology**, a scientist did not have to be consistent.

He/she could be an “unscrupulous opportunist”, resorting to realism, idealism, positivism, or Platonism as the situation seemed to require.¹

Result: Contradiction and Confusion

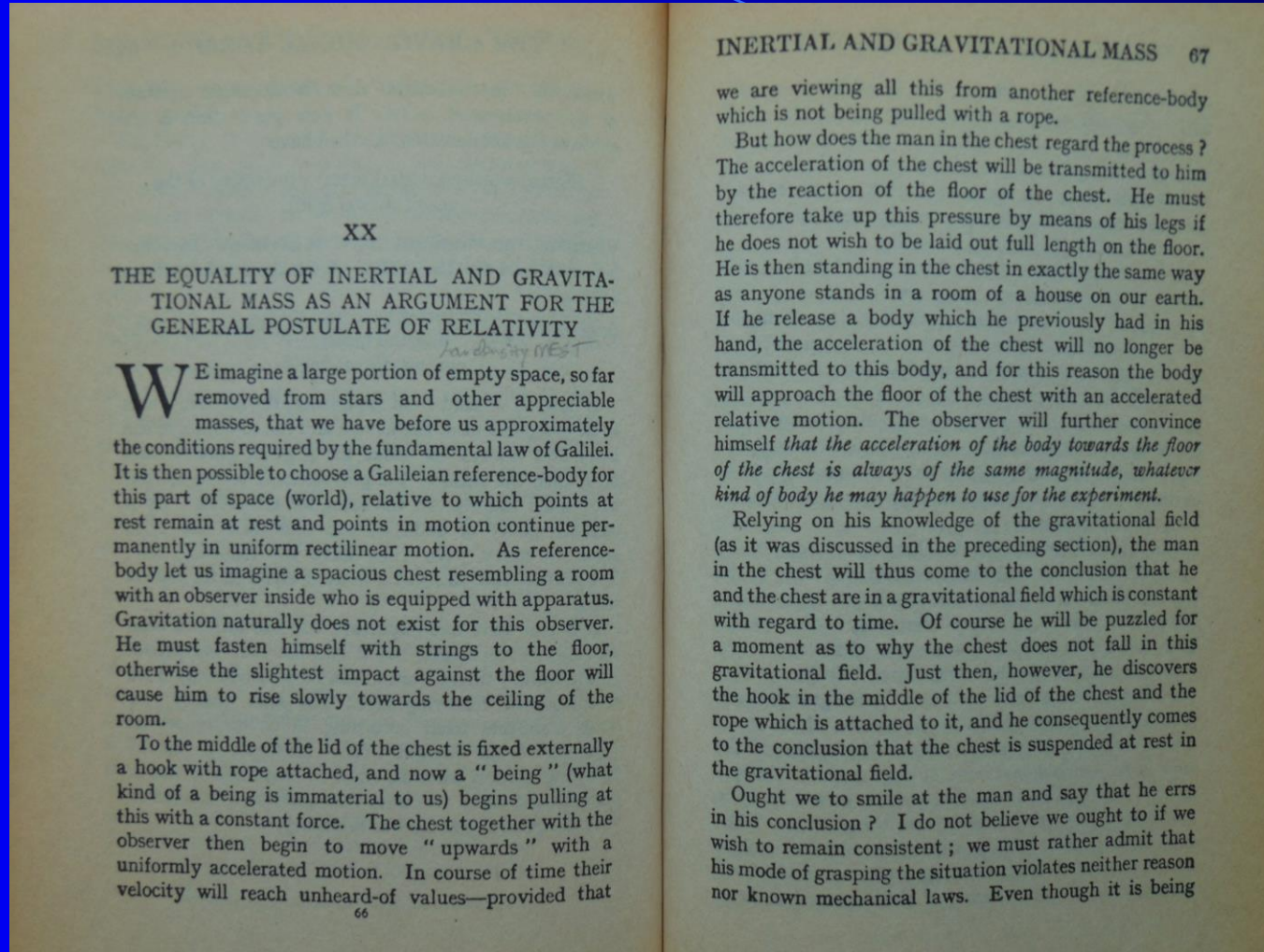
¹Schlipp, P.A. (ed.), *Albert Einstein: Philosopher-Scientist*, Tudor, New York, p. 684 (1949)

²Lindner, H.H. On the Philosophical Inadequacy of Modern Physics and the Need for a Theory of Space. *Cosm. Hist.* 11(1), 136-180 (2015) [Link](#)

Einstein Found the Key

“Man in Chest”
gedanken:

Considered What
observers experience
in free fall, forced
acceleration, and on
Earth's surface



Equivalence of Inertial and Gravitational Acceleration

Acceleration felt when pulled by a rocket is identical to acceleration felt on Earth's surface¹

→ Einstein's Principle of Equivalence:

“...physical equivalence of a gravitational field and a corresponding acceleration of the reference system.”²

Same Physical Effect ⇒ Same Physical Cause: Acceleration wrt inertial space!

¹Einstein, A. *Relativity, The Special and General Theory*. Crown, New York, ch. XX (1961)

²Einstein, A. On the Relativity Principle and the Conclusions Drawn From It. *Jahrb. Radio. Elektron.* 4:411–462 (1907)

Inertial Space Flows

POE \Rightarrow Inertial space is accelerating centripetally towards Earth's center of mass

\Rightarrow **Newton's space is a fluid that flows into matter**

Free fall is the natural state of non-acceleration *wrt* accelerating inertial space.

