The phenomenon of gravity in the framework of the submicroscopic approach

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Gravitation…

Gravity is a force that makes things move toward each other.

The gravitation theory is a theory dealing with attraction of massive bodies. **But what is mass *m* ??..**

Newton: objects are attracted through the gravitational force.

Einstein-Hilbert: gravitation is a space-time curvature instead of a force (nevertheless, the first term in general relativity is Newton's potential $-G\,m\,/\,r$).

Space -??..

In 1860s B. Riemann and then in 1870s H. Helmholtz suggested that the motion of a ‘rigid’ object through space does not change the shape of the object, but the space around the object becomes curved.

The suggestion of a ‘rigidity’ of objects is crucial for modern physical mathematics, because it allows the introduction of symmetries in the study of the equations of motion of these objects.

Michel Bounias:

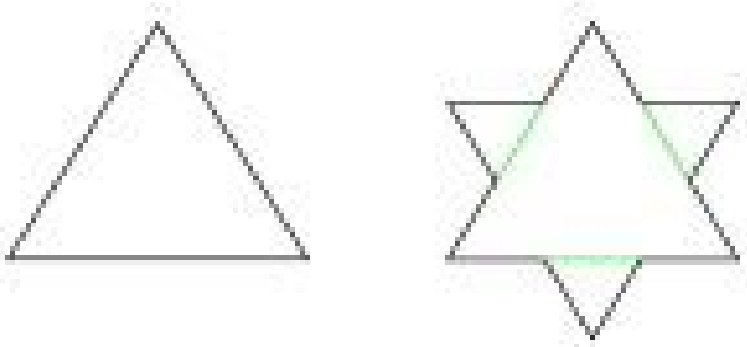
Space is made of {objects + distances} and all comes from the same origin: manifold of sets and nothing else

The association of discrete sets whose interior is continuous although covered by discrete subparts, as derived from the empty set ∅ provides a wonderfully organized fundamental ‘substrate’, i.e. a mathematical lattice.

The magma $\varnothing^{\varnothing} = \{\varnothing, \complement\}$, which is a set equipped with a single binary operation and $\complement$ is the complement, constructed with the empty hyperset (∅) and the axiom of availability is a fractal lattice.

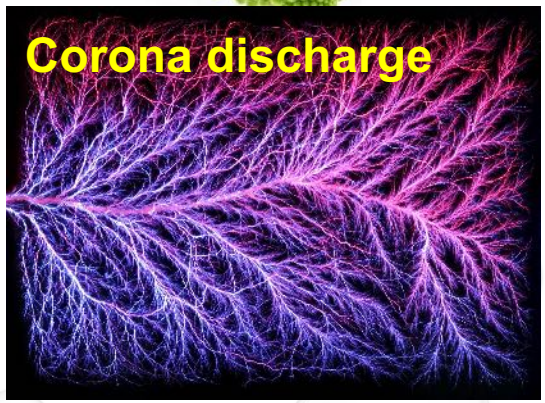
Fractal is an irregular, self-similar structure. In a broad sense, a fractal means a figure whose small parts are arbitrarily crushed or iterated.

Helge von Koch
(1880 - 1924)

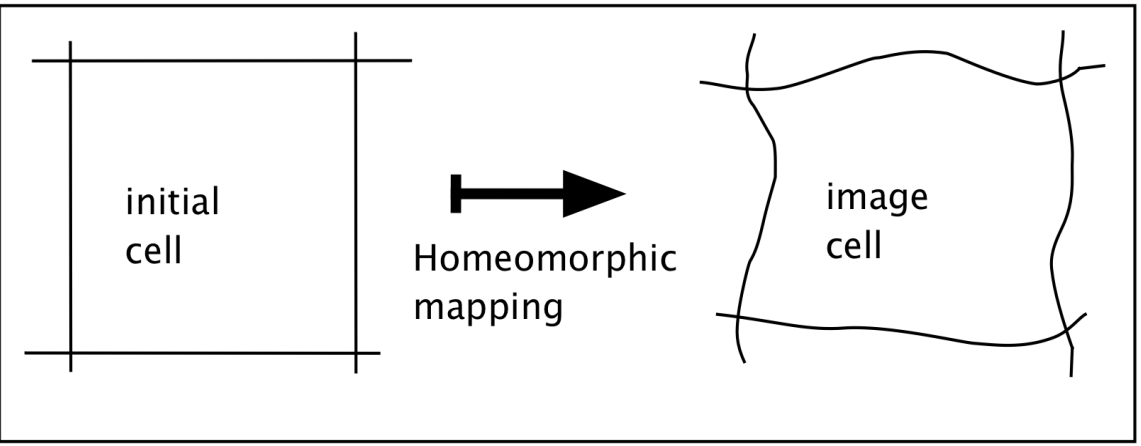


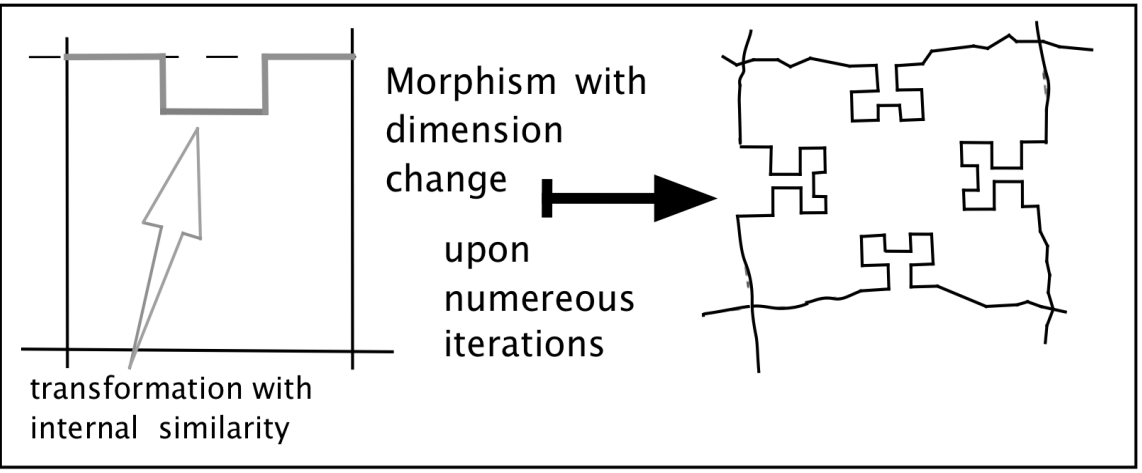
snowflakes

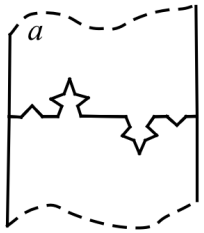
Fractals in Nature

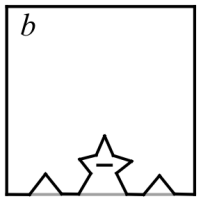


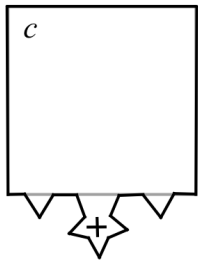
The tessellattice is a mathematical lattice of cells, primary topological balls



