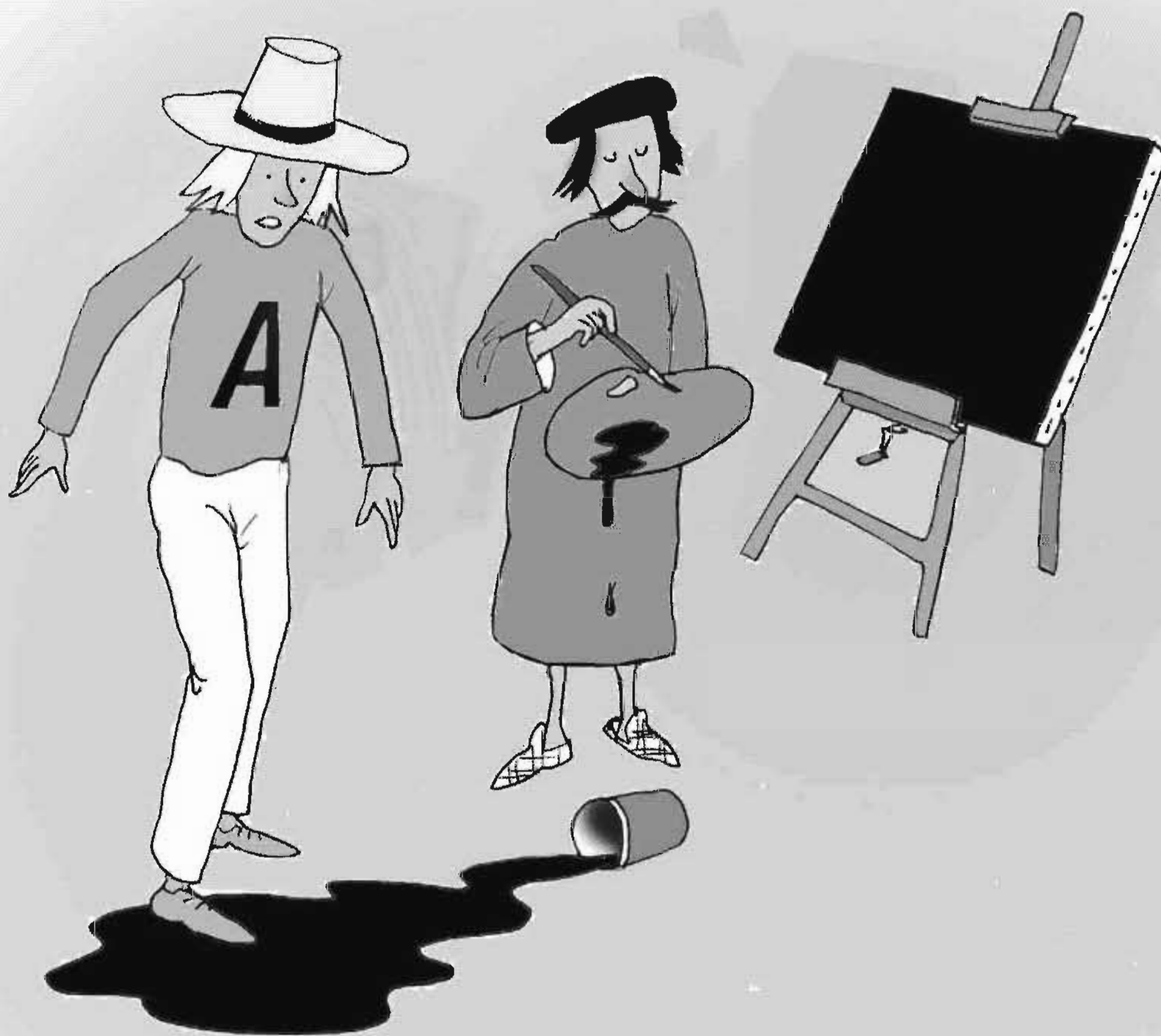


Jean-Pierre Petit

JANUS MODEL

versus

BLACK SCIENCE



2023

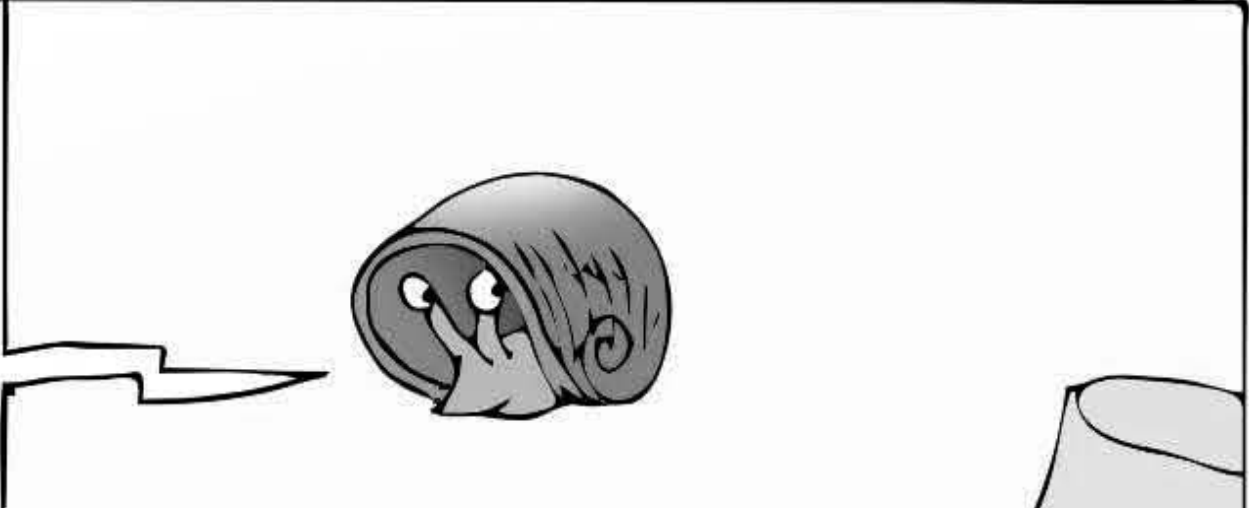
PROLOG



The fog is beginning to lift.

We can see more clearly.

If you ask me, I think the boss has reactivated us.

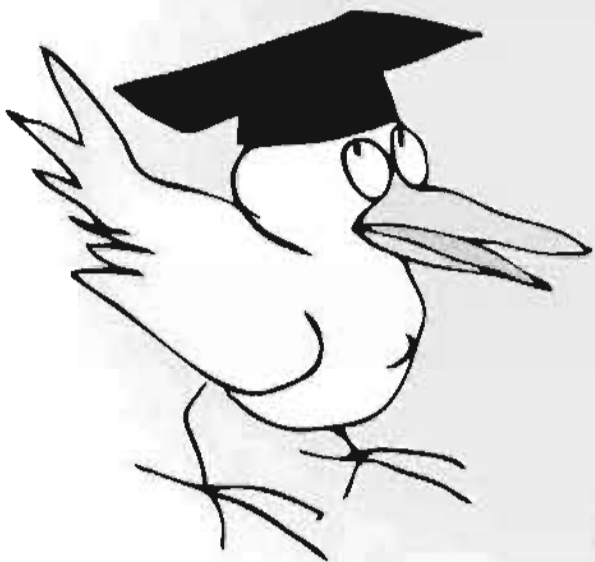
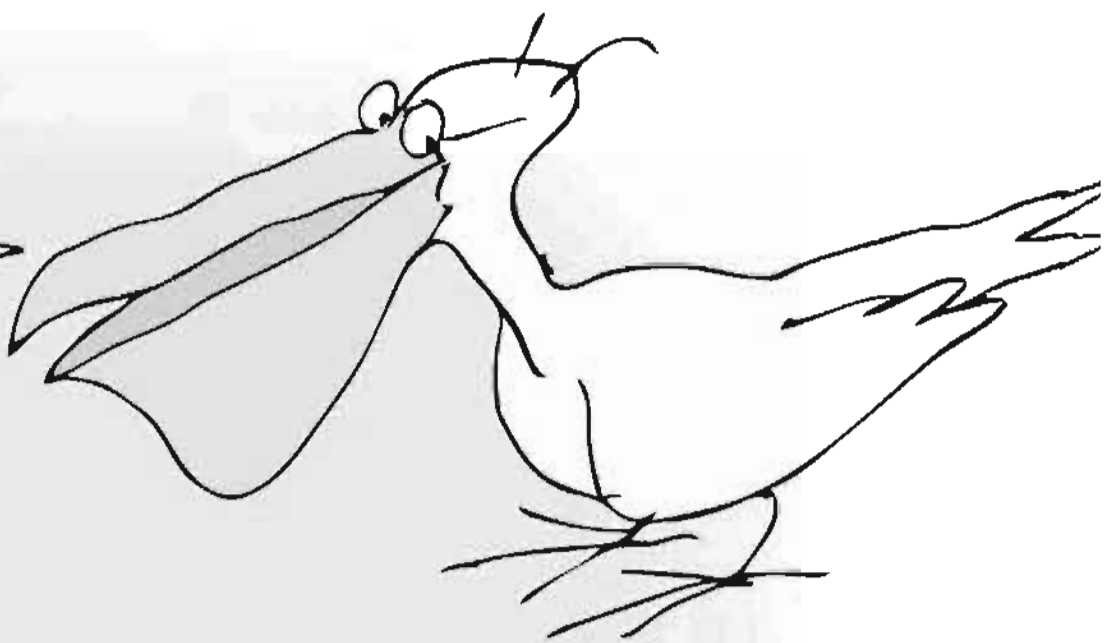


After so many years spent in the pages of the same albums!

New adventures at last!

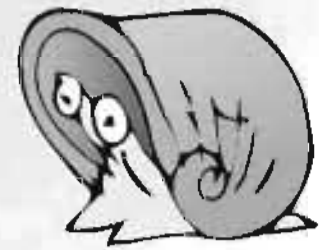


This means that the publisher has decided to publish a new album.

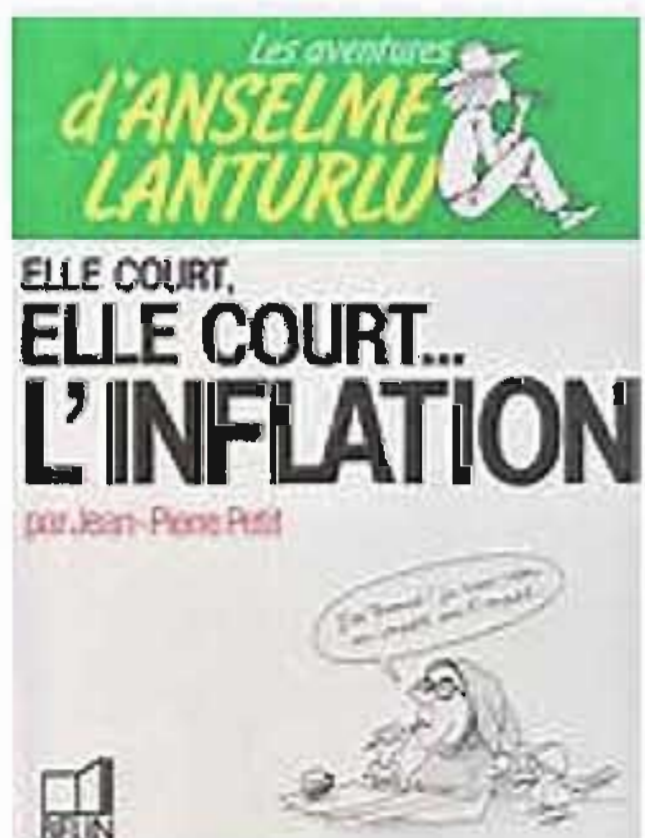
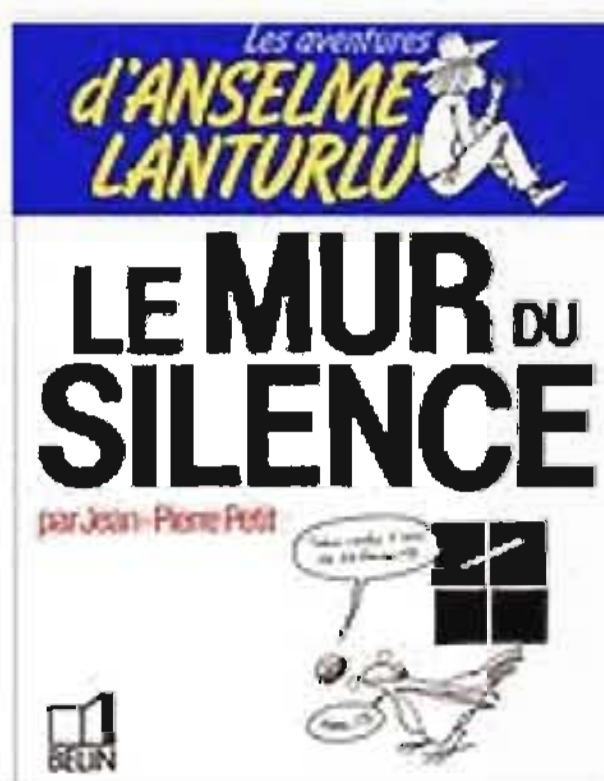
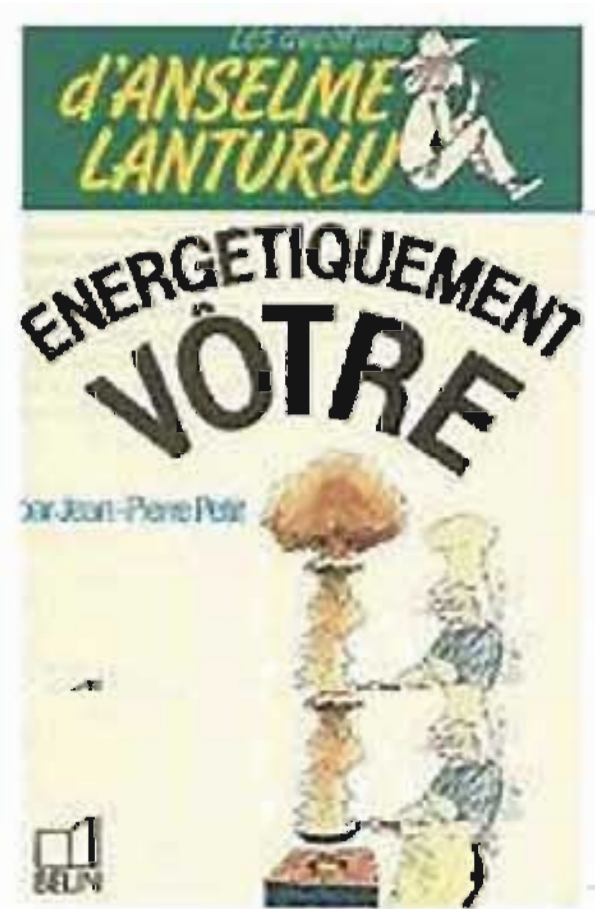
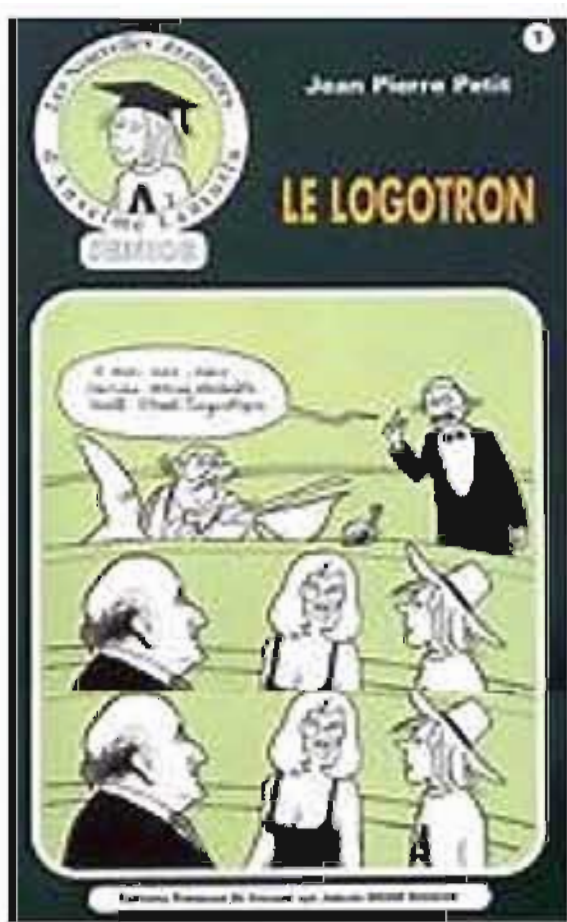
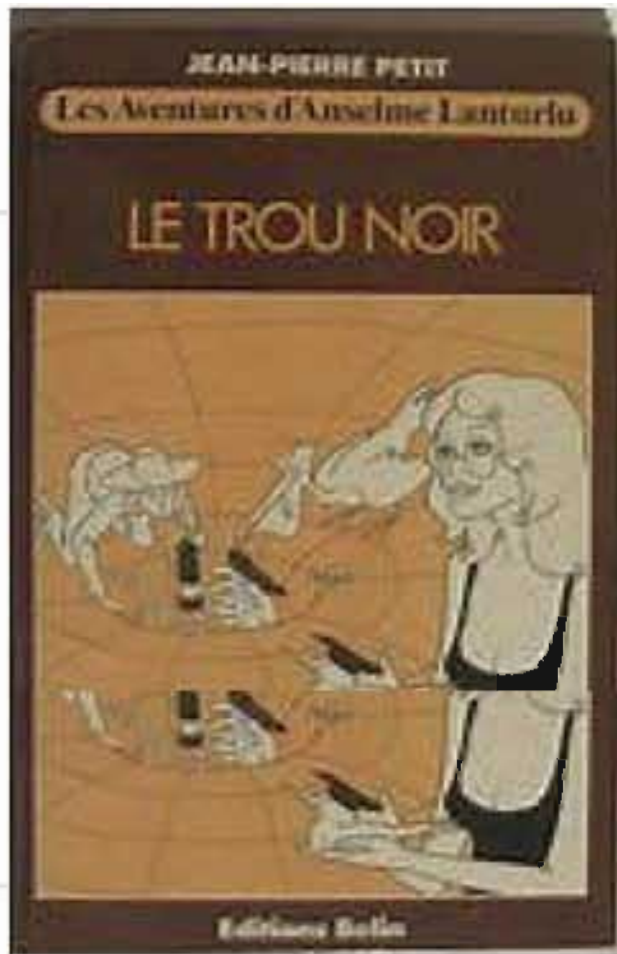


No publisher left

He never liked us anyway.



Has the collection disappeared?
In the form of books printed on paper, yes.
So we're nowhere to be found!





On the contrary, it has millions of readers in every country, and we've been translated into forty languages.

What about the boss?



As active as ever. He says only that he's been too busy with his work to produce new albums.



And Sophie!?



She says she's on her way.



So, what's the theme now?

Let's have a look...

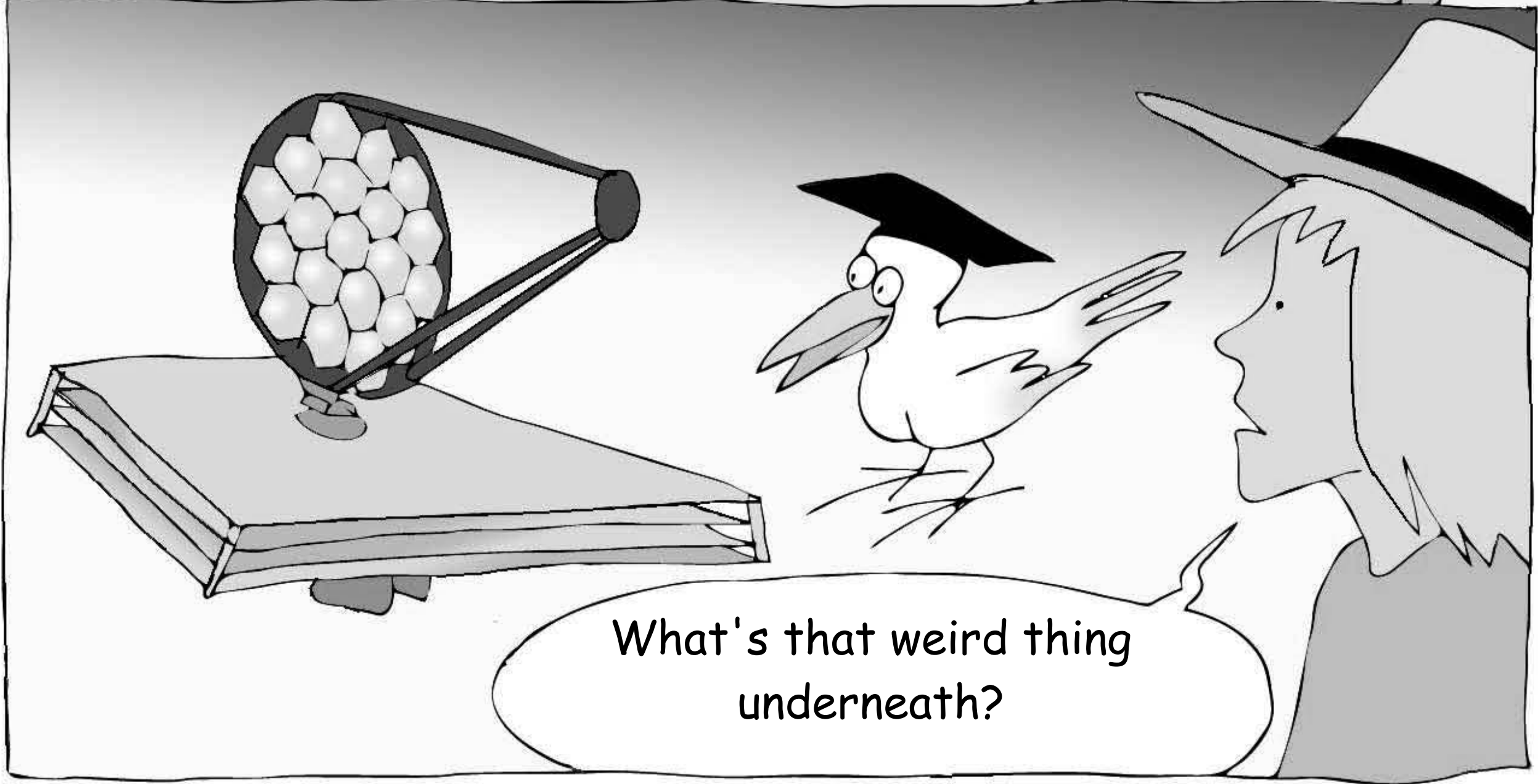
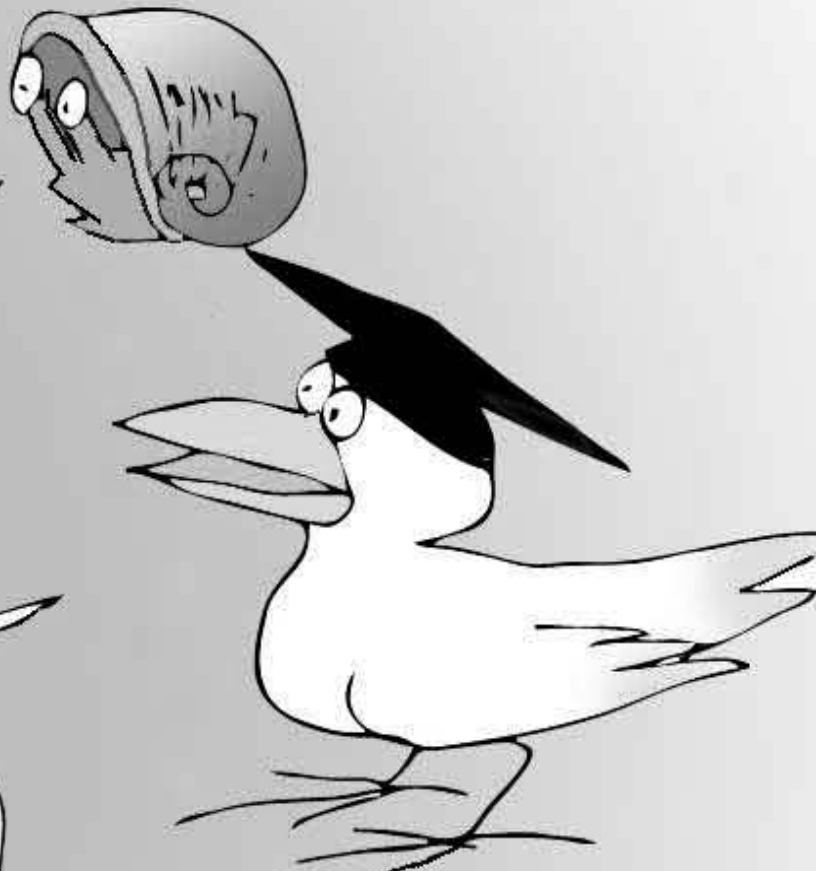


Come in, come in, come and see Science live. In a few minutes, the first images from the James Webb Space Telescope.

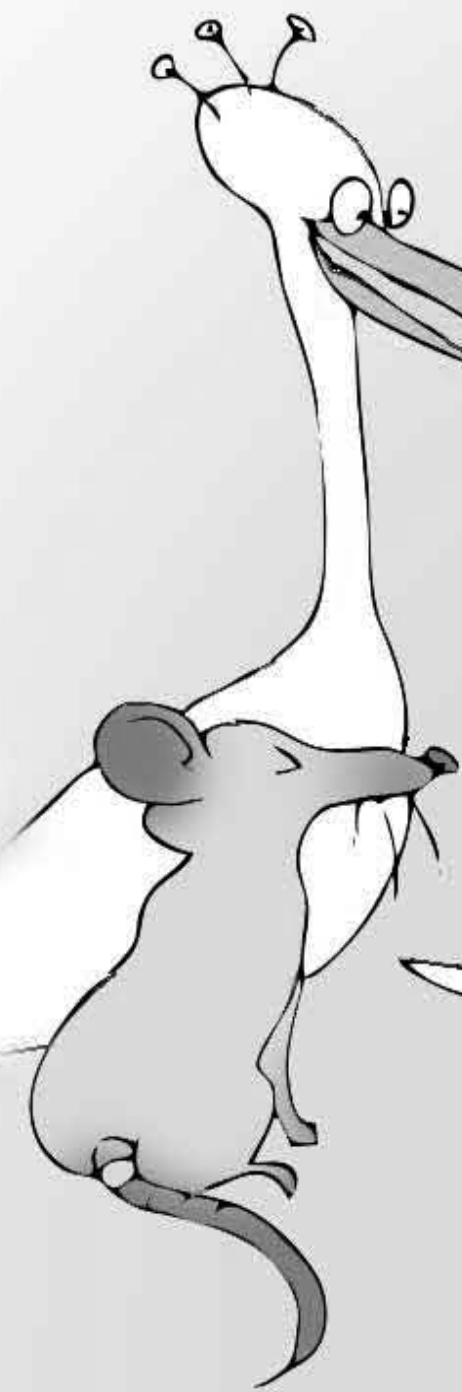
They put a telescope into space!?

As I understand it, this isn't the first. In 1990, there was already the Hubble Space Telescope.

We'll have to get up to speed.



What's that weird thing underneath?



After an absence of several decades, your knowledge needs a serious dusting!

A lot has been discovered since then.

What, for example?

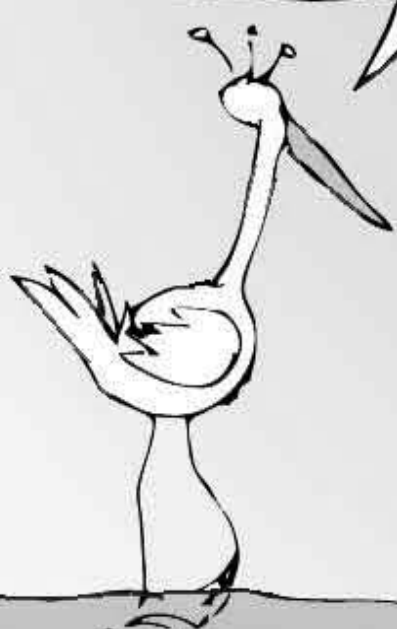


During the first 10^{-33} seconds, the universe underwent an expansion of 10^{30} , due to particles called INFLATONS.

What are INFLATONS?

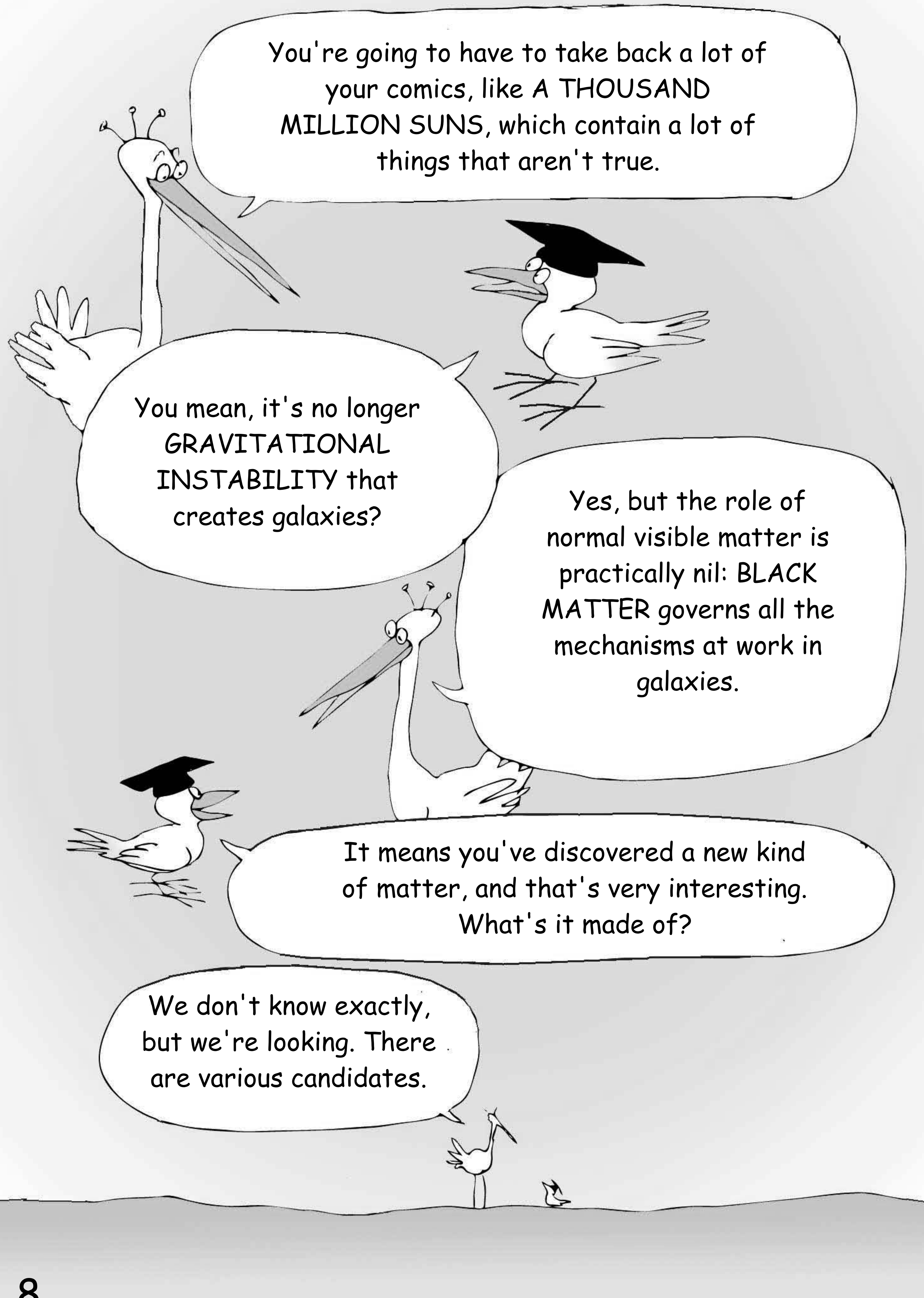


Well, it's these particles that create this inflationary field, responsible for the fantastic primordial expansion that the Universe is undergoing.



Ah well...





You're going to have to take back a lot of your comics, like **A THOUSAND MILLION SUNS**, which contain a lot of things that aren't true.

You mean, it's no longer **GRAVITATIONAL INSTABILITY** that creates galaxies?

Yes, but the role of normal visible matter is practically nil: **BLACK MATTER** governs all the mechanisms at work in galaxies.

It means you've discovered a new kind of matter, and that's very interesting. What's it made of?

We don't know exactly, but we're looking. There are various candidates.



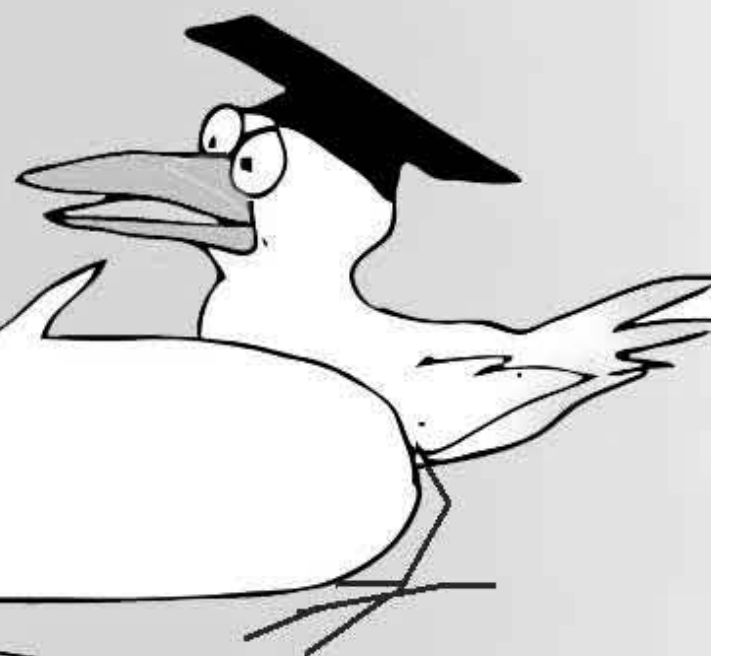
How can we talk about things we know nothing about?



We have a number of people who do this very well now; just use the conditional and say 'if this... if that...'



The conditional sells very well. It's the froth of things, so to speak. Harvey Kiss, here's my card.



What does he always carry with him?

This is the key to his success: a shoe-shine kit. He represents a major popularization magazine.

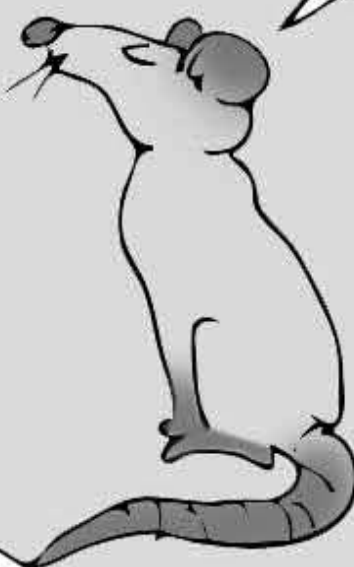
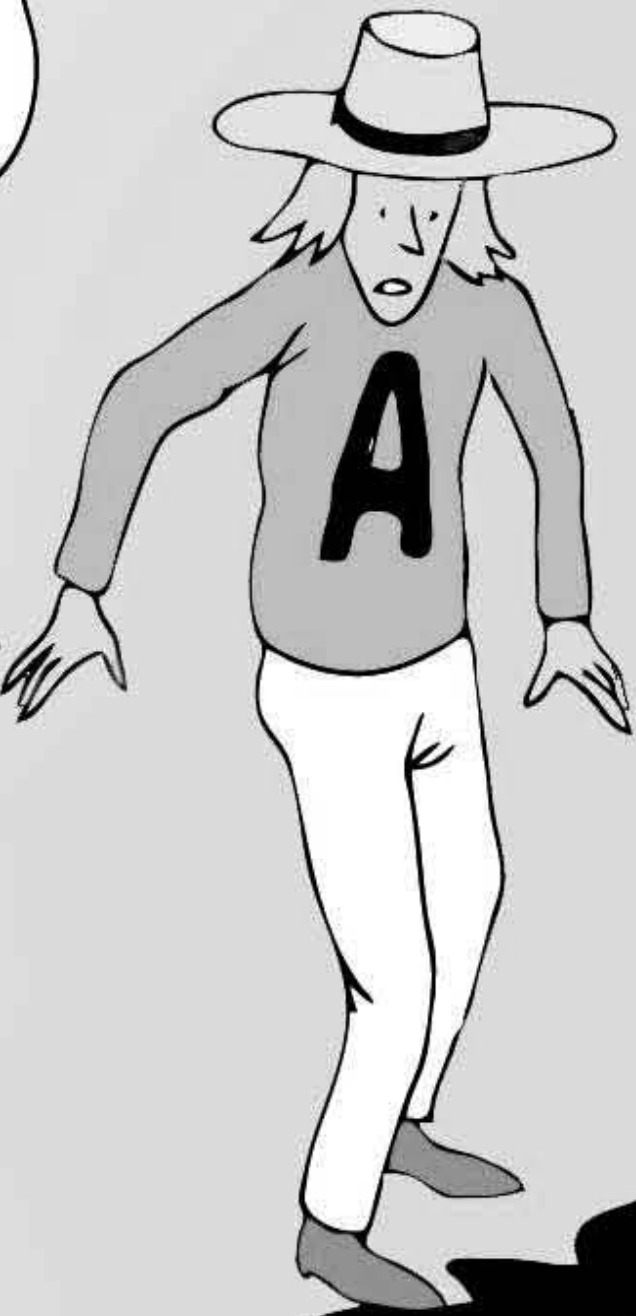


Science is just another kitchen.





As a complement, we have artist's images.

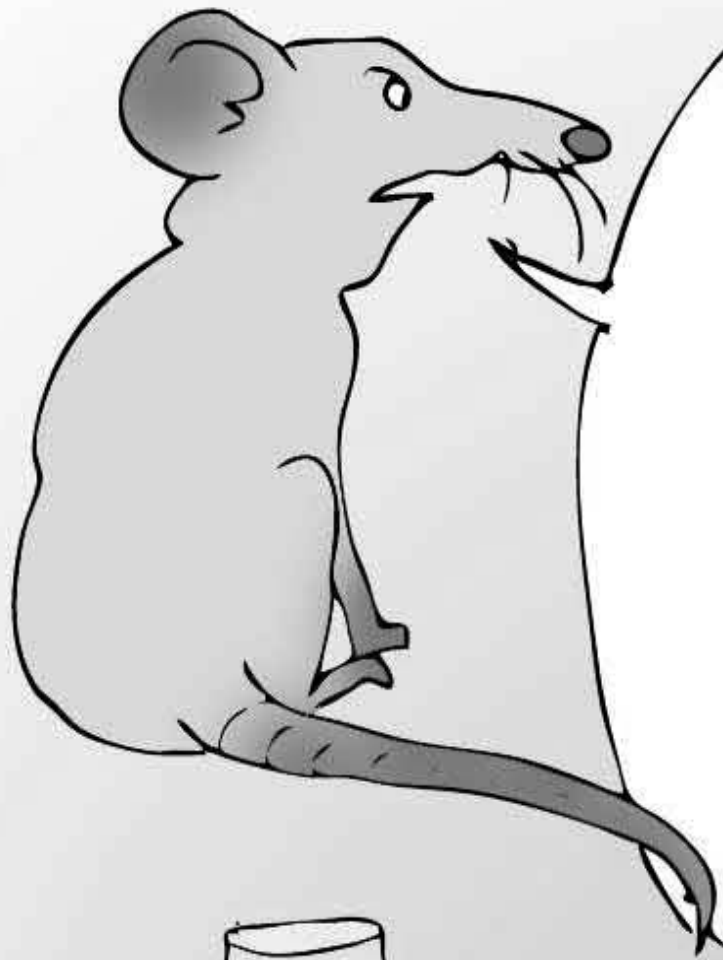


It's all right! It's good luck.

BIG BANG and COSMIC STORY also need to be revisited, as they fail to capture this fantastic discovery of the acceleration of cosmic expansion.



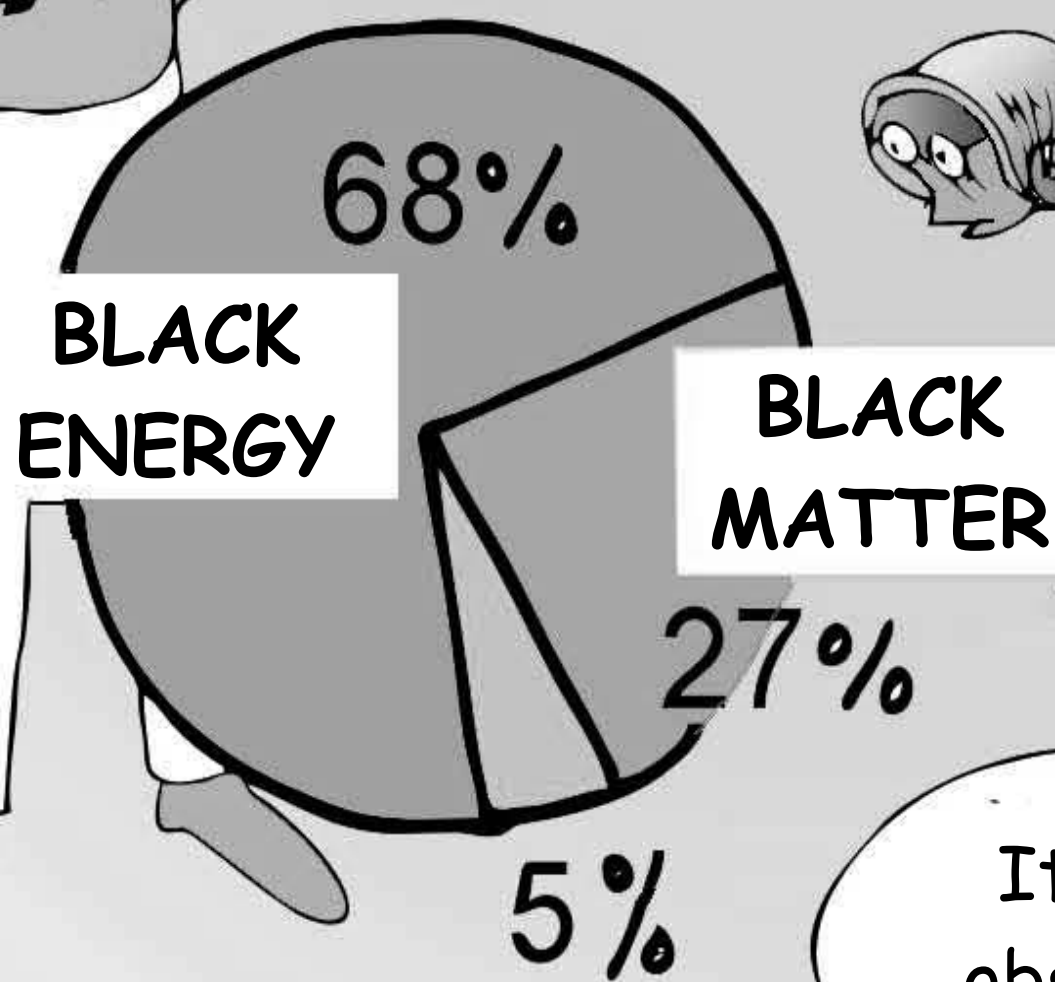
Which is due to what?



What causes the ACCELERATION of COSMIC EXPANSION is BLACK ENERGY. Converted into matter equivalents according to $E = mc^2$, it represents 68% of the content of the Cosmos, while BLACK MATTER represents only 27%.



According to all this, classic, visible matter represents only five percent of the whole!



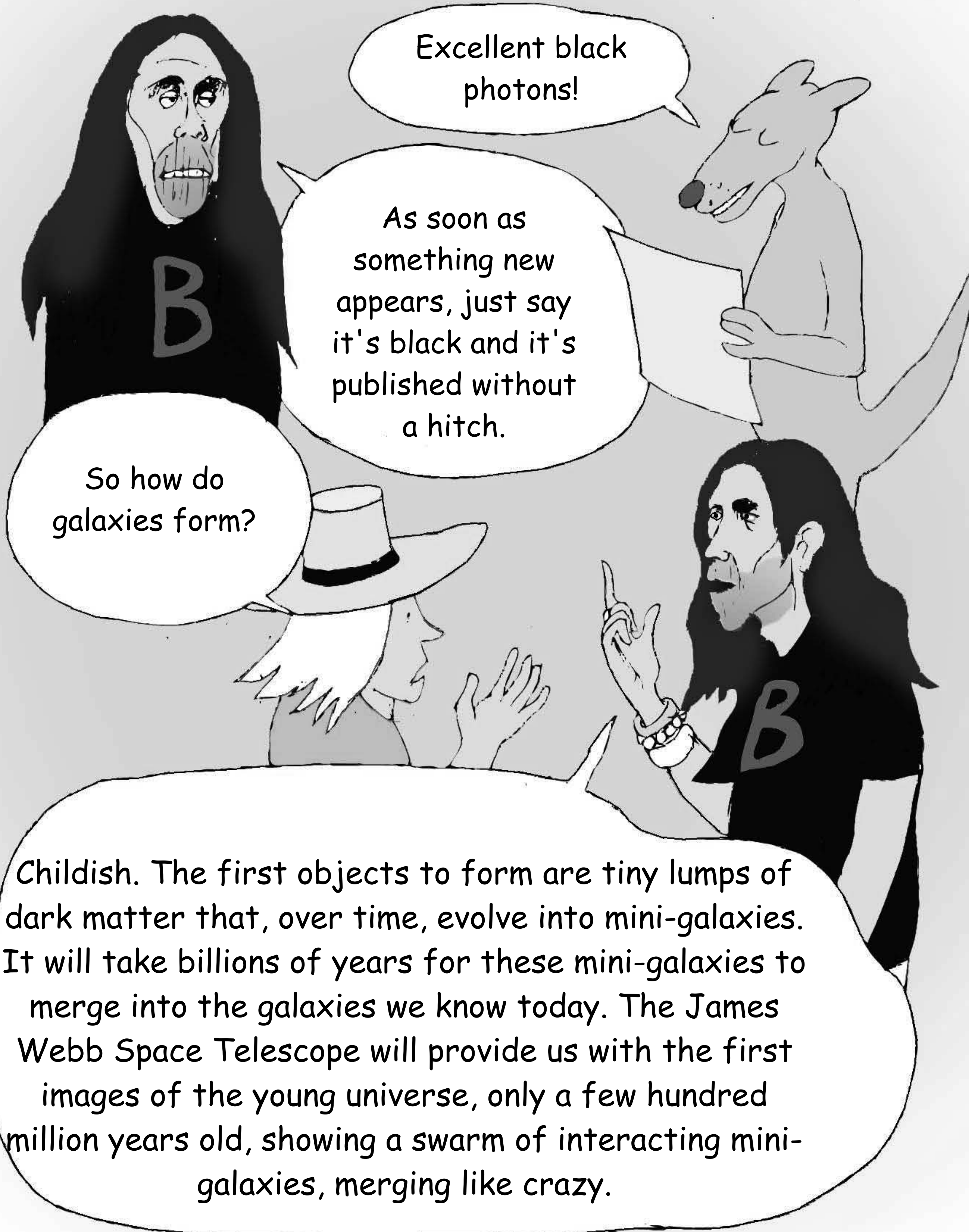
So what's the point of this negligible ordinary matter?