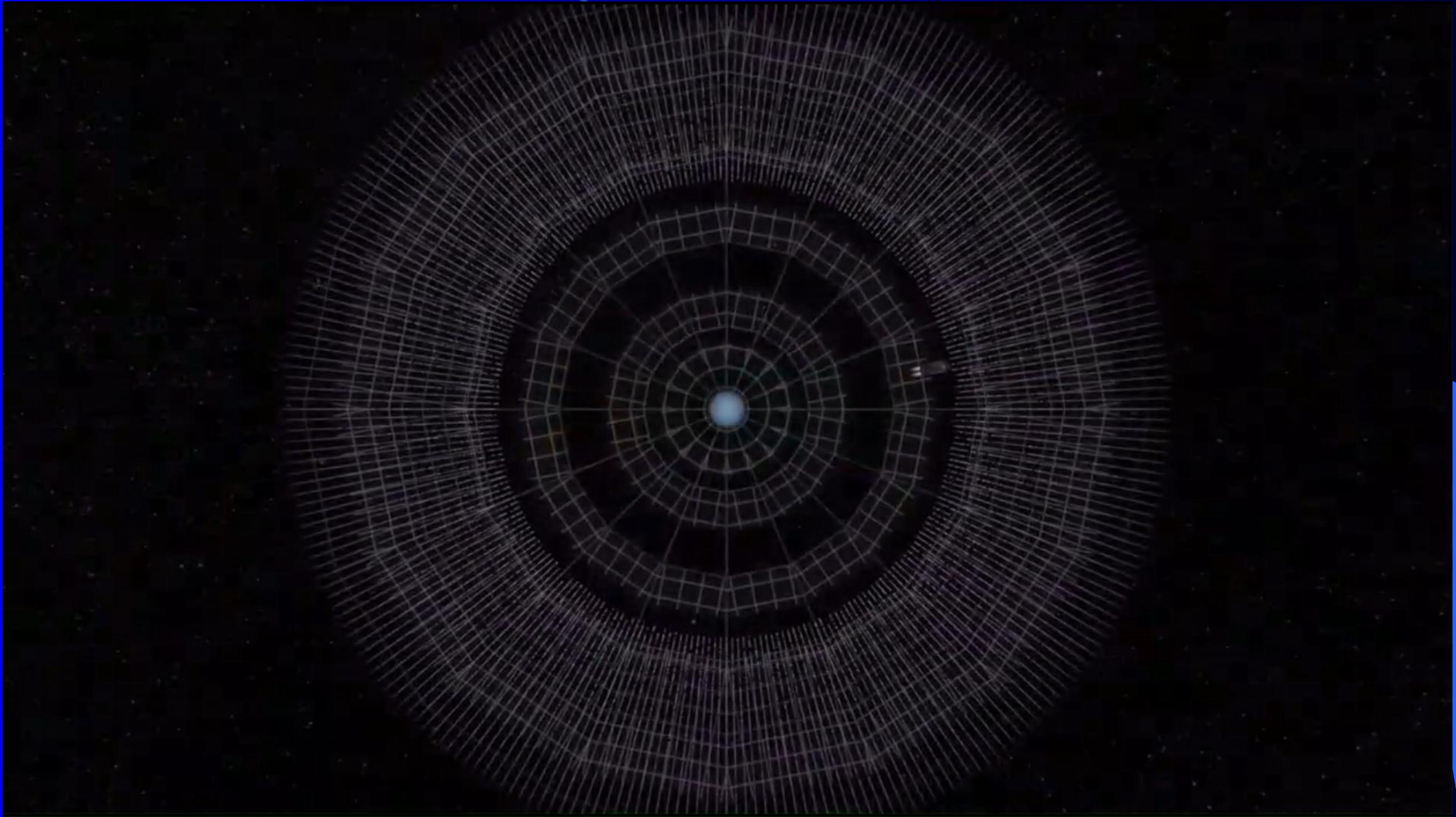
$$a_{space} = 4\pi GM / 4\pi r^2 = GM / r^2$$

Perfectly explains the accelerational-ballistic aspects of gravity

$$4\pi GM = \text{Spatial Sink Strength}$$

Dialect: Flowing Space

[The River Model of General Relativity \(youtube.com\)](https://www.youtube.com/watch?v=...)



What is the Flow's Velocity?

A test mass, m_0 , released at infinite distance from mass, M , will remain at rest in the infalling space:

$$\frac{1}{2}m_0v^2 - GMm_0/r = 0$$

$$\rightarrow v_r = \sqrt{2GM/r}$$

$v_r =$ Newton's escape velocity = 11.2 km/s at Earth's surface.

This velocity field perfectly models the electromagnetic ("relativistic") aspects of gravity

Space is also the Electromagnetic Medium

Huygens, Faraday, Maxwell and Lorentz → Space is the EM medium (luminiferous ether).

NOT disproved by null Michelson-Morley Experiment – Two EM spatial explanations

1. George Stokes:² No ether wind: Earth entrains surrounding space into its orbital free-fall motion
2. Lorentz ether theory (LET):³ $\pm 30\text{km/s}$ ether wind exists but is concealed by
 - a. Increased light travel time across ether flow (“time dilation”) compensated by
 - b. Physical length contraction of device in direction of motion through ether

LET is experimentally equivalent to Special Relativity, and produces no paradoxes^{4,5}

¹Lindner H.H. A QED-compatible Wave Theory of Light, Electrons, and their Interactions”, *Proc. SPIE*, vol. 8121, 2011, p. 81210X-1. [10.1117/12.893053](https://doi.org/10.1117/12.893053)

²Stokes, G. On the Aberration of Light. *Philos. Mag.* 27, 9-15 (1845)

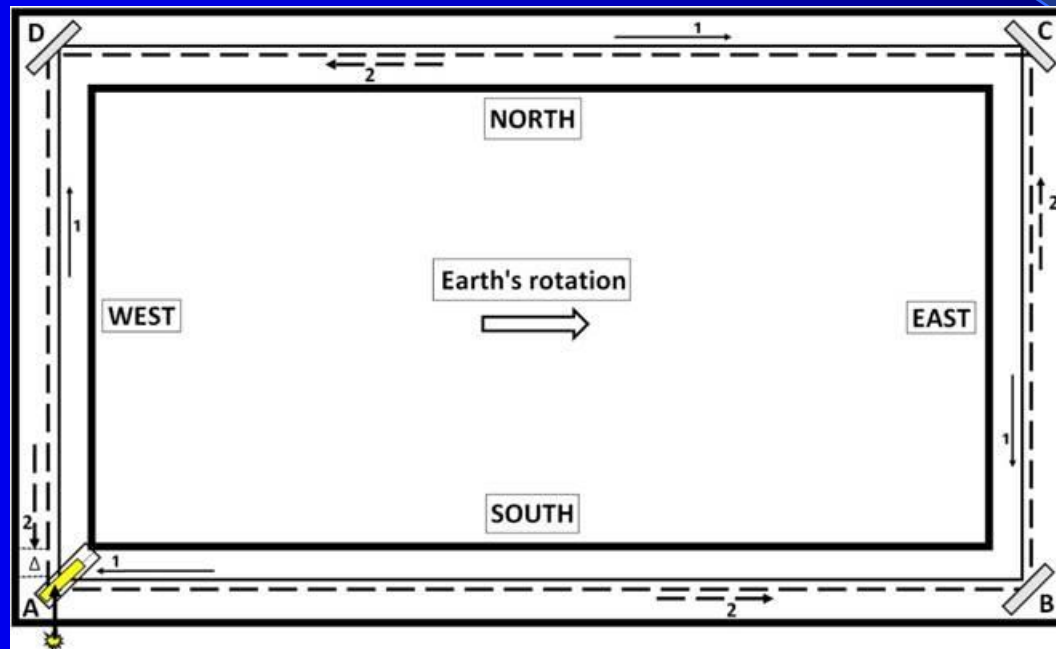
³Lorentz, H.A. *Attempt of a Theory of Electrical and Optical Phenomena in Moving Bodies*, E. J. Brill, Leiden (1895)

⁴Builder, G. Ether and Relativity. *Aust. J. Phys.* 11, 279-297 (1958) [10.1071/PH580279](https://doi.org/10.1071/PH580279)

⁵Mansouri, R., Sexl, R.U. A Test Theory of Special Relativity: I. Simultaneity and Clock Synchronization. *Gen. Rel. Gravit.* 8, 497-513 (1977) [10.1007/BF00762634](https://doi.org/10.1007/BF00762634)