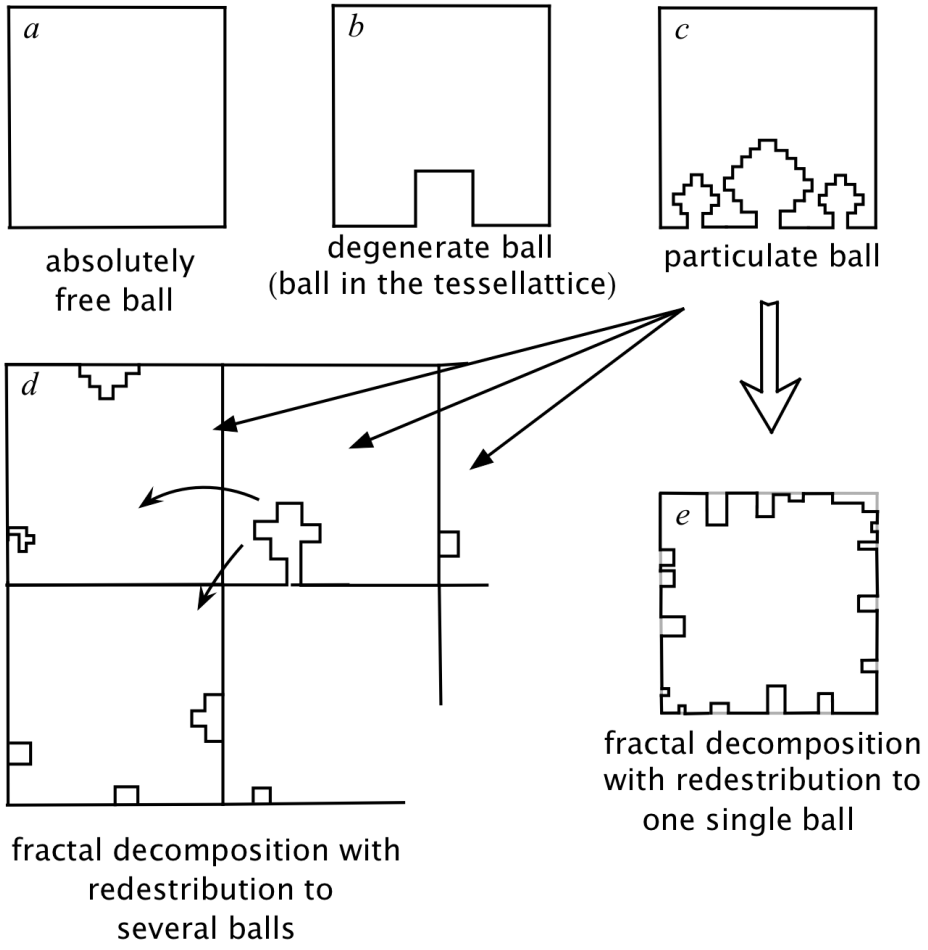




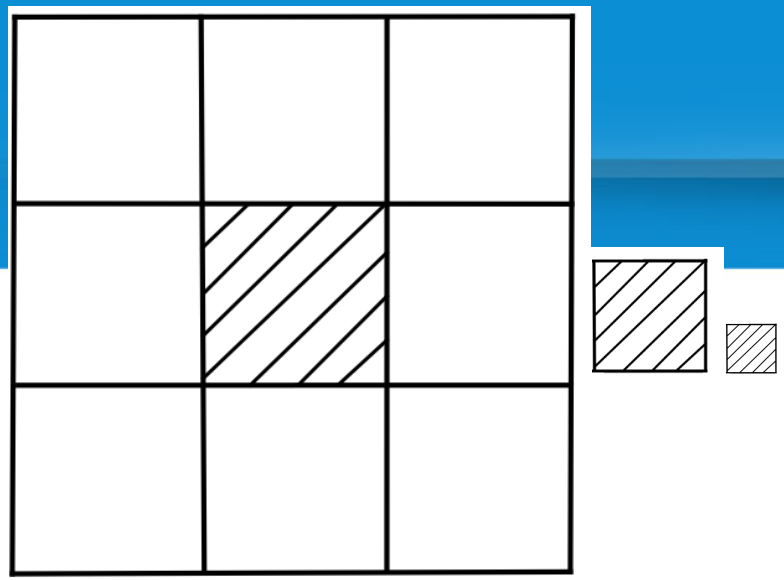


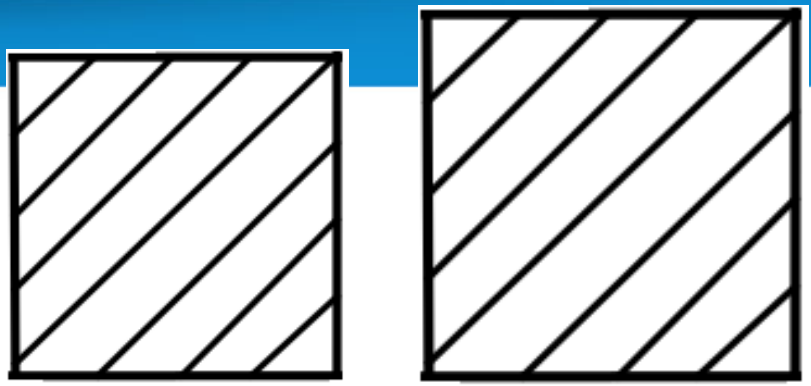


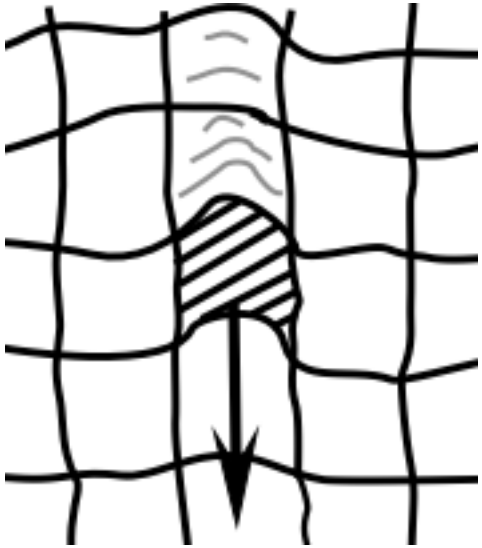
Distribution of volumetric fractals



The appearance of matter



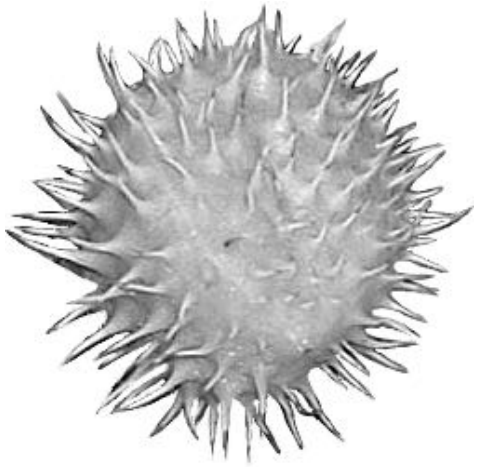


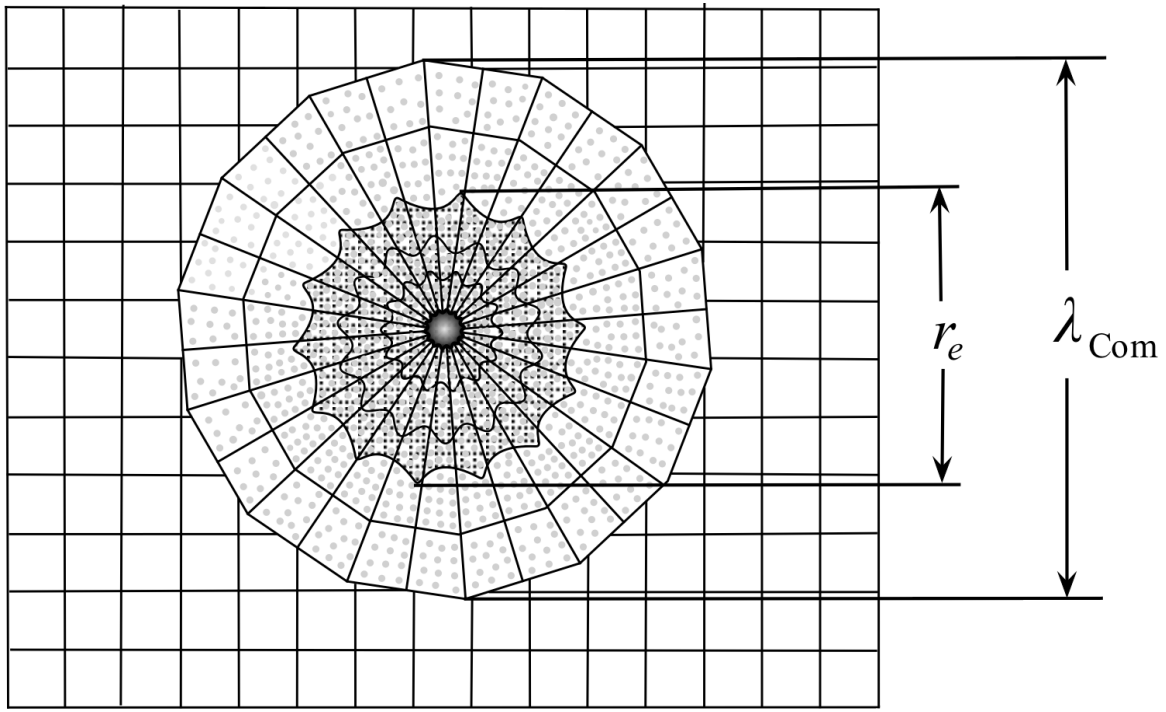


$$m \sim V_0 / V_{particle}$$