It provides observations.

We thought things would become clearer with time. But all these explanations are quite obscure.



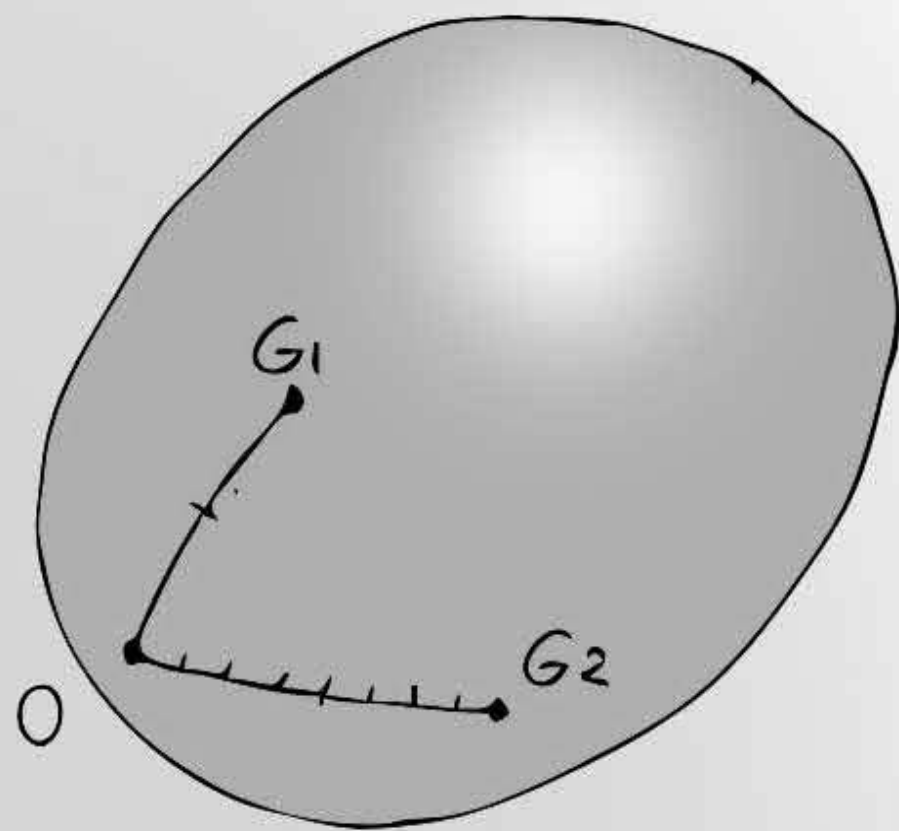
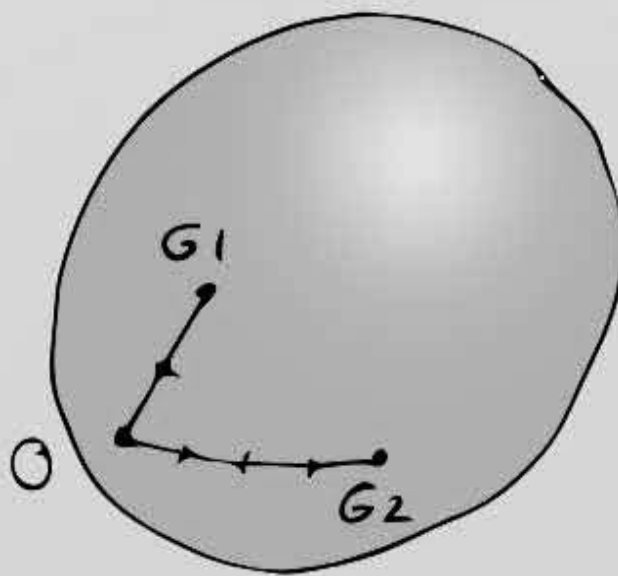
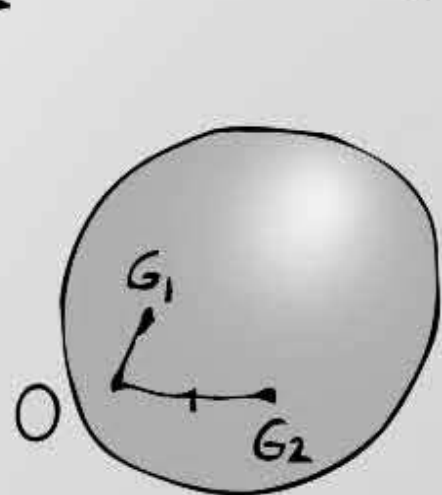
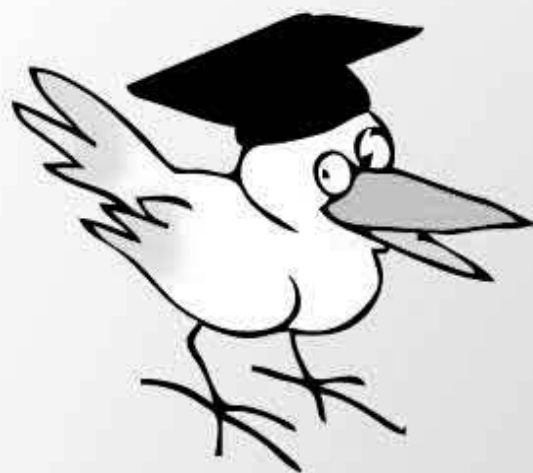
BLACK SCIENCE



Childish. The first objects to form are tiny lumps of dark matter that, over time, evolve into mini-galaxies. It will take billions of years for these mini-galaxies to merge into the galaxies we know today. The James Webb Space Telescope will provide us with the first images of the young universe, only a few hundred million years old, showing a swarm of interacting mini-galaxies, merging like crazy.

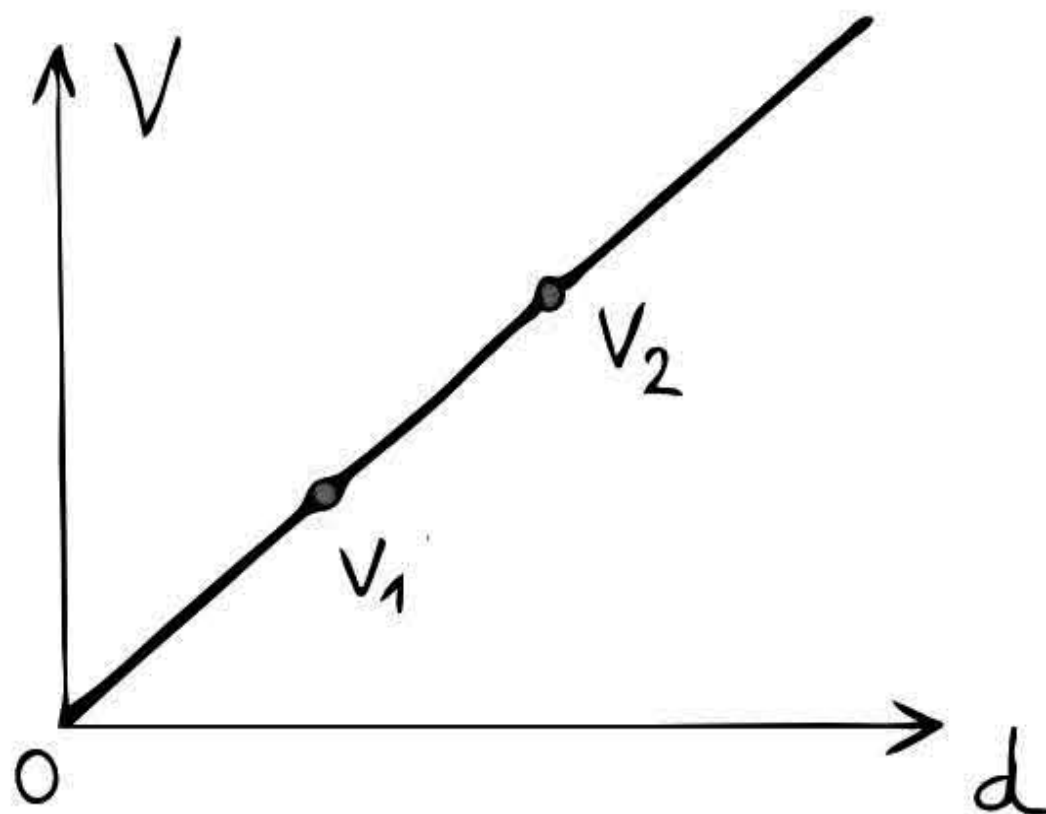
Why JWST?

The universe is expanding. In 1929, Edwin Hubble demonstrated the runaway motion of galaxies.



The most telling image is that of an inflated balloon.

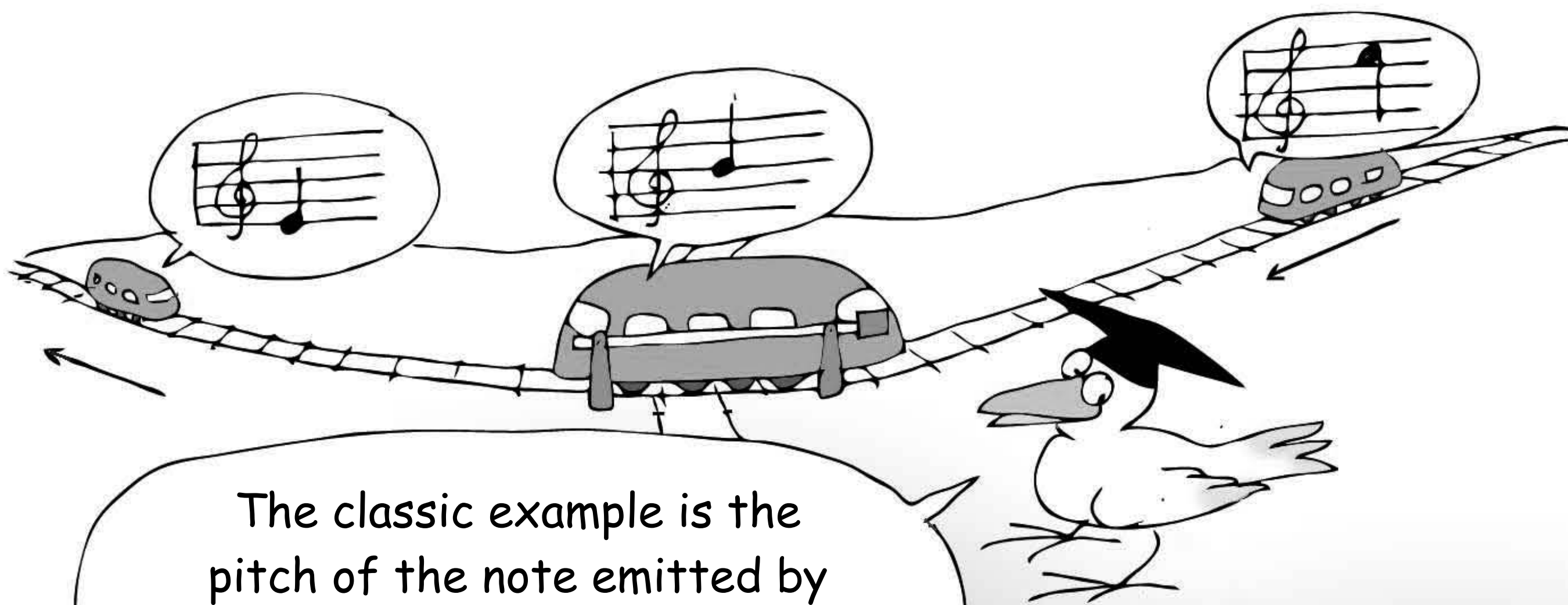
On the balloon, from an observer's point of view, the distance to galaxy G_2 is double the distance to galaxy G_1 . In an interval of time, distance OG_2 becomes 4, while distance OG_1 becomes 2. This means that the speed at which G_2 moves away will be twice that of G_1 .
Direction.



More generally, the escape velocity is proportional to the distance of the galaxy object: this is HUBBLE'S LAW.

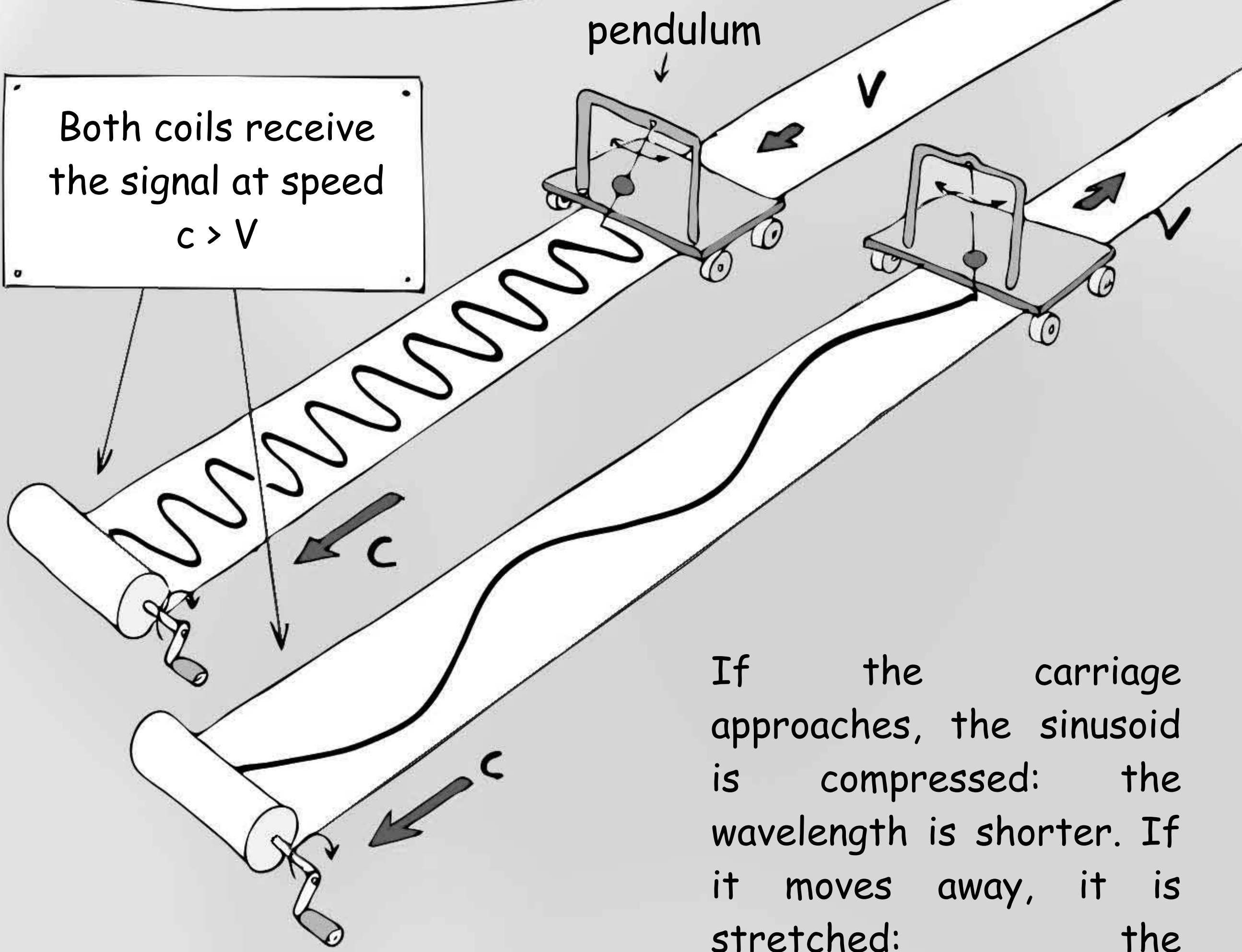


THE DOPPLER EFFECT



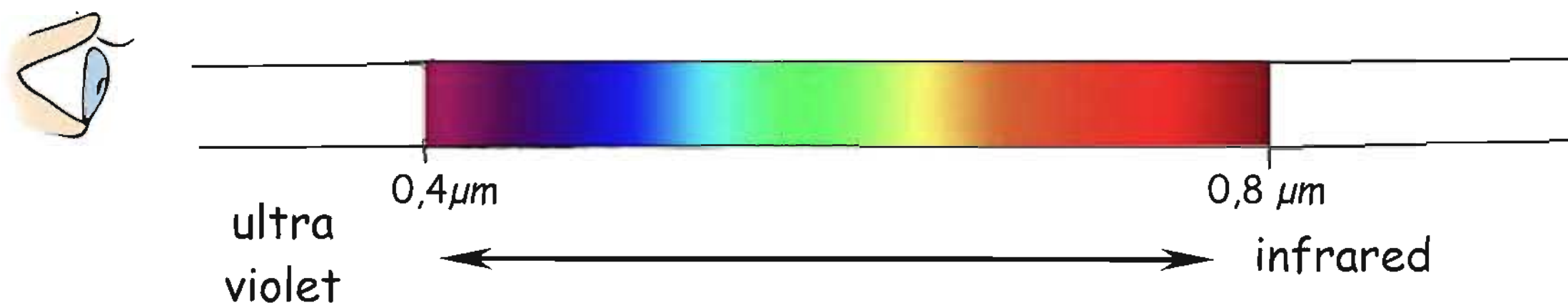
The classic example is the pitch of the note emitted by a train, higher as it approaches and lower as it moves away.

Both coils receive the signal at speed $c > v$



If the carriage approaches, the sinusoid is compressed: the wavelength is shorter. If it moves away, it is stretched: the wavelength is longer.

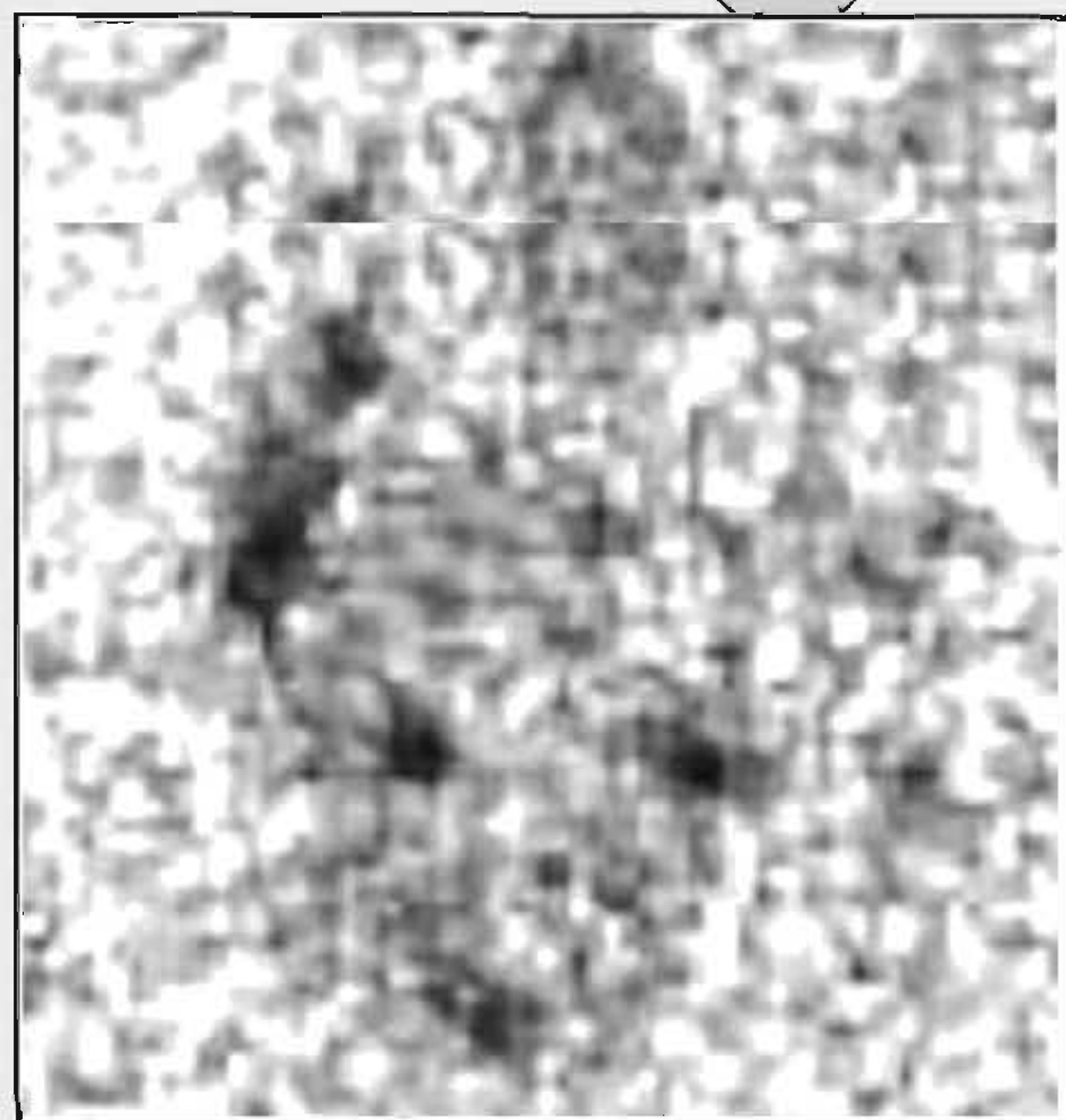
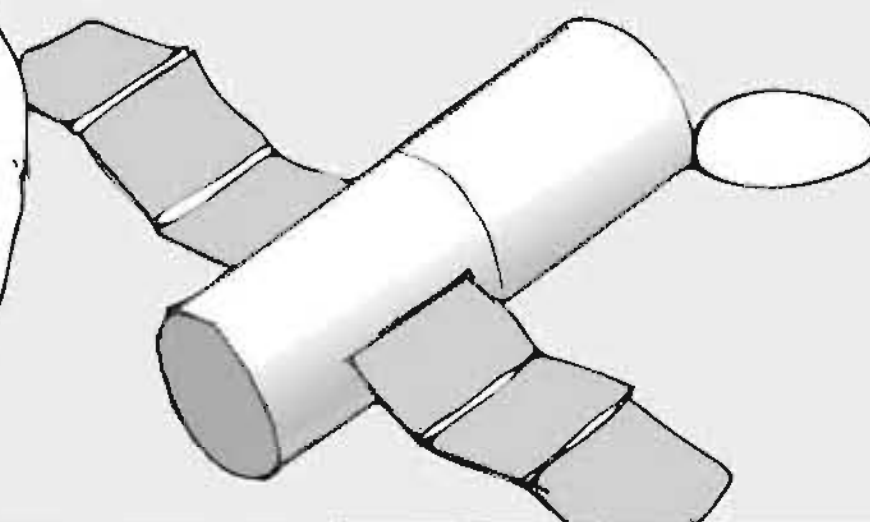
The human eye does not perceive light wavelengths longer than 0.8 microns.



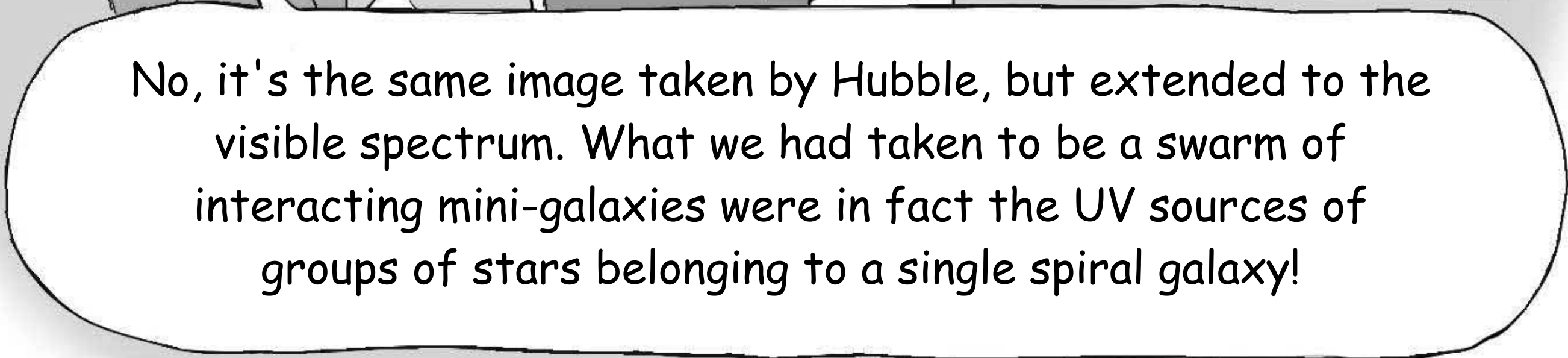
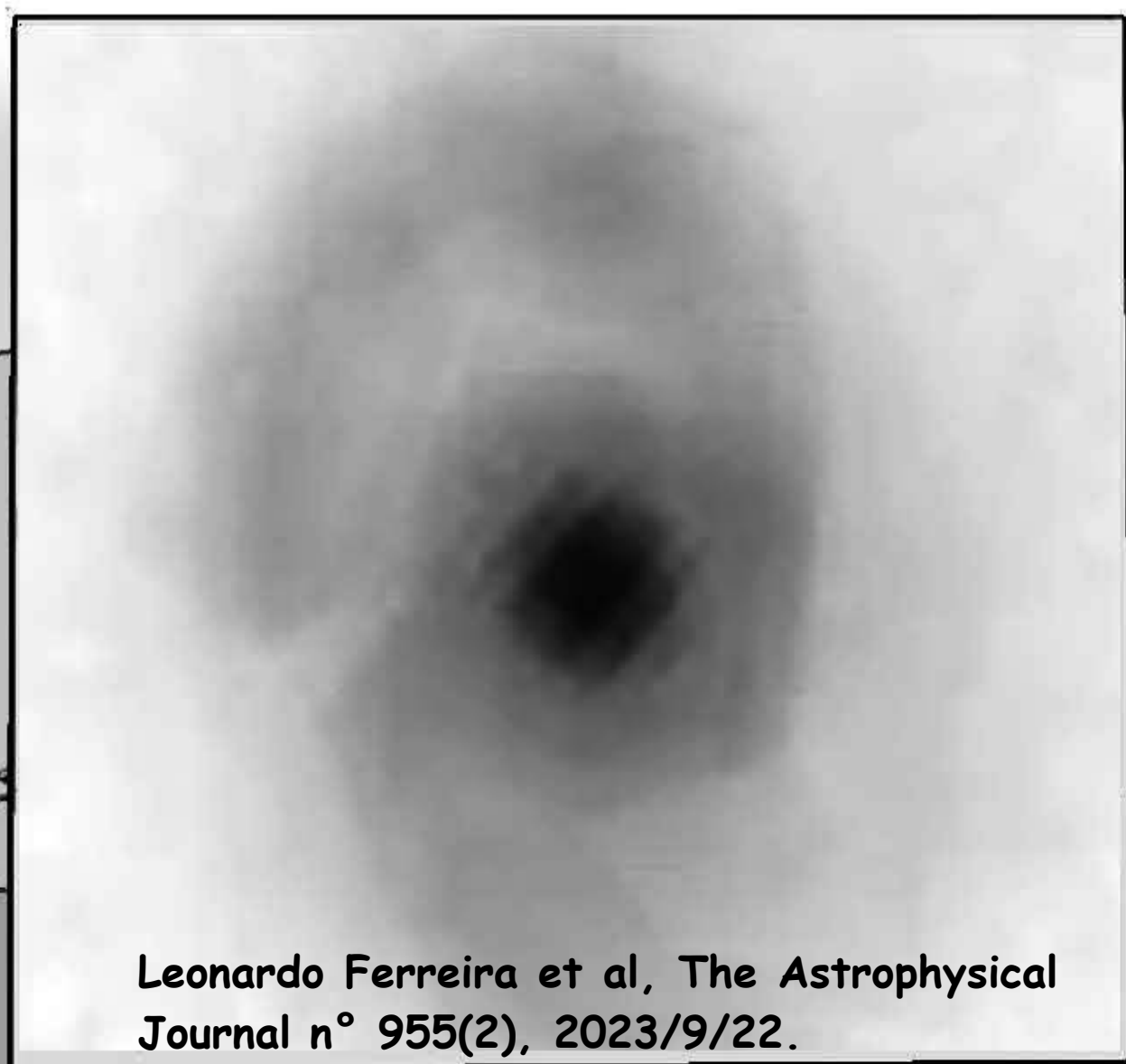
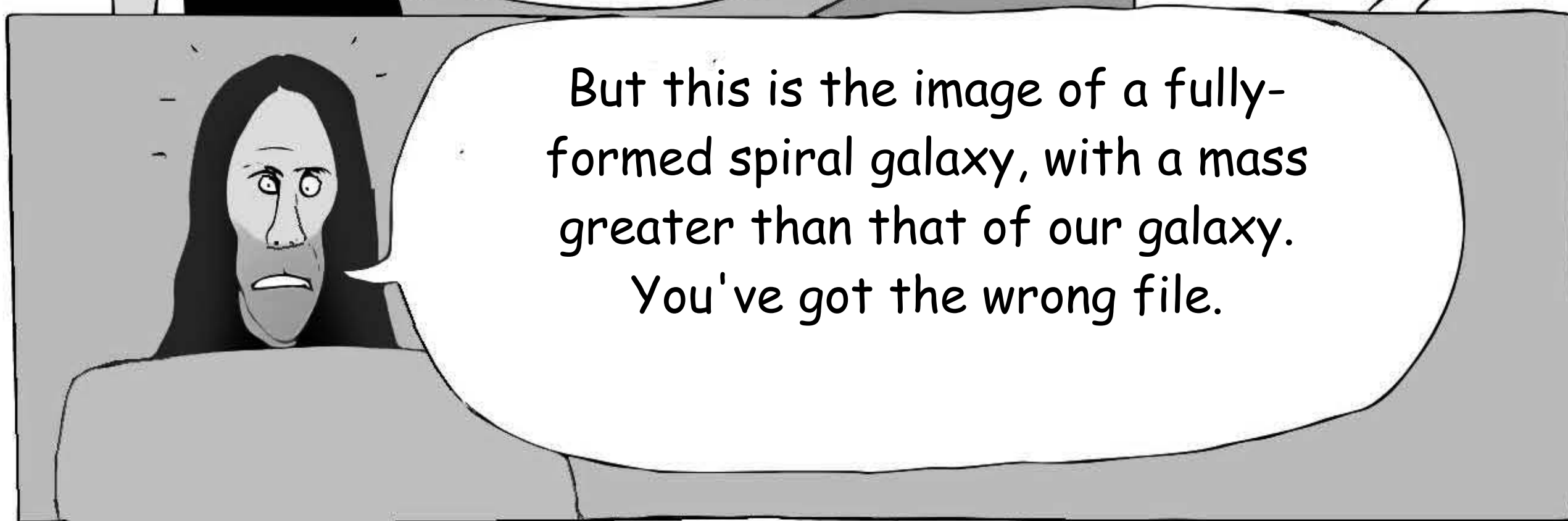
The Hubble Space Telescope was equipped with infrared-sensitive instruments down to a wavelength of 1.7 microns, enabling it to obtain images of galaxies 2 billion light-years away in the visible-light range. This distance could be extended to 8 billion light-years if the infrared images corresponded to UV sources emitted by groups of young stars.

Direction

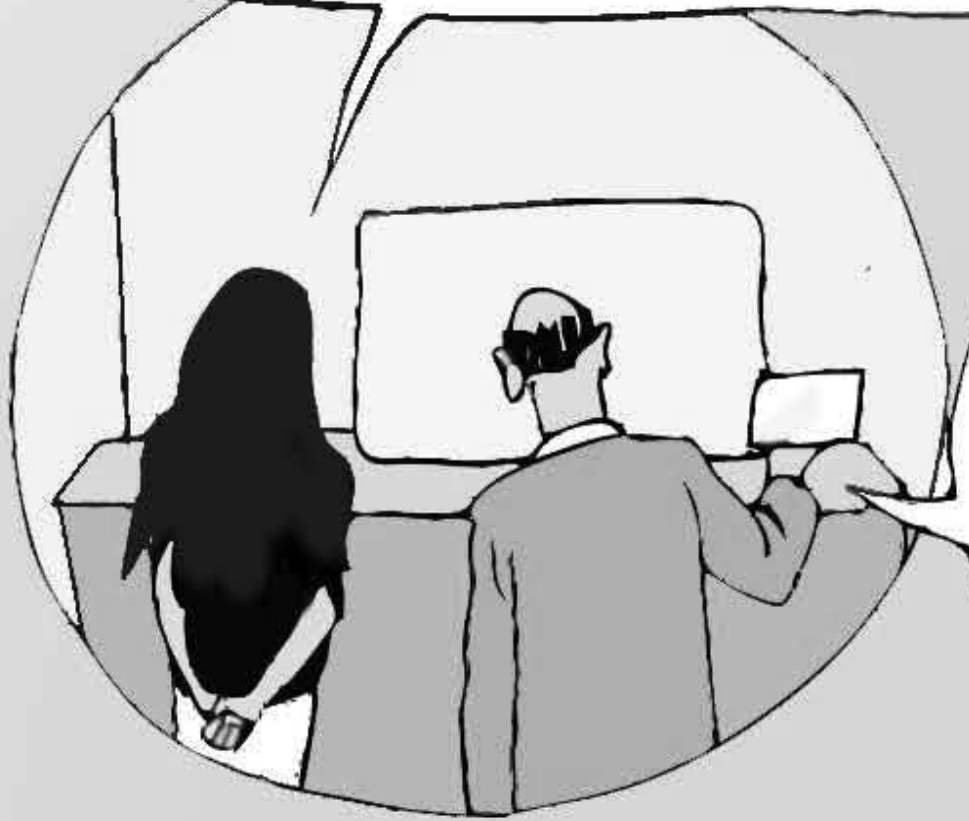
Images of UV sources led astronomers to believe that they represented a collection of mini-galaxies.



Leonardo Ferreira et al, The Astrophysical Journal n° 955(2), 2023/9/22.



This snapshot shows the state of the Universe when it was only 500 million years old. No galaxy can form that quickly. Yet this one already contains relatively old stars. There is no model that could produce this.



That's not what the simulations showed at all. We had a large number of mini-galaxies merging at a high rate.



I have a feeling that our **BLACK SCIENCE** champions are in trouble.

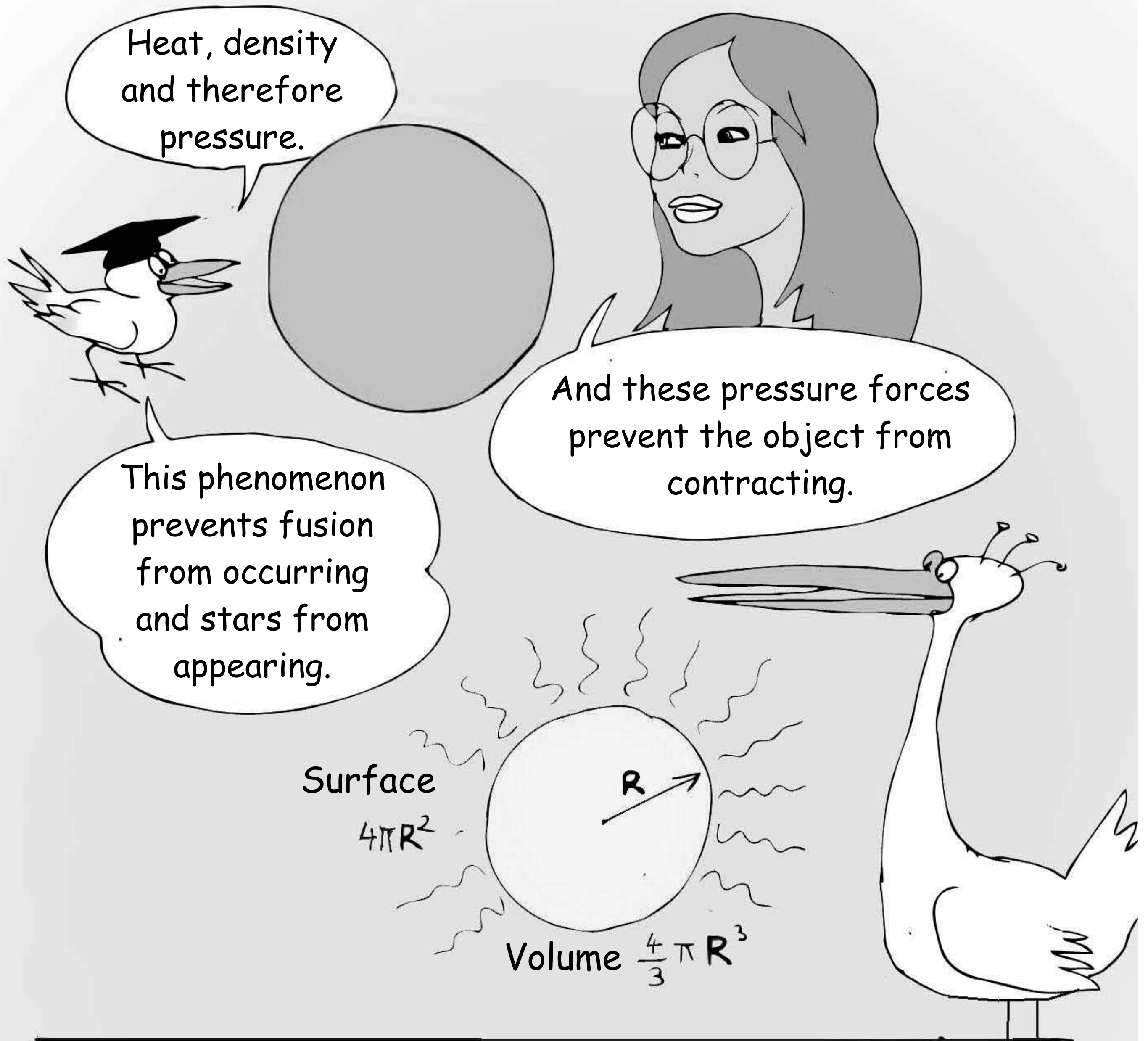


When objects form, this means that **GRAVITATIONAL INSTABILITY(*)** causes masses m to rush towards each other, acquiring velocity V and therefore **KINETIC ENERGY:**

$$\frac{1}{2} m V^2$$

And this gravitational energy will be transformed into **HEAT**.

(*) See the comic strip **A THOUSAND MILLION SUNS**



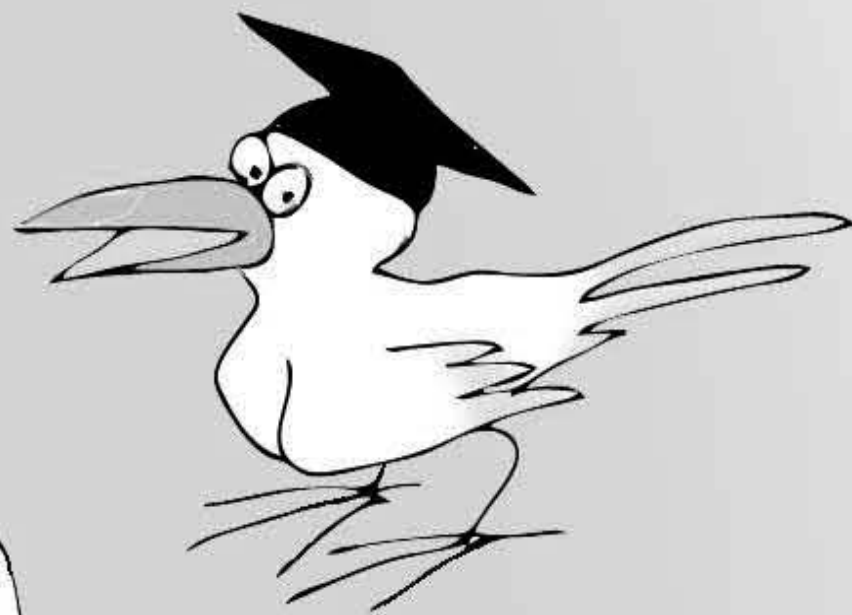
The only way for these objects to dissipate this heat is to emit infrared, or thermal, radiation from their surface. The larger the object, the more energy it needs to evacuate, which increases with volume, i.e. with the cube of the object's radius R . But the surface area of the "radiator" increases with the square of this radius. But the surface area of the "radiator" grows as the square of this radius. Smaller objects therefore move faster than larger ones.

Direction

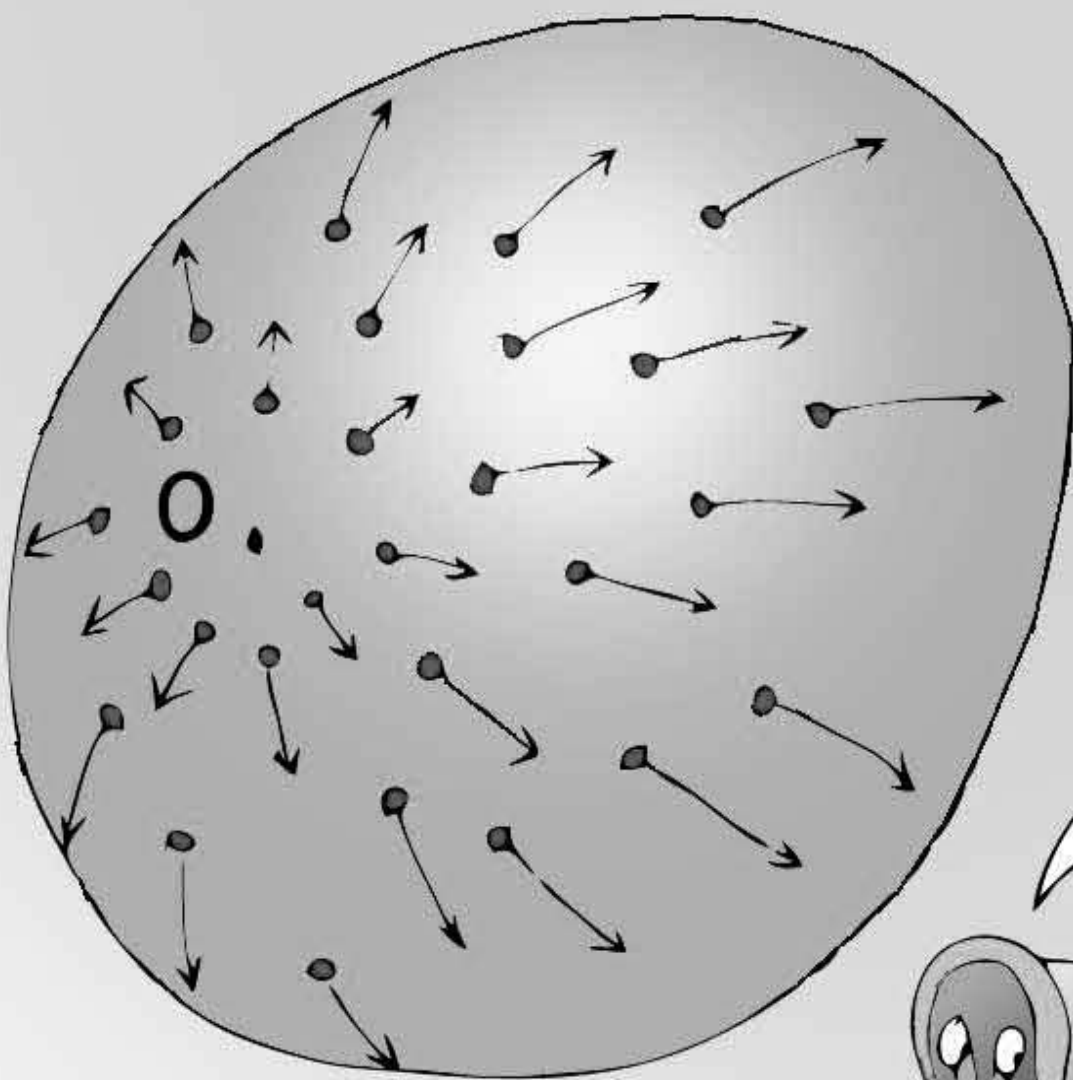


This is why, whatever the parameters we give to **BLACK MATTER**, of **POSITIVE MASS**, we'll never be able to produce a model that accounts for the complete formation of galaxies for billions of years.