EM Medium Revealed by Rotation

Michelson-Gale Experiment: Rectangular interferometer 2000'x1000' in Illinois.
Fringe shift seen \Rightarrow Light propagates in a medium that is not rotating with Earth.³



Also Sagnac effect, laser gyroscopes

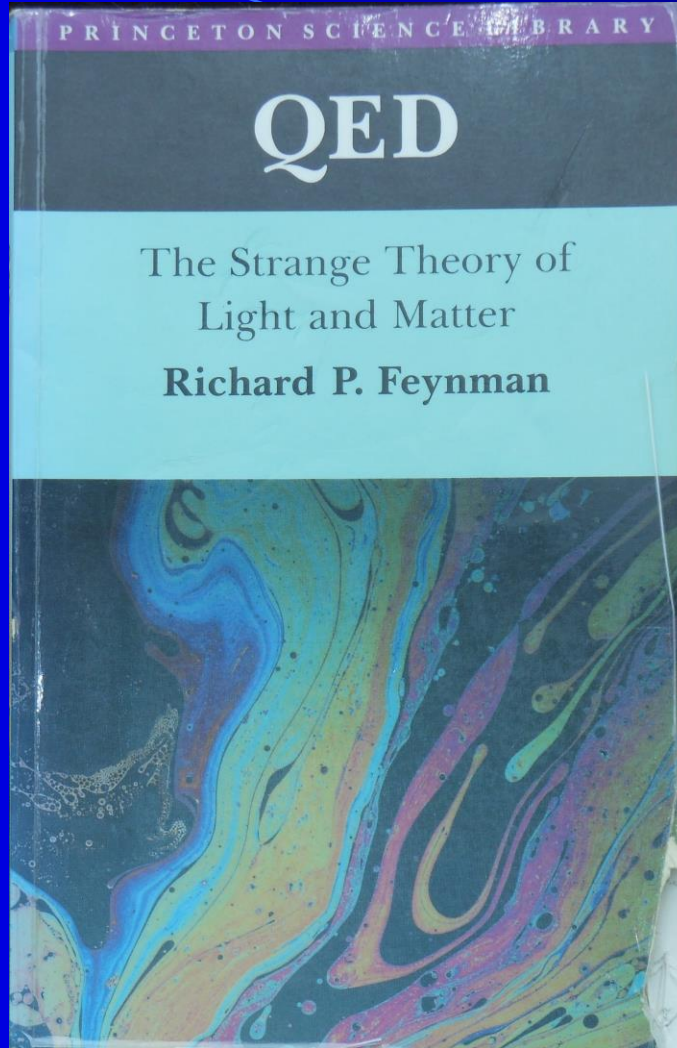
Rotation in the medium is inertially and electromagnetically “absolute”, physical

³Michelson, A., Gale, H. The Effect of the Earth's Rotation on the Velocity of Light, Part II. *Astrophys. J.* 61, 140 (1925) [10.1086/142879](https://doi.org/10.1086/142879)

“wave theory cannot explain how the detector makes equally loud clicks as the light gets dimmer.”

(Argument from ignorance!)

Feynman’s QED turns real light waves into “probability-of-detection waves!”



“Light is made of particles”

but it’s wrong to think about which way the photon goes,

Therefore “Nature...is absurd.”

So theoretical physics has given up on explaining how even the simplest phenomena actually work. (p.82)

Light is a Wave in Inertial-EM Space

Wave-Particle Truth Table¹

Consistent with:	Wave Theory	Particle Theory
Wavelength and frequency	Yes	No
Invariant velocity independent of source velocity	Yes	No
Huyghens-Fresnel spreading, diffraction	Yes	No
Superposition, interference	Yes	No
Continuous spectrum (including radio waves)	Yes	No
Light of “subphotonic” amplitude	Yes	No
Laser	Yes†	No*
Blackbody spectrum	Yes†	No*
Photoelectric effect	Yes†	No*
Compton effect	Yes†	No*
Photoelectronic anti-correlation experiments	Yes†	No*
Quantum Electrodynamics’ computations	Yes†	No*

†Requires light-electron interactions to be quantized, plus inclusion of unknown background radiation

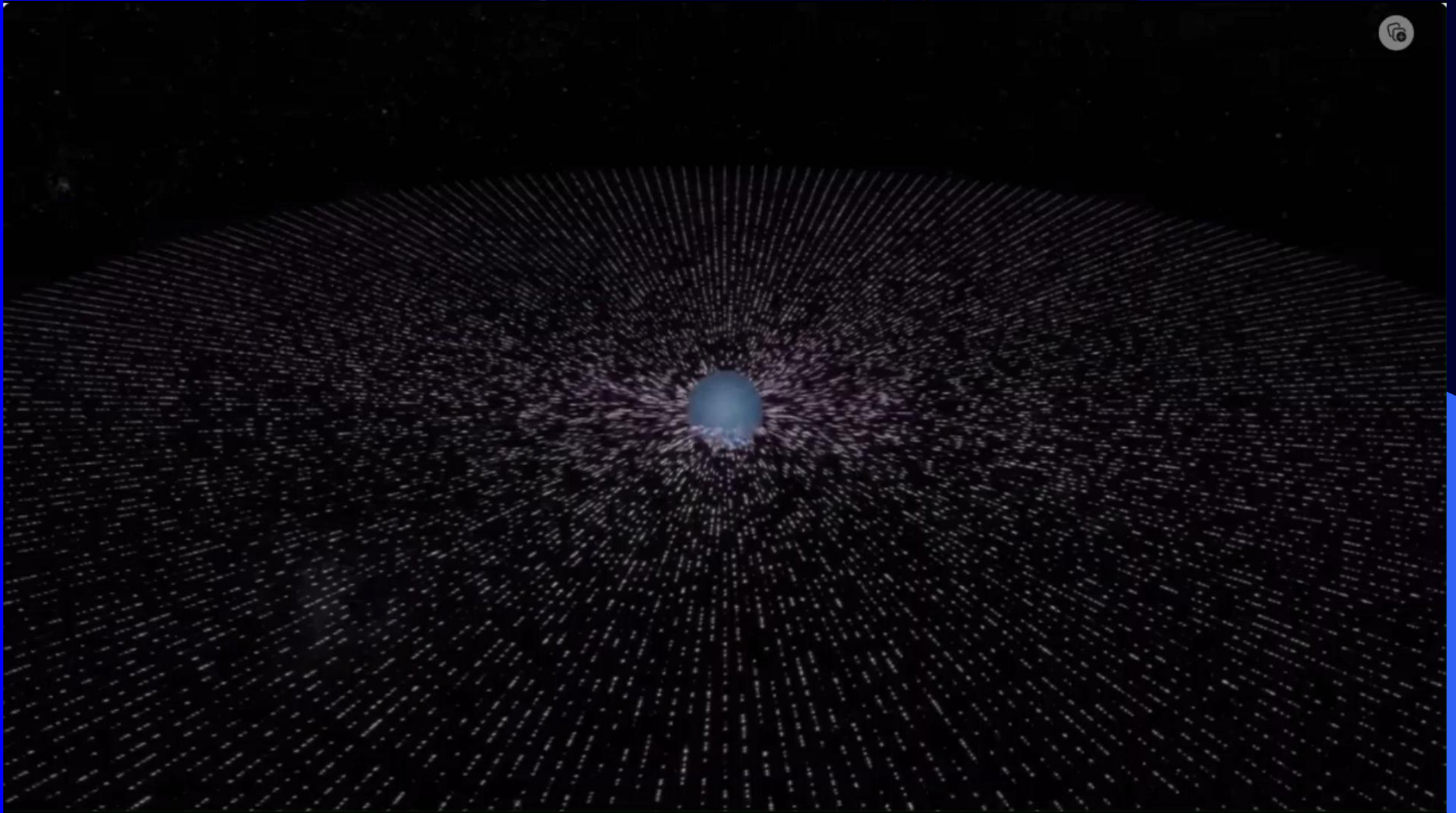
*Requires wave theory to model and predict quantized light-electron interactions²