$$(V_0)^{1/3} = \sqrt{\hbar G / c^3} = 10^{-35}\ \text{m}$$

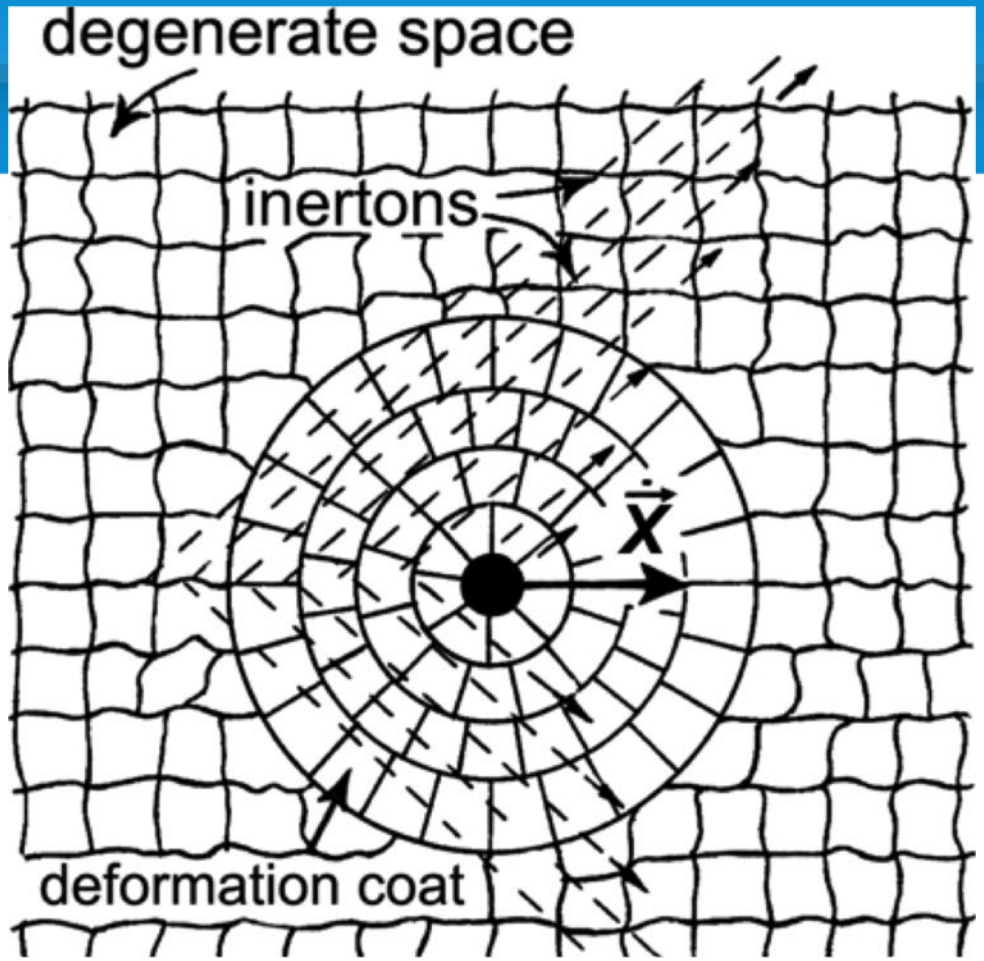
Charge is the surface phenomenon





deformation coats
-- polyhedrons

Motion of a particle



$$L = m\dot{x}^2/2 + \mu\dot{\chi}^2/2 - \sqrt{m\mu}\,\dot{x}\chi/T$$

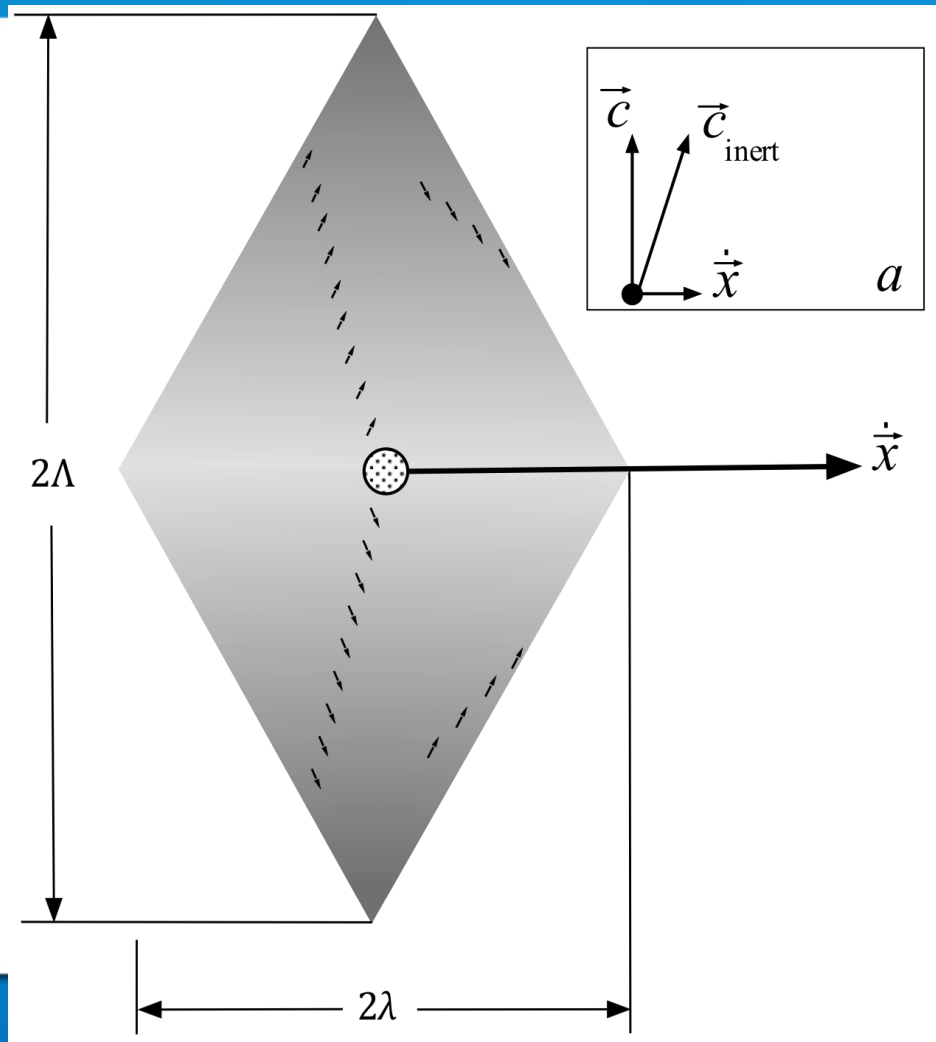
Submicroscopic mechanics:

the particle with its inerton cloud

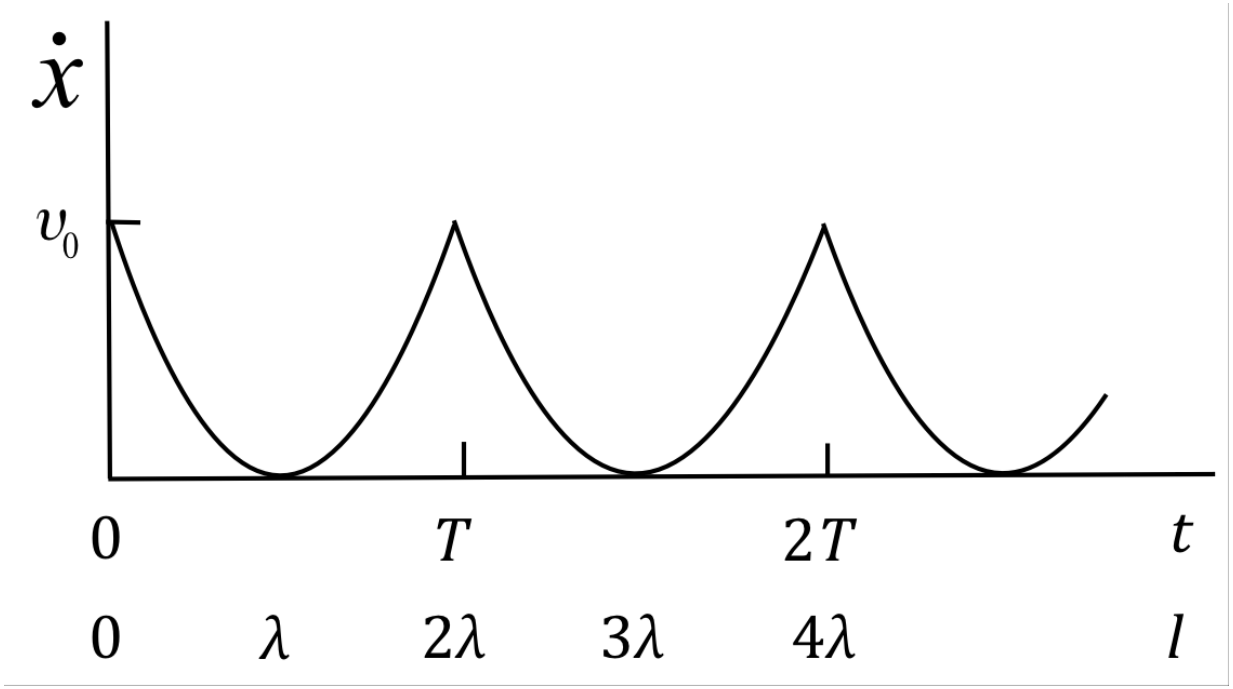
QM: the particle's wave ψ-function

$$E = h\nu, \qquad \lambda = \frac{h}{m\upsilon}$$

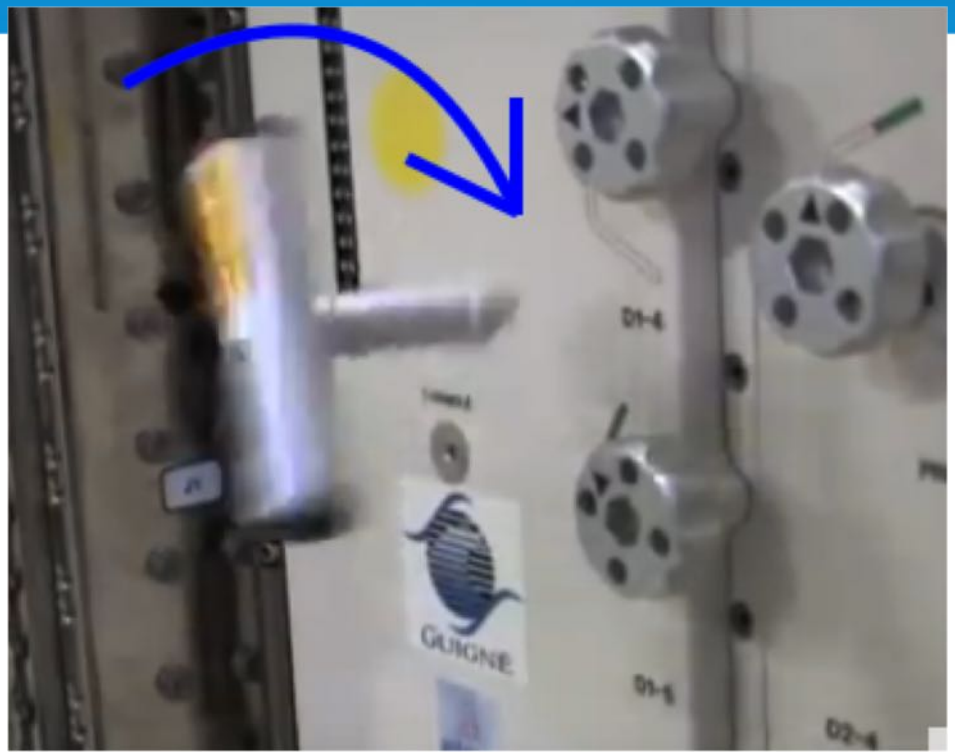
$$\Lambda = \lambda \frac{c}{\upsilon}$$



Submicroscopic mechanics



1985: Soviet cosmonaut Vladimir Dzhanibekov's effect



The screw lamb is rotating in the same direction even when it changes the orientation to diametrically opposite.