But the heroes of this **BLACK SCIENCE** have already experienced serious setbacks of a different kind in 2017!



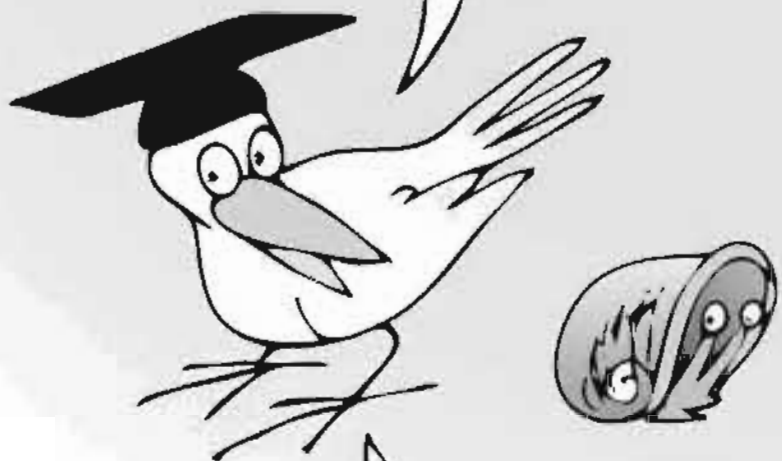
THE DIPOLE REPELLER



An immobile observer sees the galaxies fleeing from him with a speed proportional to their distance, if these galaxies, also immobile in space, are like confetti stuck on the balloon.

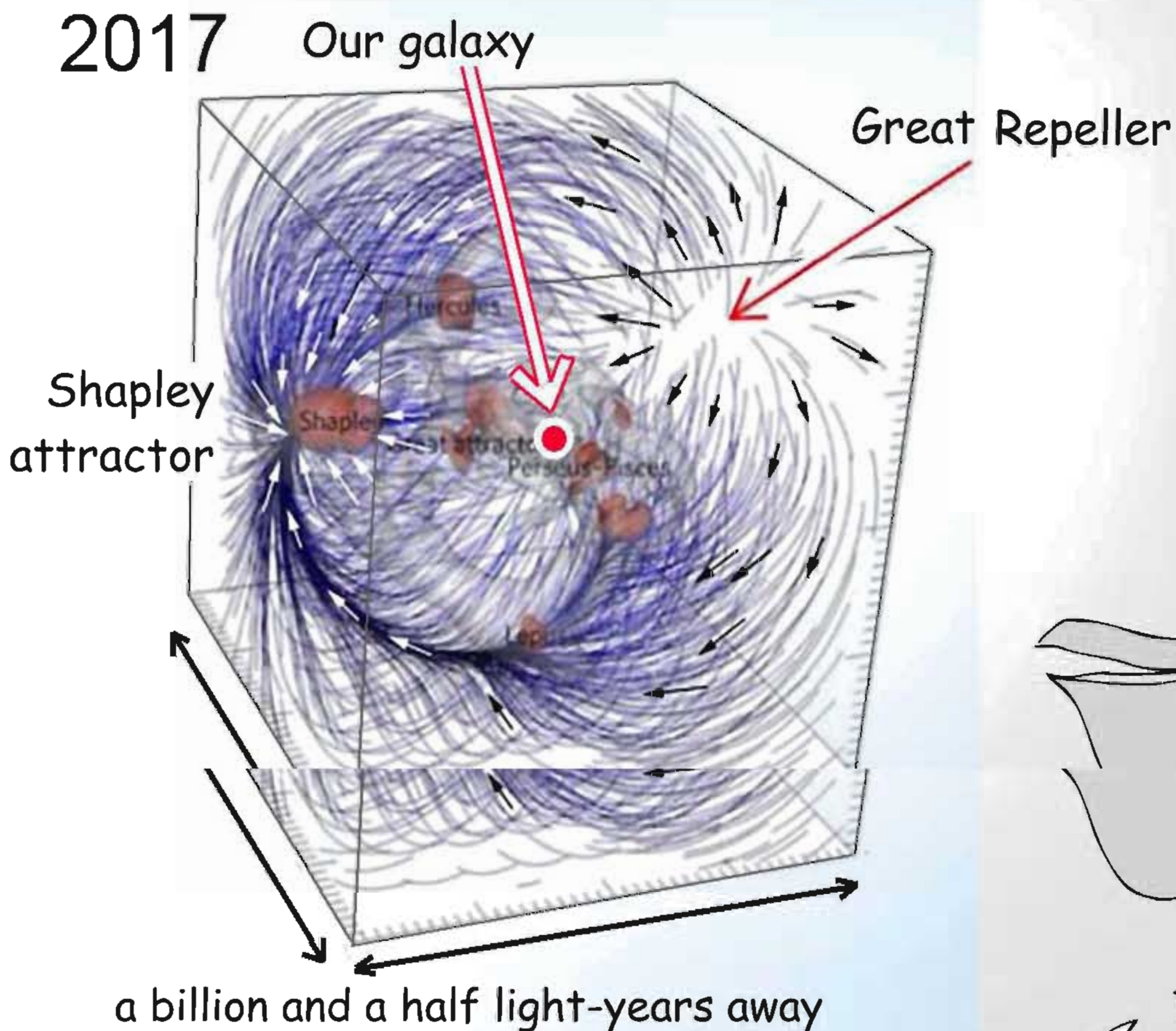


Four researchers (*) came up with the idea of subtracting from galaxy velocity measurement data what was due to cosmic expansion, to obtain the galaxies' OWN SPEEDS.

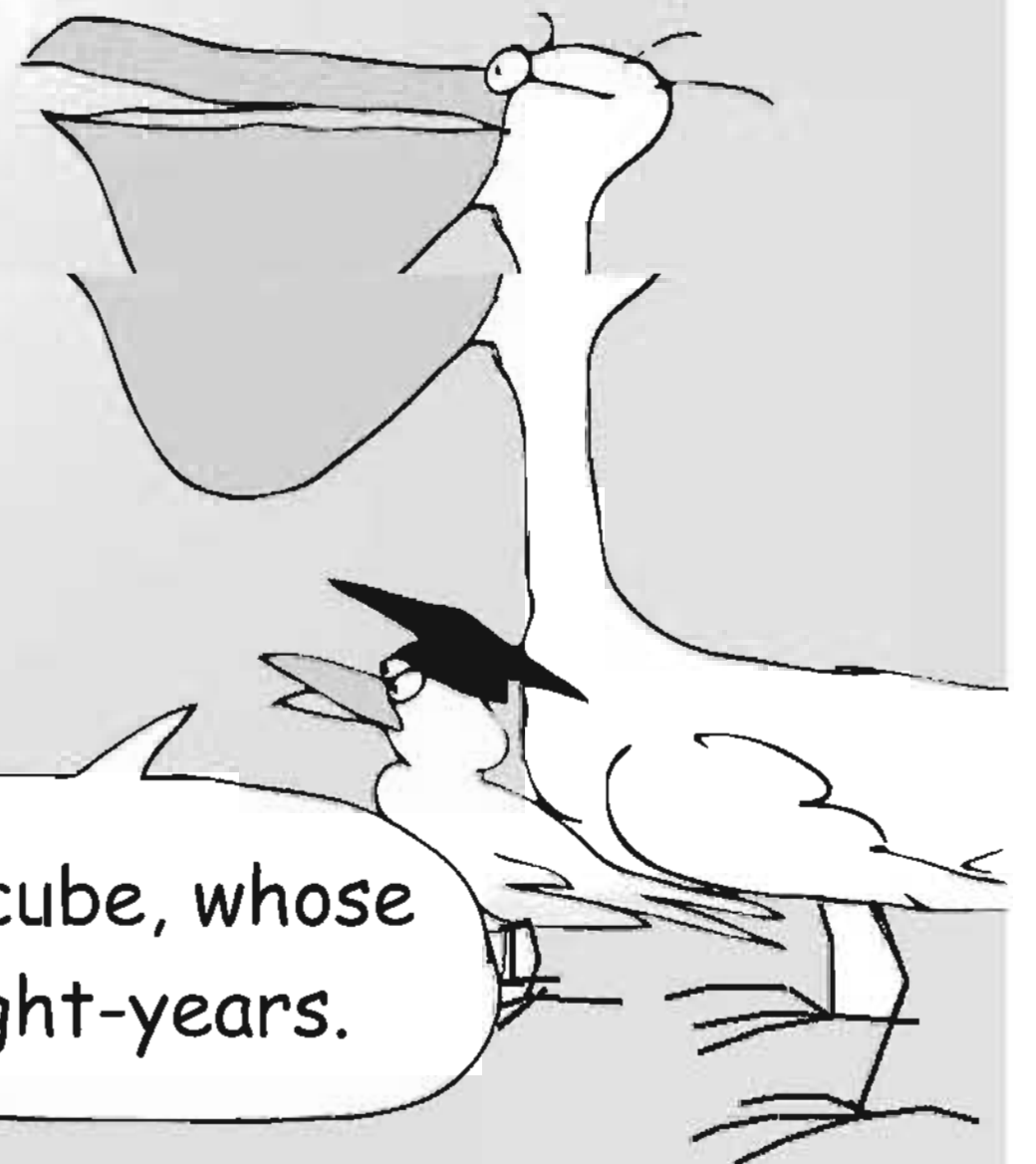


The way the confetti moves on the balloon skin.

And they obtained the following velocity field:



Astonishing...

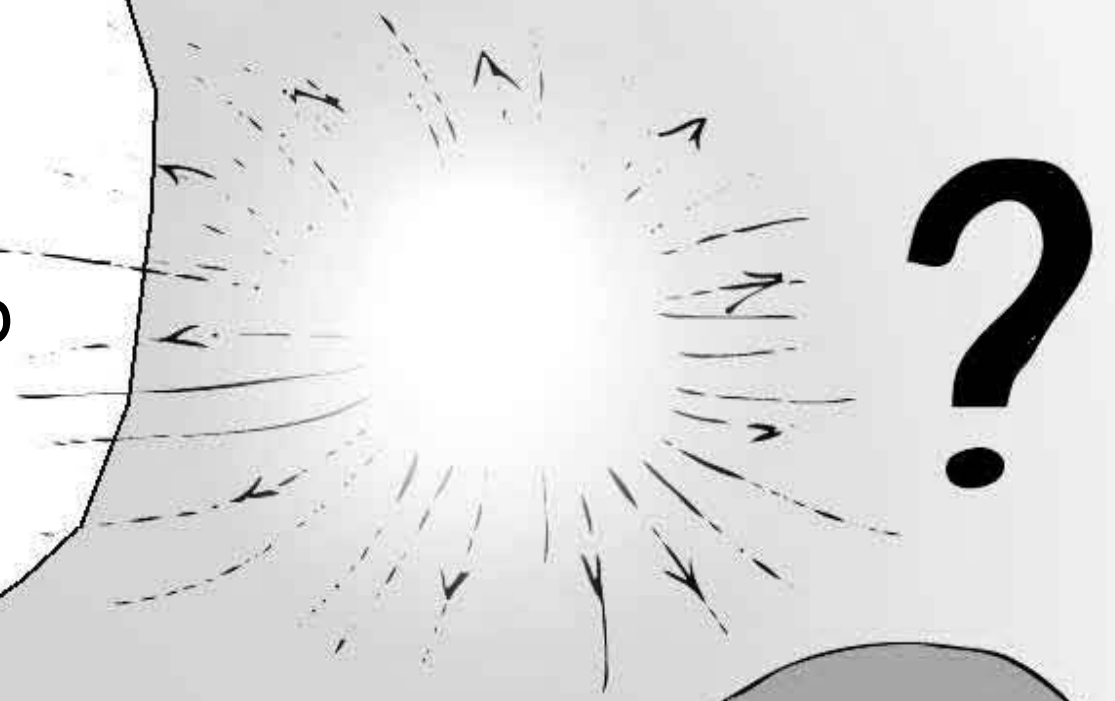


The Milky Way is at the center of the cube, whose side measures one and a half billion light-years.

(*) France's H el ene Courtois, Daniel Pomar ede, Israel's Yeudi Hofmanet and Canada's Brent Tully.
(Nature 2017)

The Great Repeller

600 million light-years from the Milky Way, we find an immense void that repels everything around it. In this void, there are no galaxies, no matter.



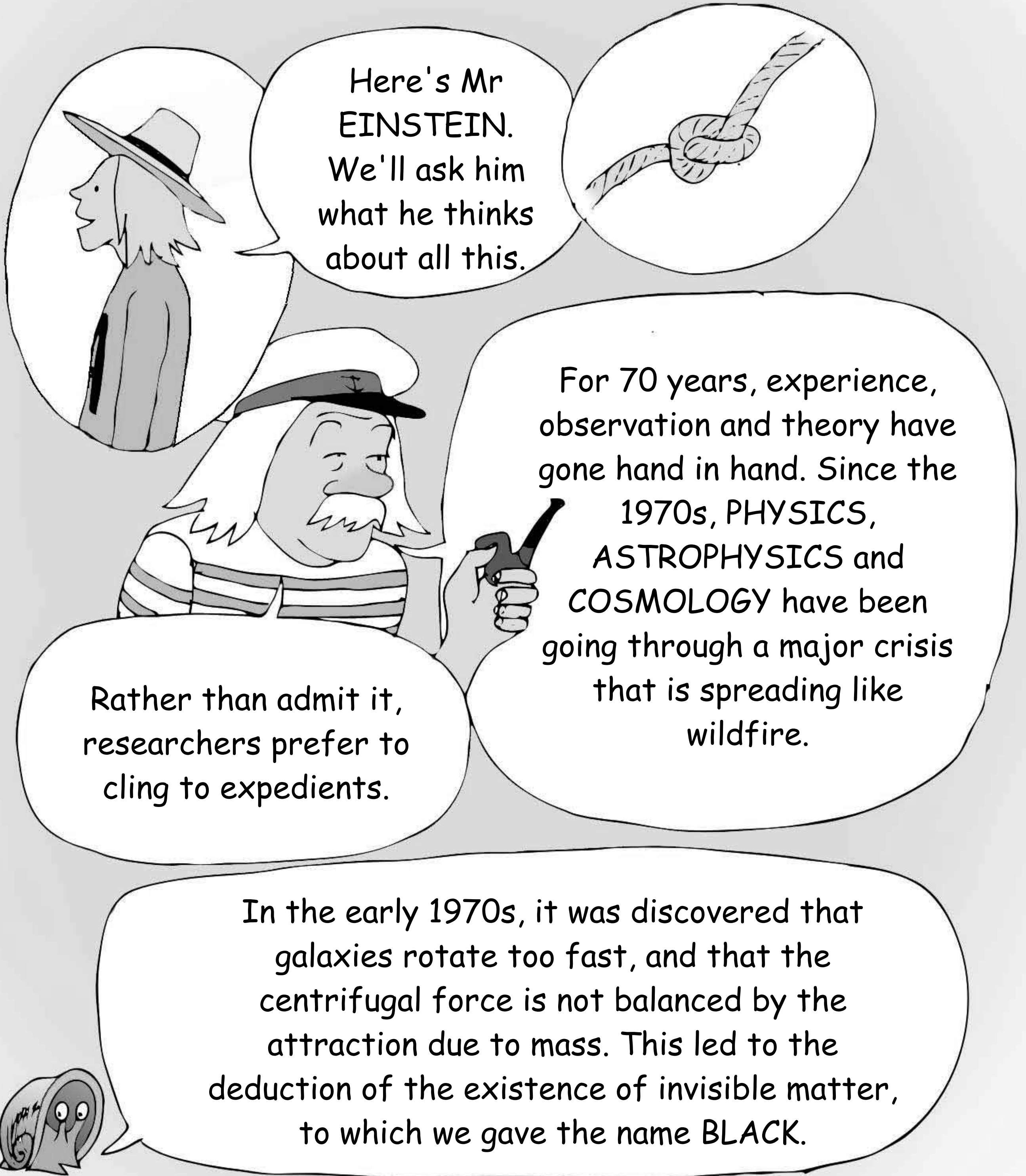
Official explanation: NIL. There hasn't even been an article published on the subject. If you don't know what to say, just ignore it.

Some specialists believe this is due to the repulsive effect of a gap in the dark matter.

Nonsense! **GRAVITATIONAL INSTABILITY** produces **CONDENSATIONS**, but not **VOIDS!**

It was just a suggestion.

NOTHING IS GOING WELL IN PHYSICS!(*)



(*) This was the title of the American Lee Smolin best seller - 2006



To justify the homogeneity of the early universe, we assume that it is made up of INFLATONS, particles of which there is NO THEORETICAL MODEL.

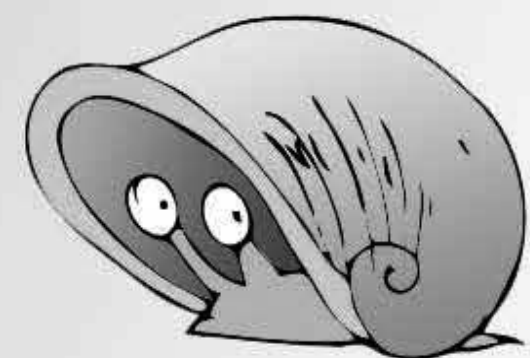
We discover that the expansion of the Universe is accelerating. No problem: BLACK ENERGY explains it all! A new, major component for which there is NO THEORETICAL MODEL



Between 1900 and 1970, particle physics experienced a golden age, with matter taking on a variety of forms. Everywhere, experiment confirms theory (e.g. Dirac's prediction of the existence of antimatter). And suddenly nothing works. None of the "super-particles" associated with photon, neutron, electron, neutrino, predicted by SUPERSYMETRY, manifest themselves in gas pedals designed to make them appear.

Management

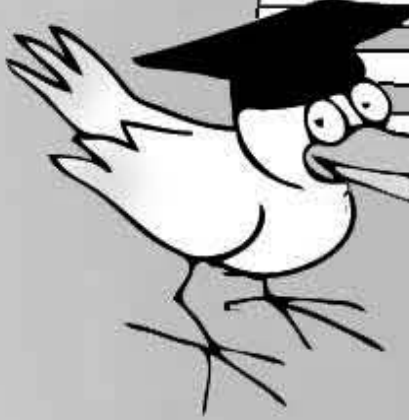
In short, whether we're talking about the infinitely large or the infinitely small, it's a complete shambles.



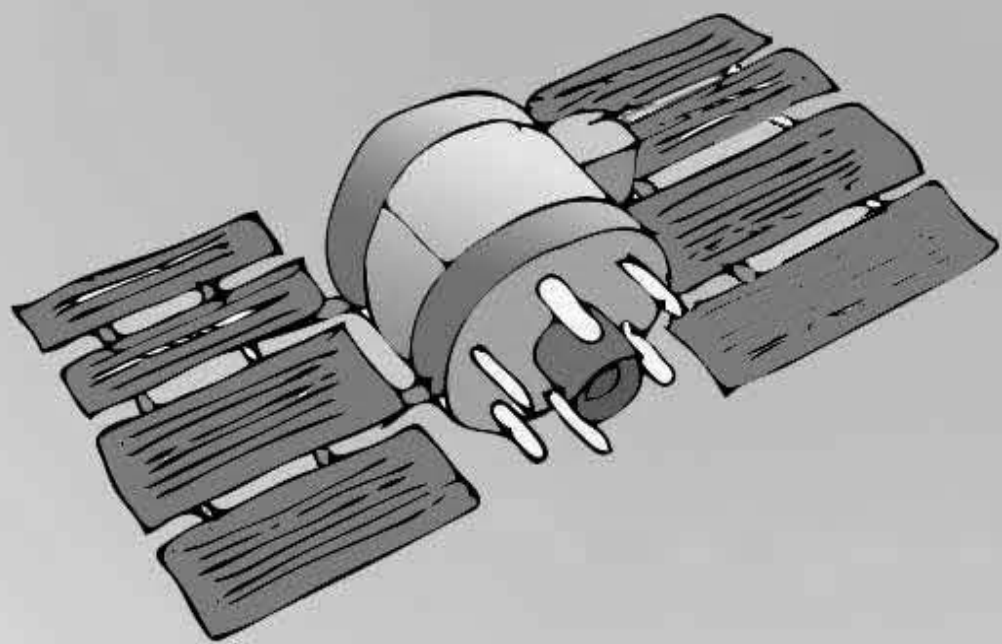
THE FANTASTIC PROGRESS OF TECHNOLOGY



Ahr, 1960, still the heyday(*), two Americans, Pound and Rebka, came up with the idea of an experiment showing that time on Earth does not flow at the same rate according to altitude.



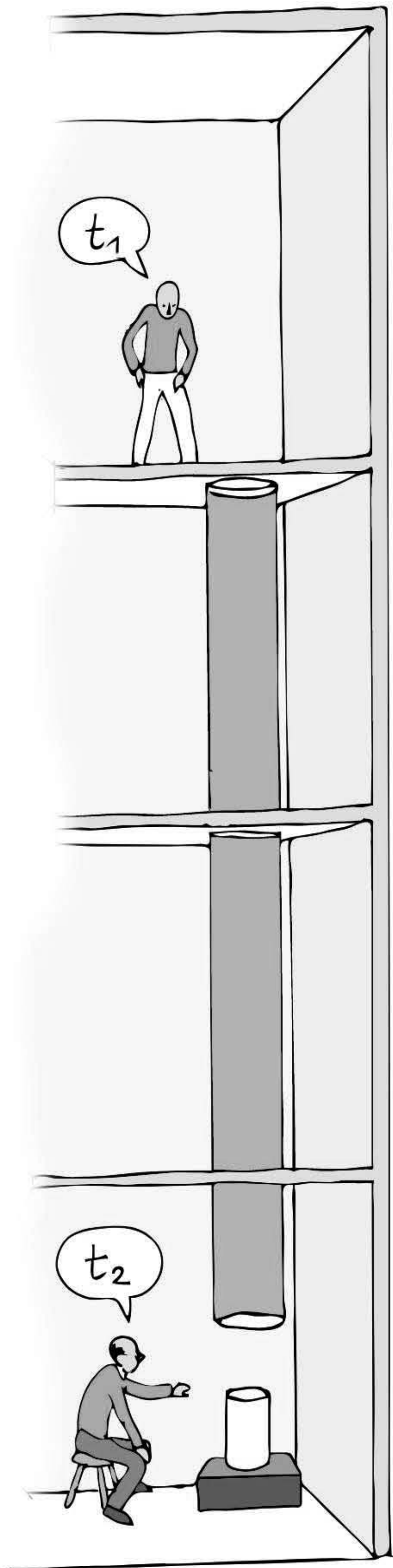
Near a mass, the flow of time slows down.



The GPS system uses some thirty satellites located at an altitude of 20,000 km, equipped with a high-precision atomic clock.

Time moves faster here than on the Earth's surface. Without this correction, the GPS system would be unusable.

In 1960, the Americans Pound and Rebka devised a simple yet ingenious set-up to compare the gamma-ray emission frequencies of two sources made of the iron isotope ^{57}Fe , with an extra neutron. The height difference is 22 metres. They used the formula established in 1916 by the German Karl Schwarzschild (*)

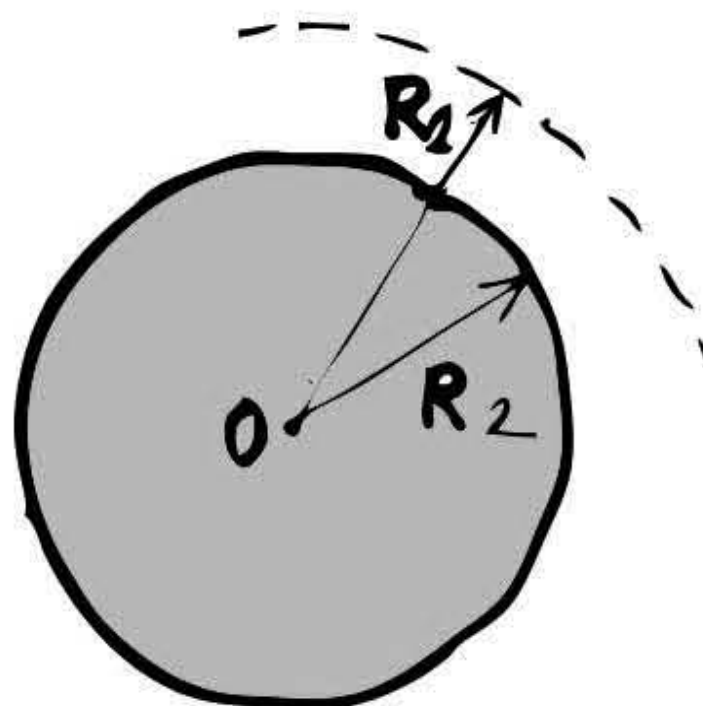


$$\frac{t_2}{t_1} = \sqrt{\frac{1 - \frac{2GM}{R_2 c^2}}{1 - \frac{2GM}{R_1 c^2}}} > 1$$

deduced from the first exact solution he constructed to the equation with which Albert Einstein founded the science of mathematics in 1915.

general relationship

$$R_{\mu\nu} - \frac{1}{2} R g_{\mu\nu} = \chi T_{\mu\nu}$$



$G = 6,67 \times 10^{-11} \text{ N m}^2 \text{ kg}^{-2}$
gravitational constant

$c = 3 \times 10^8 \text{ m/s}$
speed of light

$M = 6 \times 10^{24} \text{ kg}$
Earth's mass

(*) January 1916

GRAVITATIONAL REDSHIFT

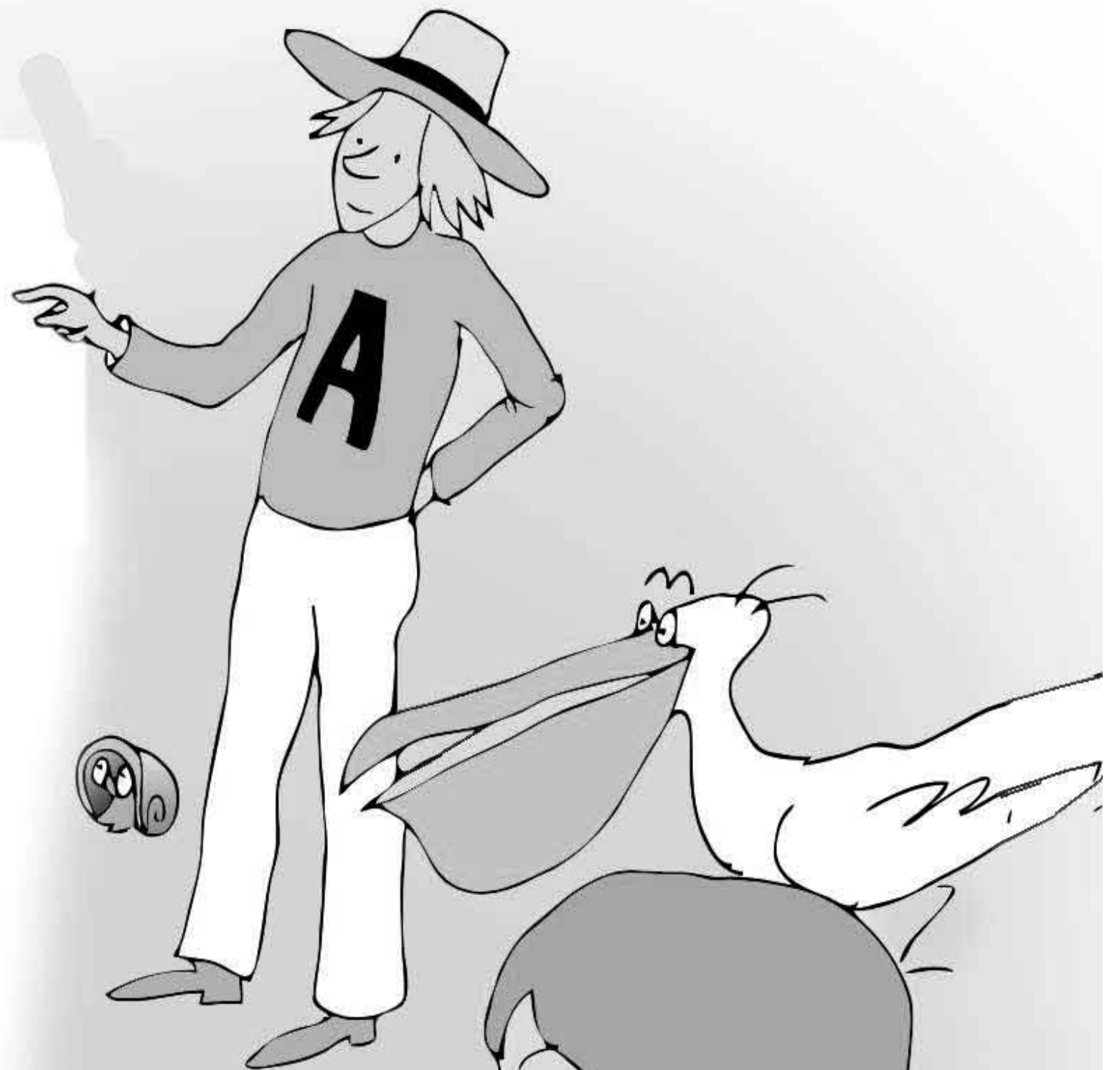
WAVE LENGTH is :

$$\lambda = ct$$

if observer "1" is very far away, then the formula tends towards :

$$\frac{\lambda_2}{\lambda_1} = \frac{1}{\sqrt{1 - \frac{2GM}{Rc^2}}} > 1$$

R being the radius of a star emitting light from its surface, this light will be perceived with a longer wavelength (λ_2) by a distant observer.



Congratulations, Anselme! You've just rediscovered **GRAVITATIONAL REDSHIFT**, and the central part of the object will be darker.



A month later: in February 1916, just before his death(*), my friend Karl published a second article, which was not translated from German until 1999, and has remained unknown to most cosmologists to this day.

He shows that there is a maximum value for the mass of a star, beyond which, at its center, the pressure (which is a density of energy per unit volume) and the speed of light become infinite.

K. Schwarzschild : Über das Gravitationsfeld Massenpunktes nach der Einsteinschen Theorie. Sit. Deut. Akad. Wiss. 1916



Such objects cannot exist in Nature!

This limits the masses of neutron stars to 2.5 solar masses.



(*) He died of an infection on the Russian front in 1916.



For those in doubt, here are these key phrases in German and their translations.



z. B. bei konstanter Masse und zunehmender Dichte der Übergang zu kleinerem Radius unter Energieabgabe (Verminderung der Temperatur durch Ausstrahlung) erfolgt.

4. Die Lichtgeschwindigkeit in unserer Kugel wird:

$$v = \frac{2}{3 \cos \chi_a - \cos \chi}, \tag{44}$$

sie wächst also vom Betrag $\frac{1}{\cos \chi_a}$ an der Oberfläche bis zum Betrag $\frac{2}{3 \cos \chi_a - 1}$ im Mittelpunkt. Die Druckgröße $\rho_0 + p$ wächst nach (10) und (30) proportional der Lichtgeschwindigkeit.

Im Kugelmittelpunkt ($\chi = 0$) werden Lichtgeschwindigkeit und Druck unendlich. sobald $\cos \chi_a = 1/3$, die Fallgeschwindigkeit gleich $\sqrt{8/9}$ der (natürlich gemessenen) Lichtgeschwindigkeit geworden ist.

4. The speed of light in our sphere is :

$$v = \frac{2}{3 \cos(\chi_a) - \cos(\chi)} \tag{44}$$

so that it varies from the value on the surface $\frac{1}{\cos \chi_a}$

to the value in the center $\frac{2}{3 \cos(\chi_a) - 1}$

The pressure variable $\rho_0 + p$ increases according to (10) and (30) in proportion to the speed of light.

At the center of the sphere ($x = 0$), the speed of light and pressure become infinite.

But there are several situations in which much larger quantities of matter tend to concentrate into a single object: for example, the implosion of the iron core of a massive star with a mass well in excess of 2.5 solar masses.



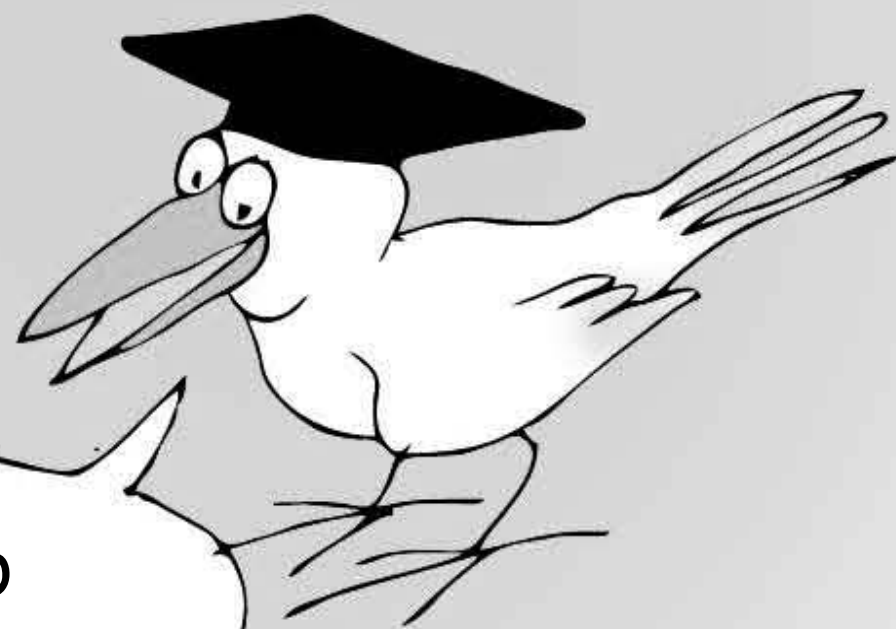
Particles with mass m can only exist if they have sufficient space to accommodate their wave function, whose characteristic length is the Compton length:

$$\lambda_c = \frac{h}{mc}$$

So electrons, which are 1836 times lighter than protons and neutrons, will be the first to disappear.

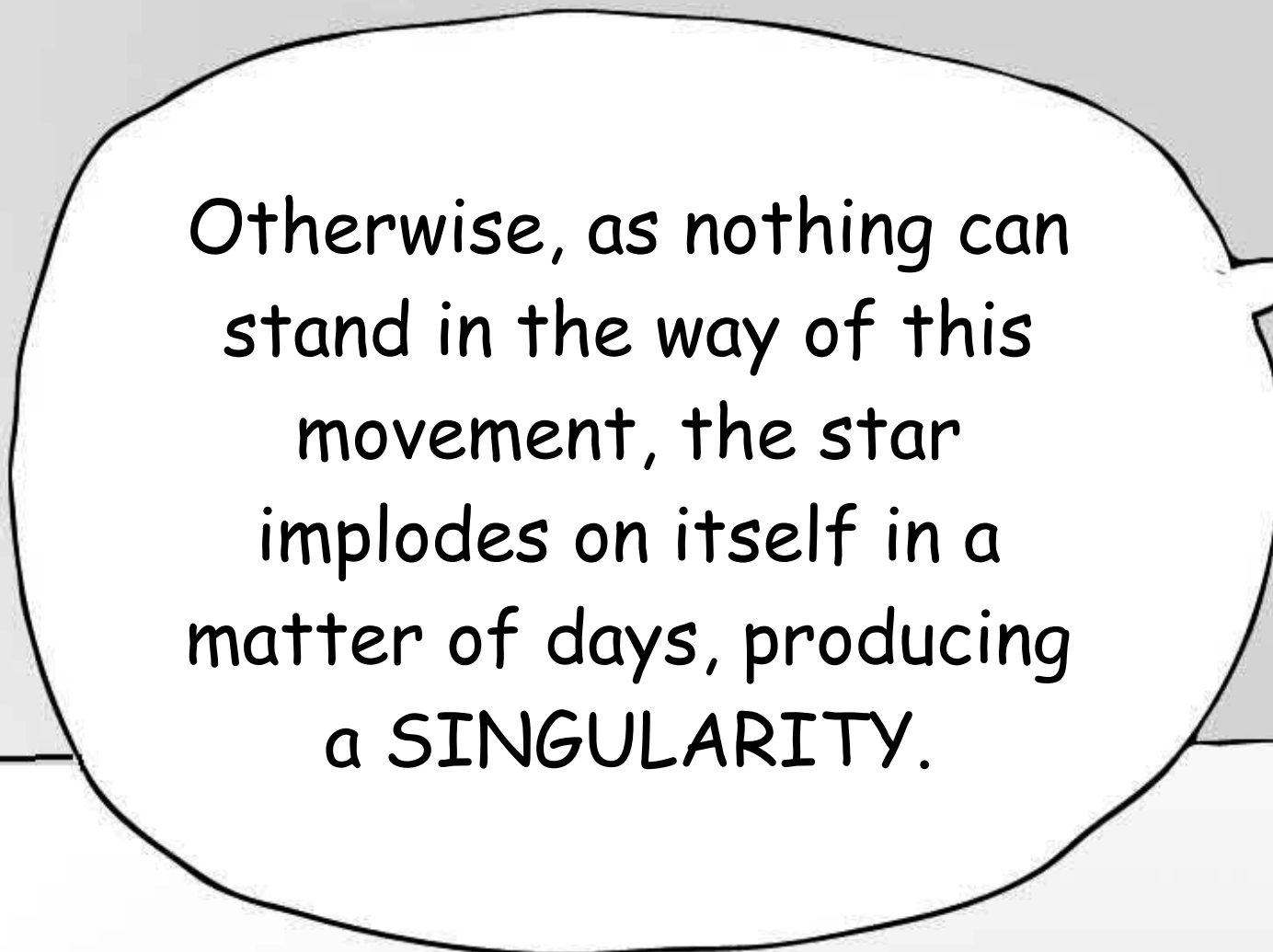


By combining with protons to form neutrons.

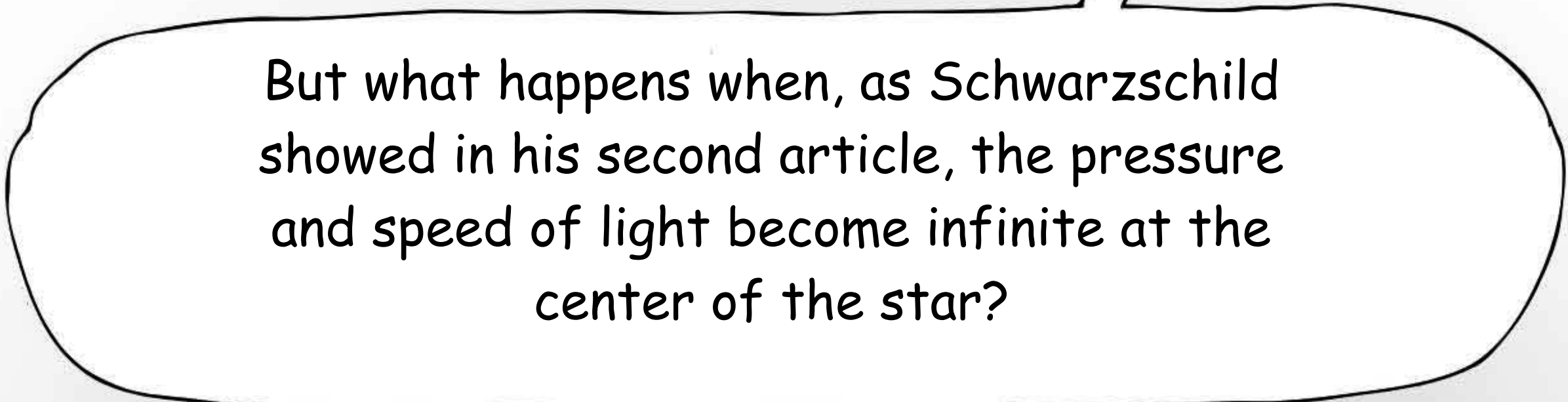




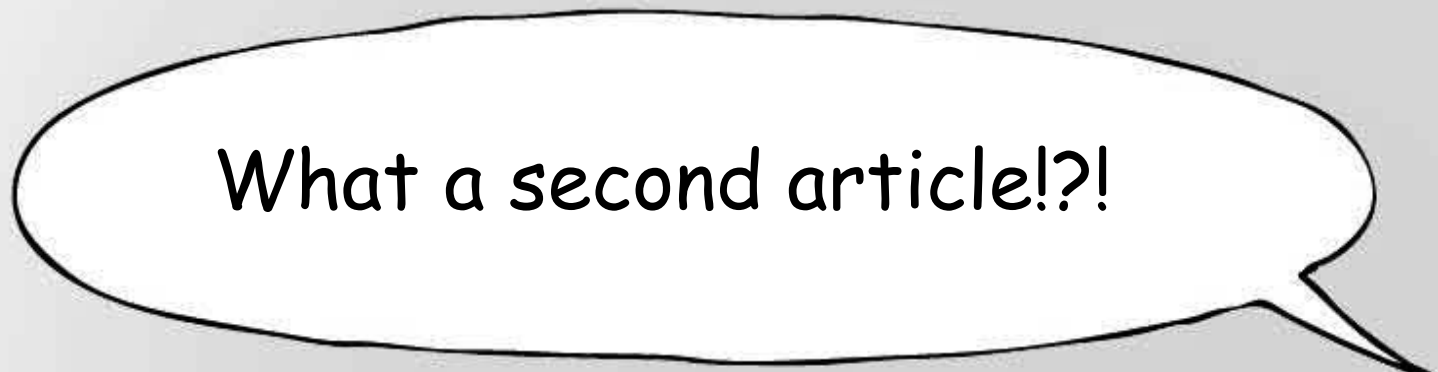
If the pressure forces in the neutron fluid balance the force of gravity, the contraction stops and we get a NEUTRON STAR.



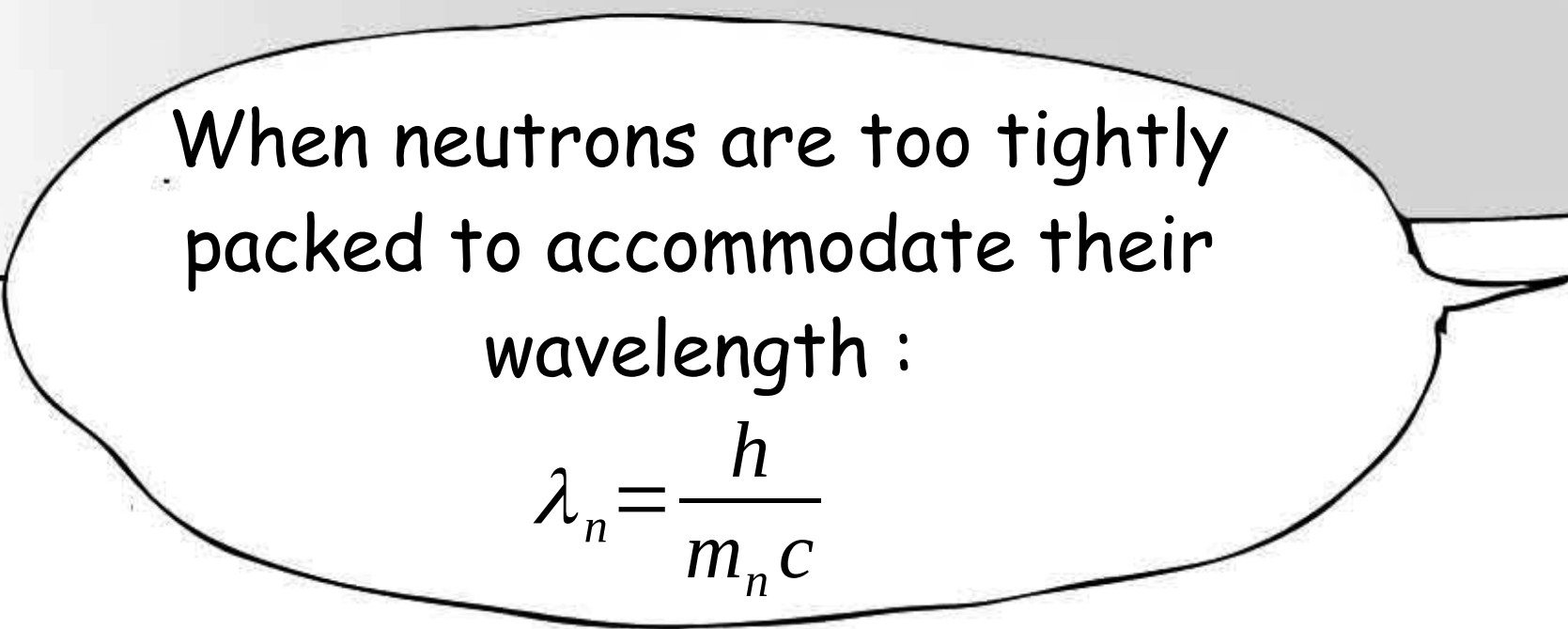
Otherwise, as nothing can stand in the way of this movement, the star implodes on itself in a matter of days, producing a SINGULARITY.



But what happens when, as Schwarzschild showed in his second article, the pressure and speed of light become infinite at the center of the star?



What a second article?!?