¹Lindner H.H. A QED-compatible Wave Theory of Light, Electrons, and their Interactions”, *Proc. SPIE*, vol. 8121, 2011, p. 81210X-1. [10.1117/12.893053](https://doi.org/10.1117/12.893053)

²Feynman, R., *QED The Strange Theory of Light and Matter*, Princeton University Press, Princeton NJ (1985)

Dialect: Matter and Light moving in Spatial Flow

[The River Model of General Relativity \(youtube.com\)](https://www.youtube.com/watch?v=9jK3D8Yt8j0)



Velocity in EM Space Redshifts Atomic Spectra

Lorentz velocity redshift: $\Delta v/v = 1 - \sqrt{1 - v^2/c^2}$

In flowing space gravity: $v_{esc}^2 = 2GM/r$, therefore

Gravitational velocity redshift: $\Delta v/v = 1 - \sqrt{(1 - 2GM/rc^2)}$

FACT: Atomic clock on Earth's surface slows just as if it is moving at $11.2km/s$ through space

Unification: Atomic redshift/clock slowing has one cause: Velocity in EM space

New Principle of Equivalence of Inertial and Gravitational
Acceleration and Velocity!

Redshift Links Microcosm and Macrocosm

Plausible Assumption: Electrons are EM wave-structures: Emit and absorb light waves in quanta as determined by their structure.

When in motion *wrt* EM space, atom-bound electrons' waves must propagate through more space → Lorentz redshift (transverse Doppler) of the wavelengths they absorb/emit.

Atomic clocks physically analogous to “light clocks”

Half-life of evanescent particles (e.g., muons) increased by same EM mechanism

No universal “clock-slowness” or “time dilation”¹

¹Lindner, H.H. On the Philosophical Inadequacy of Modern Physics and the Need for a Theory of Space. *Cosm. Hist.* 11(1), 136-180 (2015) [Link](#)

Dialect

[What Time Dilation ACTUALLY IS in Relativity \(youtube.com\)](https://www.youtube.com/watch?v=...)



Space Theory: Definitions

Space is an inertial-electromagnetic, massless, frictionless fluid.

Must be discrete-quantized: composed of complex “cells” at the (?) Planck scale (10^{-33} cm)?

Must be compressible: deforms in gravitational flows, supports gravitational waves

All physical phenomena result from alterations of and/or motions within cellular space.

All fundamental particles are combinations of various processes in/of cellular space

Time is Cosmic evolution—endless procession of cause and effect.

We mark time with clocks—highly regular cause-effect mechanisms

Flowing Space Reproduces GR's Successes—More Simply

Painlevé, P. [Classical Mechanics and the Theory of Relativity], *C. R. Acad. Sci.* **173**, 677-680 (1921)

Gullstrand, A. [General solution of the static body problem in Einstein's gravitation theory]. *Arkiv för Matematik, Astronomi och Fysik*, **16**(8), 1-15 (1922)

Ives, H.E. Behavior of an Interferometer in a Gravitational field, *J. Opt. Soc. Am.* **29**, 183-187 (1939) [10.1364/JOSA.29.000183](https://doi.org/10.1364/JOSA.29.000183)

Ives, H.E. The Behavior of an Interferometer in a Gravitational Field. II. Application to Planetary Orbit. *J. Opt. Soc. Am.* **38**, 413-416 (1947) [10.1364/JOSA.38.000413](https://doi.org/10.1364/JOSA.38.000413)

Kirkwood, R. The Physical Basis of Gravitation. *Phys. Rev.* **92**, 1557-1562 (1953) [10.1103/PhysRev.92.1557](https://doi.org/10.1103/PhysRev.92.1557)

Kirkwood, R. Gravitational field equations. *Phys. Rev.* **95**, 1051-1056 (1954) [10.1103/PhysRev.95.1051](https://doi.org/10.1103/PhysRev.95.1051)

Kirkwood, R. The physics of a metric space with a time variable. *Int J Theor Phys* **7**, 391–414 (1973) [10.1007/BF00713242](https://doi.org/10.1007/BF00713242)

Martin, T. On the Motion of Free Material Test Particles in Arbitrary Spatial Flows (1999) [gr-qc/9807006](https://arxiv.org/abs/gr-qc/9807006)

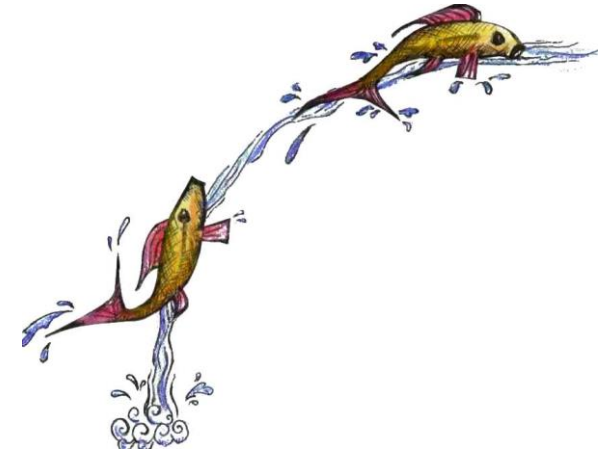
Martin, T. General Relativity and Spatial Flows: I. Absolute Relativistic Dynamics (2000) [gr-qc/0006029](https://arxiv.org/abs/gr-qc/0006029)

Lindner H.H. Beyond Newton and Einstein to flowing space, *Phys. Essays* **25**(4), 500-509 (2012) [10.4006/0836-1398-25.4.500](https://doi.org/10.4006/0836-1398-25.4.500)

} Best Intro

General Relativity is an observer-based, abstract model of Flowing Space!