Die Glocke / The Bell Project, 1944-1945

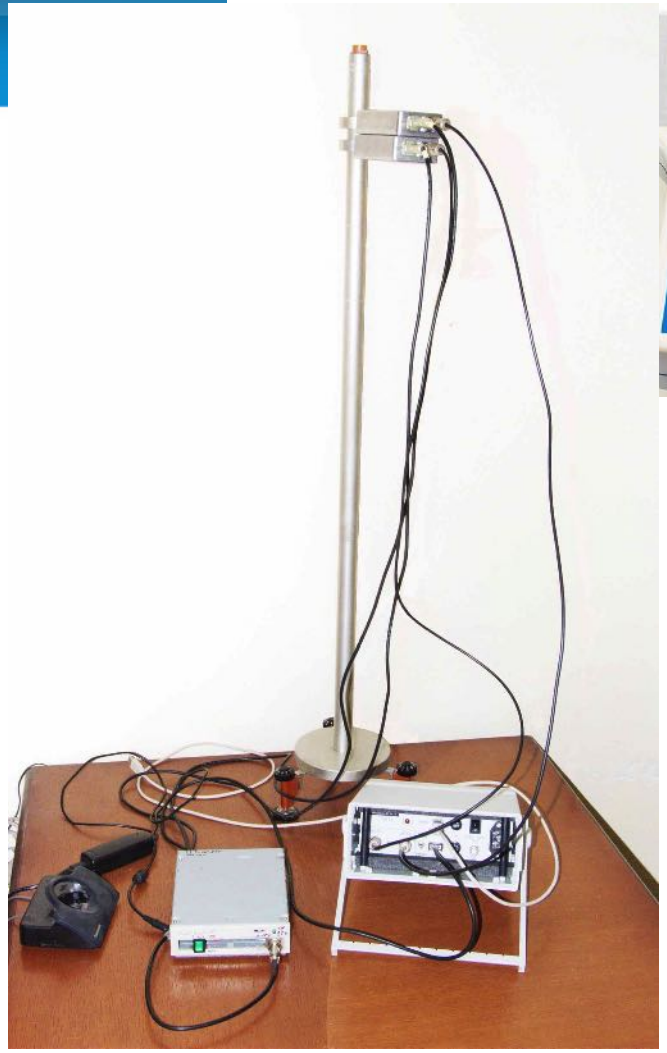
http://inerton.kiev.ua/Studies.of.inerton.field.effects.in.1944-1945.pdf

N. Cook, Hunt for Zero Point. Inside the Classified World of Antigravity Technology (2002)

All living entities that were put under the irradiation of this field changed to the state of a gel, became white and then felt apart as pieces of gel-like threads.

People exposed to the program complained of ailments, in spite of their protective clothing. These ranged from sleep problems, loss of memory and balance, muscle spasms and a permanent and unpleasant metallic taste in the mouth. The first team was said to have been disbanded as a result of the deaths of five of the seven scientists involved.

An inerton field in action



The motion with the decay of mass

$$\mathcal{L}_{\{\text{part.+in.}\}} = \tfrac{1}{2}\lambda_{\text{dB}}^2\,\dot{m}^2 + \tfrac{1}{2}m_0^2\,\dot{\boldsymbol{\Xi}}^2 - \tfrac{1}{4}\upsilon_0^2\,m_0^2\left(\nabla\cdot\boldsymbol{\Xi}\right)^2 + \tfrac{1}{\sqrt{2}}\upsilon_0\,m_0\,\lambda_{\text{dB}}\,\dot{m}\,\nabla\boldsymbol{\Xi}$$

$$\ddot{m} + \frac{1}{\sqrt{2}}\frac{\upsilon_0 m_0}{\lambda_{\text{dB}}}\nabla\dot{\boldsymbol{\Xi}} = 0$$

$$\ddot{\boldsymbol{\Xi}} - \tfrac{1}{2}\upsilon_0^2\,\nabla^2\boldsymbol{\Xi} + \frac{1}{\sqrt{2}}\frac{\upsilon_0}{m_0}\nabla\dot{m} = 0$$

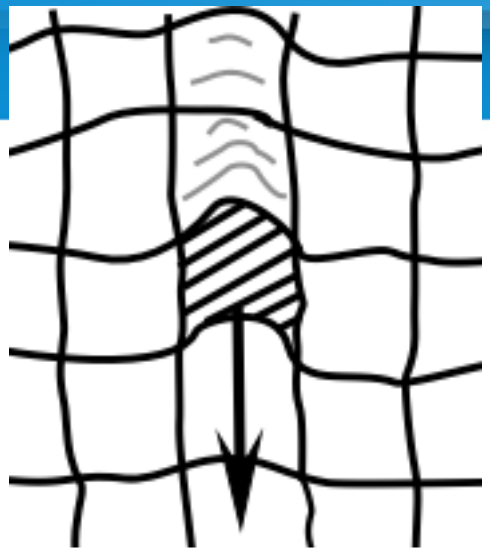
mass *m* periodically passes to tension Ξ

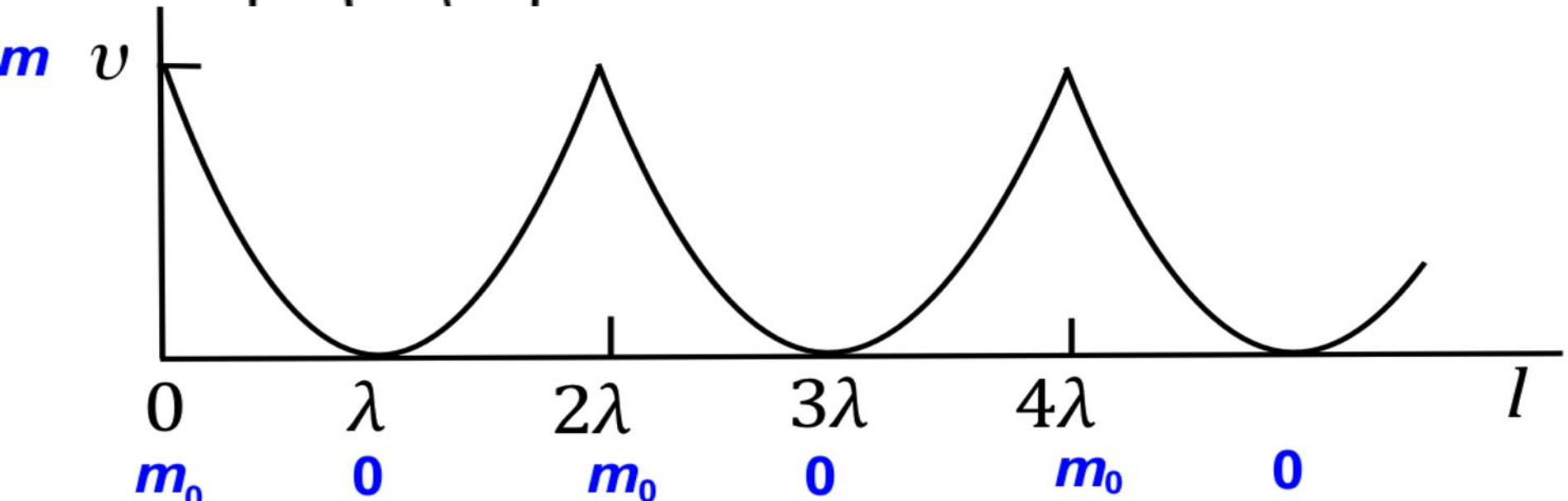
Hence, the mass *m*, i.e. volumetric fractals, are periodically destroyed and a new property appears, the tension Ξ.
The solutions are:

$$m(x,\ t) = \tfrac{1}{2} m_0 [1 + \cos(kx - \omega t)] = \tfrac{1}{2} m_0 \left(1 + \cos\left(\frac{\pi x}{\Lambda} - \frac{\pi t}{T}\right)\right)$$