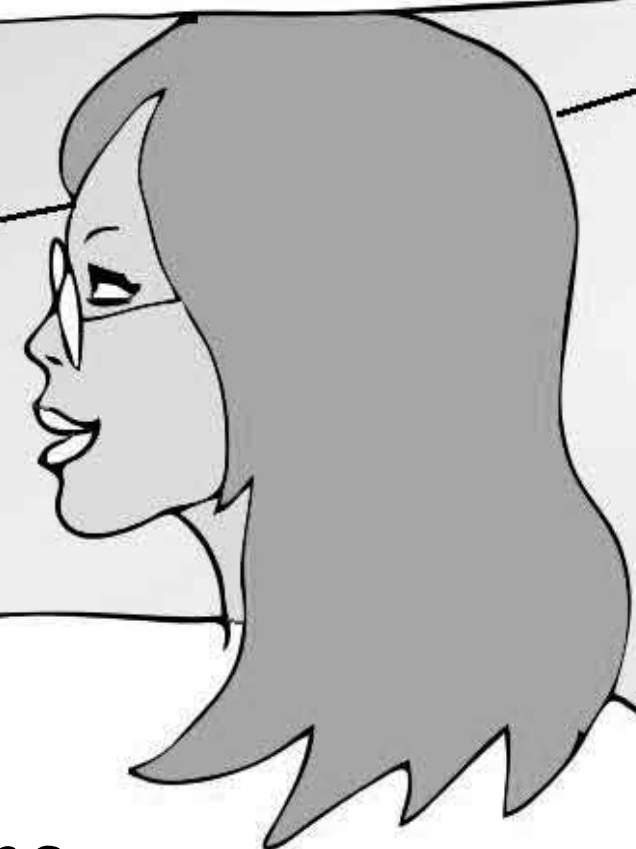
When neutrons are too tightly packed to accommodate their wavelength :

$$\lambda_n = \frac{h}{m_n c}$$

In the 1950s, those who opted for this scenario of unlimited implosion were unaware of the existence of this second article. Today, it would be so difficult to turn back the clock that their successors prefer to ignore the phenomenon.

Management

Let's assume the existence of a process that would limit mass below this PHYSICAL CRITICITY. If we were to observe such objects, what would they look like?



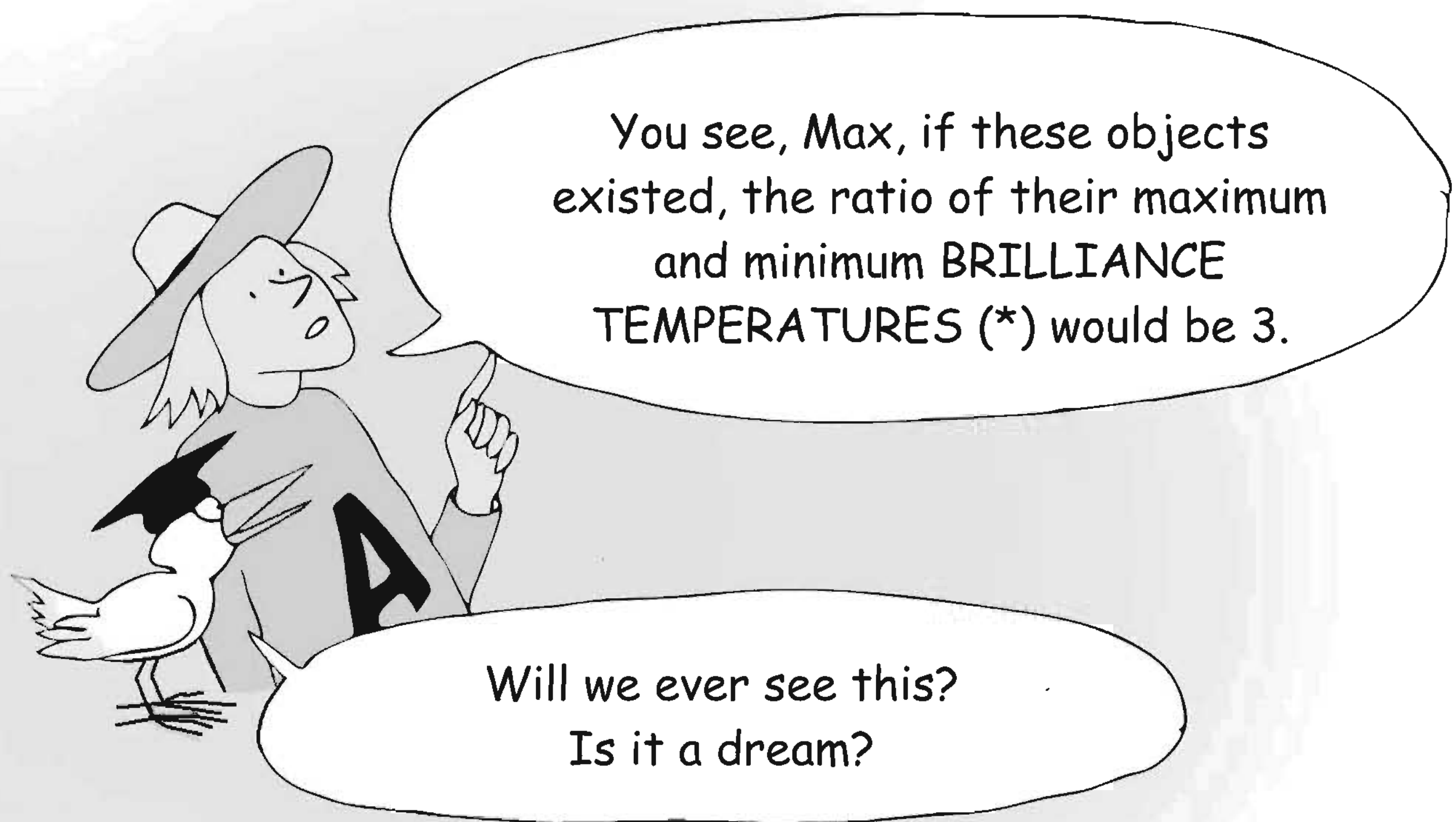
All you have to do is calculate their GRAVITATIONAL REDSHIFT using the formula :

$$\frac{\lambda'}{\lambda} = \frac{1}{\sqrt{1 - \frac{2GM}{Rc^2}}} \quad \text{with} \quad M = \frac{4}{3} \pi R^3 \rho$$

$$R = \sqrt{\frac{c^2}{3\pi G \rho}} \quad \text{is the radius of these objects,}$$

you combine it all:

$$\frac{\lambda'}{\lambda} = \frac{1}{\sqrt{1 - \frac{8\pi G \rho}{3c^2} \frac{c^2}{3\pi G \rho}}} = \frac{1}{\sqrt{1 - \frac{8}{9}}} = 3$$

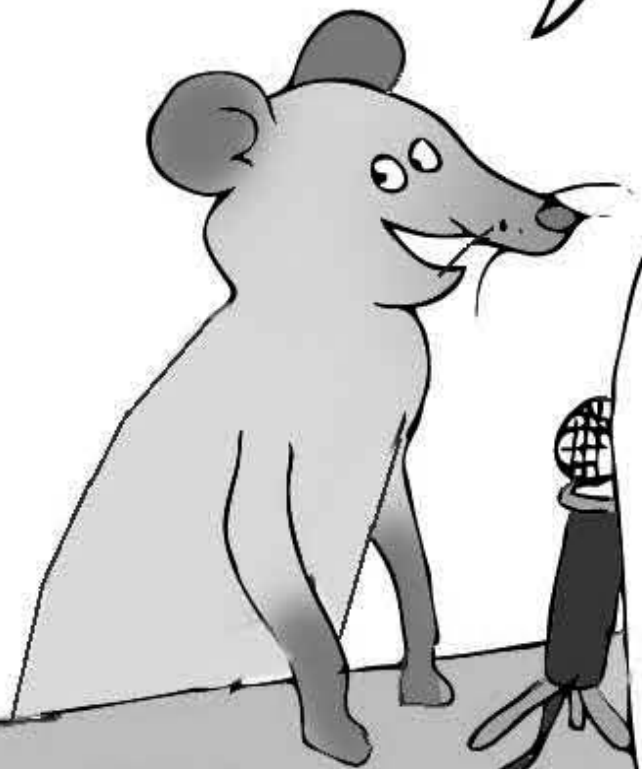


Mysterious QUASARS

Periodically, mysterious, massive objects at the center of galaxies come to life, emitting powerful jets of plasma, usually diametrically opposed. When the phenomenon ceases, the galaxies have an extinct quasar at their center. The origin of such objects remains a complete mystery, as does the cause of these violent eruptions. One of the jets, directed towards the observer, is blue-shifted by the Doppler effect. The other, directed away from the observer, is red-shifted by the Doppler effect. The other, directed towards the observer, is blue-shifted by the Doppler effect. The other, shifted in the infrared, does not appear in this image taken in the visible spectrum. The irregularities in the jet show that these emissions, focused by the strong magnetic field, occur only sporadically. To this day, the nature of this quasar phenomenon remains a complete mystery.



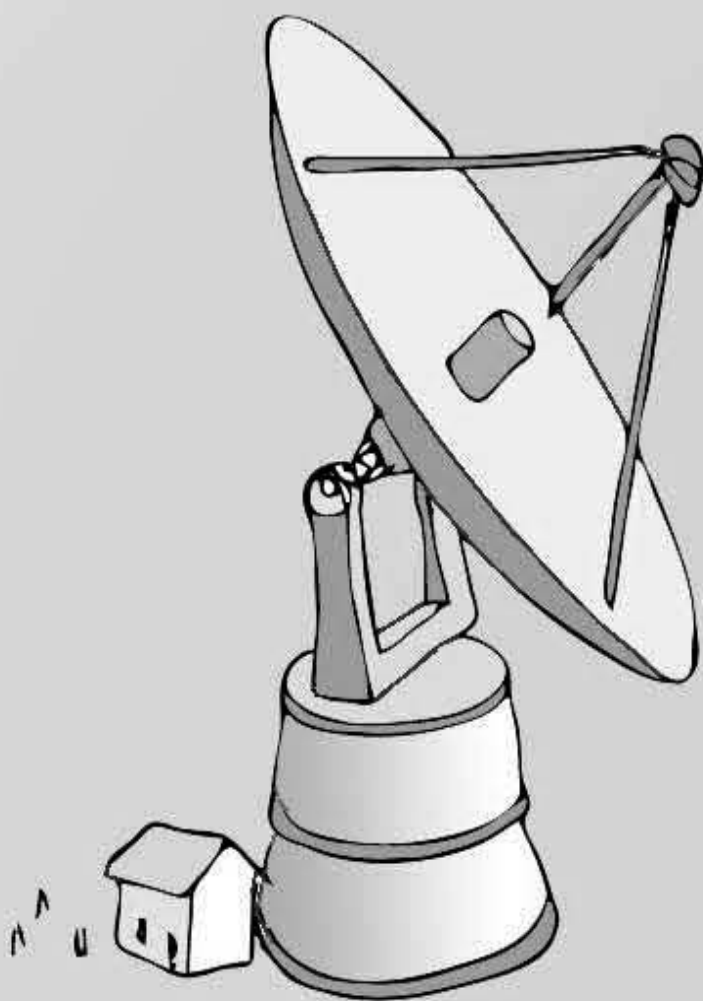
A major discovery in recent years has been the presence, at the center of galaxies, of hypermassive objects whose mass has been determined with certainty by measuring the speed of the stars orbiting them, whose nature and origin are unknown.



Some brilliant discoveries! Galaxies are spinning too fast, and the expansion of the Universe is accelerating. There are objects representing billions of solar masses within galaxies, and we don't know why! Thanks to advances in technology, you're moving deeper into ignorance, but with the utmost precision.

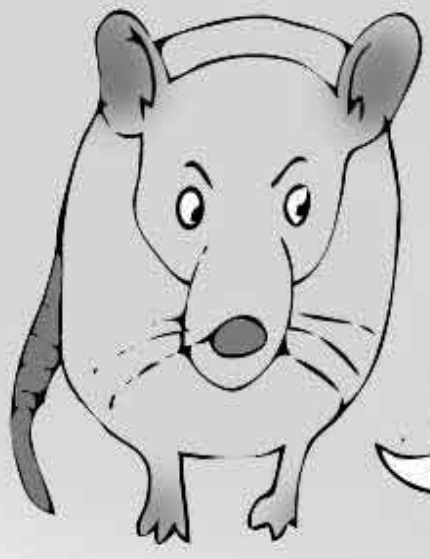


The one at the center of our own galaxy represents four million solar masses.



We obtain images from this radio radiation using the vast mirrors of radio telescopes, where the reflecting surface is a simple grid whose meshes are matched to the signal wavelength. (as in microwave ovens).

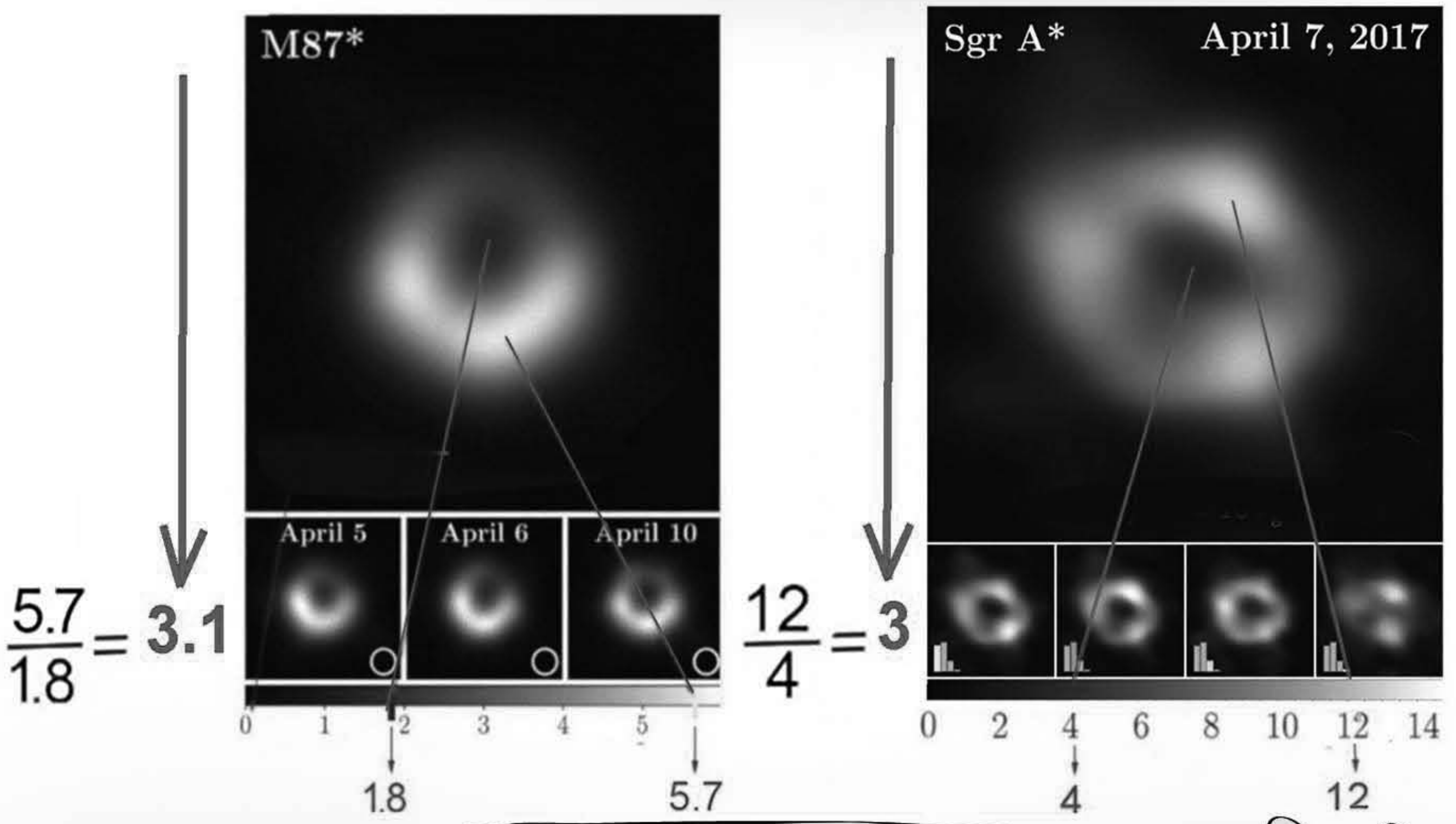
The direction



By combining images from several radio telescopes(*) it has been possible to produce two images, firstly of the object located at the center of the Milky Way, a quarter of the galaxy's diameter away, and secondly of another, 2000 times further away, but 1600 times more massive, located at the center of the giant galaxy M87, with a mass of 6.5 billion solar masses.

6.5 billion solar masses

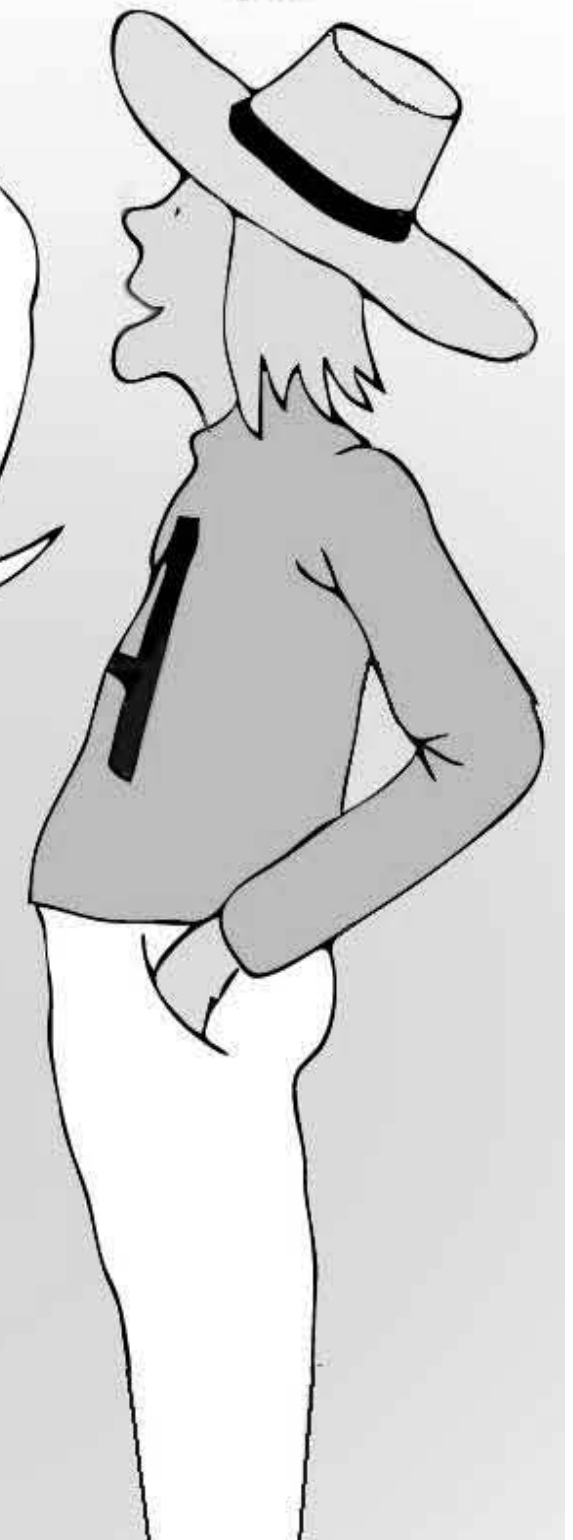
4 million solar masses



There's a bar showing the scale of brightness temperatures, and the ratio of maximum to minimum values in both cases is very close to 3. These are the SUB-CRITICAL OBJECTS from earlier!



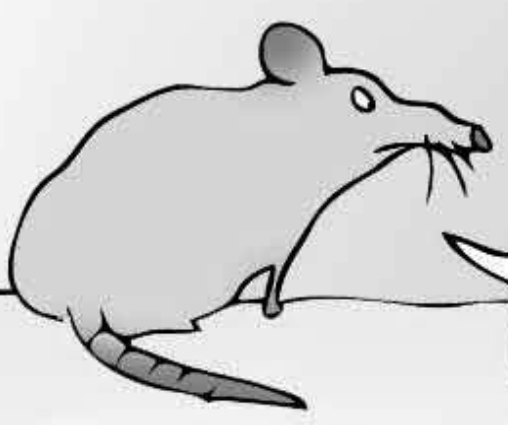
No, they're GIANT BLACK HOLES.




(*) ETHC: "First M87 Event Horizon Telescope Results" The Shadow of the Supermassive Black Hole. Astr.Jr. 875:L1 2019 April 10




But their center isn't black!




That's because of the hot gas clouds just ahead.



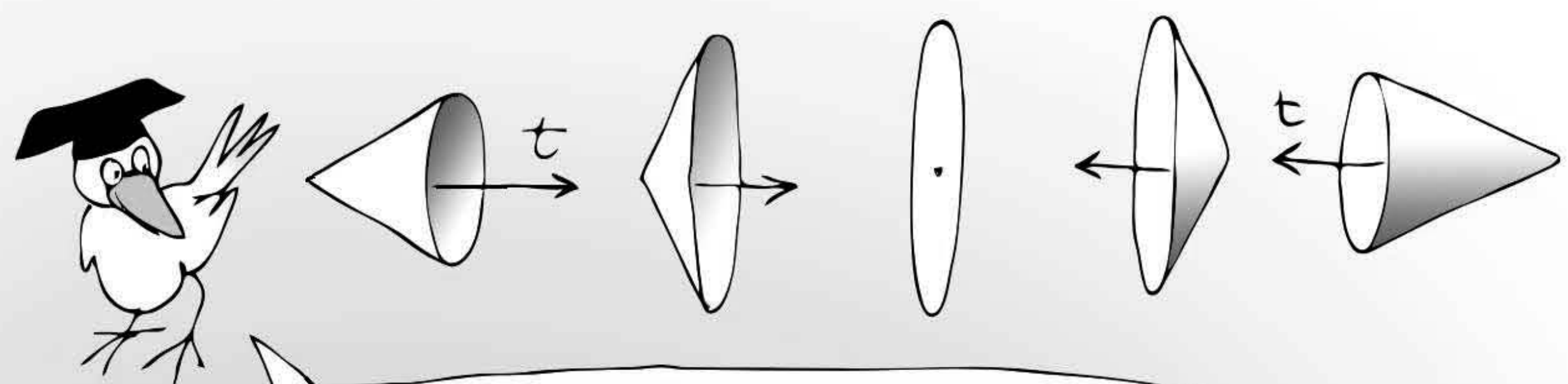
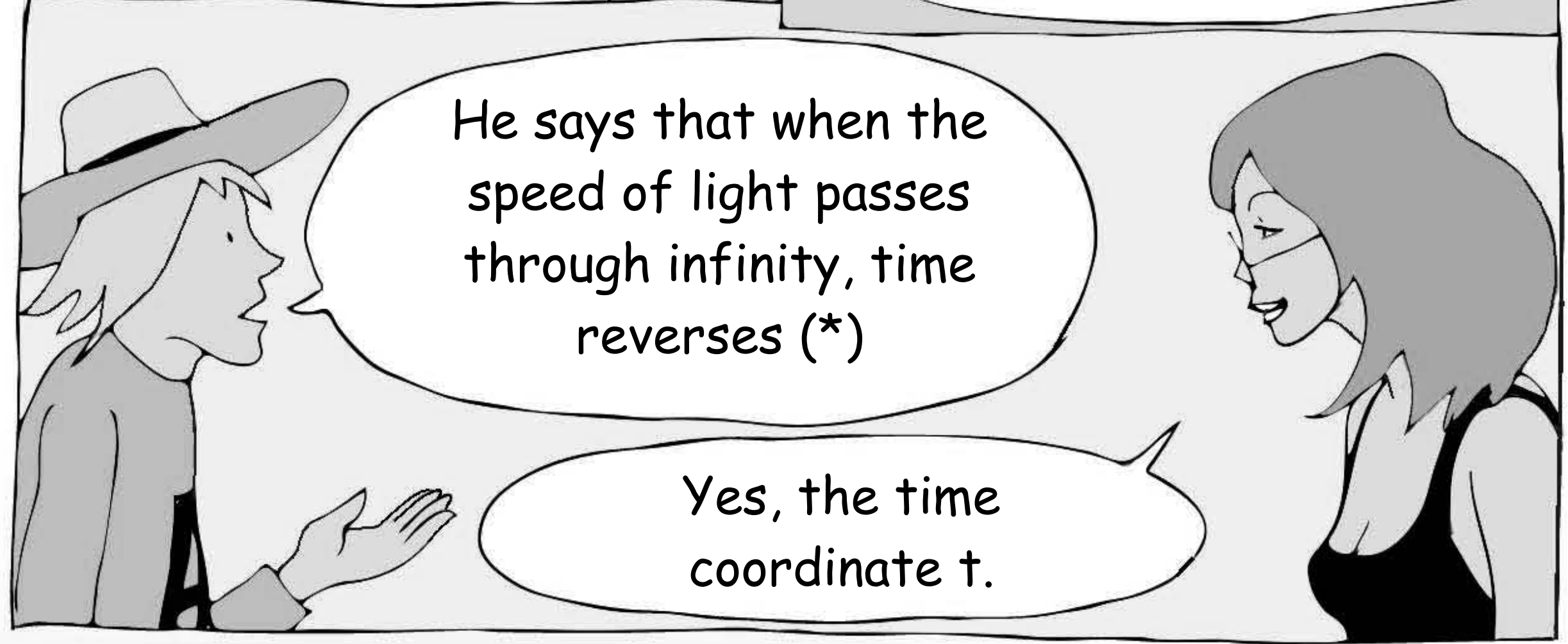
The objects have masses that differ by a factor of 1600, their maximum brightness temperatures are 4.5 billion degrees for one and 12 billion degrees for the other, but clouds of hot gas are placed just in front of their central parts to give a temperature ratio equal to 3. Who are you trying to kid?



When images of a third object become available, if this ratio of maximum and minimum brightness temperatures is still 3, this will pose a serious problem.



And when these objects form, what happens when the pressure and speed of light at the center become infinite?



The cone of light flips over like an umbrella in strong winds. The higher the speed of light, the more the cone opens.

(*) See Appendix

THE MYSTERY OF PRIMORDIAL ANTIMATTER

Has anyone imagined that particles could experience time in reverse?



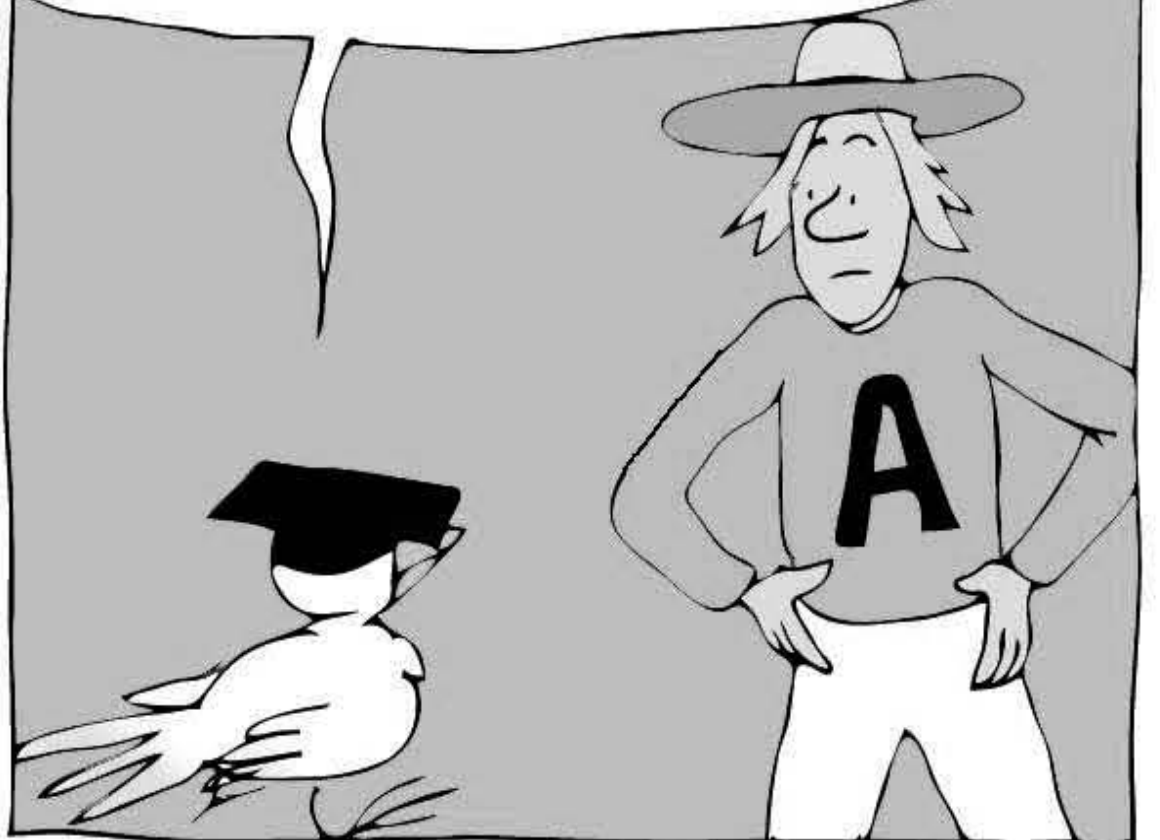
A.Sakharov 1921 - 1989

Yes, the great Russian physicist Andrei Sakharov (*) thought that primordial antimatter (**), which nobody detects, was located in a twin universe of our own where time flowed in an opposite direction.

And what are the other theories?



There is no other theory. This is the only one.



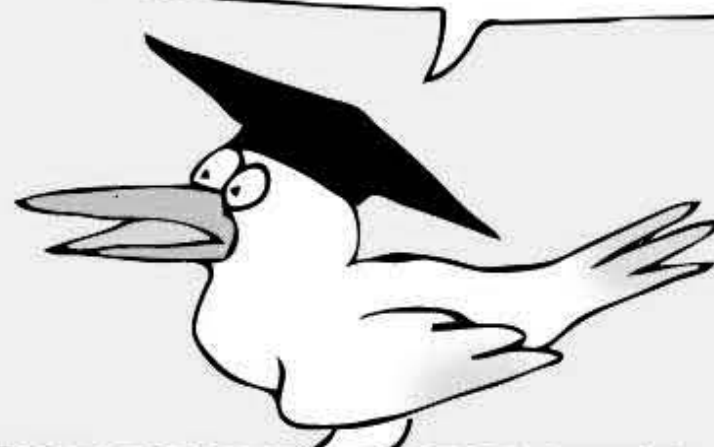
(*) Inventor of the Russian H-bomb

(**) See the comic strip BIG BANG

But what do they say at conferences and seminars?



We never talk about it, it's a NON-SUJET.

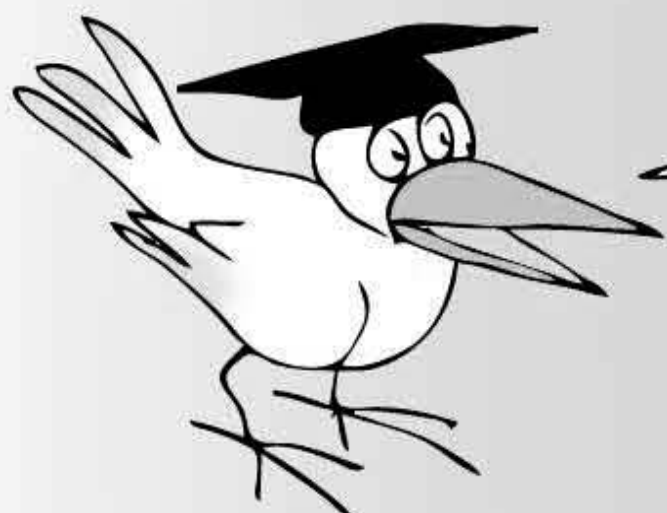
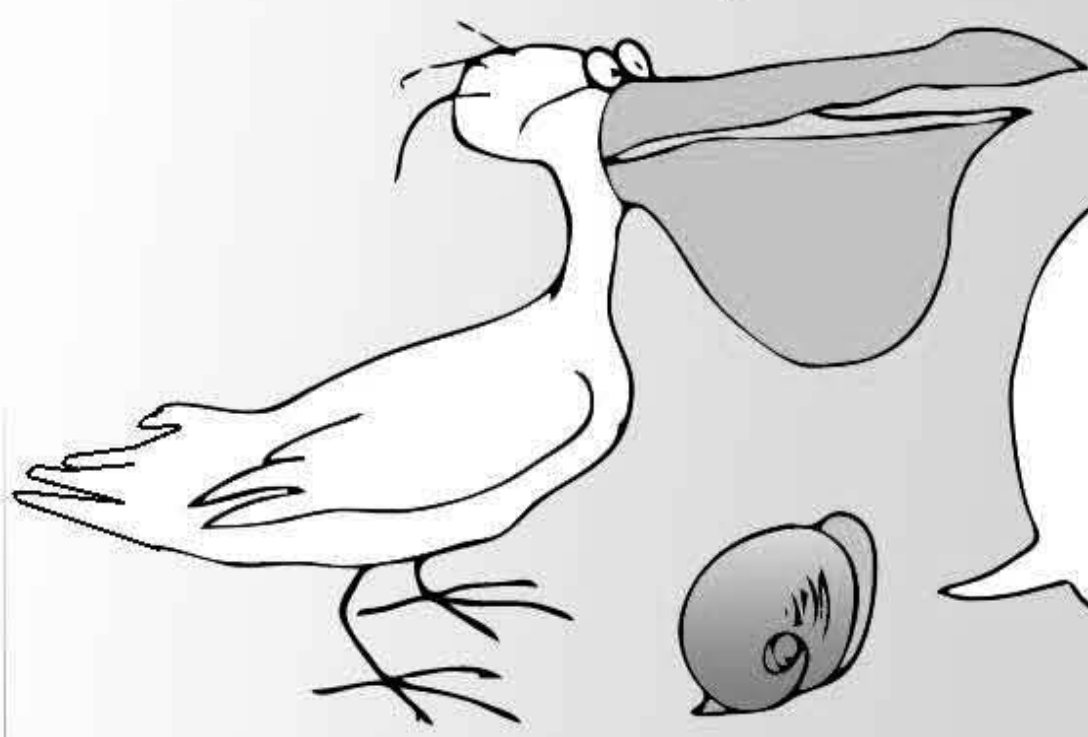


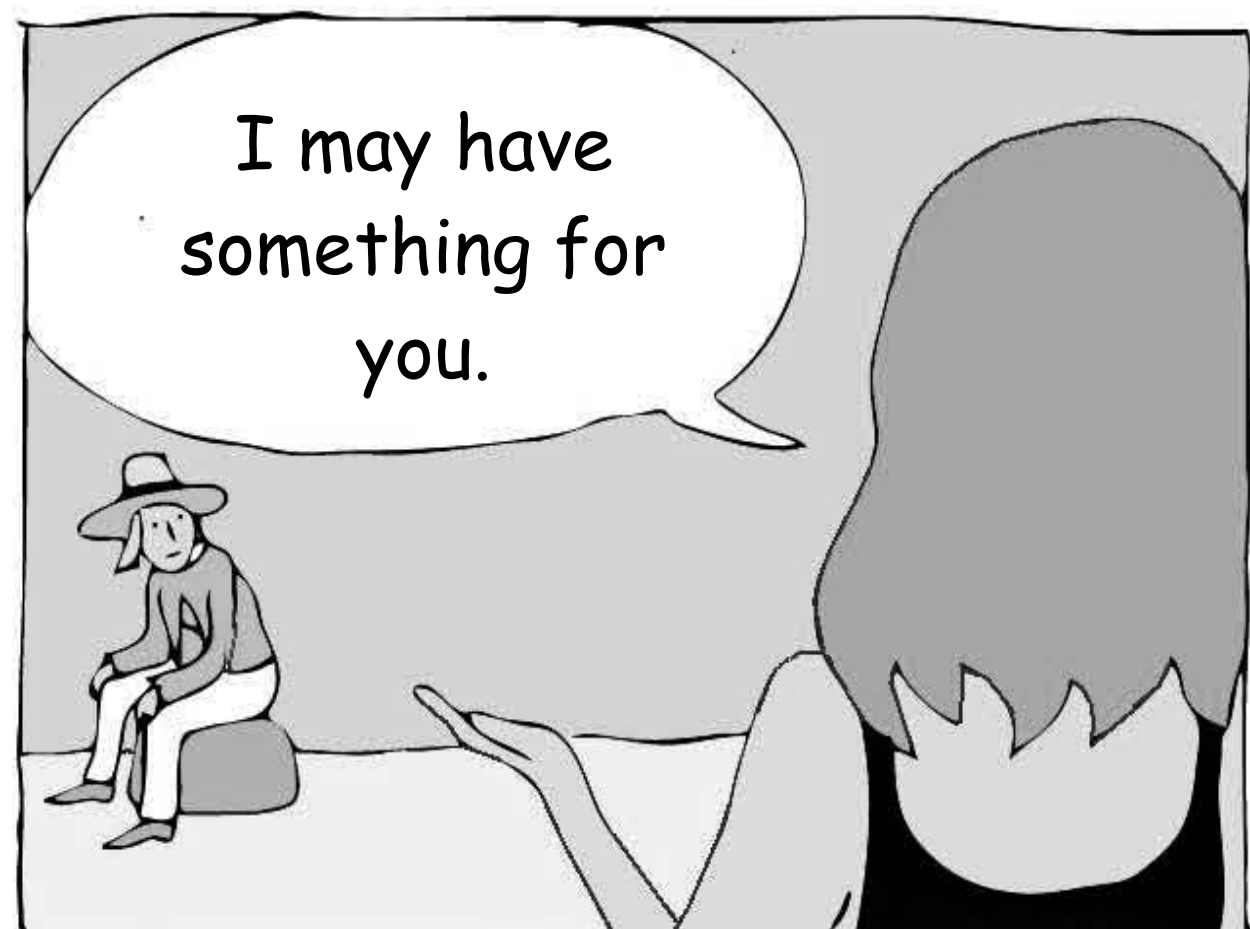
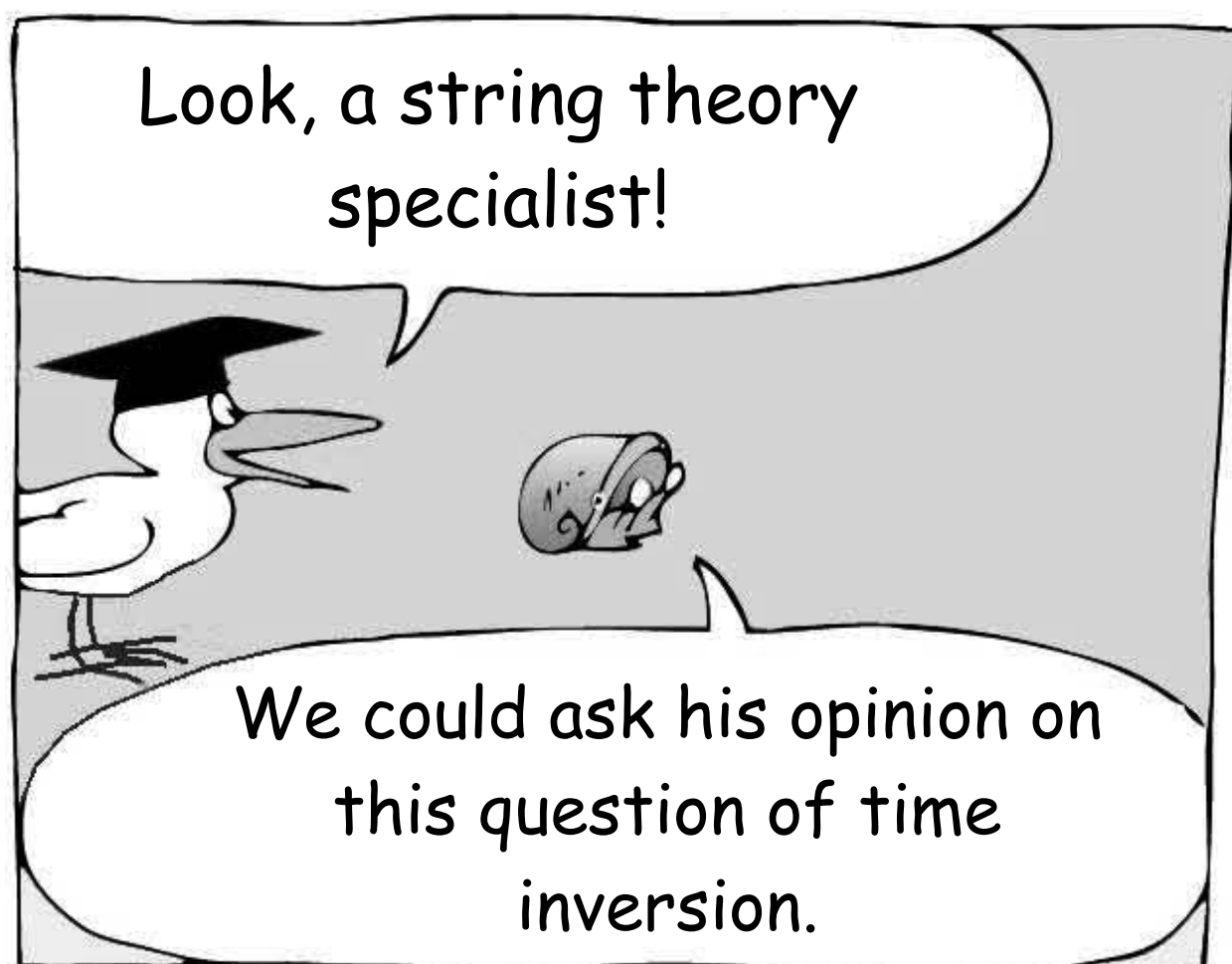
You still haven't understood that in the scientific world, when there's a question you can't answer, you pretend it doesn't exist!

But then, just after the **BIG BANG**, we lose half the Universe along the way. That's no mean feat!

In my opinion, if Sakharov had used the term **BLACK UNIVERSE**, it would have gone down much better.

Or is it because it's Russian?