The river model of black holes



Andrew J. S. Hamilton* and Jason P. Lisle†
*JILA and Dept. Astrophysical & Planetary Sciences,
Box 440, U. Colorado, Boulder CO 80309, USA*

This paper presents a new way to conceptualize stationary black holes, which we call the river model. The river model is mathematically sound, yet simple enough that the basic picture can be understood by non-experts. In the river model, space itself flows like a river through a flat background, while objects move through the river according to the rules of special relativity. In a spherical black hole, the river of space falls into the black hole at the Newtonian escape velocity, hitting the speed of light at the horizon. Inside the horizon, the river flows inward faster than light, carrying everything with it. We show that the river model works also for rotating (Kerr-Newman)

No mention that it works equally well for weak gravity!

Black Holes Simplified

If EM space flows into a mass @ $\geq c$, light waves cannot escape:

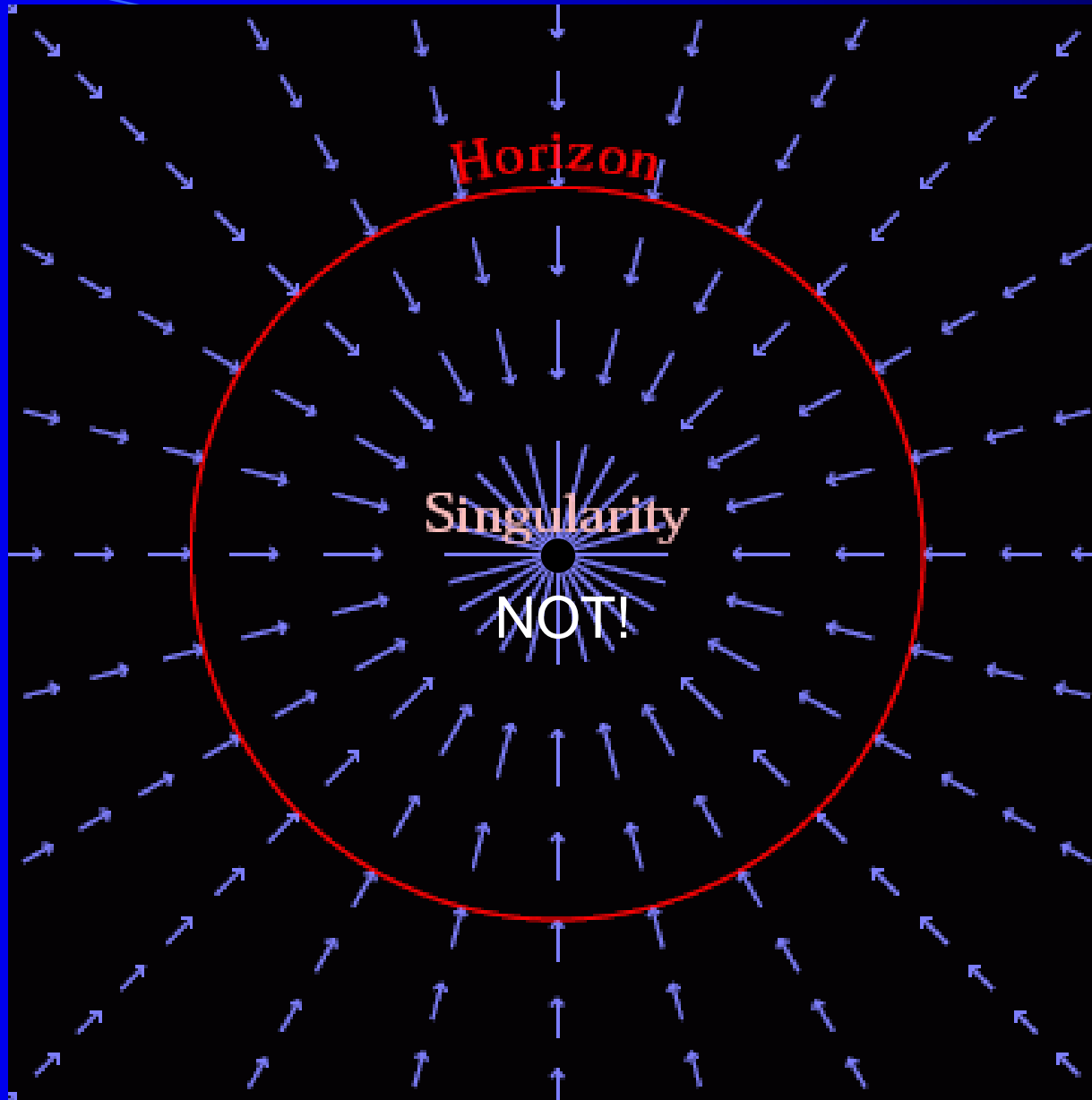
At the Schwarzschild (luminal) radius r_S , $v_{esc} = c$:

$$v_{esc}^2 = c^2 = 2GM/r \rightarrow r_S = 2GM/c^2$$

Compare with the Schwarzschild Solution of Einstein's equations:

$$ds^2 = -\left(1 - \frac{2GM}{rc^2}\right) (dx^0)^2 + \left(1 - \frac{2GM}{rc^2}\right)^{-1} dr^2 + r^2(d\theta^2 + \sin^2\theta d\varphi^2)$$

Which is simpler? Which is more likely to represent physical reality?



<https://jila.colorado.edu/~ajsh/insidebh/waterfall.html>

No Singularity

Central mass must consume space, must be hadronic matter

A neutron star of $\geq 6M_{\odot}$ would form a black hole, but largest observed N-stars are only $\sim 2.5M_{\odot}$

At $> 2.5M_{\odot}$, N-stars may collapse into a denser form of matter and become black holes.

“Quark Matter”?

Valerie on Flowing Space

“Many GR calculations can be done more simply in Flowing Space (the river model):