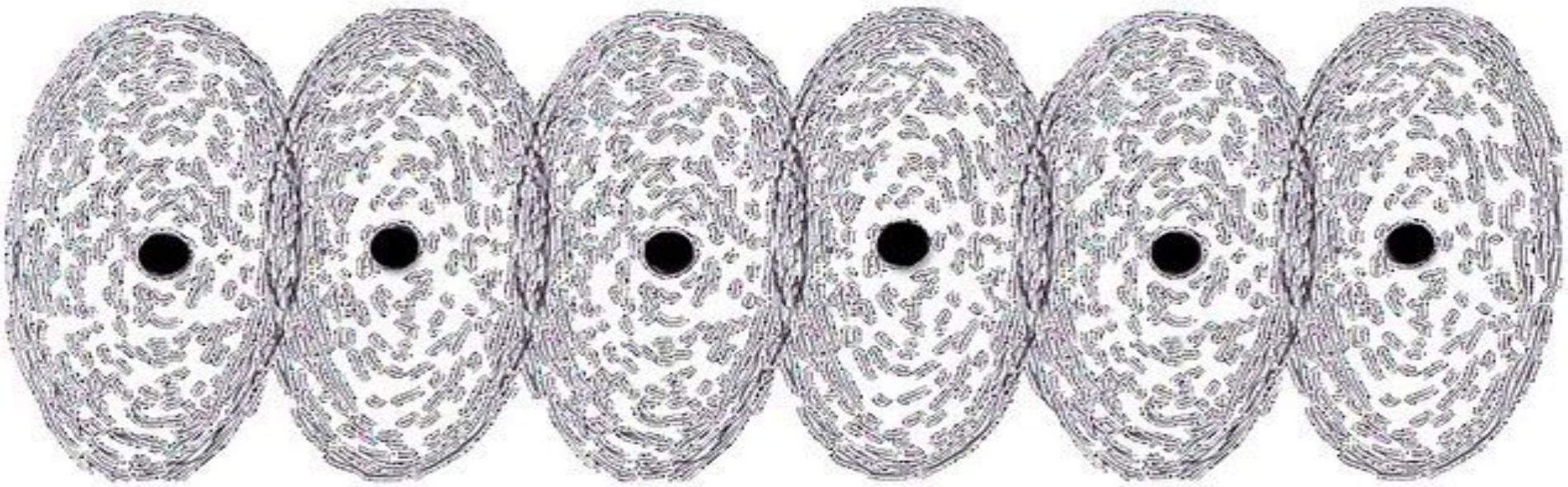
$$\Xi(x,\ t) = \tfrac{1}{2} \Xi_{\max} [1 - \cos(kx - \omega t)] = \tfrac{1}{2} \Xi_{\max} \left(1 - \cos\left(\frac{\pi x}{\Lambda} - \frac{\pi t}{T}\right)\right)$$

The mass varies along the particle path





A solid state object



Inerton clouds of oscillating atoms overlap forming a total inerton cloud of the object studied. So in the object inertons can be treated as an inerton gas.

Inertons in the body can be boiled down to the well-known task of mathematical physics, which describes small vibrations of a gas contained in a sphere. The solution to the equation is proportional to 1/*r* .

So, we can consider the fundamental inerton harmonic (the longest inerton standing wave).

The Lagrangian that specifies oscillations of inertons

$$L = \sum_{\vec{l}} \left(\tfrac{1}{2} R_0^2 \dot{\mu}_{\vec{l}}^{\,2} + \tfrac{1}{2} m_0^2 \dot{\boldsymbol{\xi}}_{\vec{l}}^{\,2} + c R_0 m_0 \dot{\mu}_{\vec{l}} \nabla \boldsymbol{\xi}_{\vec{l}} \right)$$

The equations of motion:

$$\frac{\partial^2 \mu}{\partial r^2} + \frac{2}{r}\frac{\partial \mu}{\partial r} = \frac{1}{c^2}\frac{\partial^2 \mu}{\partial t^2}, \qquad \frac{\partial^2 \boldsymbol{\xi}}{\partial r^2} + \frac{2}{r}\frac{\partial \boldsymbol{\xi}}{\partial r} = \frac{1}{c^2}\frac{\partial^2 \boldsymbol{\xi}}{\partial t^2}$$

The solutions:

$$\mu(r,\,t) = m_0 \frac{r_{01}}{r} \left|\cos\left(\frac{\pi r}{\Lambda}\right)\right| \left|\cos\left(\frac{\pi t}{T}\right)\right|$$

$$\xi(r,\,t) = m_0 \frac{\xi_{01}}{r} \left|\sin\left(\frac{\pi r}{\Lambda}\right)\right| \left|\sin\left(\frac{\pi t}{T}\right)\right|$$

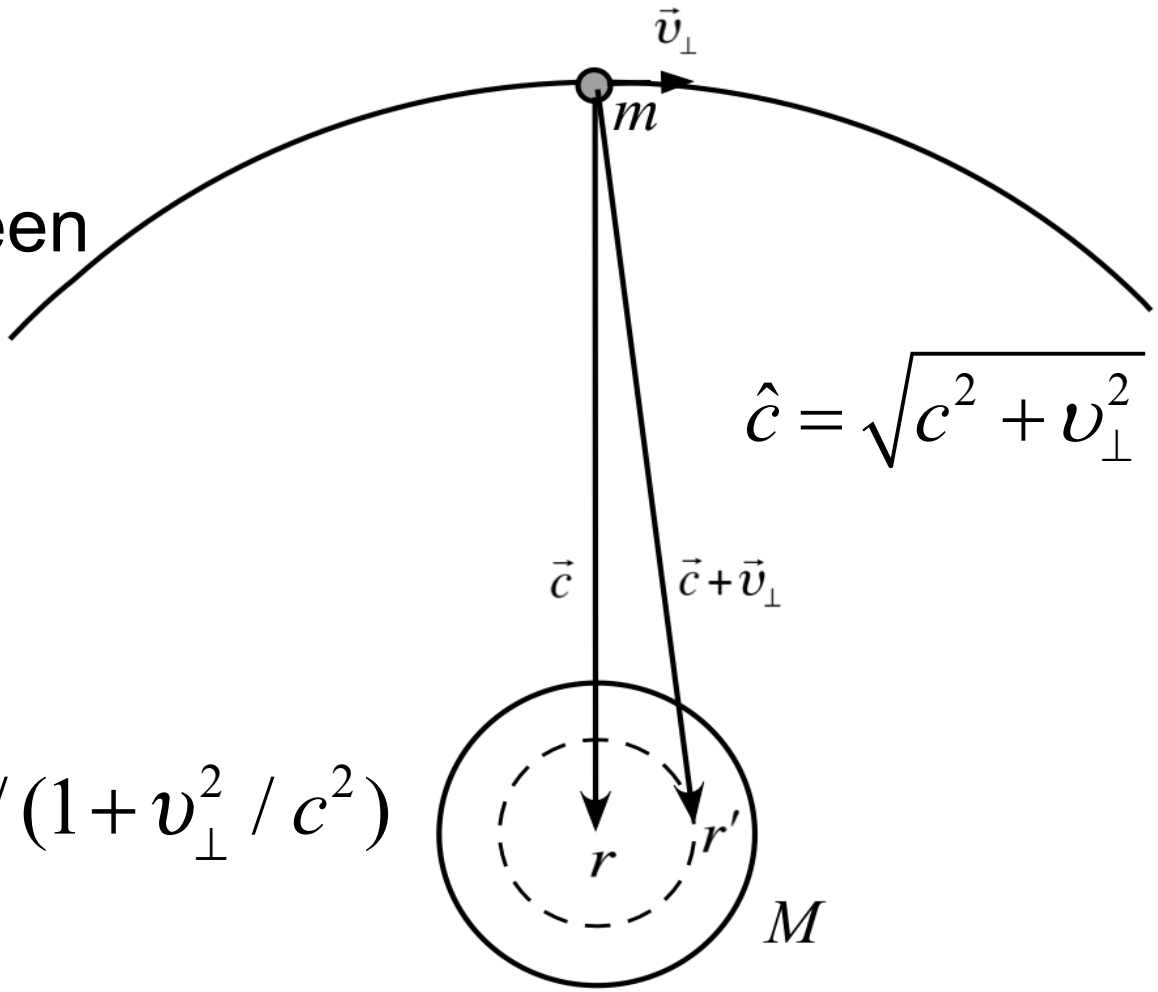
$$\mu(r,\,t) \cong m_0 \frac{r_{01}}{r}$$