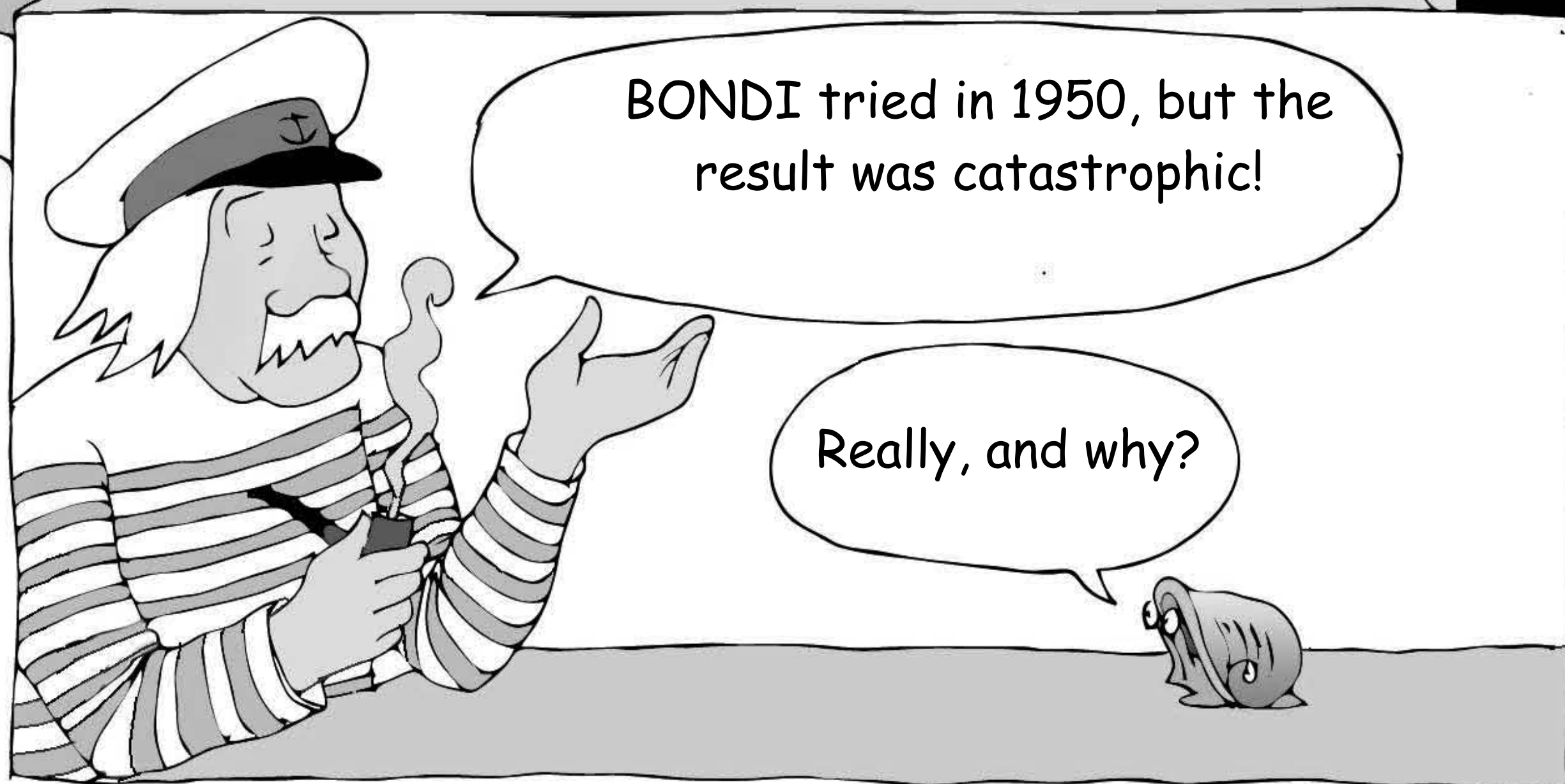
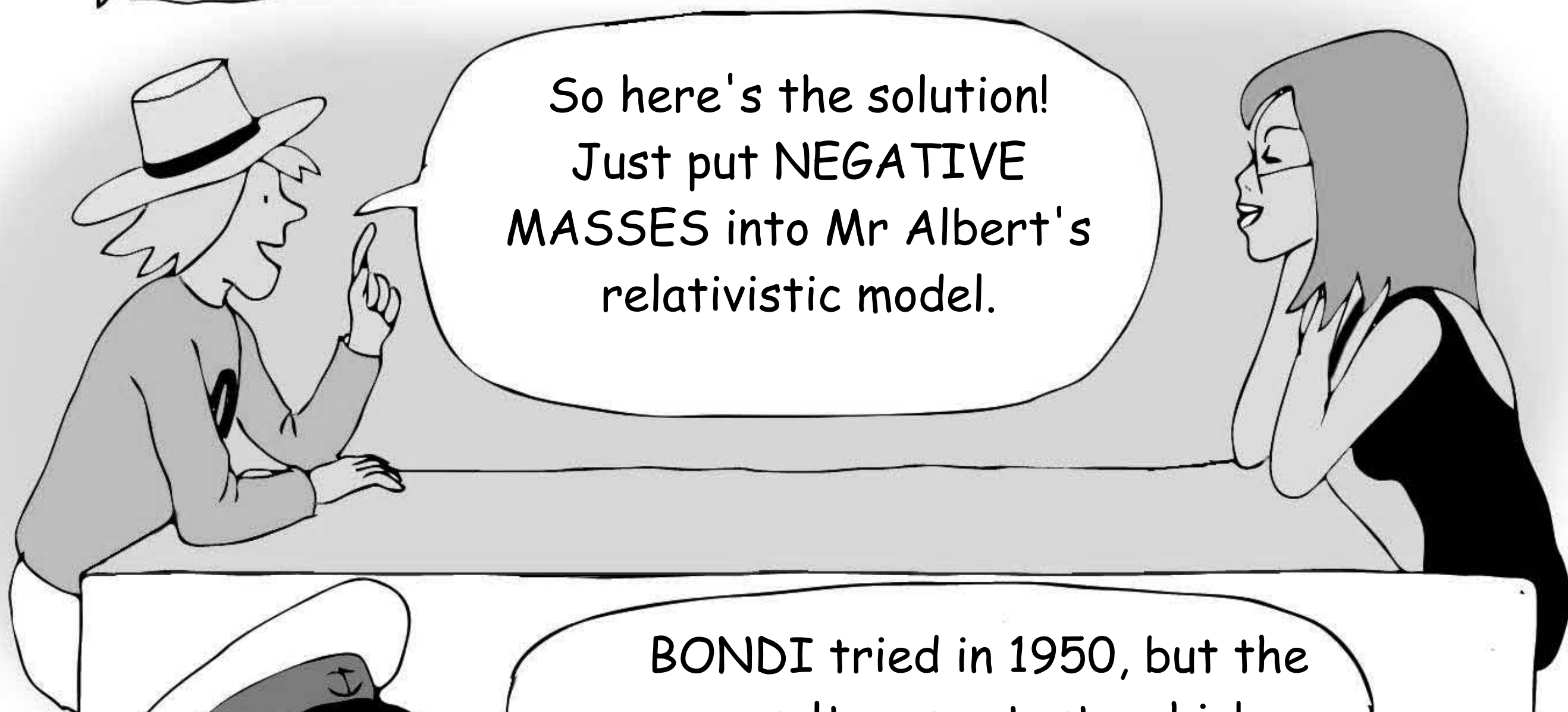
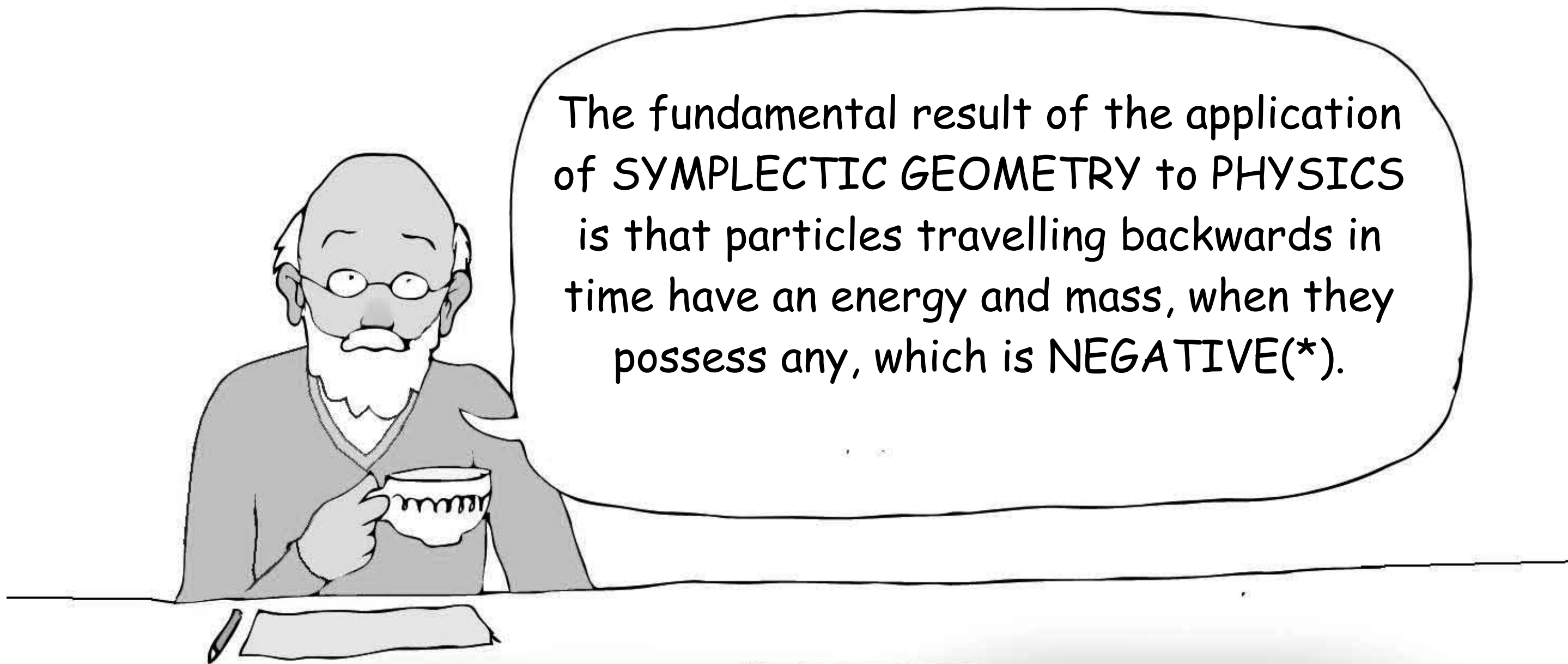




The French mathematician JEAN-MARIE SOURIAU was, along with the American KOSTANT and the Russian KIRILOV, the founder of SYMPLECTIC GEOMETRY. Unlike the first two, he set out to identify the applications of this GEOMETRY to PHYSICS.



(*) Died in 2012. The author was his pupil.



* Souriau's theorem (1970): the inversion of TIME leads to the inversion of ENERGY, MASS and IMPULSION, but retains SPIN as a pure geometrical quantity.

$$R_{\mu\nu} - \frac{1}{2}Rg_{\mu\nu} = \chi T_{\mu\nu}$$

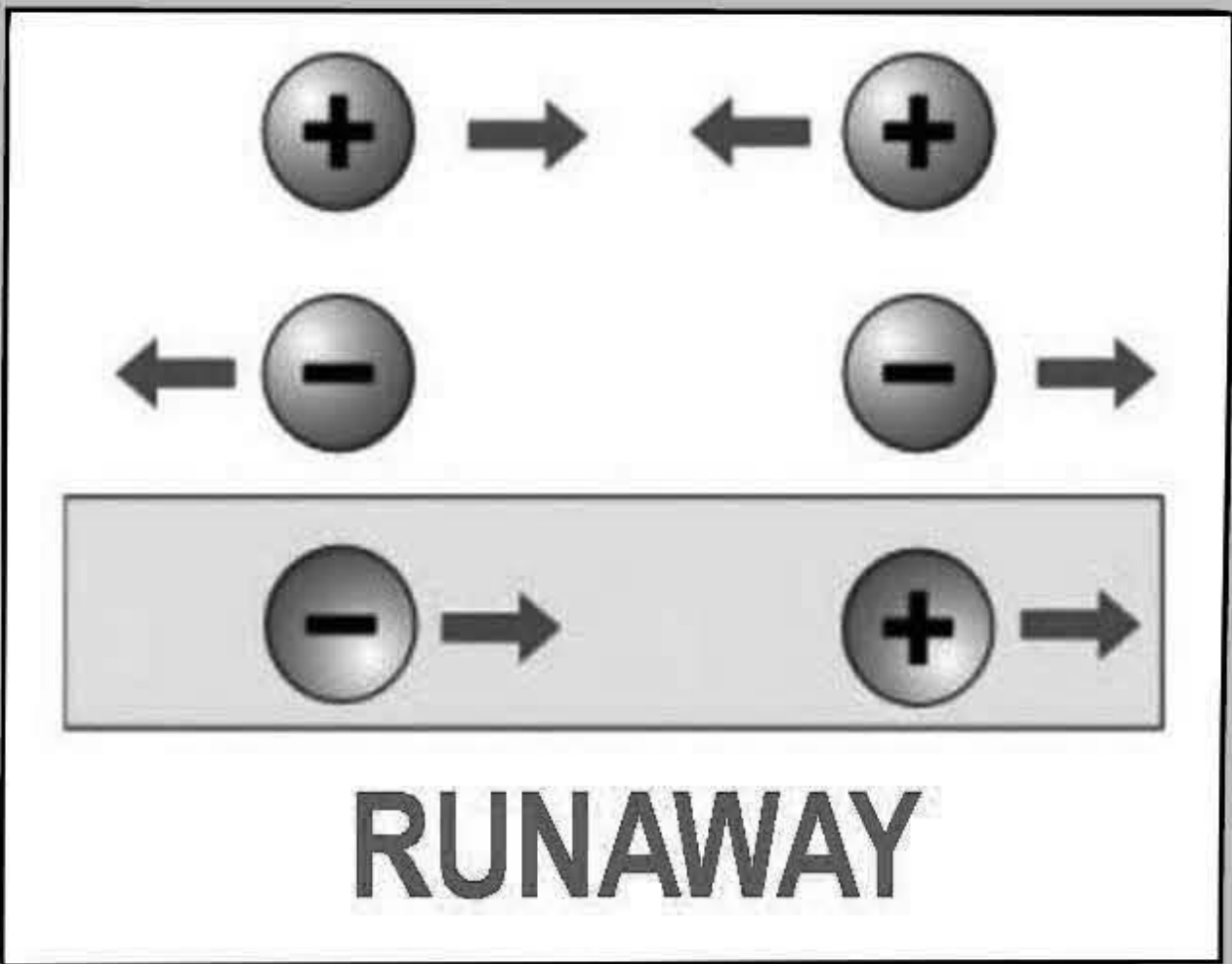


Imagine, Tiresias, that
NEWTON'S LAWS(*) are
derived from my equation
as an approximate form.

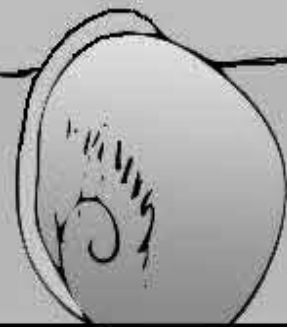
Wow!



If you introduce negative masses into my
GENERAL RELATIVITY model, you get these
weird interaction laws:



Negative masses repel positive
masses, which flee!



(*) its Newtonian "approximation"

THE RUNAWAY PHENOMENON(*)

In a universe containing positive and negative masses, when a $+m$ mass meets a $-m$ mass, the latter repels the $+m$, which flees.

But as the $+m$ attracts the $-m$, the latter follows.

By remaining at a constant distance, the two accelerate indefinitely. But as the kinetic energy (**)
of the negative mass is itself negative, the phenomenon occurs without any energy input.



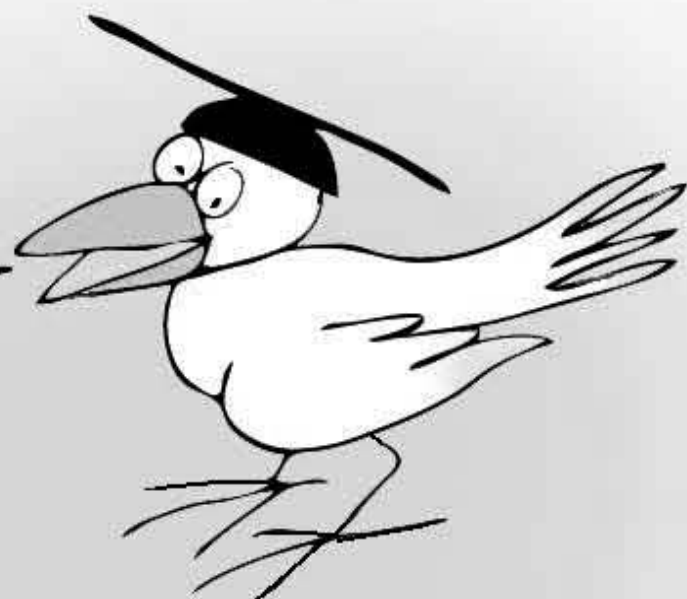
Catch me if you can!

$$E = \frac{1}{2} m^+ V^2 + \frac{1}{2} m^- V^2 = \text{Cst}$$



You can't do physics with that!

The scientific world concluded that negative masses could not be present in the universe.



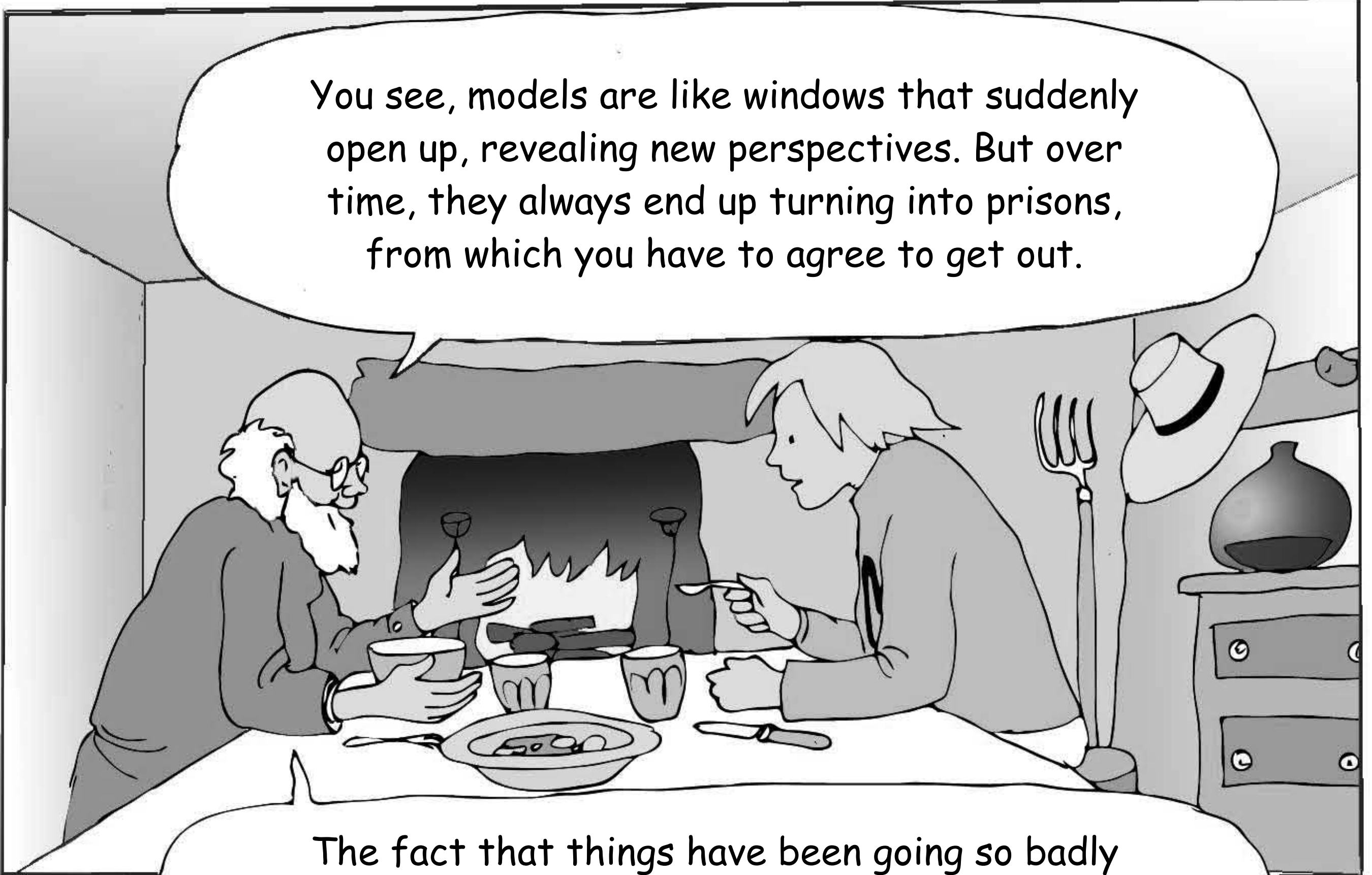
(*) RUNAWAY

(**) $\frac{1}{2} m^- V^2$



(*) Jean-Pierre Petit maintained friendly relations for many years with his friend and neighbor Alexandre Grothendieck, a pioneer of ALGERIAN GEOMETRY.

You see, models are like windows that suddenly open up, revealing new perspectives. But over time, they always end up turning into prisons, from which you have to agree to get out.



The fact that things have been going so badly for so long, and that no one can find anything, is a sign that we need to get out of a new prison that we can't see, and find something else.

There's no model that escapes this. Even if it worked for a very long time.



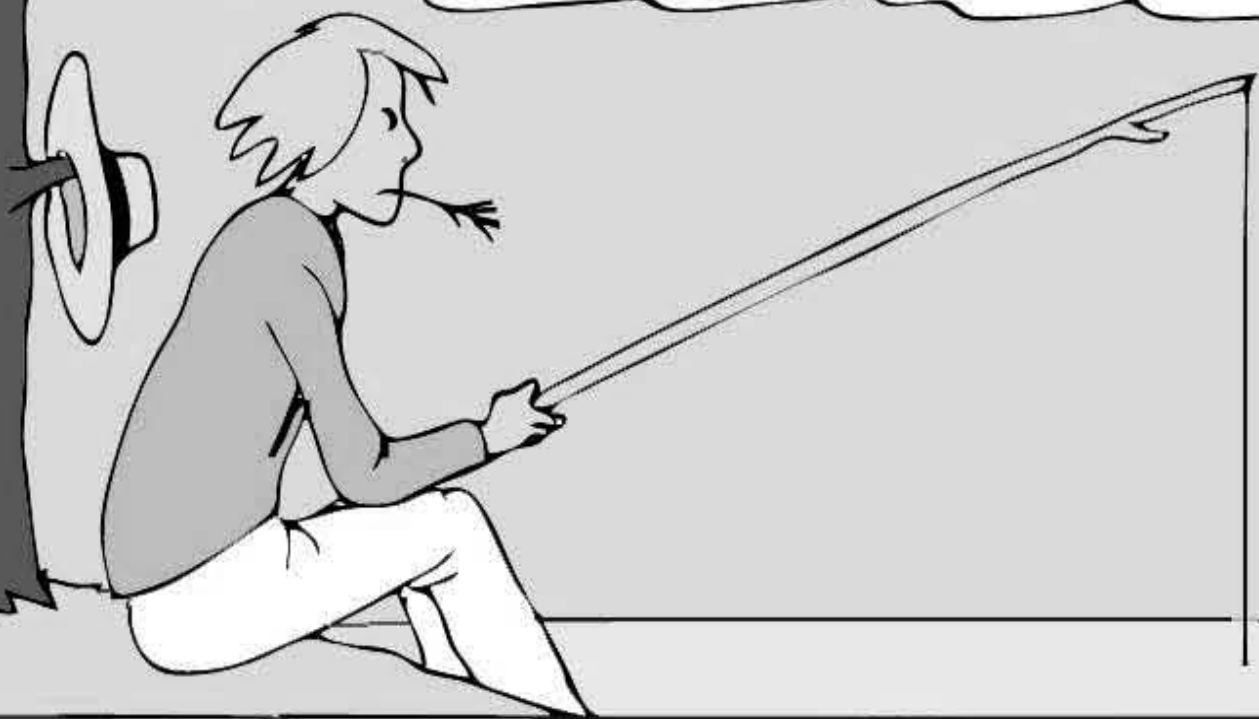
Schwarzschild and Souriau: clever foxes. It's too easy to dismiss these negative masses because they don't fit into Albert's field equation. Perhaps they have their own world... their own equation?



A world of negative masses with its own equation,



a relativistic equation, similar to Albert's,



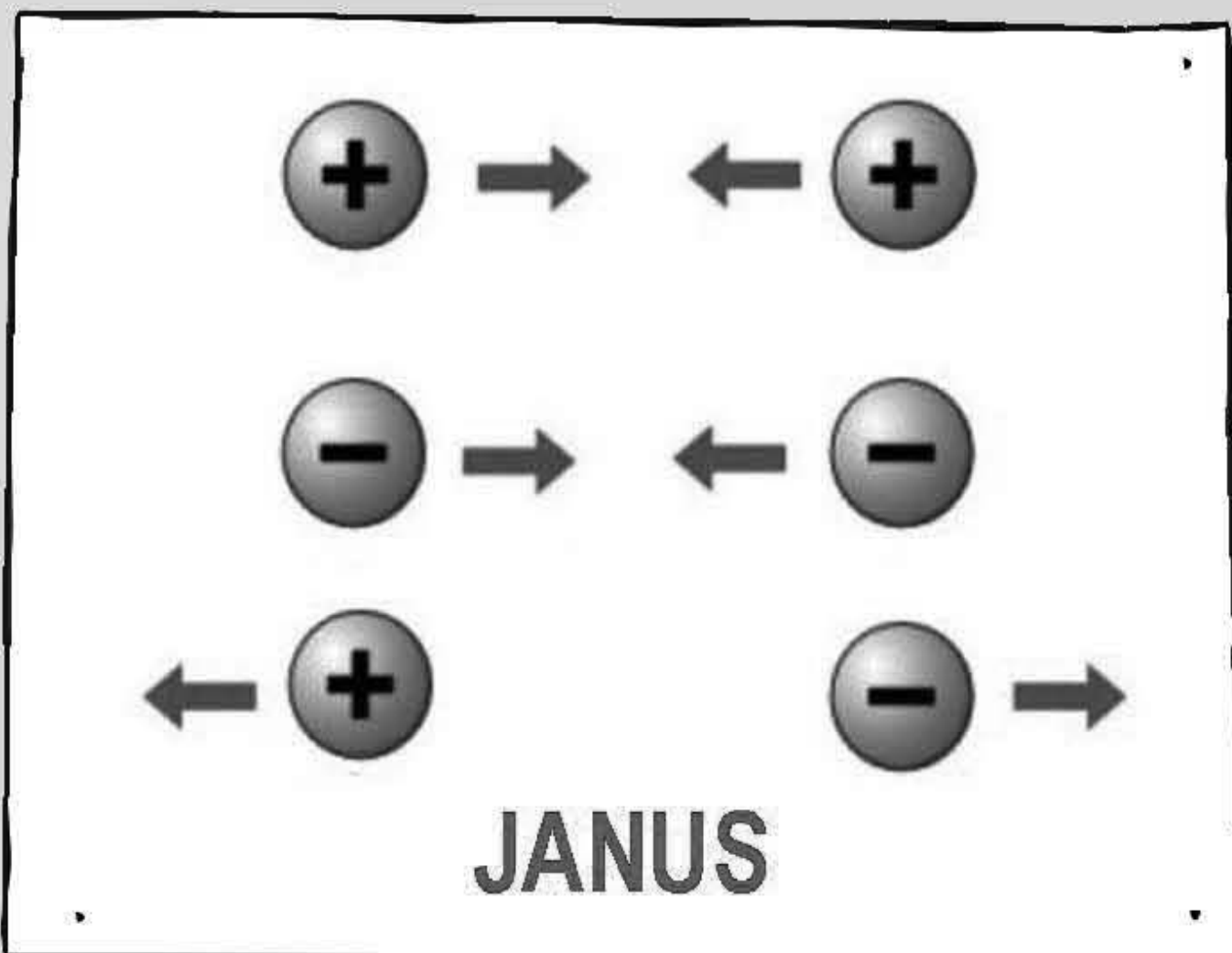
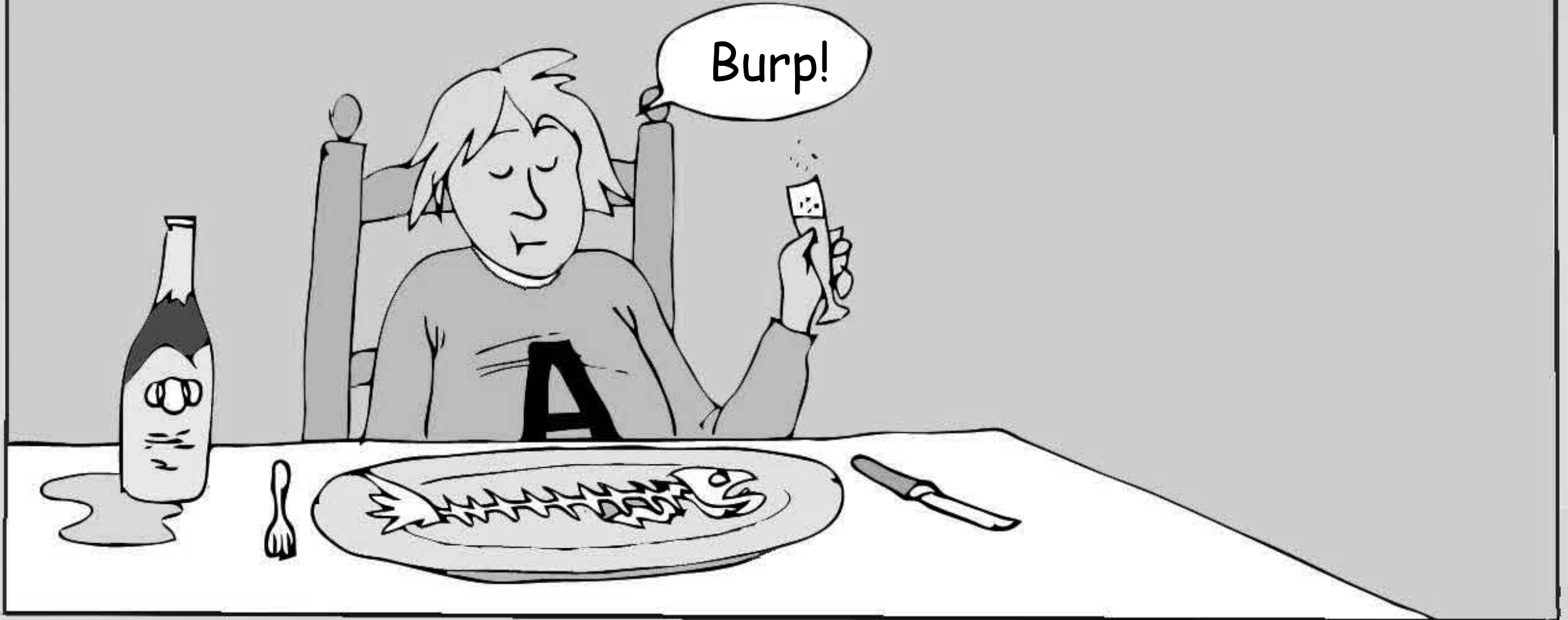
with interaction terms that would give the right laws,
those that satisfy the ACTION-RESPONSE principle and
eliminate that pesky RUNAWAY phenomenon.





$$R_{\mu\nu}^{(+)} - \frac{1}{2} R^{(+)} g_{\mu\nu}^{(+)} = \chi \left[T_{\mu\nu}^{(+)} + \sqrt{\frac{g^{(-)}}{g^{(+)}}} \hat{T}_{\mu\nu}^{(-)} \right]$$

$$R_{\mu\nu}^{(-)} - \frac{1}{2} R^{(-)} g_{\mu\nu}^{(-)} = -\chi \left[\sqrt{\frac{g^{(+)}}{g^{(-)}}} \hat{T}_{\mu\nu}^{(+)} + T_{\mu\nu}^{(-)} \right]$$



From these equations
derive the laws



Like Einstein's equation, this second equation, which governs the world of negative masses, requires their speed to remain below $c(-)$, which is the speed at which photons $\gamma(-)$ of negative energy travel.

And $c(-)$ is a priori different from $c(+)$

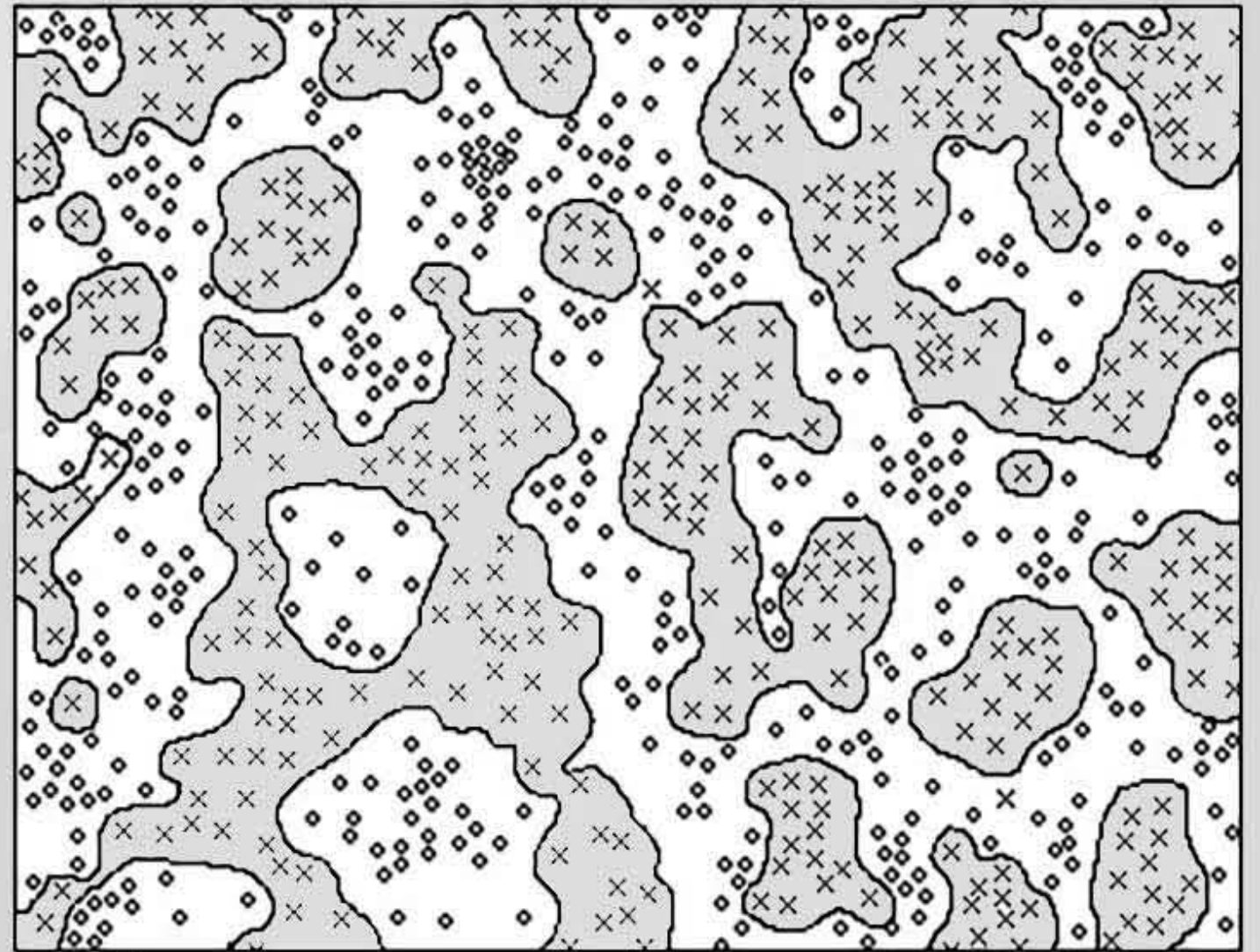
And since our eyes and optical instruments don't pick up these photons emitted by negative masses, they're basically invisible!

In other words, it's a special form of dark matter.

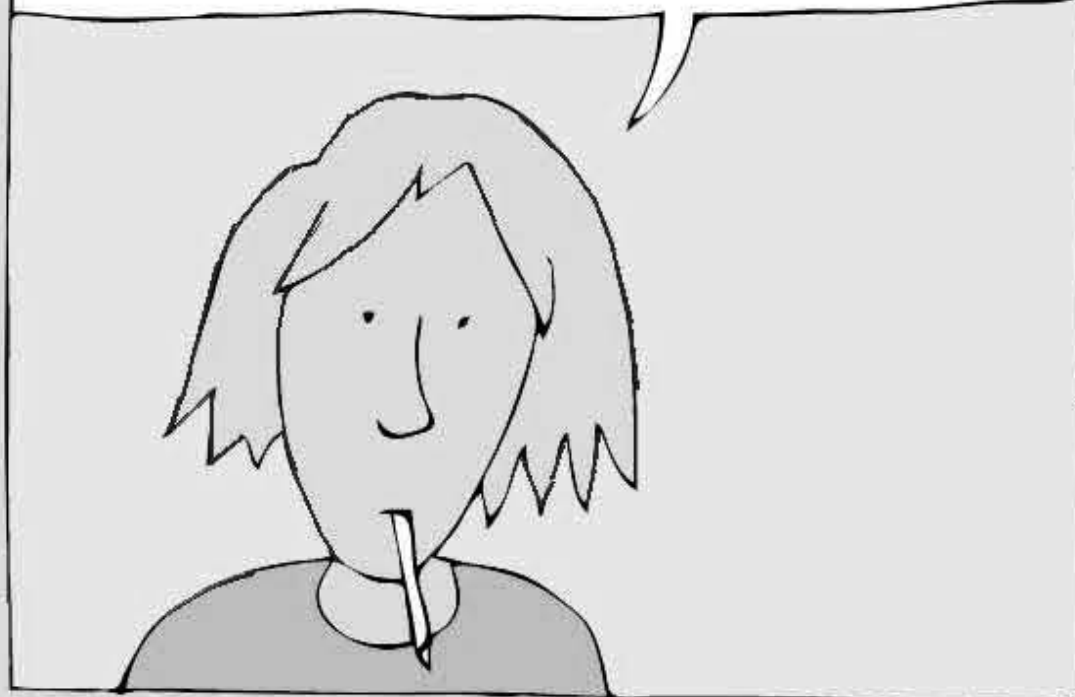
No, because dark matter has positive mass. It attracts ordinary matter, while negative mass repels it.



Masses of the same sign attract each other according to Newton's law. Opposite-sign masses repel each other according to "anti-Newton", as shown in my two equations. Now, how does this mixture behave?



The two populations are separating, but what to do with it all?



Be a little logical. You've given the same density ρ to both populations, while the invisible components obviously play the most important role.

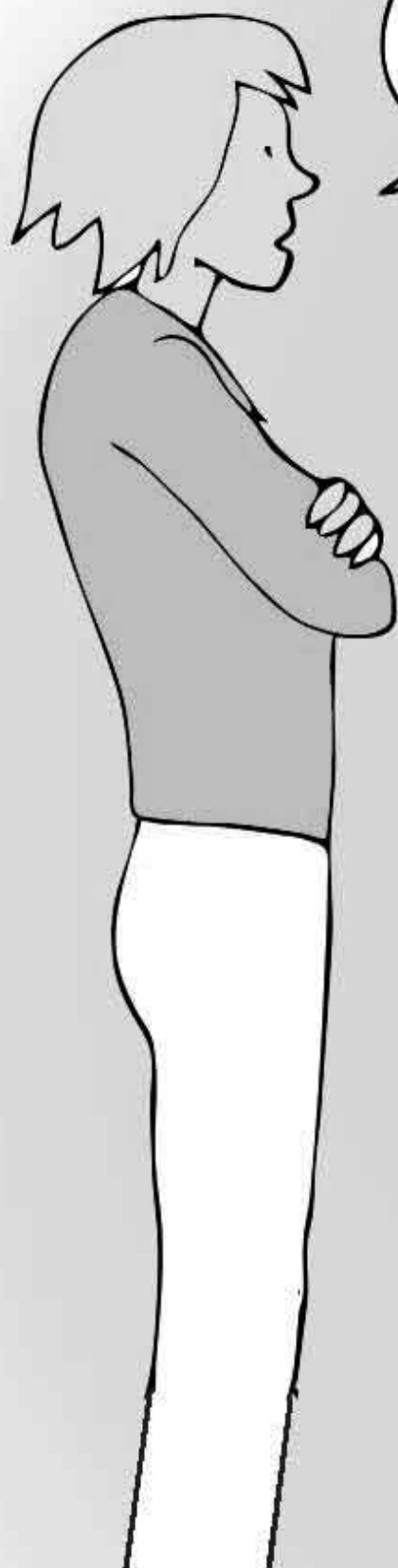


You're right. I'll take $|\rho_-| > \rho_+$ and let it run all night.

To better understand how gravitational instability works with these two materials made of masses of opposite signs, we'll represent the force of gravity by gravity and the "antigravity force" to which negative masses (of opposite direction) are subjected by the Archimedean force.



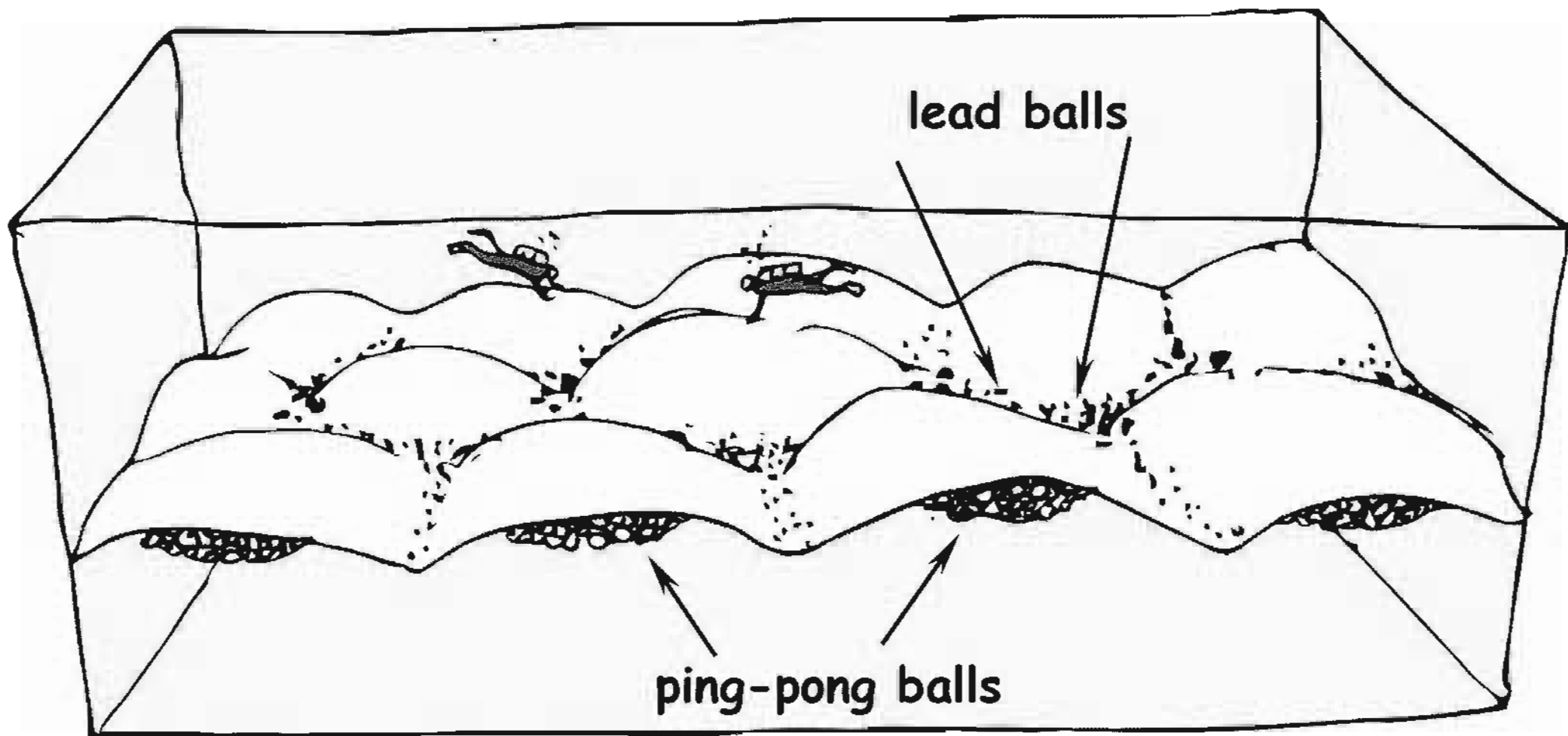
In water, separated by a membrane, I'll represent the positive masses by lead balls and the negative masses by ping pong balls.



And now what do you do?

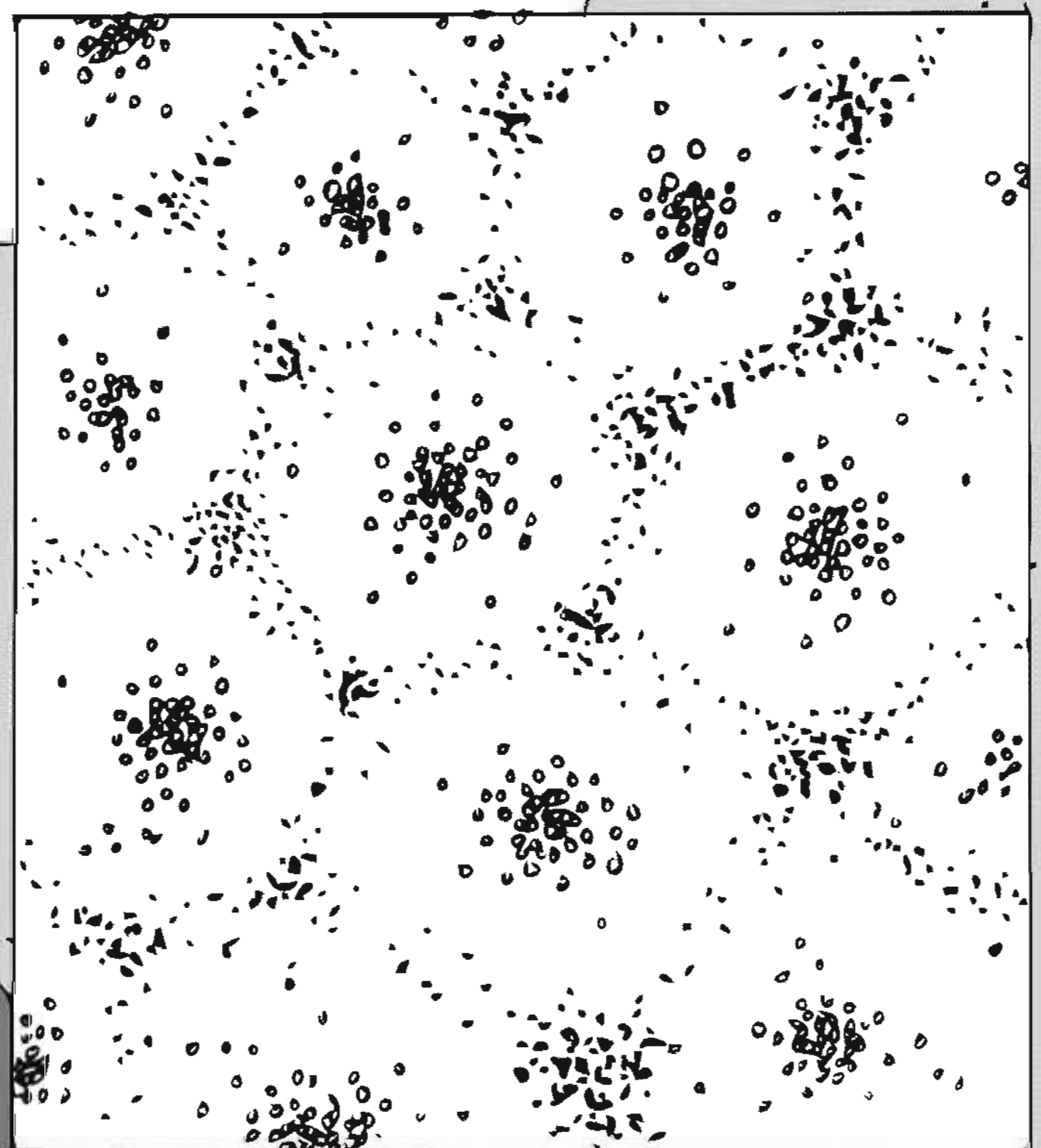
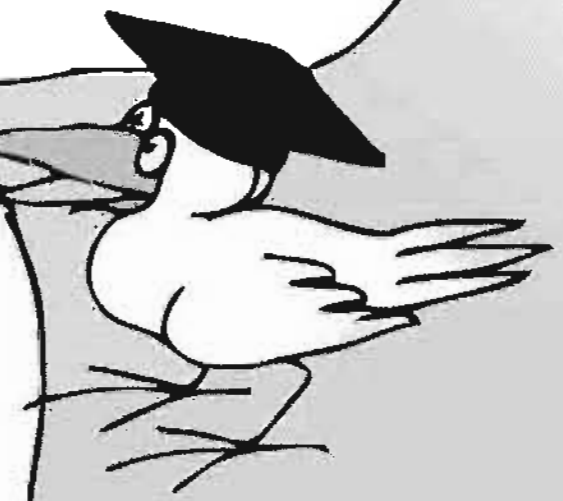


Get ready. Do as I do. We're going to experiment.