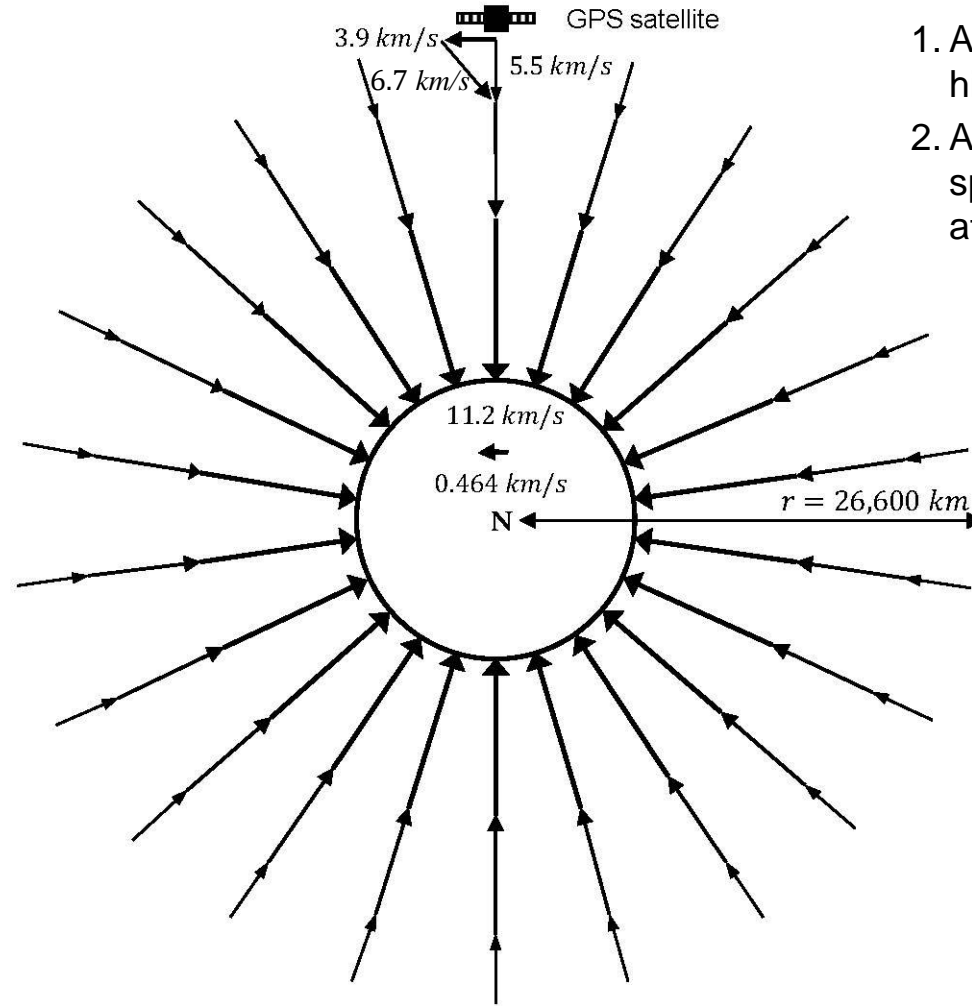
1. Gravitational lensing
2. Light orbit radius
3. Event horizon radius of a black hole
4. Proper time of a spacetime path
5. Time delays in the GPS system, cosmology, etc.

...with nothing but high school calculus and in a very physically intuitive, quasi-Newtonian way, by referring to the velocity and acceleration of the object relative to space at every point...

She presented some of these calculations in Dr. Bianchi's GR class.

GPS System in Earth's Entrained Flow Field

← **30 km/s** Orbital Motion



Testable Prediction:

1. Atomic clocks **rising** against the flow have higher spatial velocities and run **slower**
2. Atomic clocks **falling** with the flow have lower spatial velocities and run **faster**. A clock falling at v_{esc} is at rest in space and runs at **fastest** rate

← **30 km/s** Orbital Motion

Earth and its entrained (co-moving) flow-field moving through Sun's larger entrained flow field

The atomic clock of a GPS satellite is subjected to a 5.5 km/s spatial inflow, and so runs faster than an Earth surface clock (11.2 km/s). GPS clock is also slowed by its 3.9 km/s tangential orbital velocity in the Earth-entrained flow-field. Resultant spatial velocity is $6.7 \text{ km/s} \Rightarrow$ correct GPS atomic clock slowing.

Valerie: In summer before senior year

Some calculations regarding the operation of the GPS in flowing space.

Author: Valerie Lindner

Date: 07/16/15

The purpose of this project was to determine whether flowing space (specifically, the resultant anisotropy of light propagation) produces noticeable errors in GPS signal travel times (particularly between signals from satellites at different zenith angles) if the GPS is designed to assume that the speed of light is isotropic and equal to c .

Theory

In Figure 1, we consider a GPS receiver (REC) on the surface of the Earth receiving signals from two GPS satellites: One directly above the receiver (S1) and another on the horizon (S2). The orbital radii of the GPS satellites is $d = 26,600 \text{ km}$; the radius of the earth is $R = 6371 \text{ km}$; and the distance to the satellite on the horizon is $X_d = \sqrt{d^2 - R^2}$. The center of the earth is the origin of a Cartesian coordinate system (x, y) .

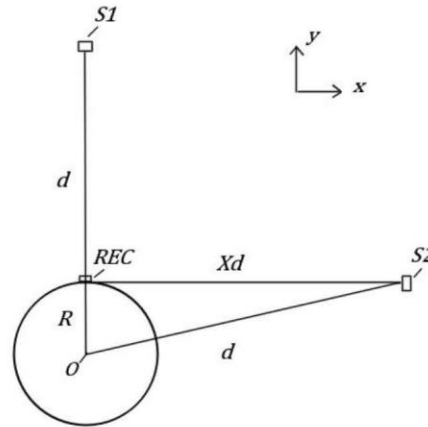


Figure 1 Geometry of the problem. S1 and S2 are GPS satellites communicating with the receiver REC on the Earth.

At the same time, the Earth lies in the center of a radial spatial inflow field given by (1)

$$\mathbf{w} = -\sqrt{\frac{2GM}{r}} \hat{\mathbf{r}}$$

Light moves at c relative to space; that is, if \mathbf{v} is the velocity of a light signal relative to Earth, then (2)

Q: Wouldn't
Flowing Space
create an
overhead/horizon
difference in GPS
signal paths?

Val's Answer:
Yes: $\approx 2.4\text{mm}$
within known margin of error
Same result for VLBI

Also reproduced
Shapiro Time Delay

Implications of Flowing Space Gravity

Unification: Inertial and gravitational mass are identical¹ because they have the same cause:
Spatial sink flow. Mass has inertia because it interacts gravitationally with space

Spatial consumption is probably hadronic—sustaining the mysterious strong nuclear force.

Testable prediction: No gravity from electrons, energy, heat, light, neutrinos, etc.

Space is not an ideal fluid: For an ideal fluid of sink strength S , $v = S/4\pi r^2 \rightarrow$ Greater \uparrow in velocity

Spatial cells must elongate by lateral compression or contract as they approach mass.²

¹Eötvös, RV. *Math. u. Naturw. Ber. aus Ungarn* 8, 65 (1890)

²Lindner H.H. Beyond Newton and Einstein to flowing space, *Phys. Essays* 25(4), 500-509 (2012) [10.4006/0836-1398-25.4.500](https://doi.org/10.4006/0836-1398-25.4.500)

“Dark Matter” Anomaly

Hidden Assumption: Newton’s Space!