$$U = -\frac{m_1}{m_P}\frac{\hbar c}{r} \rightarrow U = -G\frac{m_1}{r}, \qquad U = -G\frac{m_1 m_2}{r}$$

The interaction when a velocity is present

Inertons in the cloud travel faster than *c*, the relationship between these two times has to be as follows:

$$\sqrt{1+\upsilon_{\perp}^2/c^2}\,dt' = dt$$



$$r'^2 = r^2/(1+\upsilon_{\perp}^2/c^2)$$

Correlated Newton's Law

$$F = G\frac{Mm}{r'^2} \quad \rightarrow \quad F = G\frac{Mm}{r^2}(1+\upsilon_\perp^2/c^2)$$

$$U = -G\frac{Mm}{r}(1+\upsilon_\perp^2/c^2)$$

Putting the tangential velocity $\upsilon_\perp = r\dot{\varphi}$, we obtain:

$$U = -G\frac{Mm}{r}\cdot\left(1+\frac{r^2\dot{\varphi}^2}{c^2}\right)$$

Correlated Formula

The derived expression immediately opens the gateway to the solutions in the framework of the tessellattice such problems as

- the motion of Mercury's perihelion,
- the deflection of starlight by the Sun,
- the gravitational redshift of spectral lines,
- the Shapiro time delay effect.

Mercury's perihelion & deflection of starlight

$$I = m r^2 \dot{\varphi}$$

$$E = \tfrac{1}{2} m \dot{r}^2 + \tfrac{1}{2} m r^2 \dot{\varphi}^2 - G \frac{M m}{r} \cdot \left(1 + \frac{r^2 \dot{\varphi}^2}{c^2} \right)$$

$$\Delta\varphi = 6\pi G^2 M^2 / \hbar$$

$$I = m r^2 \dot{\varphi}$$

$$E = \tfrac{1}{2} m \dot{r}^2 + \tfrac{1}{2} m r^2 \dot{\varphi}^2 - G \frac{M m r \dot{\varphi}^2}{c^2}$$

$$\Delta\varphi \approx 4 \frac{G M}{c^2 r}$$

Red shift of spectral lines

Here we consider a mathematical pendulum where *l* and *m* are length and mass respectively; φ is the angle of the deviation

$$K = \tfrac{1}{2} m\, l^2 \dot{\varphi}^2$$

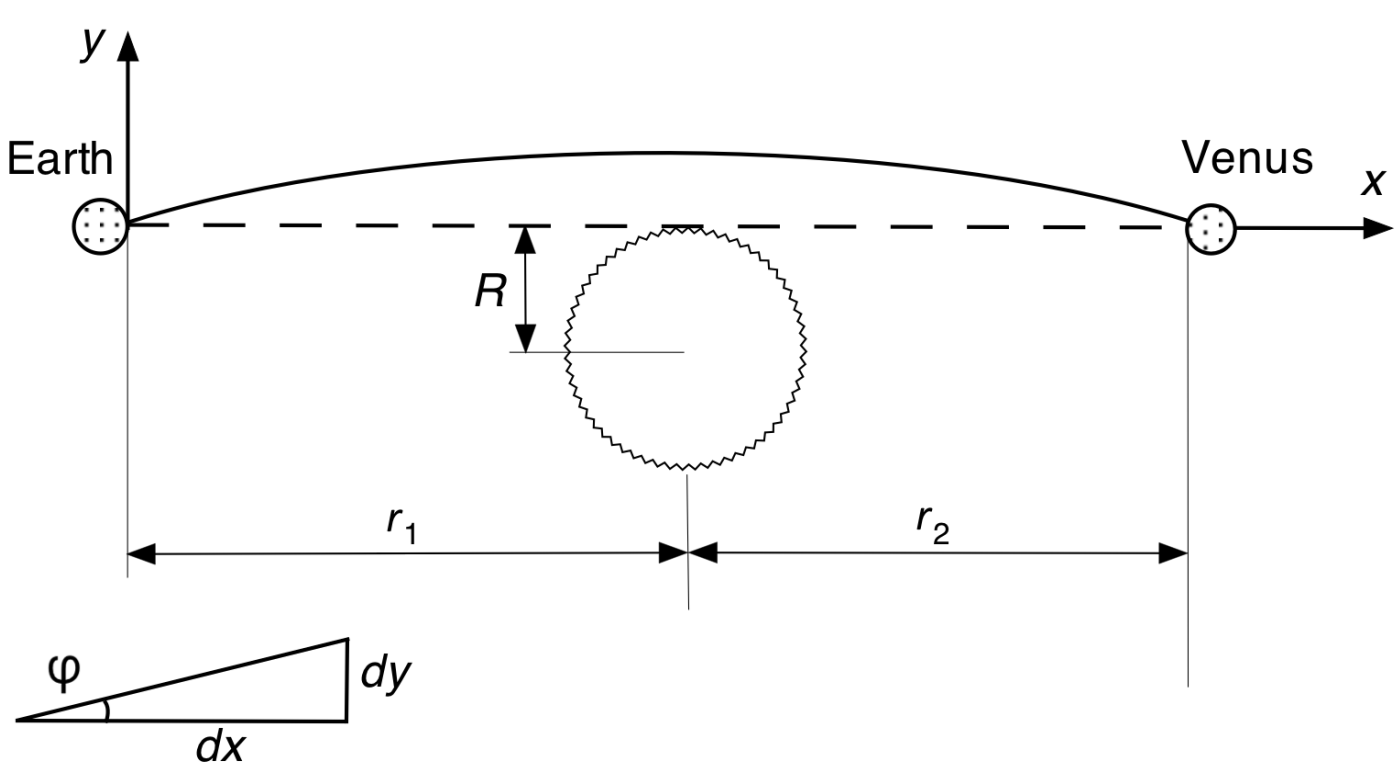
$$U = -G \frac{M m}{r + l \cdot (1 - \cos\varphi)} \cdot \left(1 + \frac{l^2 \dot{\varphi}^2}{c^2} \right)$$

$$\delta\nu \cong -\frac{G M}{c^2 r} \nu_0$$

The time delay effect

Time has to be treated as a natural parameter,

$$t = \int \frac{ds}{c}$$



Calculation of *t*

Following classical mathematics, namely, the variational procedure, we can calculate the value of *t.* The calculated time delay is $\delta t \approx 3.3 \times 10^{-11}$ s, which is 5 orders less than Shapiro's experimental result.