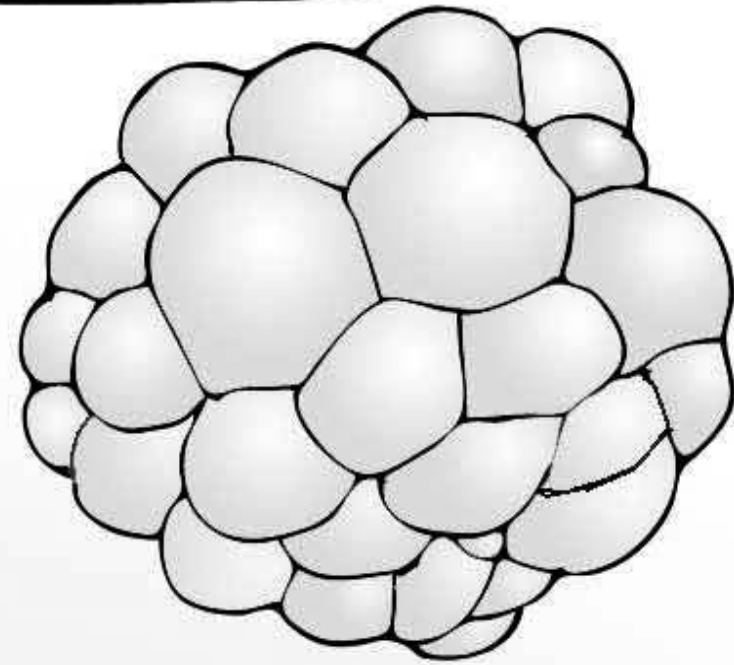
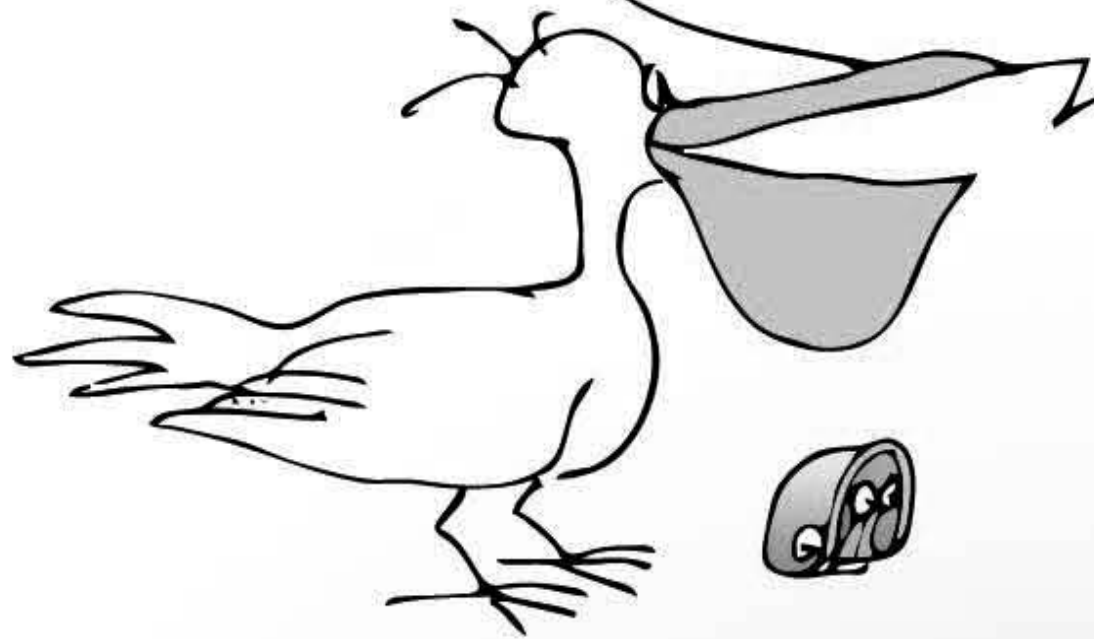


These are the ping-pong balls, pushing the hardest and gathering in evenly-spaced groups. Leads are confined to the valleys, in what remains of the available space.

Similarly, in the Universe, negative masses lead the way, giving rise to a quasi-regular set of conglomerates. As simulations show.

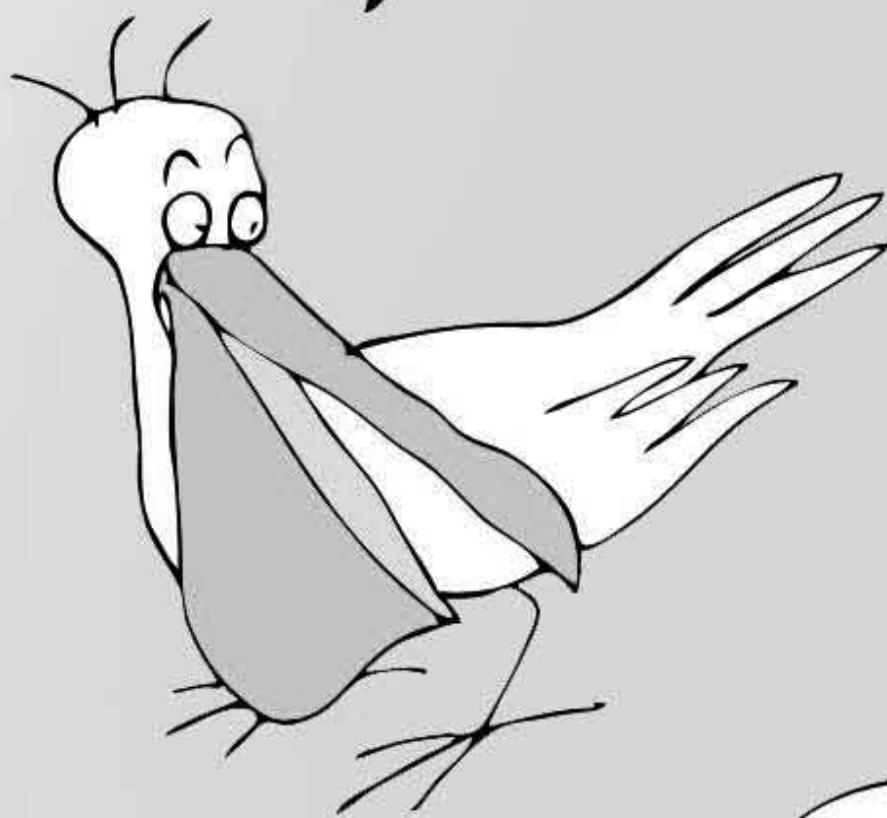


Wait a minute! If I understand correctly in 3D, it looks like JOINED SOAP BUBBLES.

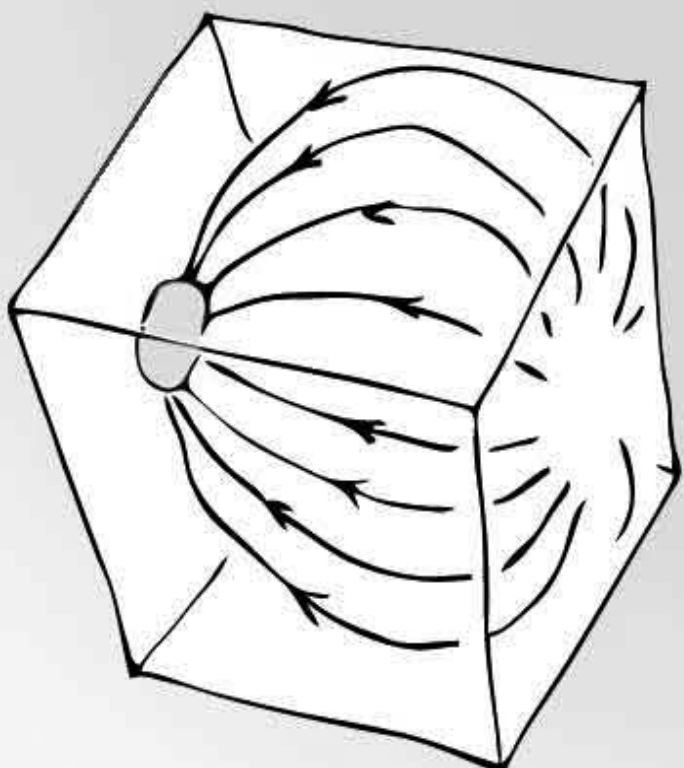


And the matter, tending to gather along the segments common to three bubbles, will give rise to FILAMENTS. At the junction of four of these cells, we obtain GALAXY CLUSTERS!

In other words, at the center of the great void discovered in 1977, there is a concentration of negative mass, perfectly invisible!



In 2023, this explanation, based on the presence of this negative mass concentration, is the only thing to be found on:
<https://scholar.google.com> (*)

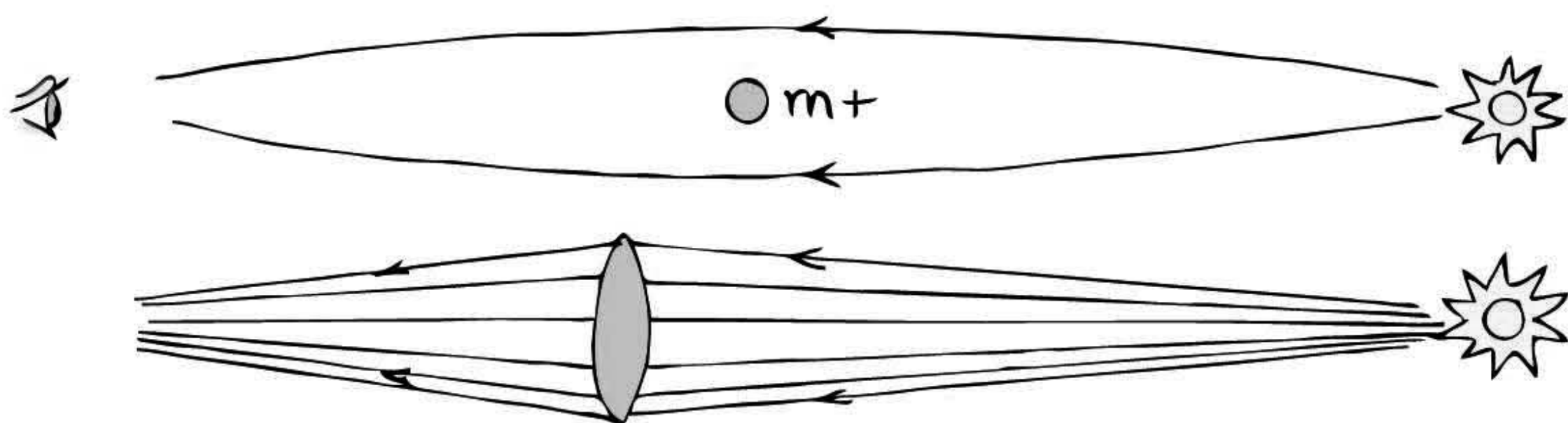


(*) Composer: dipole repeller

The negative gravitational lens effect



It has been known since 1919 that positive masses bend light rays.

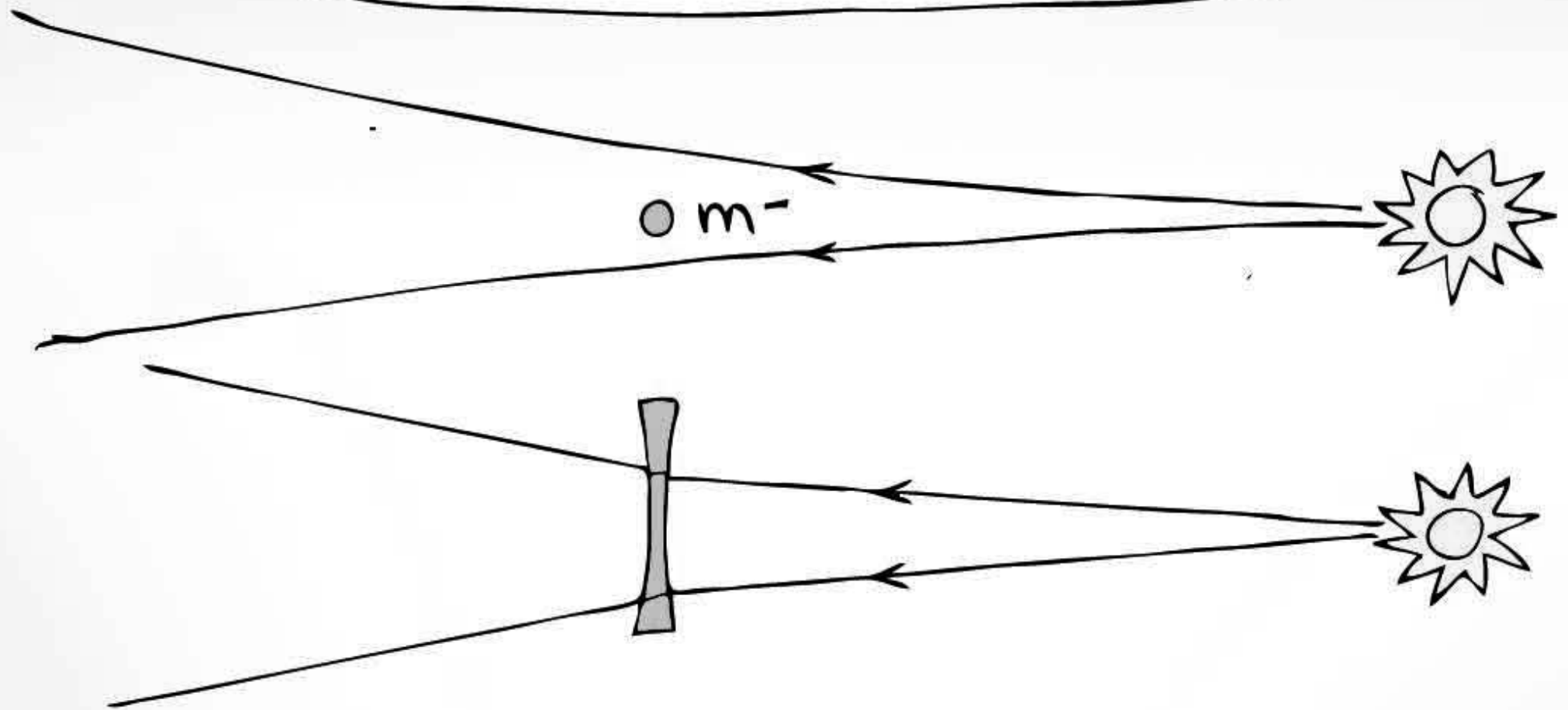


This focusing of the light increases the apparent brightness of the source, just as a converging lens does.



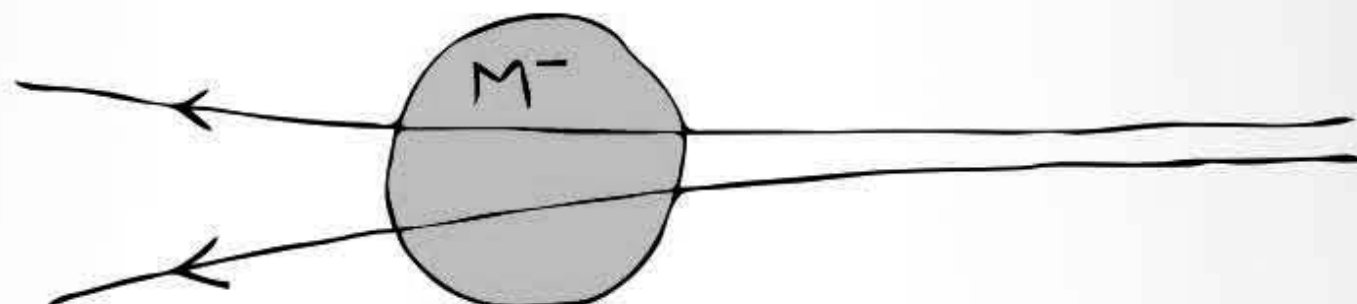


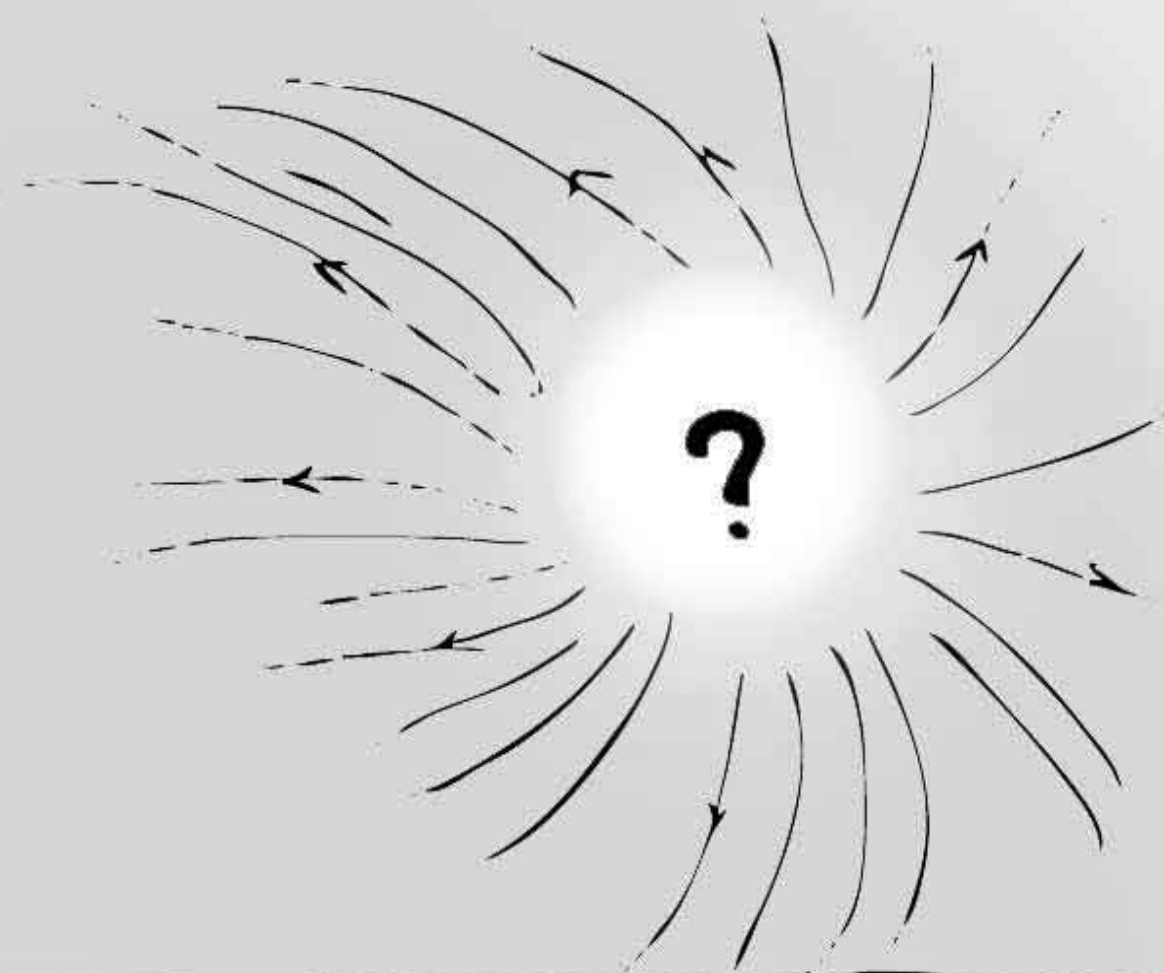
A negative mass produces the opposite effect: like a diverging lens, it scatters light rays, reducing the apparent brightness of distant sources.



Since 1990, high redshift galaxies had been found to have low magnitudes. This led to the assumption that they were dwarf galaxies. This assumption proved wrong when the JWST telescope revealed that they were similar to nearby galaxies.

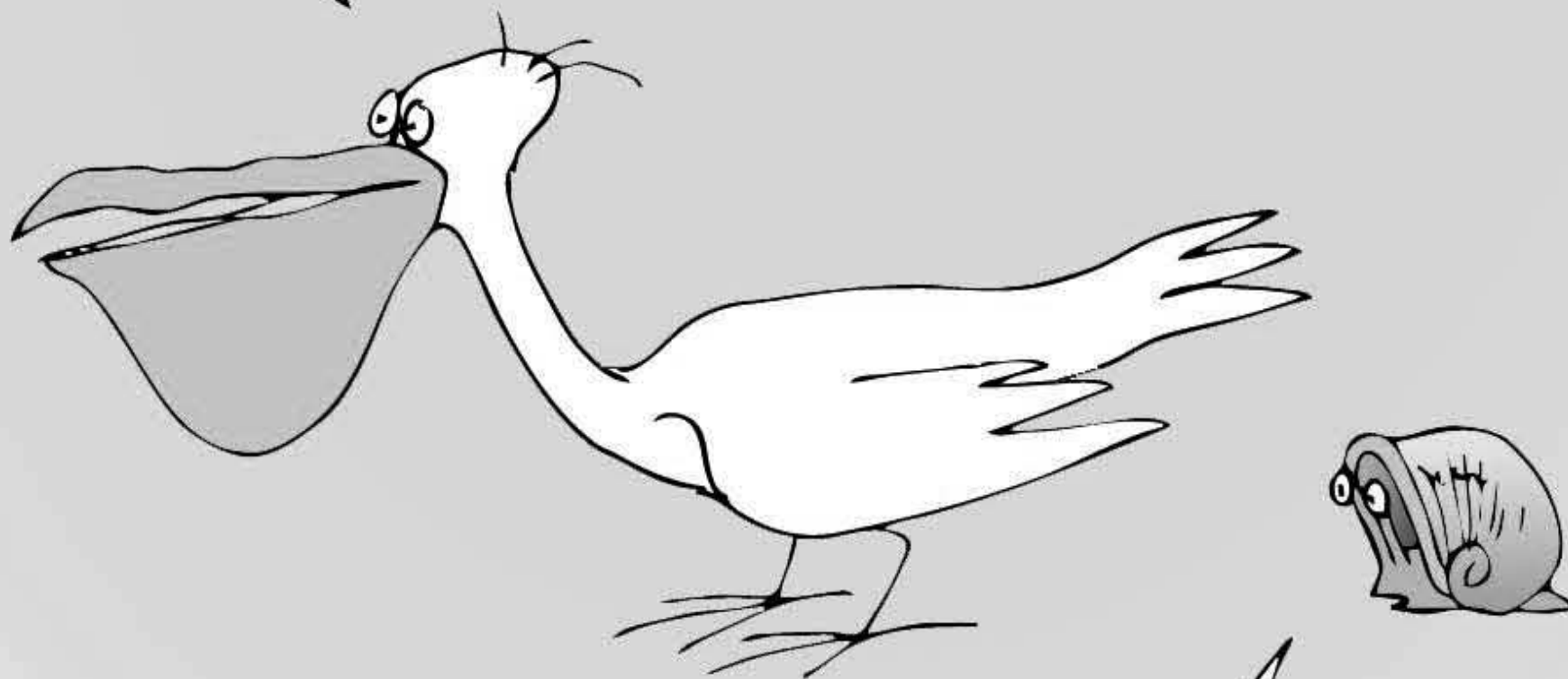
Photons pass easily through negative-mass clusters (which interact with m^+ masses and γ^+ photons only antigravitationally), but this reduces the magnitude of distant sources.





Measurements of the magnitudes of galaxies in the background of the GREAT REPELLER should make it possible to determine the diameter of this concentration of negative mass, responsible for their attenuation. The object is a priori spheroidal. The extended reach of the JWST space telescope will enable us to extend the 3D map of the velocity field by discovering other large voids.

I can't see the rat anymore.



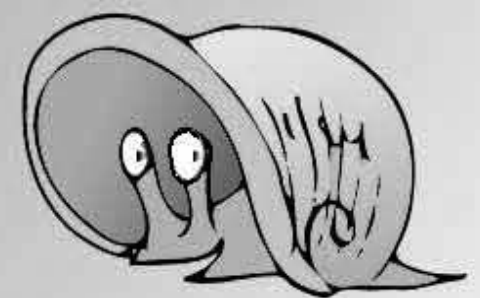
He had to leave with his master, the guy with the really long hair.

GALAXY FORMATION

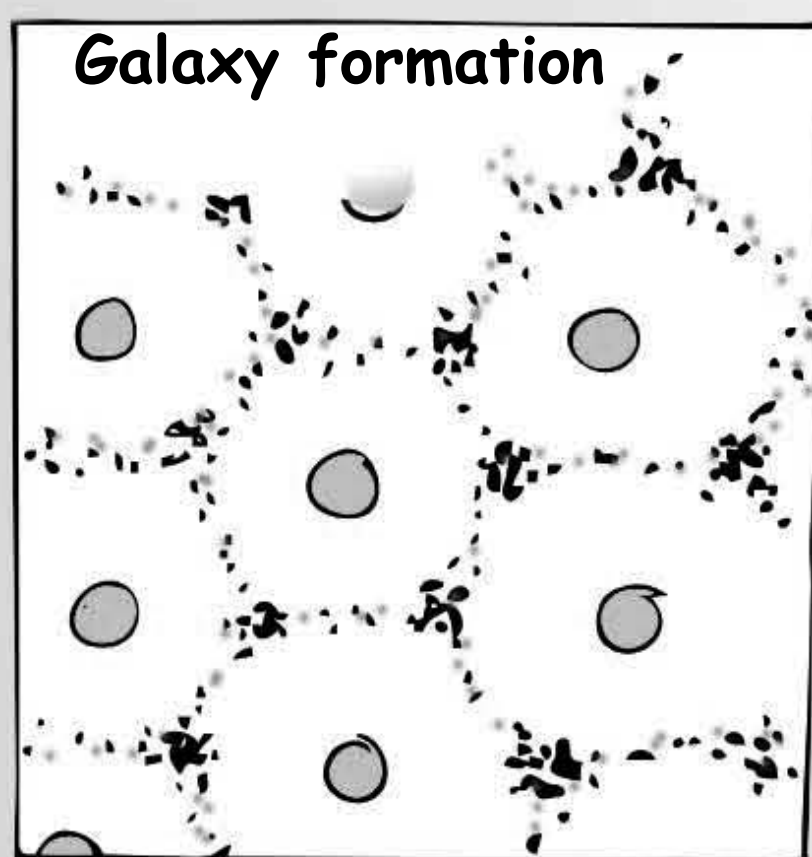
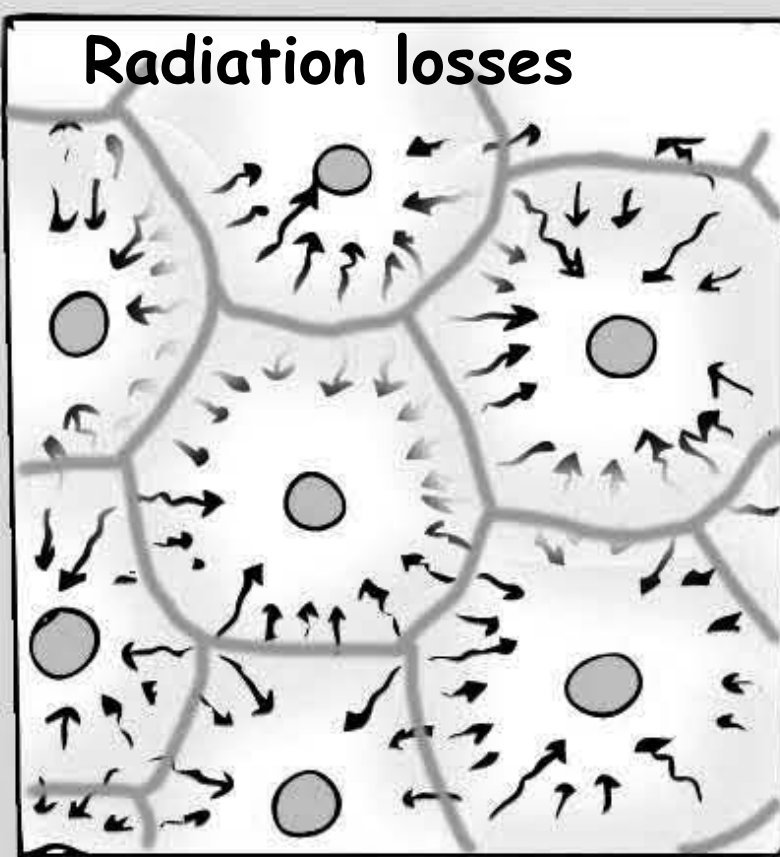
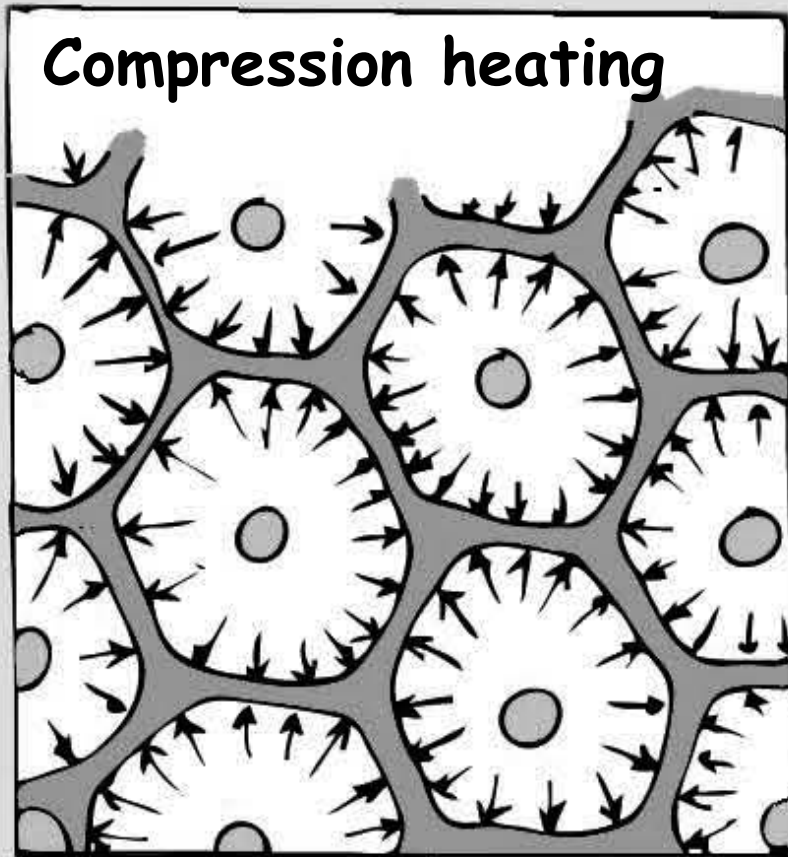
At the end of the RADIATION ERA, gravitational effects come into full play. Positive and negative masses suddenly separate. The positive mass finds itself sandwiched between two conglomerates of negative mass, which exert a retro-compression on it, heating it up. But its membrane-like configuration means it cools no less rapidly through radiative losses. Destabilized (*), the positive mass then gives rise to ALL GALAXIES, which form in the first hundred million years.

The direction

This model is the only one to account for such an early birth of galaxies.



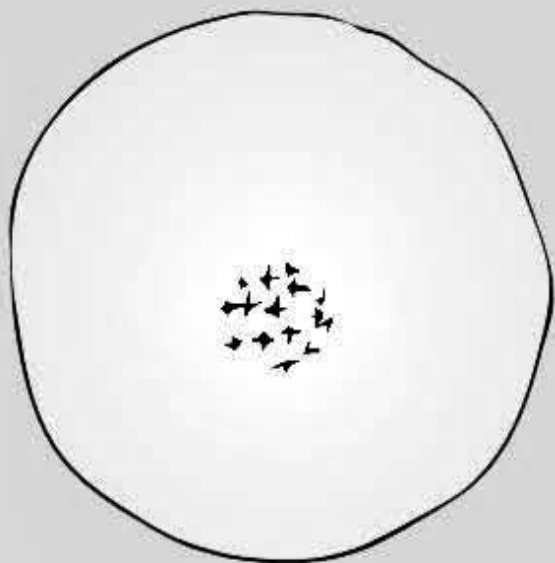
(*) see the comic strip A THOUSAND MILLION SUNS



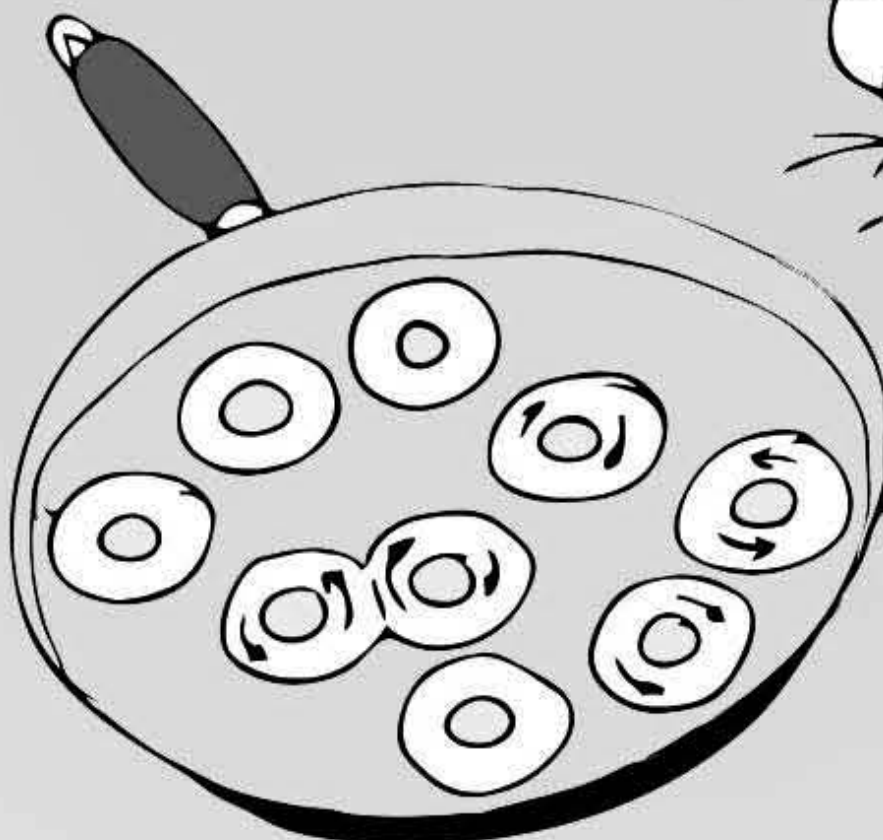
Heating is most intense at the nodes



During this phase, galaxies, packed together like grapes in a cluster, are veritable UV ovens (*), where young primitive stars heat up the residual gas. There are two possible scenarios: massive galaxies impart a thermal agitation speed to the hydrogen atoms that exceeds their liberation velocity. These galaxies, losing their gas, become ELLIPTICALS.

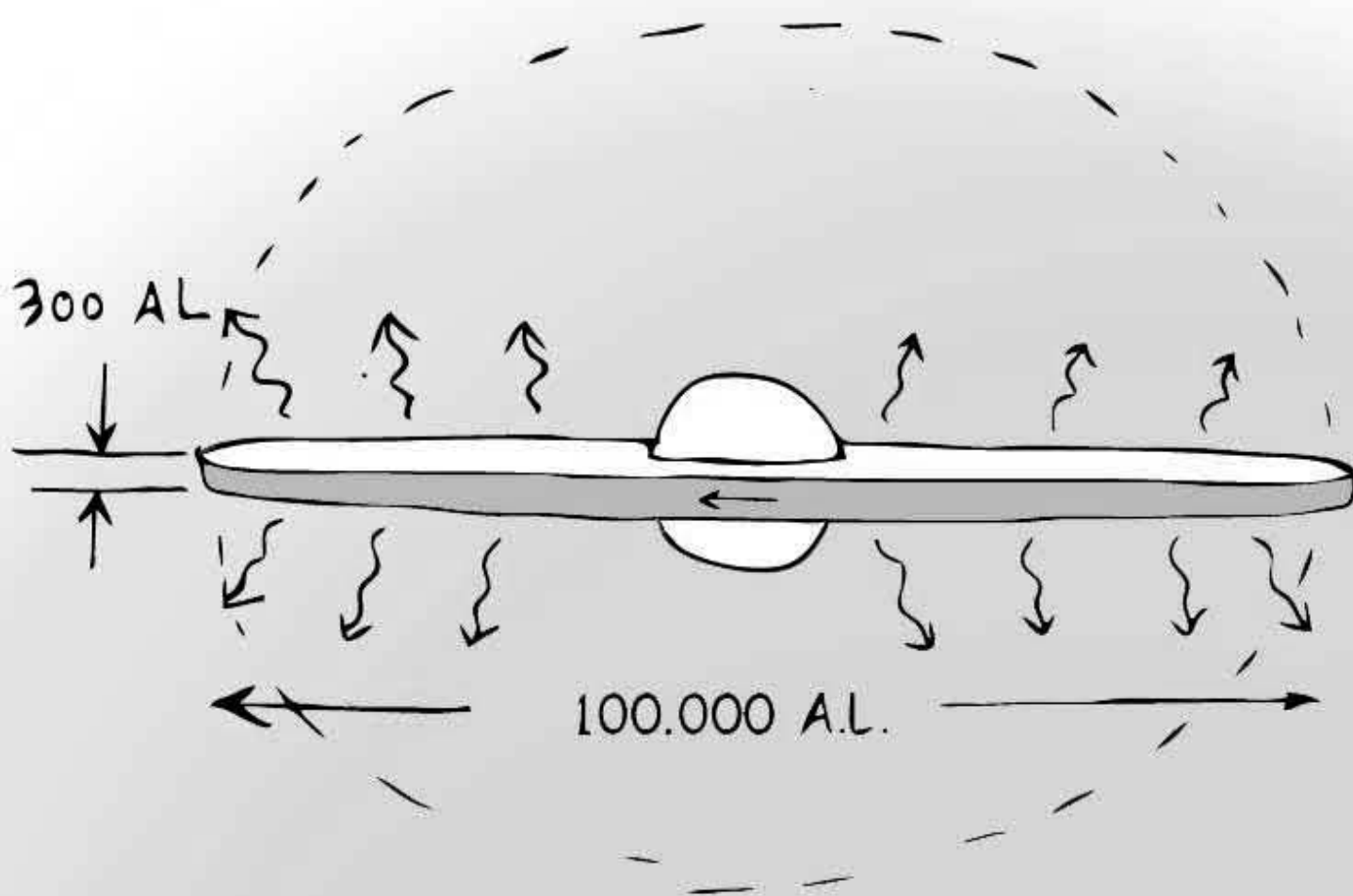


The residual gas of light galaxies expands to form halos, but remains trapped in hundreds of globular clusters containing young stars.

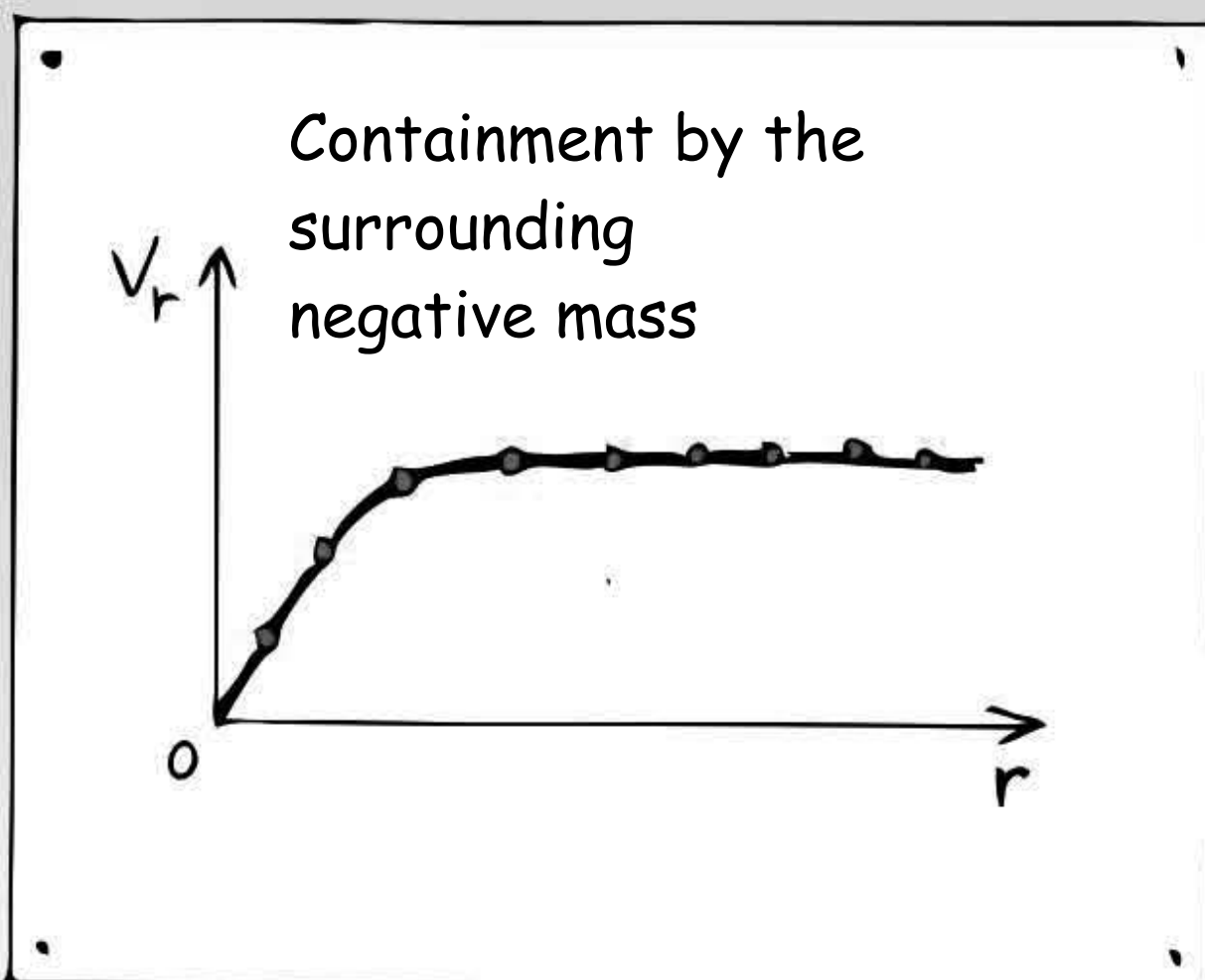


Like fried eggs sliding across a hot pan, collisions impart rotation "to the whites" and not "to the yolks".

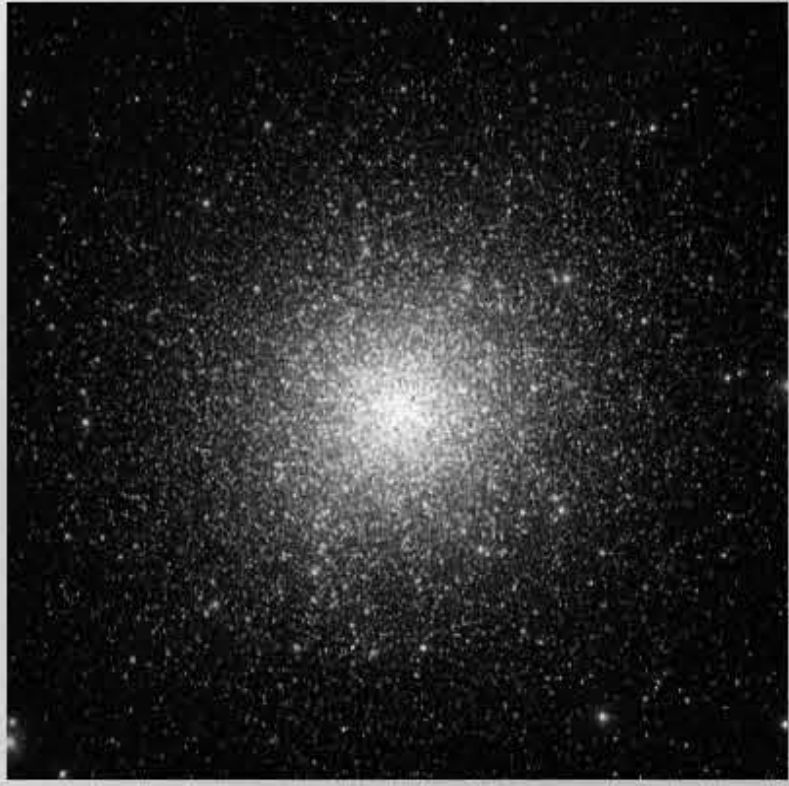
The origin of galaxy rotation



The gas halos of light galaxies cool by radiation, but retain their rotational motion, resulting in very flat disks.



Negative mass infiltrates galaxies more or less efficiently, contributing to their confinement and giving them a flat profile.