Problem: Anomalous centripetal accelerations (excess gravity?)

ad hoc hypothesis: Cold dark matter particles

Problems:

1. Improbable particle qualities
2. No laboratory evidence of such particles
3. Improbable distributions
4. Core-cusp discrepancy
5. Missing dwarf galaxies
6. No excess gravity perpendicular to the Milky Way’s plane¹
7. Dwarf galaxies disturbed by tidal forces, indicating no dark matter halo²
8. No dynamical (Chandrasekhar) friction affecting satellite galaxies³

¹Moni Bidin, C. et al. No Evidence for a Dark Matter Disk within 4 kpc from the Galactic Plane, *Astrophys. J. Lett.* 724(1), L122–L126 (2010) [10.1088/2041-8205/724/1/L122](https://doi.org/10.1088/2041-8205/724/1/L122)

²Asencio, E. et al. The distribution and morphologies of Fornax Cluster dwarf galaxies suggest they lack dark matter. *Mon. Not. R. Astron. Soc.* 515(2), 2981–3013 (2022) [10.1093/mnras/stac1765](https://doi.org/10.1093/mnras/stac1765)

³Kroupa, P. Galaxies as simple dynamical systems: observational data disfavor dark matter and stochastic star formation. *Can. J. Phys.* 93(2):169-202 (2015) [10.1139/cjp-2014-0179](https://doi.org/10.1139/cjp-2014-0179)

Flowing Space Solution: Entrainment

Celestial bodies entrain their flow fields into their free fall motion out to a great distance (Val: “strong linear frame dragging”), limited by the flow-fields of surrounding bodies:

Extent of entrained space = Hill Sphere radius: $R_{HS} \approx r_{orb} \sqrt[3]{M_g/3M_S}$

Fulfills Mach’s Principle: Local inertial frame determined by the position and motion of the near and distant celestial bodies—sinks and/or sources

Entrainment is necessary: The alternative is Newton’s singular absolute space!

Entrainment assumed in Cosmology: Superluminally-receding galaxies’ space “co-moves” with them¹

¹Davis T.M., Lineweaver C.H. Expanding Confusion: Common Misconceptions of Cosmological Horizons and the Superluminal Expansion of the Universe, *Pub. Astro. Soc. Australia*, 21, p. 97 (2004) astro-ph/0310808

Centripetal Spatial Accelerations

Spiral galaxies: Orbiting stars and their entrained flow fields cause much of the intragalaxial space to orbit the center—accelerating centripetally → a partial vortex

Intragalaxial inertial frame is (partially) rotating *wrt* the surrounding galaxies, accelerating stars with it

Supported: Lower “excess gravity” effect (M/L ratio) seen in star clusters¹ (3 vs 21 for M.W.) as stars orbit in various directions and planes (no vortex)

Galaxy clusters: Larger masses in closer proximity → greater centripetal spatial accelerations
Centripetal entrainment of space around clusters increases gravitational lensing

¹Rejkuba M, et al., Masses and M/L Ratios of Bright Globular Clusters in NGC 5128, *Proc. Int. Astro. Union*, S246, p. 418 (2007) [10.1017/S1743921308016074](https://doi.org/10.1017/S1743921308016074)

“Dark Energy” Anomaly

Galaxy clusters move apart at increasing speed with distance → accelerating expansion¹

ad hoc hypothesis: “Dark Energy” (no plausible theory)

Flowing Space Solution: Space is being created somewhere

Clue: Space flowing out of a body (source) produces the same velocity and acceleration gradients as space flowing in (sink) → Normal attractive gravity locally²

¹Perlmutter, S. et al. Measurements of Ω and Λ from 42 High-Redshift Supernovae. *Astrophys. J.* 517(2), 565-586 (1999) [10.1086/307221](https://doi.org/10.1086/307221)

²Martin, T. General Relativity and Spatial Flows: I. Absolute Relativistic Dynamics, *arXiv.org, General Relativity and Quantum Cosmology* (2000). [gr-qc/0006029v1](https://arxiv.org/abs/gr-qc/0006029v1)

What Bodies Could be Spatial Sources?

Not all celestial bodies; black holes exist

Plausible Hypothesis: Inert matter (planets, gas) consumes space, but stars create space

Stars can be spatial sources IF their nuclear fusion produces far more space than is consumed by their inert matter → Spatial outflow at v_{esc}

If so: All bright stars are spatial sources

If so: All bright galaxies are spatial sources!

¹Perlmutter, S. et al. Measurements of Ω and Λ from 42 High-Redshift Supernovae. *Astrophys. J.* 517(2), 565-586 (1999) [10.1086/307221](https://doi.org/10.1086/307221)

²Martin, T. General Relativity and Spatial Flows: I. Absolute Relativistic Dynamics, *arXiv.org*, *General Relativity and Quantum Cosmology* (2000). [gr-qc/0006029v1](https://arxiv.org/abs/gr-qc/0006029v1)

Nuclear Reactions Create/Release Space?

OTHER EVIDENCE:

1. Cosmic Inflation (space creation) in the Big Bang
2. Blast effect—shock wave of nuclear bombs (not explained by particles and radiation)
3. “Neutrinos”: Produced by nuclear reactions, always move at c , have no mass \Rightarrow high frequency fluid displacement waves in space—akin to low frequency gravitational waves.

As with “photons”, we detect “neutrinos” by the waves’ quantized interactions with particles—the quantization is a property of the particle, not of the freely propagating wave.

Space Accumulates in Voids

All galaxy clusters are surrounded by other clusters in all directions.

Space flowing out of bright galaxy clusters accumulates in some regions more than others.

Voids form and grow; More space moves clusters apart.

Growth of voids → Cosmic Expansion.¹

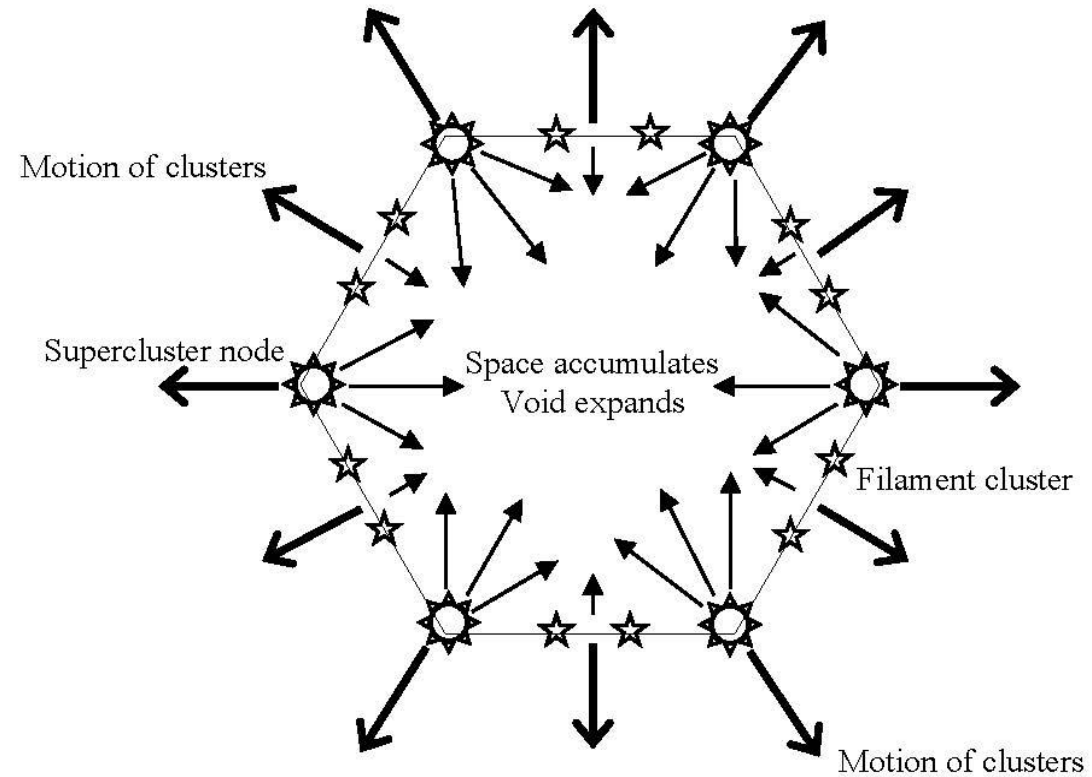
Support: Biggest voids are expanding more rapidly than Cosmos²