Since real space is organized as the tessellattice of topological balls, curvature of space can easily be illustrated by changes in the geometry of cells of the tessellattice around a massive object. In this case the proper time of photons becomes

The fractal contribution

$$t = \int \frac{ds}{c} = \int \frac{dx}{c} + \int \varphi \frac{dx}{c}, \qquad \Delta t = \int \varphi(x) \frac{dx}{c}$$

where $\varphi(x)$ is the angle of deflection. So, photons hopping from cell to cell run $N + \Delta N$ cells. Here, $N = 10^{46}$

An additional number of cells involved in the path due to the cells' fractal volumetric shrinking caused by the solar mass M and the interaction of photons with the gravitational field caused by this mass via the correction is $\Delta N = 10^{39}$, which corresponds to the experimentally revealed time $\Delta t = 2.5 \times 10^{-4}$ s.

Hendrick Casimir's effect

The shortest acoustic wave is associated with the edge of the Brillouin zone and it is this fundamental wave that is responsible for the formation of the shortest inerton wave in a solid:

$$\Lambda_1 = 2g\,c / \upsilon_{\text{sound}} \leq 1\ \mu\text{m}.$$

The attractive energy between the two plates studied:

$$\delta E / \mathcal{L}^2 = -\hbar c \frac{\pi^2}{24 \times 30} \cdot \frac{1}{a^3}$$

George Shpenkov's wave effects in the gravitational interaction

The wave gravitational radius was determined by Shpenkov as the value $\lambda\!\!\!^{-}_{g} = 3.274 \times 10^{11}$ m.

The roots of Bessel functions, which describe orbits of planets, are radii of stable shells:

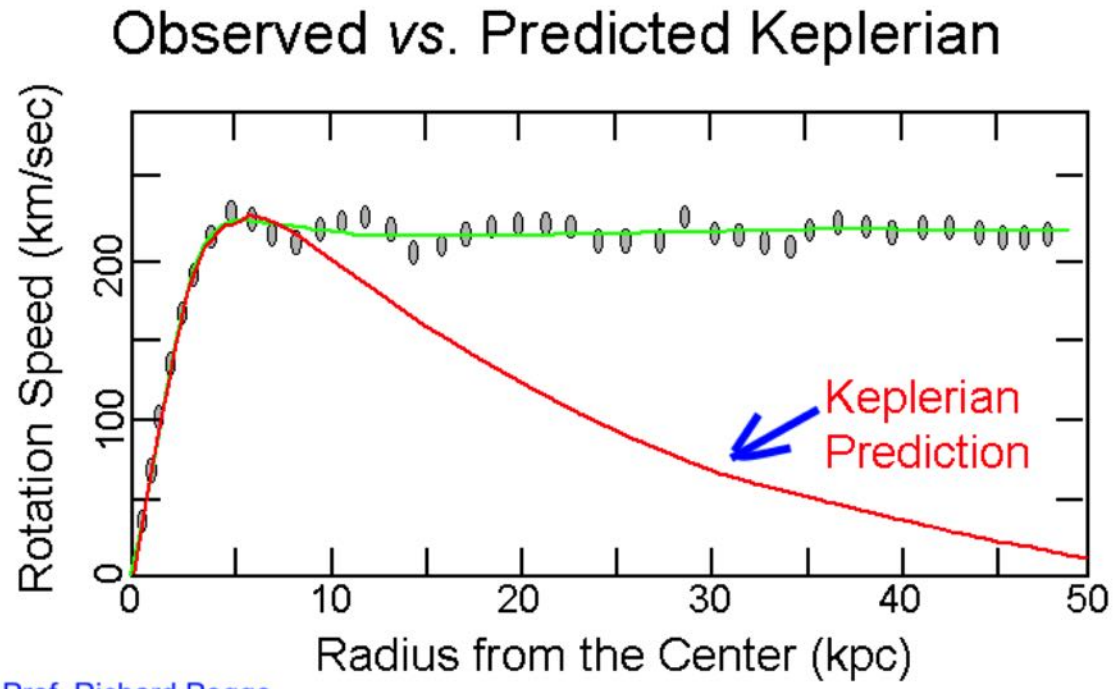
$$r = \lambda\!\!\!^{-}_{g} z_{m,n} = 3.274 \times 10^{11} \times z_{m,n} \text{ m.}$$

The fundamental inerton harmonic (the amplitude of the inerton cloud of the Sun / Earth):

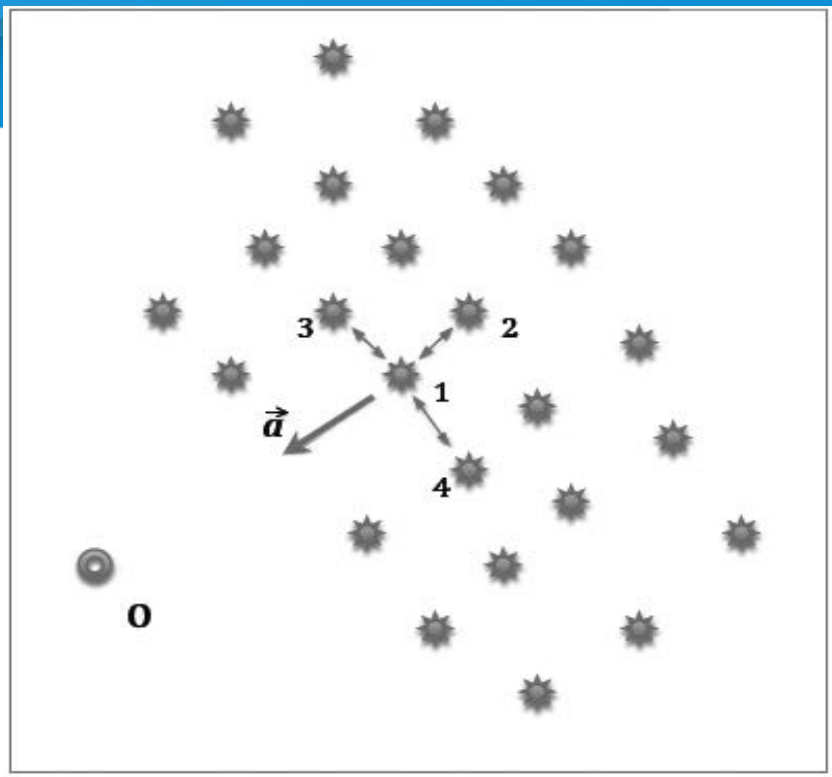
$$\Lambda = 2R_0 c / \upsilon$$

Dark Matter

The rotation curves of disc galaxies behave as flat: stars' orbital velocities $v \sim$ const, although in the classical case of Newton dynamics the curves have to follow a Keplerian law, $v \sim 1/\sqrt{r}$.



Dark Matter - solution



$$U^{\text{attract.}}(r) = -G\frac{M\,m}{R} - G\frac{m^2}{r}$$

$$U^{\text{elast.repul.}}(r) = \frac{1}{2}m\omega^2 r^2 + \frac{1}{2}mH_0^2 r^2$$

Conclusions:

- Mass *m* is a local deformation of space, which is defragmented at the motion;
- Moving/oscillating mass *m* is surrounded with its inerton cloud;
- Gravitational field of the mass *m* is induced by the mass' cloud of oscillating inertons;
- Inertons are able to significantly influence chemical physical reactions and allow a direct measurement.

THANKS

for your attention