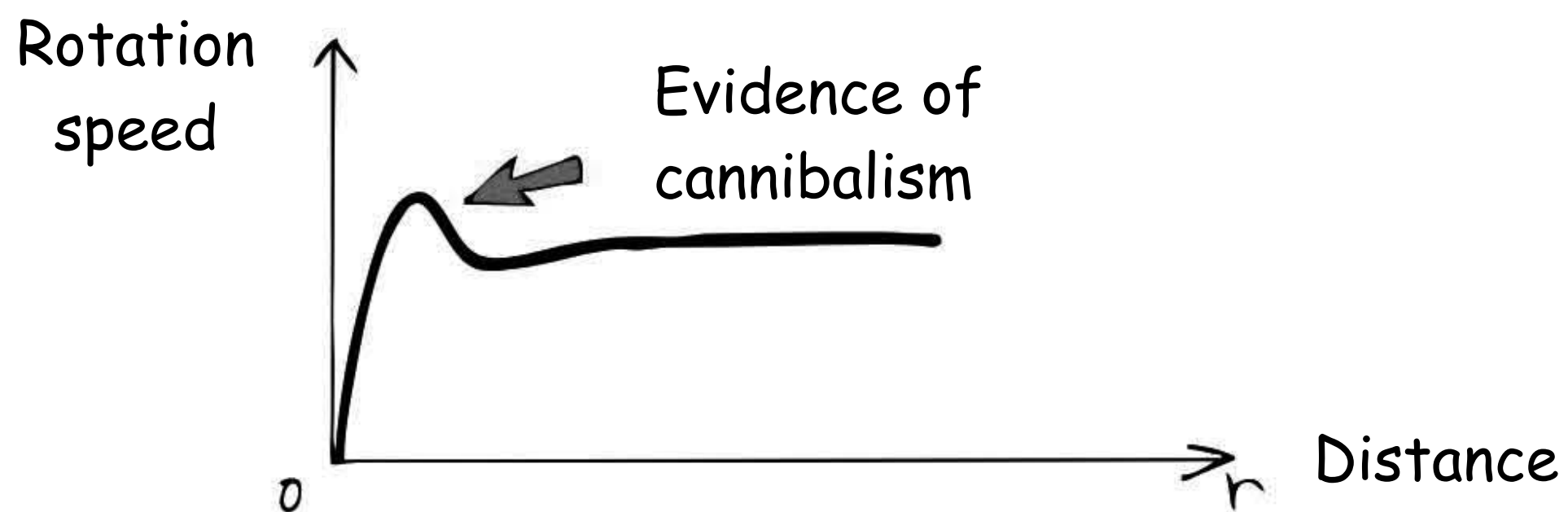
Hercules cluster

The hundreds of *GLOBULAR AMAS* made up of the oldest stars represent the fossil of the primitive galaxy, spheroidal and free of rotational motion.

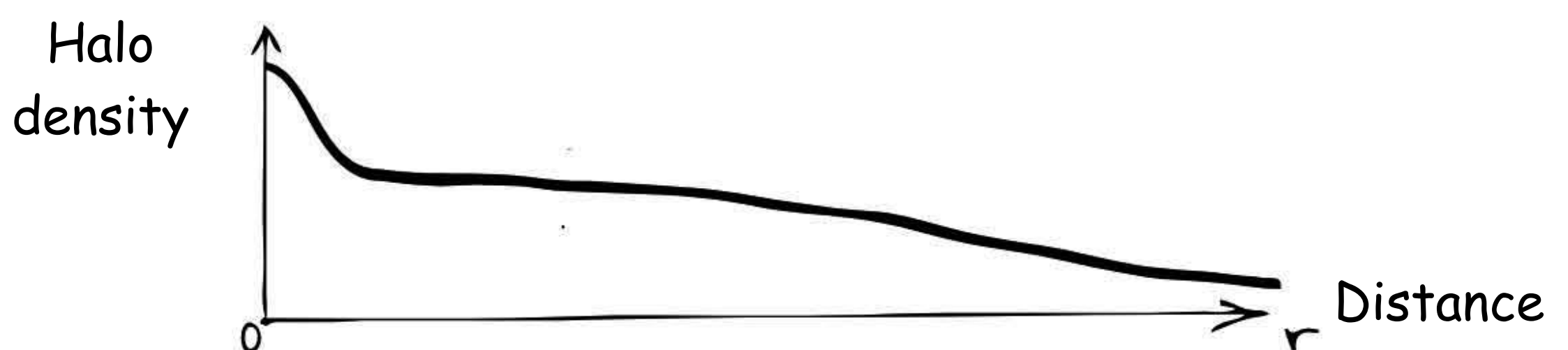


Cannibalism

Large galaxies swallow up small ones. The vestige can be seen in the rotation curves. Galaxies are non-colliding systems. The small galaxy retains its rotational momentum. Its set of stars is squeezed into the gravitational field of the larger galaxy. This increases the speed of its stars:



ASTROPHYSICIANS, who deduce the density of the large dark matter halo, are astonished by the presence of a central peak necessary to counterbalance the overflows.





When the wise man shows the moon, the fool looks at the finger.

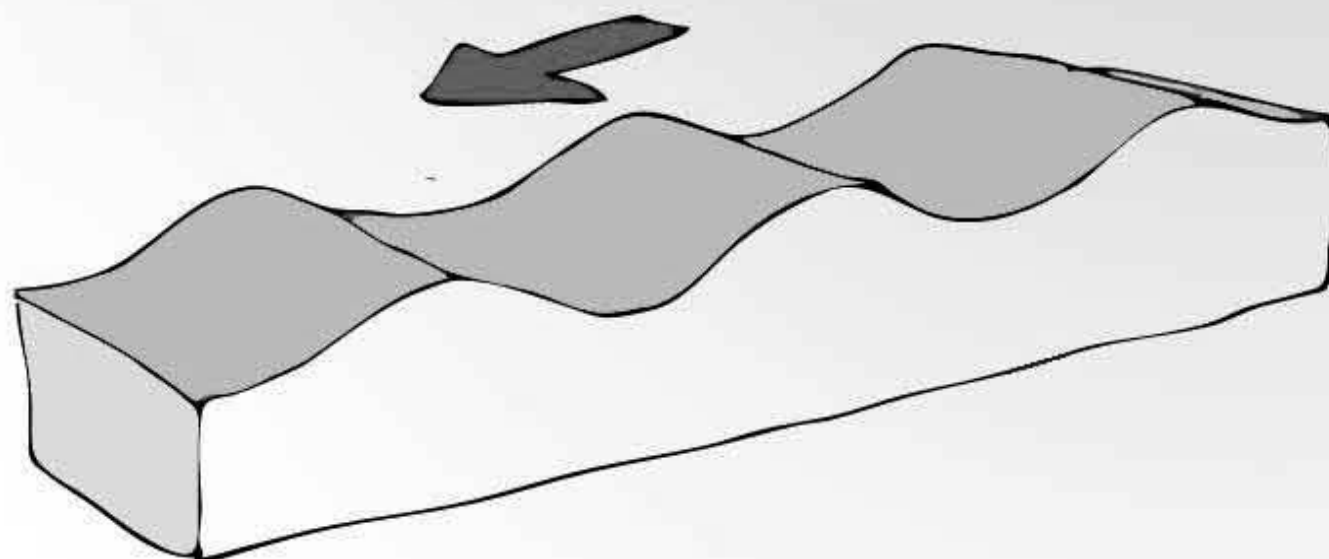
The raison d'être of the spiral structure



Françoise Combes, Vice-President of the French Academy of Sciences, specialist in spiral structure

Since 1990, no matter how many times we introduce the spiral structure as an initial condition in simulations, it dissipates in little more than one revolution. We still need to find the mechanism that will keep it going.

She's like someone who wants to understand, through simulations, how the waves of the sea work, but forgets... the wind!

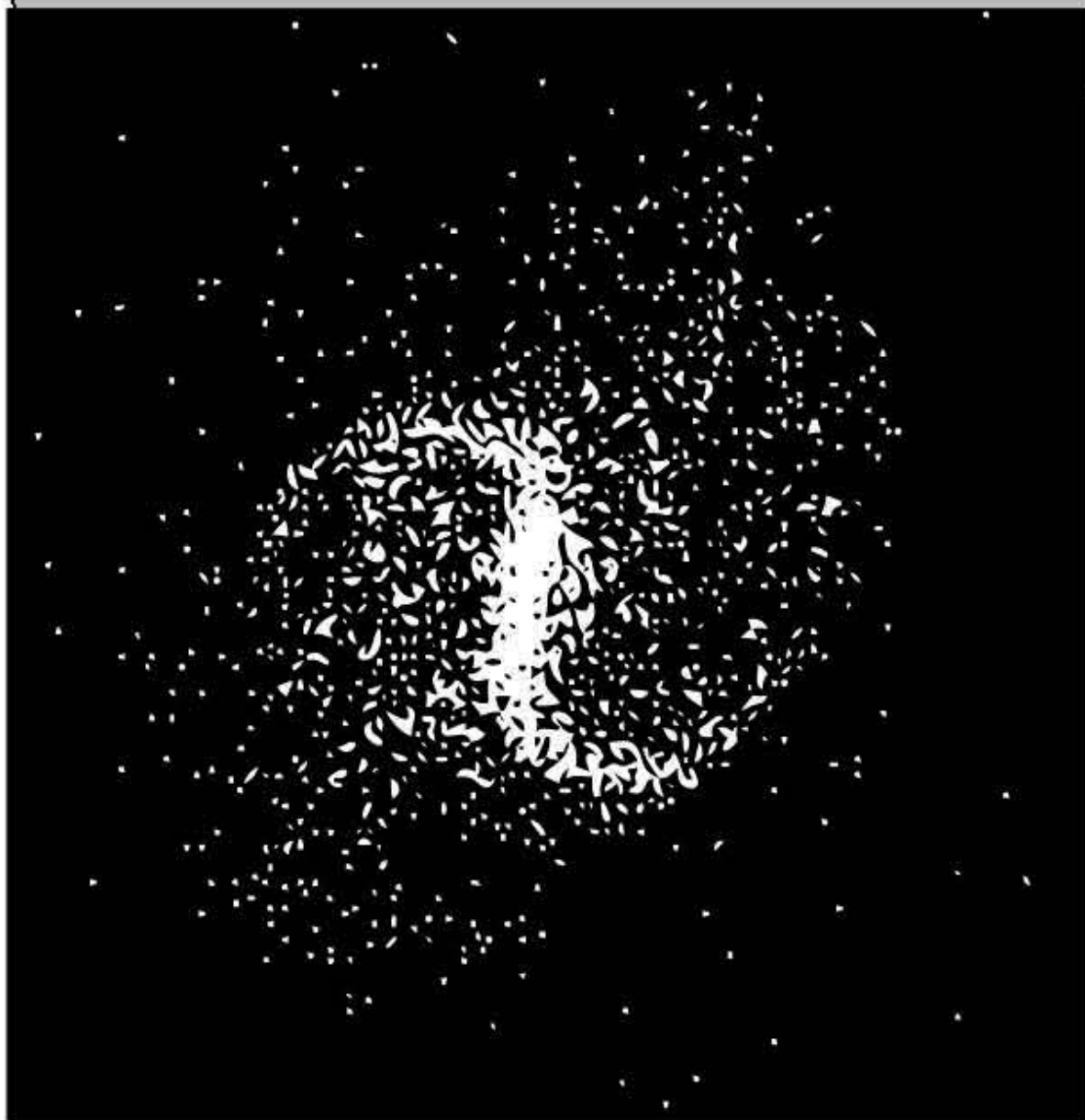




A vortex, in a fluid, dissipates its momentum by transporting it from near to near, through collisions. But galaxies are non-colliding media, so they can't transfer momentum and energy in this way.



They couple to their surroundings by means of DENSITY WAVES, which also appear in the surrounding negative mass. The forces that bind these two media at a distance are gravitational in nature.

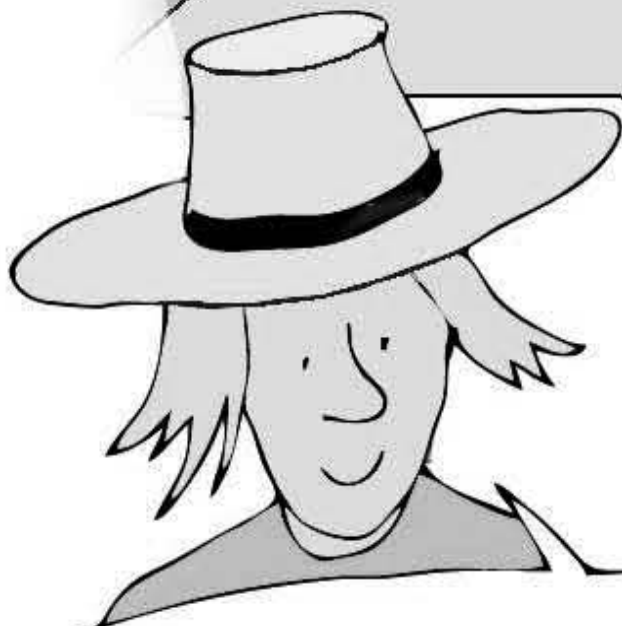


This is the result of a 1992 simulation. A barred spiral structure appeared immediately and was maintained for 30 revolutions. The trade journals all rejected this work with the same response:

Sorry, we don't publish speculative works



As long as astrophysicists fail to understand that density waves, like spiral structures, reflect a transfer of momentum for which a "partner" (negative mass or another galaxy) is needed, these artificially introduced spiral structures will quickly dissipate.



All very well, but which way do these waves turn?



Hound galaxy



To simulate this, we'll watch for the last second, when the bathtub empties. The water rotates rapidly, leaving only a thin film of water (*). Then you'll fugitively see the spiral waves turning in opposite directions.

It works!

(*) so that friction on the bathtub bottom is high

When the primitive gas halos that form in the earliest moments of galaxy existence, still close to one another, drift like fried eggs in a hot pan, they interact with one another, colliding atoms and setting them spinning. And that's before gravitational instability splits them into lumps (*).

Management



In France, we don't have oil, but we do have sinks.

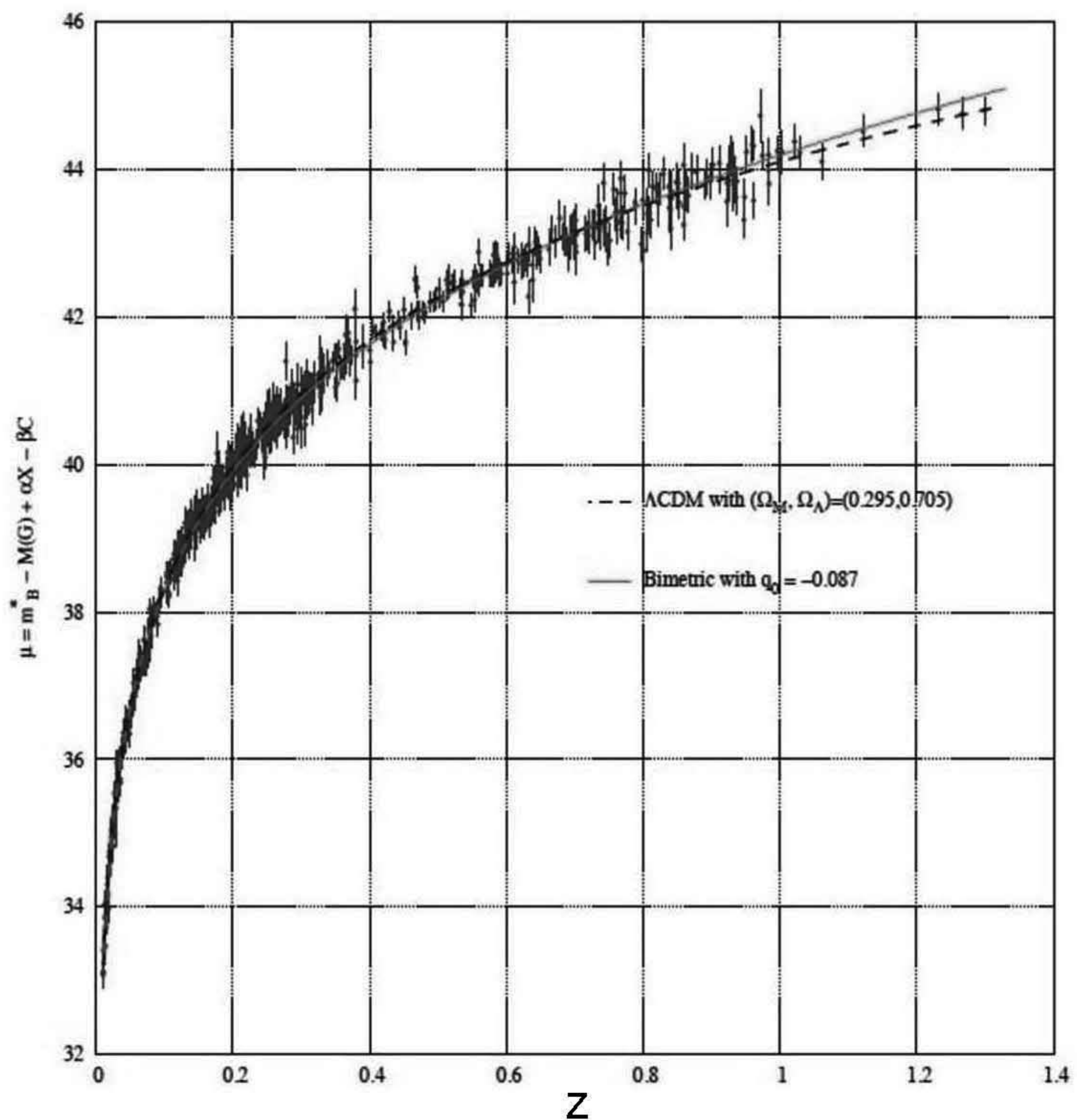
ACCELERATING EXPANSION

To account for this, I'd need **NEGATIVE PRESSURE**.

But you've already got it, you big ninny! The one for negative mass is :

$$p^- = \frac{\rho^- V^2}{3}$$

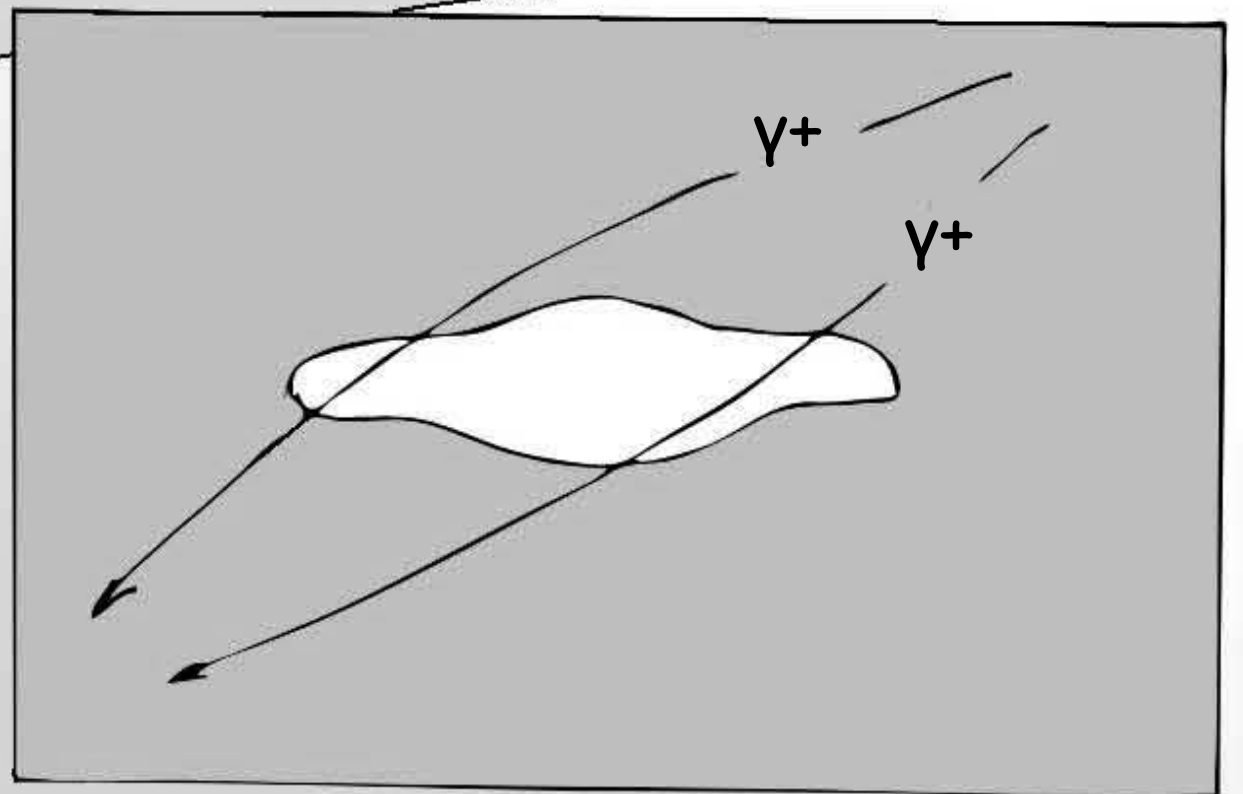
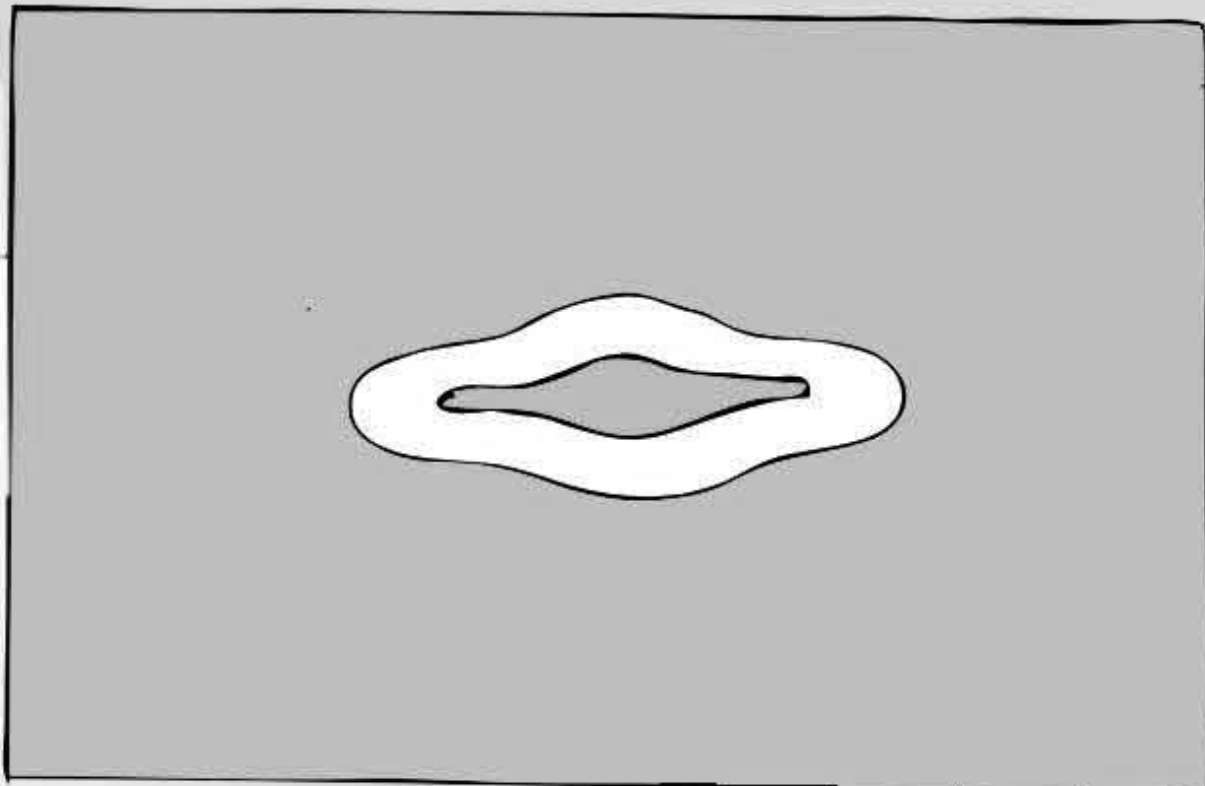
Your equations give you the solution.



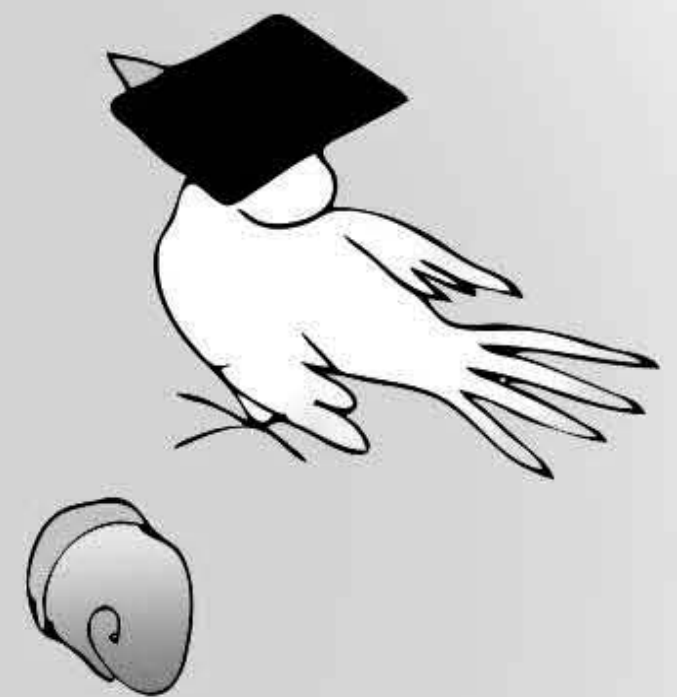
This negative pressure, introduced into the equation, provides an EXACT mathematical solution, which fits perfectly with the observation data.



As masses of opposite signs are mutually exclusive, in the vicinity of the Sun, they are practically absent. So your first equation identifies with Einstein's equation, and your model agrees with all local verifications of **GENERAL RELATIVITY**.



As a gap in the negative mass distribution is the gravitational field equivalent of its inverted image, these gaps account for the strong gravitational lensing effects in the vicinity of galaxies and galaxy clusters.



What's missing?

While the identity of dark matter is hard to define, that of negative mass is luminous in its simplicity. They are simply copies of the components of ordinary matter whose mass has been inverted.



Matter-antimatter duality exists in the negative world. There is matter with negative mass and antimatter with negative mass.

THE IDEA OF RUSSIAN ANDREI SAKHAROV(*)

Positive-mass matter is created from QUARKS and antimatter from ANTIQUARKS.

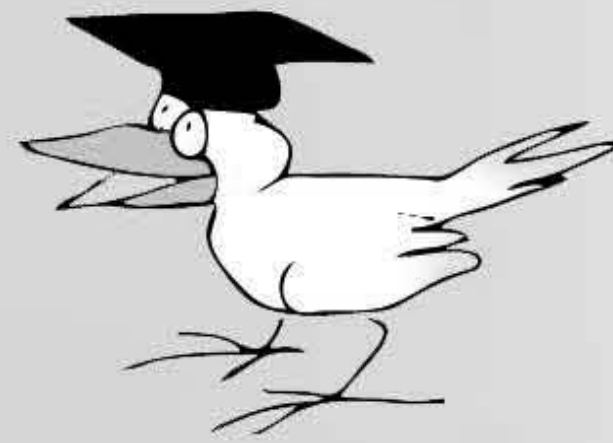
He assumes that, from the BIG BANG onwards, the synthesis of matter was faster than that of antimatter in our side of the universe. After the fantastic matter-antimatter annihilation, only a small remnant of matter and positive-energy antiquarks remain in the positive world. Added to this are the many photons produced by annihilation. The situation is reversed in the negative world, where we'll find only negative-mass antimatter particles, negative-energy quarks and negative-energy photons from annihilations.

Direction

(*) 1967



So here's the answer to the question. In the negative world, you'll find **NEGATIVE MASS ANTIHYDROGEN**.



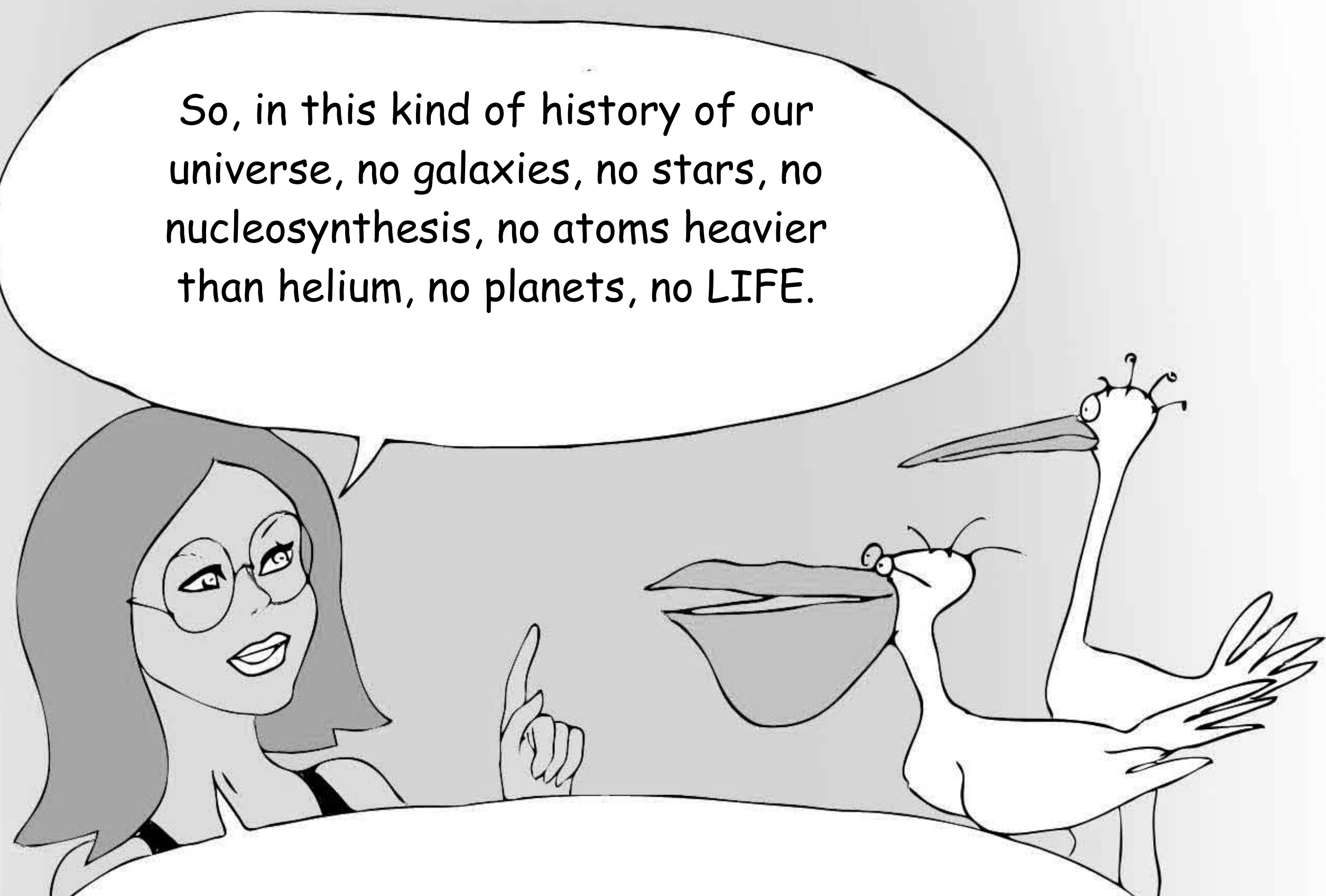
Plus negative mass anti-helium(*).

But nothing else, because conglomerates of negative mass are like immense protostars that will never light up because of the immensity of the thermal energy to be dissipated by radiation.

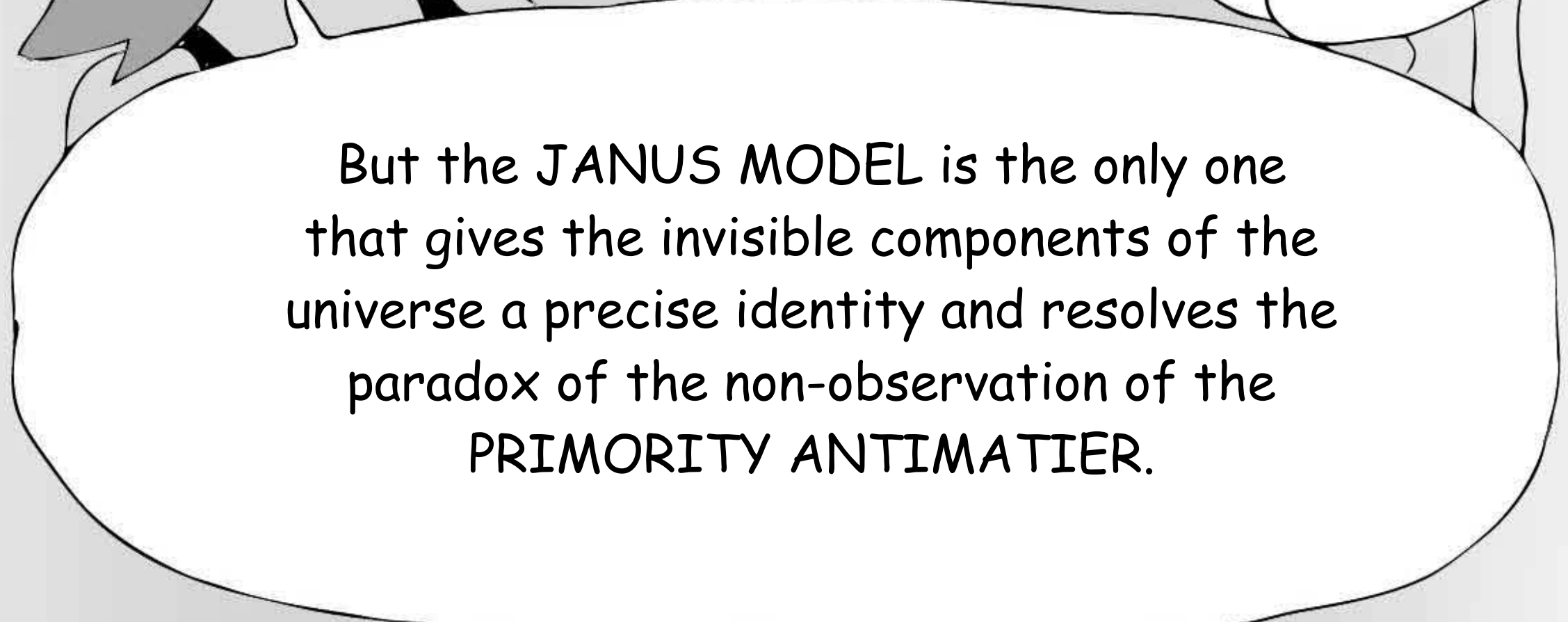


Energy:
 R^3

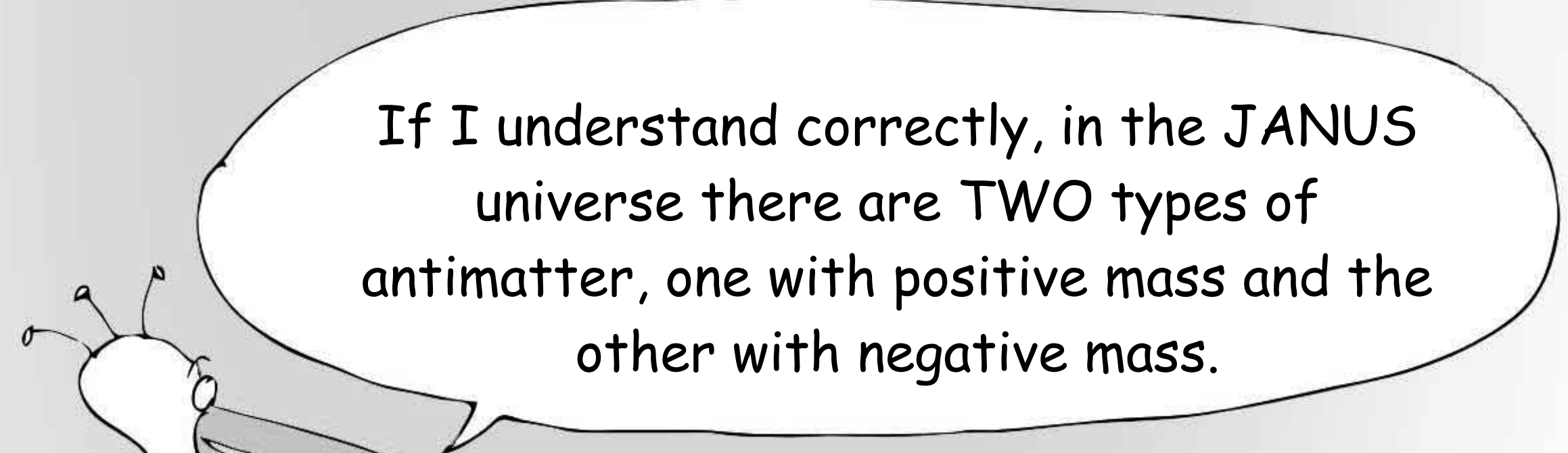
"radiator": R^2




So, in this kind of history of our universe, no galaxies, no stars, no nucleosynthesis, no atoms heavier than helium, no planets, no LIFE.



But the JANUS MODEL is the only one that gives the invisible components of the universe a precise identity and resolves the paradox of the non-observation of the PRIMORITY ANTIMATIERS.



If I understand correctly, in the JANUS universe there are TWO types of antimatter, one with positive mass and the other with negative mass.



Yes, that's right.

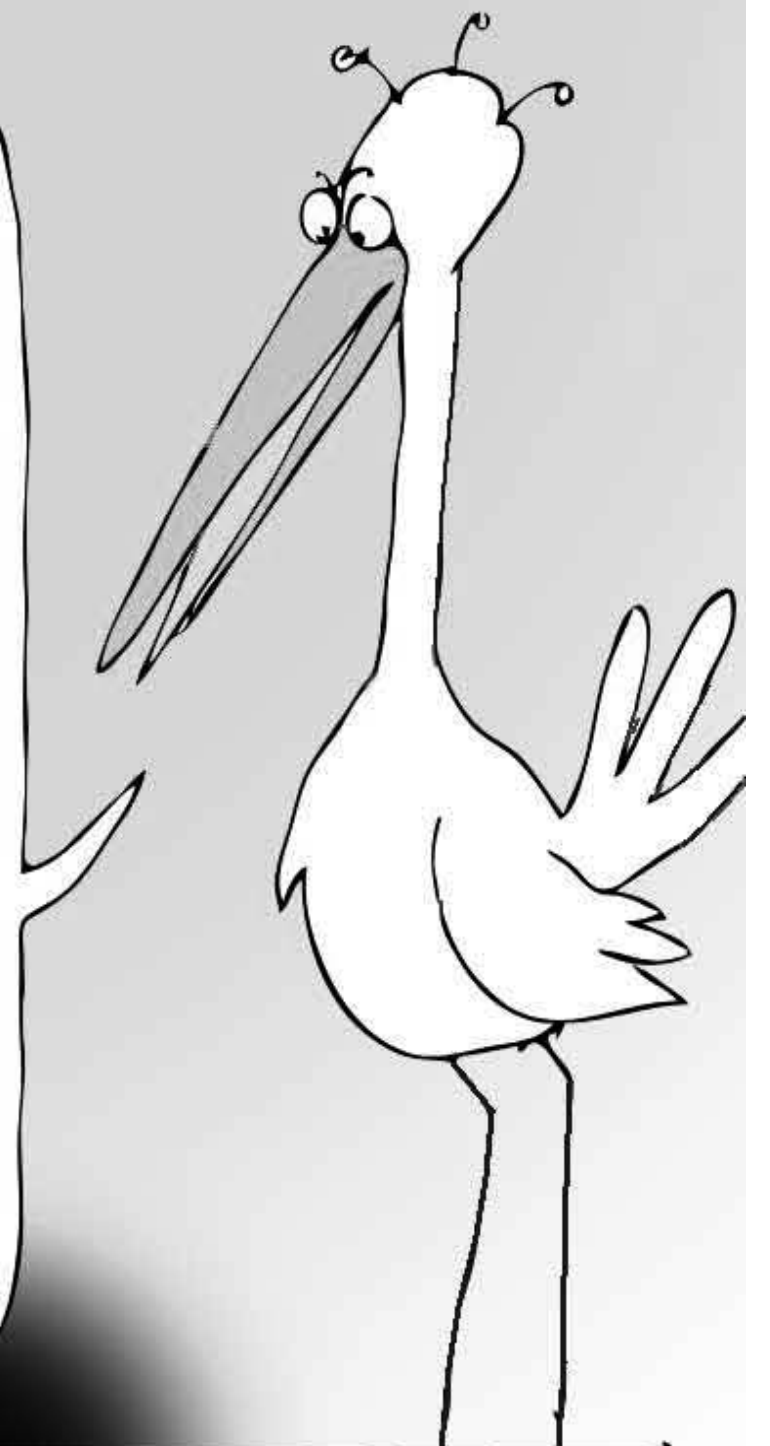


The antimatter created in the laboratory or in cosmic ray sprays has a positive mass and, in the CERN experiment, WILL FALL DOWN (*).

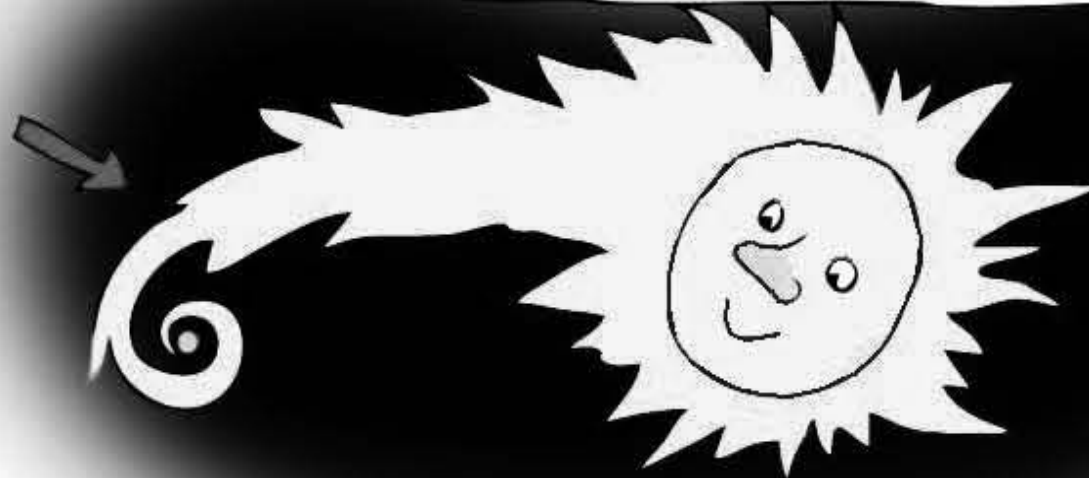
The other, which has negative mass and would "FALL UP", lies between the galaxies!



On page 35, you said that, according to Schwarzschild, when a mass of constant density ρ reaches a critical value (**), the pressure and speed of light tend towards infinity, which would, according to you, limit the masses of neutron stars to 2.5 solar masses. But many neutron stars are in close pairs with a companion star. They then pick up what it emits.



STELLA
WIND



$$(**) M = \sqrt{\frac{c^2}{3\pi G \rho}}$$

PLUGSTARS



When the neutron star receives a surge of matter, the neutrons at the center see their time reversed.



So, according to Souriau, their mass is reversed and they are expelled from the star.

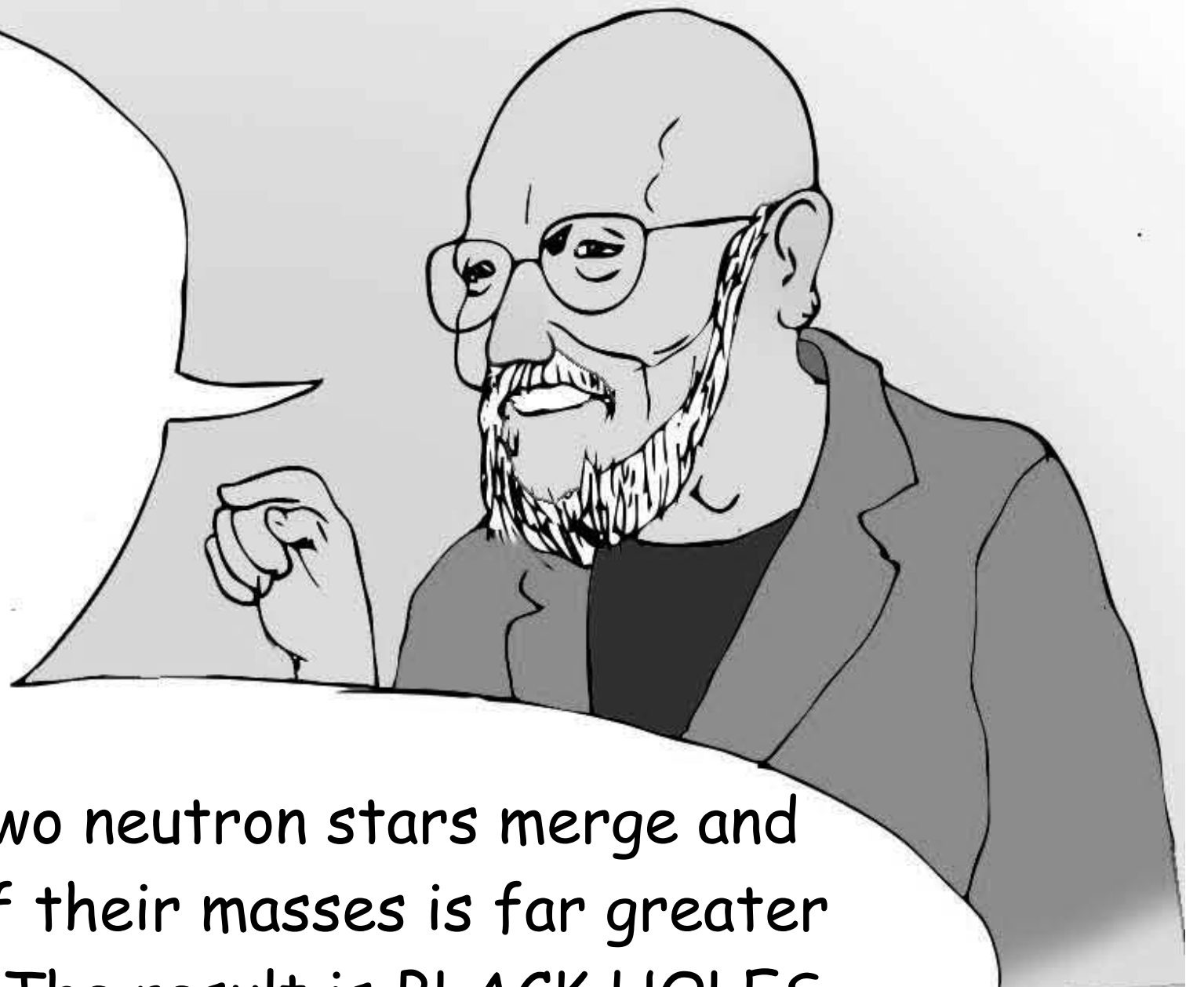
Which they then pass through freely, interacting with matter only by ANTIGRAVITY.