Result: Expanding sponge-like structure

¹Yusofi, E. et al. Surface Tension of Cosmic Voids as a Possible Source for Dark Energy. *Mon. Not. R. Astron. Soc.* 511(1) L82-L86 (2022) [10.1093/mnrasl/slac006](https://doi.org/10.1093/mnrasl/slac006)

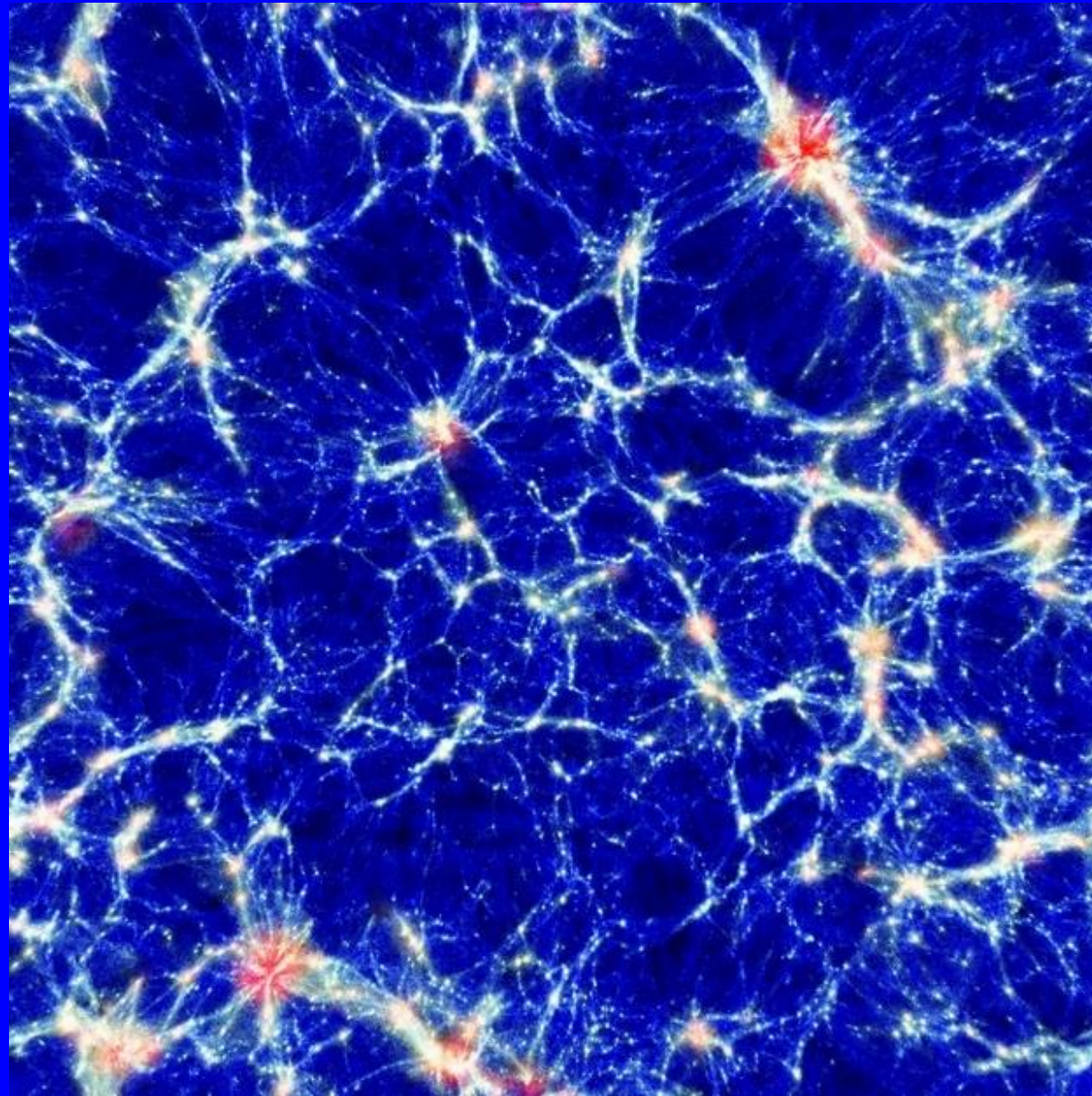
²Wandelt, B. quoted in Lemonick, D. Cosmic Nothing. *Sci. Am.* 330 (1), 20-27 (2024) [10.1038/scientificamerican0124-20](https://doi.org/10.1038/scientificamerican0124-20)

2-D Growth of a Void Surrounded by Nodal Superclusters and Filament Clusters



The more expanding voids between us and distant galaxies, the faster they move away from us.

Cosmic Web



Predictions

Accelerating Cosmic expansion began (~9 billion years) when bright stellar mass exceeded dark inert mass (gas, planets) → Era of net spatial creation

Darker stars (less fusion) will have less apparent gravitational mass than expected.
IF spatial production = consumption, a star could have no inertial or gravitational mass!

Warp Speed? A spaceship with a sufficiently powerful fusion reactor could have no spatial inflow or outflow → no inertial mass; could easily accelerate to c (or travel $> c$?)

Bang-Crunch Cosmos

Eventually stellar formation and fusion will decline → ↓'d space production

Spatial consumption will dominate → Cosmic contraction as dark galaxies rush together

IF spatial consumption maintains hadrons (strong force), then at extreme Cosmic matter density remaining space will be under tension → Destabilization of matter of central galaxies

Cosmic Nuclear Explosion creates a vast amount of space and radiation (Big Bang with Inflation)

Peripheral galaxies could survive—explaining some JWST anomalies?

Flowing Space

Cosmic-objectivistic: Relates all phenomena to Cosmic space

Uncouples space (substance) and time (motion/evolution)

Fits and explains the facts—no contradictory evidence, no paradoxes

Unifies and simplifies the known phenomena

Allows us to theorize about physical causes of all phenomena

Produces many testable predictions

Requires reinterpretation of current observer-based concepts and models