This process has been modelled geometrically, showing that the inverted mass is transformed into negative-mass antimatter.

Kip Thorne :

Wait, not so fast,
Monsieur le Français.
What happens when a
massive star collapses
onto an iron core much
larger than two and a half
solar masses?



or that two neutron stars merge and
the sum of their masses is far greater
than that. The result is **BLACK HOLES**.

For you, when the mass M is confined in a sphere of
radius $R_s = 2GM/c^2$ the object becomes a black hole.
But you overlook what happens when this mass is
inside a sphere of radius $2.25 GM/c^2$ (*) and, at the
center, pressure and c become infinite.

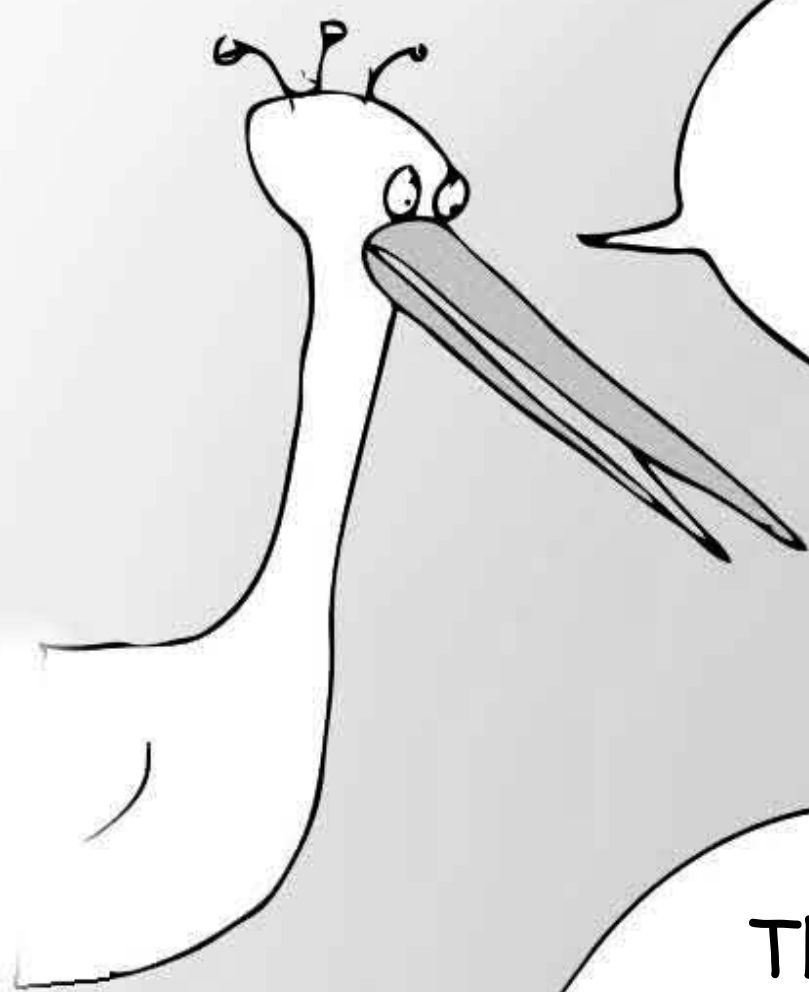


The excess mass then reverses and rapidly disperses. The phenomenon is accompanied by the emission of a very powerful gravitational wave. With your model, which completely ignores this phenomenon, this leads you to overestimate the masses of the merging objects, which you then equate with black holes of over a hundred solar masses that your theorists don't even know how to make.



Those French are annoying!

At most, it's the merger of two subcritical neutron stars, accompanied by the inversion of 2.5 solar masses, creating a gravitational wave of very high intensity.



Could we know a little more about the physics of this world of negative masses?

These two worlds, while similar at the microphysical level, are in fact very different.

It starts with density, which is much higher and drives expansion.



What actually creates the gravitational field is not mass, but mc^2 energy. Photons make their own contribution. Before 300,000 years have passed, this contribution is in the majority. This is what determines the geometry of the universe, its curvature.



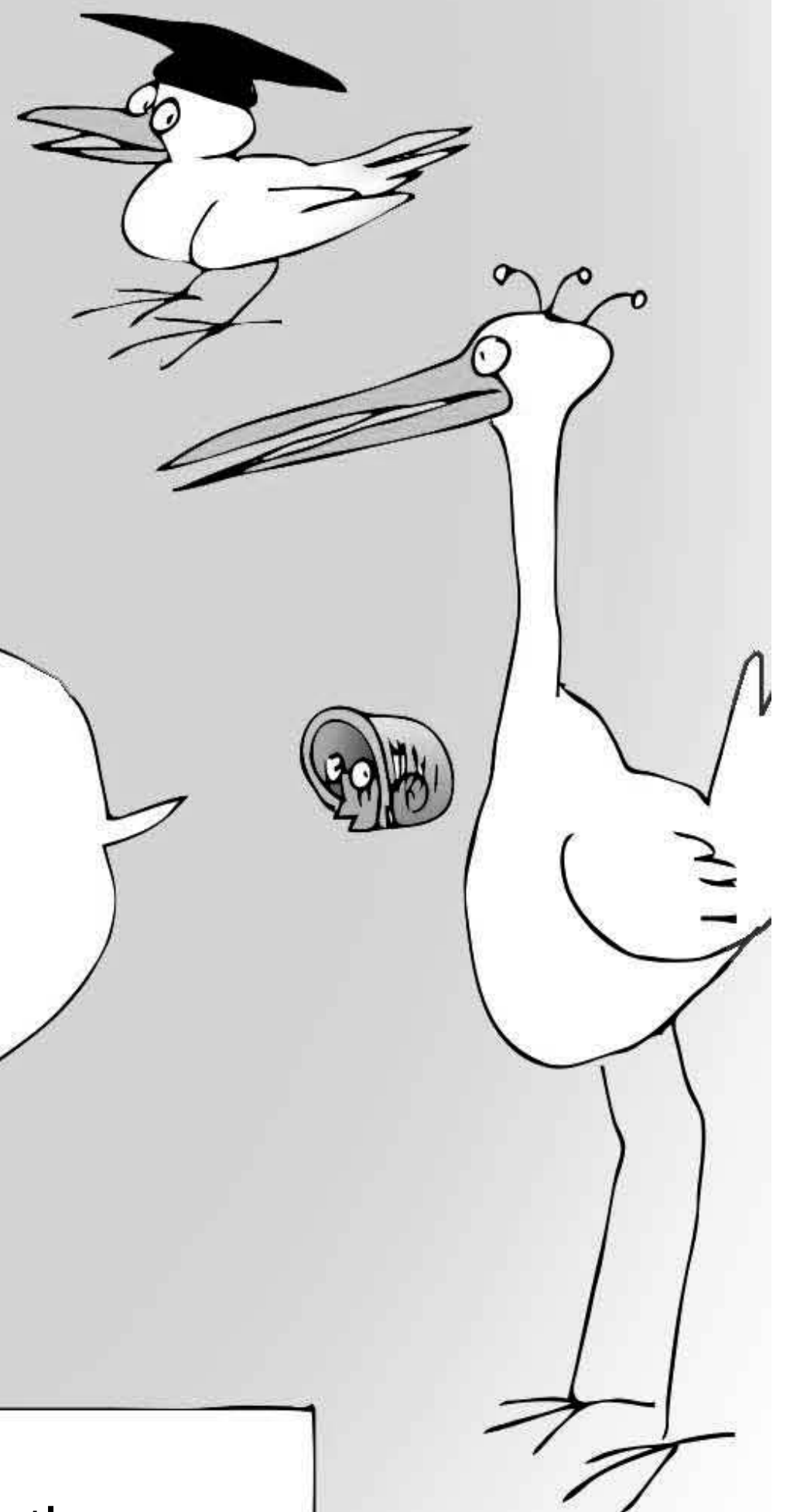
In the same way that James Jeans demonstrated gravitational instability in matter (*), we can extend this concept to gravitational instability in a "photon gas", resulting in inhomogeneities and fluctuations in the local value of the radiation temperature over characteristic distances of the order of magnitude of a Jeans length L_{λ} .

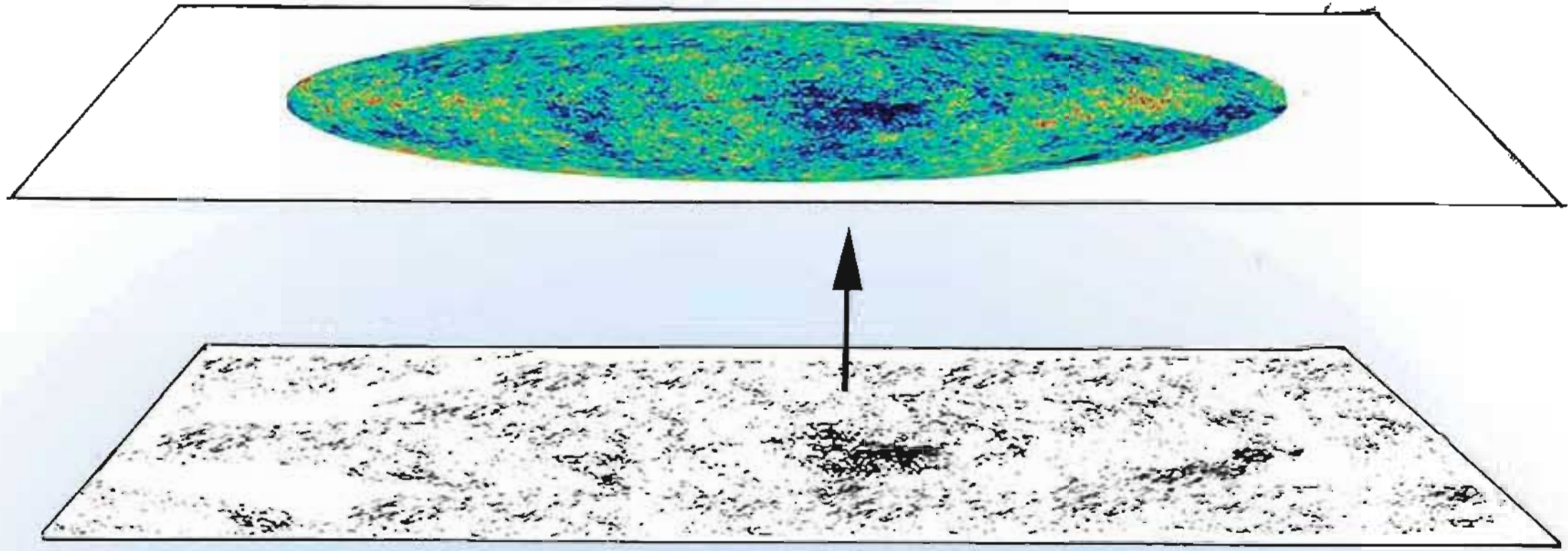
Direction

But there's a surprise in store. This length L_{λ} is then equal to the **COSMOLOGICAL HORIZON**. A distance covered by light in a time of the order of the age of the Universe.

This means that anything beyond the horizon cannot be observed. That's why astrophysicists have never tackled this question.

But this length $L_{\text{phi-}}$ is much shorter in the world of negative masses.

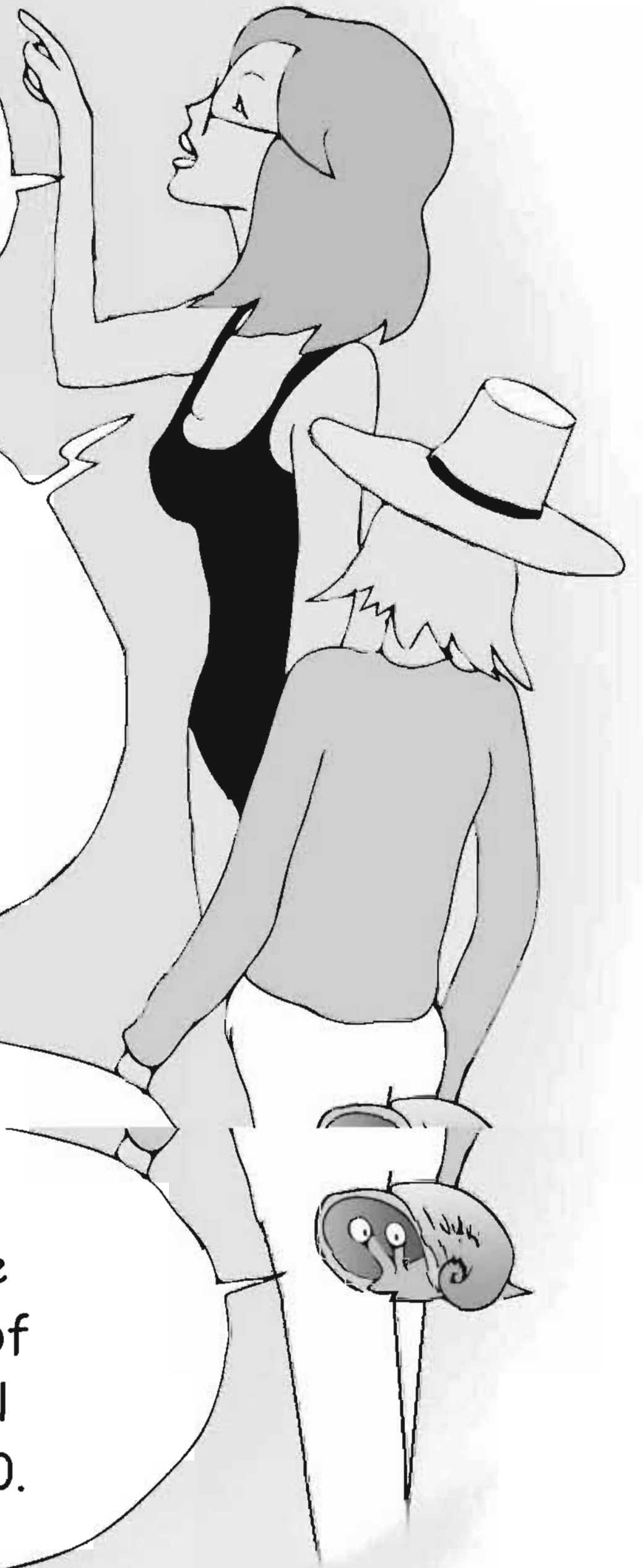




It is these fluctuations in the negative world, in the radiative phase, that are reflected in the positive world, giving rise to fluctuations in the CMB(*).

And it's these measurements of these fluctuations that make it possible to determine that lengths in the negative world are 100 times shorter, while the speed c^- of movement of photons of negative energy c^- is 10 times higher.

So a vehicle that managed to reverse its mass, traveling in the negative world, in this "reverse" of the universe, would see its travel time reduced by a factor of 1,000.



(*) For its general homogeneity, see the comic strip FASTER THAN LIGHT. DOXA interprets these fluctuations as gravito-acoustic waves.

EPILOGUE

Does that mean that this is the end of the story, that this new way of seeing things will be limited to explaining a few distant cosmic phenomena?

NO! RESTRAINED RELATIVITY began as a new vision of the geometry underlying physical reality(*). This had implications for physics, through the discovery of a NOYAL CHEMISTRY that we have exploited in EXO-ENERGETIC SELF-CATALYZING DISSOCIATION reactions.

Mortiferous

$$E = mc^2$$

Completely unable to manage radioactive waste.


(*) Space-time is a hyperbolic Minkowski Riemannian space:

$$ds^2 = c^2 dt^2 - dx^2 - dy^2 - dz^2$$

The mass inversion that takes place at the heart of neutron stars is simply the natural version of a new mass manipulation that opens up a NEW PHYSICS.


With countless spin-offs, including..:

- Elimination of all waste
- Conversion of matter into antimatter (...)
- Interstellar travel

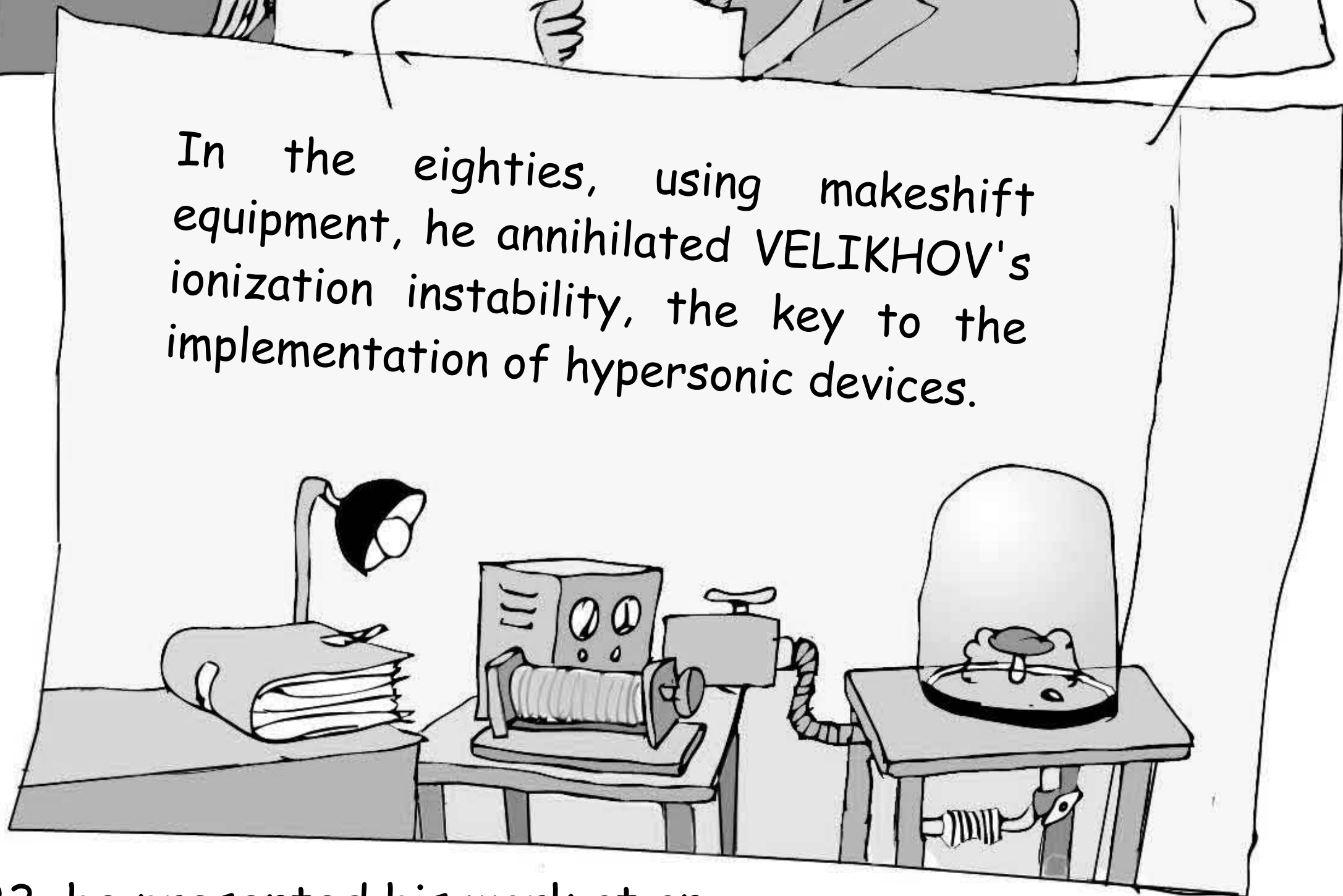
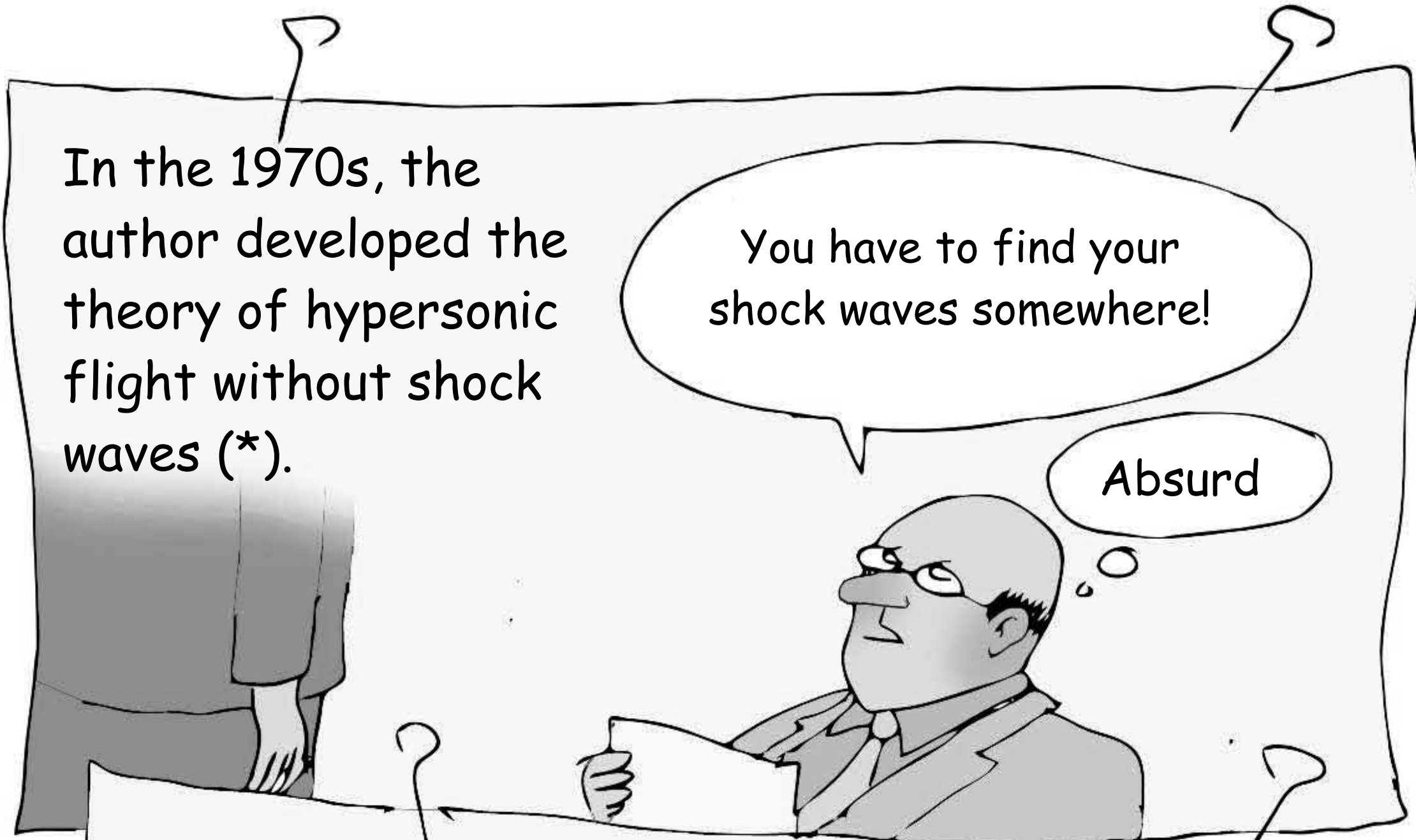


Experiments involving the inversion of the mass (*) of a small quantity of radioactive material are already conceivable without the use of science-fiction energies.

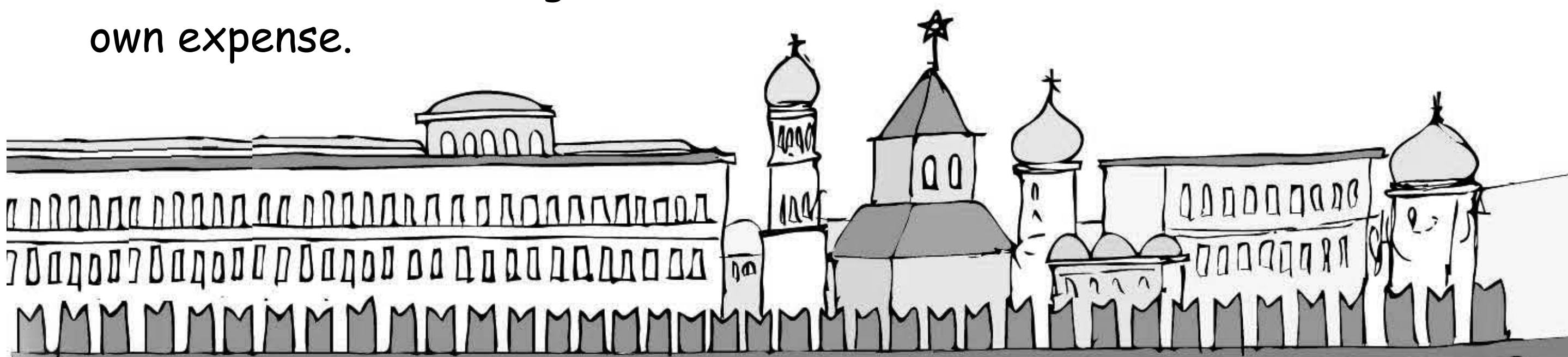
By injecting energy into nuclei with long-lasting metastable excited states, using very powerful magnetic fields created by MHD.



But how will humans use it?

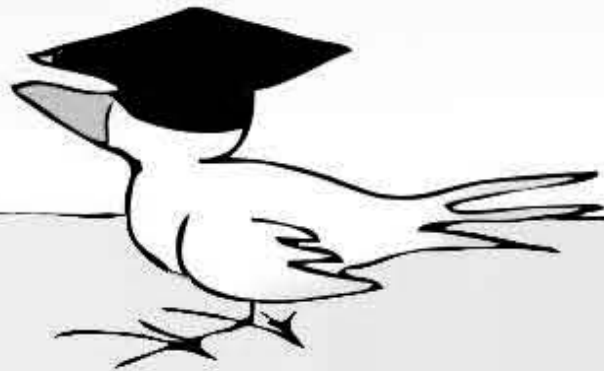


In 1983, he presented his work at an international MHD congress at his own expense.

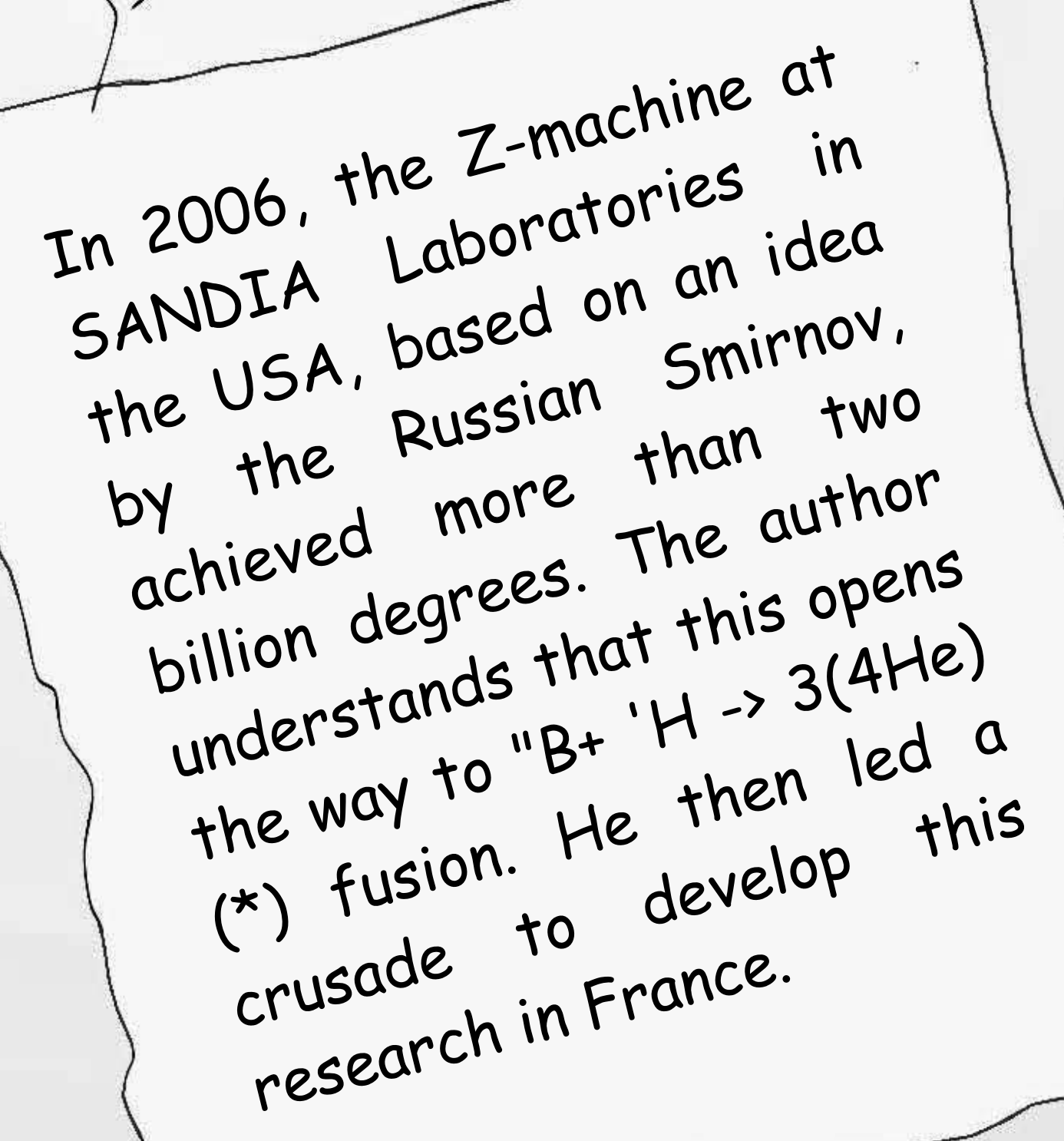


(*)The comic strip THE WALL OF SILENCE is the popularized version of the theme (understandable even by a minister).


35 years later, taking up these ideas and work, the Russians created the first hypersonic missiles operating at Mach 10 in dense air and in silence, without supersonic "Bang".



If the shock waves were to form, these machines would have to withstand temperatures of 6,000°C.



In 2006, the Z-machine at SANDIA Laboratories in the USA, based on an idea by the Russian Smirnov, achieved more than two billion degrees. The author understands that this opens the way to $B + H \rightarrow 3(4He)$ (*) fusion. He then led a crusade to develop this research in France.



Well, start by making us green bombs, then we'll see.

END

APPENDIX :

In 1916, Karl Schwarzschild constructed the geometry inside and outside a sphere of radius r_n filled with an incompressible fluid of density ρ in the form of two METRICS.

An internal metric :

$$ds^2 = \left[\frac{3}{2} \sqrt{1 - \frac{8\pi G \rho r_n^2}{3c^2}} - \frac{1}{2} \sqrt{1 - \frac{8\pi G \rho r^2}{3c^2}} \right]^2 c^2 dt^2 - \frac{dr^2}{1 - \frac{8\pi G \rho r^2}{3c^2}} - r^2 (d\theta^2 + \sin^2 \theta d\varphi^2)$$

An external metric :

$$ds^2 = \left(1 - \frac{8\pi G \rho r_n^3}{3c^2 r} \right) c^2 dt^2 - \frac{dr^2}{1 - \frac{8\pi G \rho r_n^3}{3c^2 r}} - r^2 (d\theta^2 + \sin^2 \theta d\varphi^2)$$

The outer metric is undefined for :

$$r \leq r_{cr\ geom} = \sqrt{\frac{3c^2}{8\pi G \rho}}$$

The inner metric is undefined for :

$$r \geq r_{cr\ geom} = \sqrt{\frac{3c^2}{8\pi G \rho}}$$

But what was overlooked by the designers of the BLACK HOLE model:

In his second paper, from February 1916, Karl Schwarzschild describes the geometry inside a sphere filled with an incompressible fluid of constant density ρ

Über das Gravitationsfeld einer Kugel aus inkompressibler Flüssigkeit nach der EINSTEINschen Theorie.

Von K. SCHWARZSCHILD.

Sitzung der phys.-math. Klasse v. 23. März 1916. — Mitt. v. 24. Februar

It shows how to vary:

The pressure p :

$$p = \rho c_o^2 \frac{\cos \chi - \cos \chi_a}{3 \cos \chi_a - \cos \chi}$$

La vitesse de la lumière :

$$V = \frac{2 c_o}{3 \cos \chi_a - \cos \chi}$$

To locate points inside the sphere, he uses an angle X . We switch to the r coordinate by simply changing the variable :

$$r = \sqrt{\frac{3 c^2}{8 \pi G \rho}} \sin \chi$$

The center of the sphere corresponds to $X=0$

For the surface of the sphere, this is $\chi = \chi_a$

The pressure at the center of the sphere is therefore :

$$p = \rho_o c_o^2 \left(\frac{1 - \cos \chi_a}{3 \cos \chi_a - 1} \right)$$

And the speed of light:

$$V = \frac{2c_o}{3 \cos \chi_a - 1}$$

Clearly, these two quantities become infinite if:

$$\cos \chi_a = \frac{1}{3}$$

That is, if :

$$r_a = \sqrt{\frac{c_o^2}{3 \pi G \rho}}$$

Imagine a neutron star as a sphere filled with a fluid of constant density ρ .

Let's imagine it receives the "stellar wind" emanating from a companion star. Its radius r_a will increase.

On page 79, the geometric solution describing the exterior reveals what we'll call a:

GEOMETRIC CRITICITY at :

$$r_a = r_{\text{cr geom}} = \sqrt{\frac{3c^2}{8\pi G \rho}}$$

According to this diagram, the mass of a neutron star cannot exceed :

$$M_{cr\ geom} = \frac{4}{3} \pi (r_{cr\ geom})^3 \rho$$

It then orbits around 3 solar masses.

But in this first ascent to criticality, where a neutron star sees its mass increase through the capture of the "stellar wind" emitted by a companion star, a PHYSICAL CRITICALITY arises when the star's mass reaches :

$$M_{cr\ phys} = \frac{4}{3} \pi (r_{cr\ phys})^3 \rho$$

La valeur de la masse critique tombe alors à :

$$M_{cr\ phys} = 2.5 \text{ masses solaires (*)}$$

After the Second World War, the designers of the BLACK HOLE model ignored the conclusions reached in Schwarzschild's second article. Its English translation from German was not available until 1999.

Certains "experts en trous noirs" ignorent même... son existence !

(*) In the (rare) cases where the mass of a neutron star has been directly determined, this is consistent with this constraint.

But there are two other ways of achieving criticality. The first is to consider the fusion of two neutron stars, if the sum of their two masses $M_1 + M_2$ exceeds critical values.

This fusion generates gravitational waves.

Calculations of the two masses in the case of $M_1 + M_2$ 2.5 solar masses are correct.

But when these calculations result in :

$$M_1 + M_2 > 2,5 \text{ solar mass}$$

They are wrong, because the model ignores physical criticality at 2.5 solar masses.

The second scenario refers to the crushing of the iron sphere at the heart of massive stars (the focus of fusion reactions), with a mass M that may well exceed two and a half solar masses.

The rise to criticality then takes place at variable ρ , with conservation of mass M :

$$M = \frac{4}{3} \pi r_a^3 \rho = Cst$$

Here's the structure of the (massive) star before the Supernova phenomenon crushed the iron core:

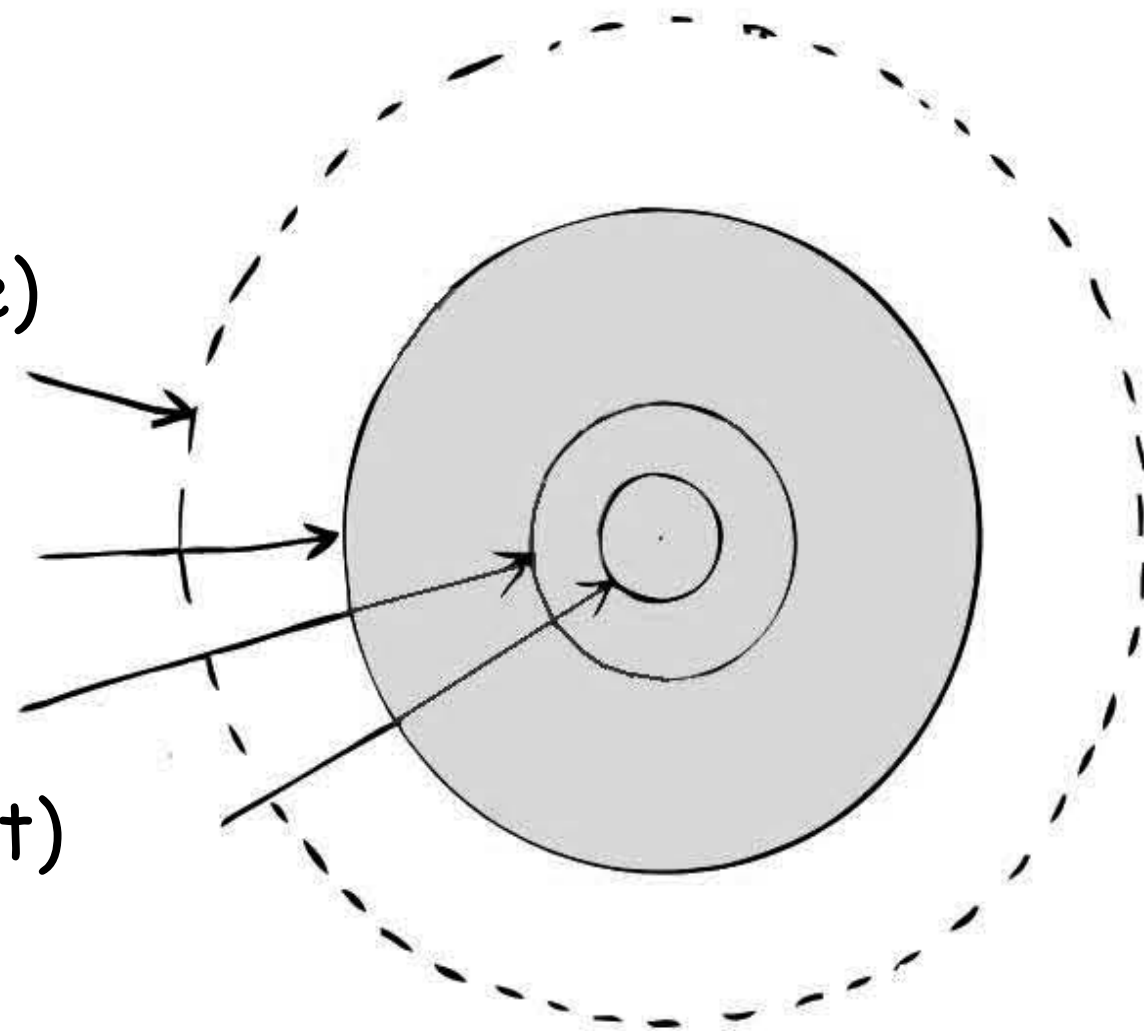
We have the different radii:

$$\hat{r} = \sqrt{\frac{c^2}{3\pi G \rho}} \quad (\text{variable})$$

r_a , star radius

iron core radius

"Schwarzschild radius (constant)



$$R_s = \frac{2GM}{c^2}$$

Physical criticality is reached when :

$$r_a = \hat{r} = \sqrt{\frac{c^2}{3\pi G \rho}} = \sqrt{\frac{c^2}{3\pi G} \frac{4\pi r_a^3}{3M}} = \sqrt{\frac{4}{9} \frac{r_a^3 c^2}{GM}}$$

or when :

$$r_a = \frac{2.25 GM}{c^2} > R_s$$

In the classic diagram, (geometric) criticality occurs when $r_a = R_s$. But here, we can see that **PHYSICAL CRITICITY** occurs **BEFORE GEOMETRIC CRITICITY** occurs.

WHAT'S GOING ON?

When the star's radius tends towards the "Schwarzschild radius":

$$R_s = \frac{2GM}{c^2} = \sqrt{\frac{3c^2}{8\pi G\rho}}$$

the denominators of the dr^2 coefficients in the outer and inner metrics become zero.

Consider a stationary observer ($dr=0=d\theta=dy$) located in the star. The metric becomes.

$$ds = c dt \left[\frac{3}{2} \sqrt{1 - \frac{8\pi G r_a^2}{3c^2}} - \frac{1}{2} \sqrt{1 - \frac{8\pi G r^2}{3c^2}} \right] = c d\tau = f(r) dt$$

where t is the OWN TIME experienced by this stationary observer. At the center of the star :

$$f(r) = c \left[\frac{3}{2} \sqrt{1 - \frac{8\pi G r_a^2}{3c^2}} - \frac{1}{2} \sqrt{1 - \frac{8\pi G r^2}{3c^2}} \right]$$

is the TIME FACTOR. At the center of the star :

$$f(0) = c \left[\frac{3}{2} \sqrt{1 - \frac{8\pi G r_a^2}{3c^2}} - \frac{1}{2} \right]$$

This term cancels out when :

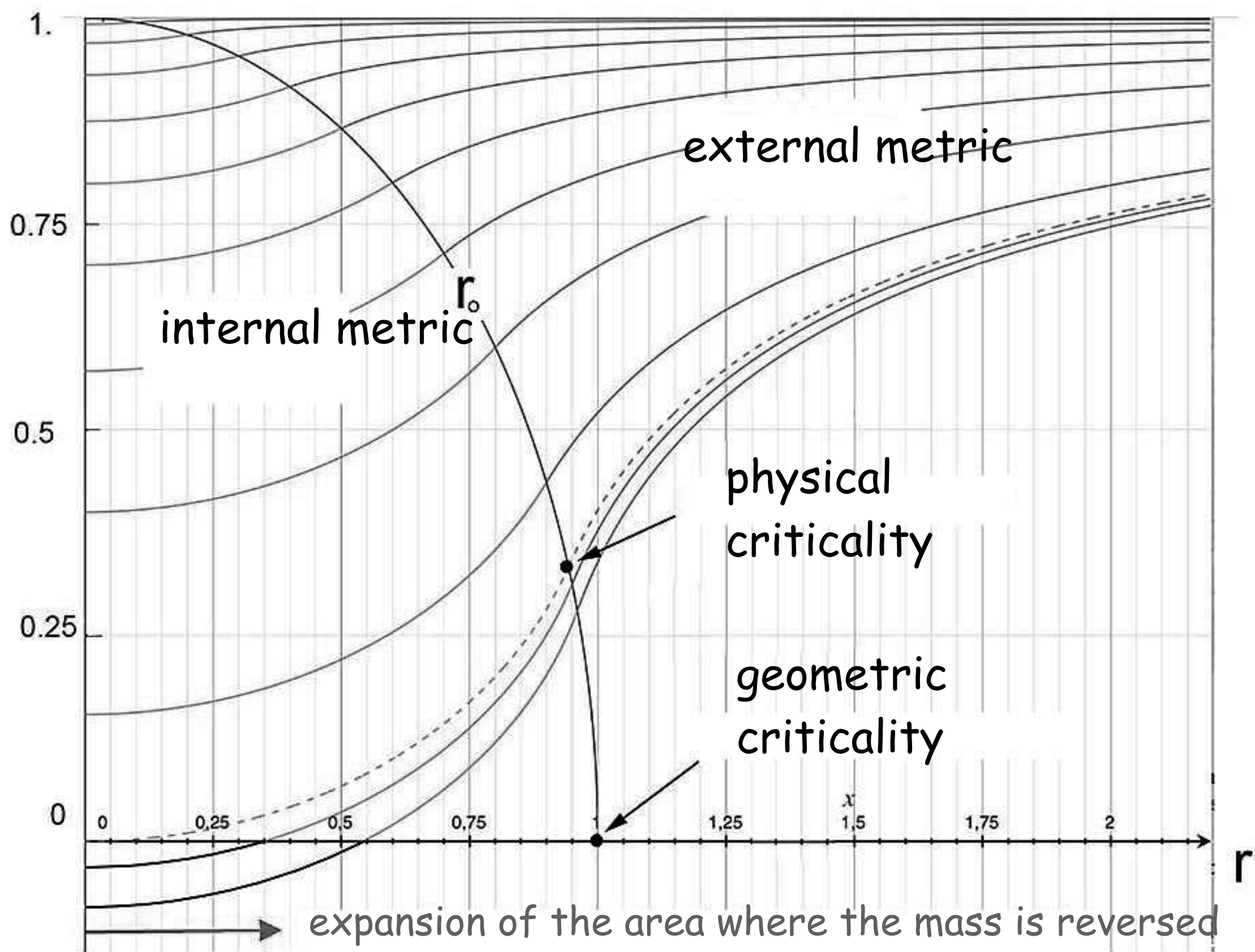
$$\sqrt[3]{1 - \frac{2GM}{c^2 r_0}} = 1 \rightarrow \boxed{r_a = \sqrt{\frac{8}{9}} R_s} = 0.943 R_s$$

Thus, physical criticality goes hand in hand with the cancellation of the time factor in the internal metric.

Let's plot the $f(r)$ function for different ratios

$$r = \frac{r_a}{\sqrt{\frac{8}{9} R_s}}$$

Time factor



When $f(r) < 0$ appears a region in the center of the star for : $r_a > \sqrt{\frac{8}{9} R_s}$

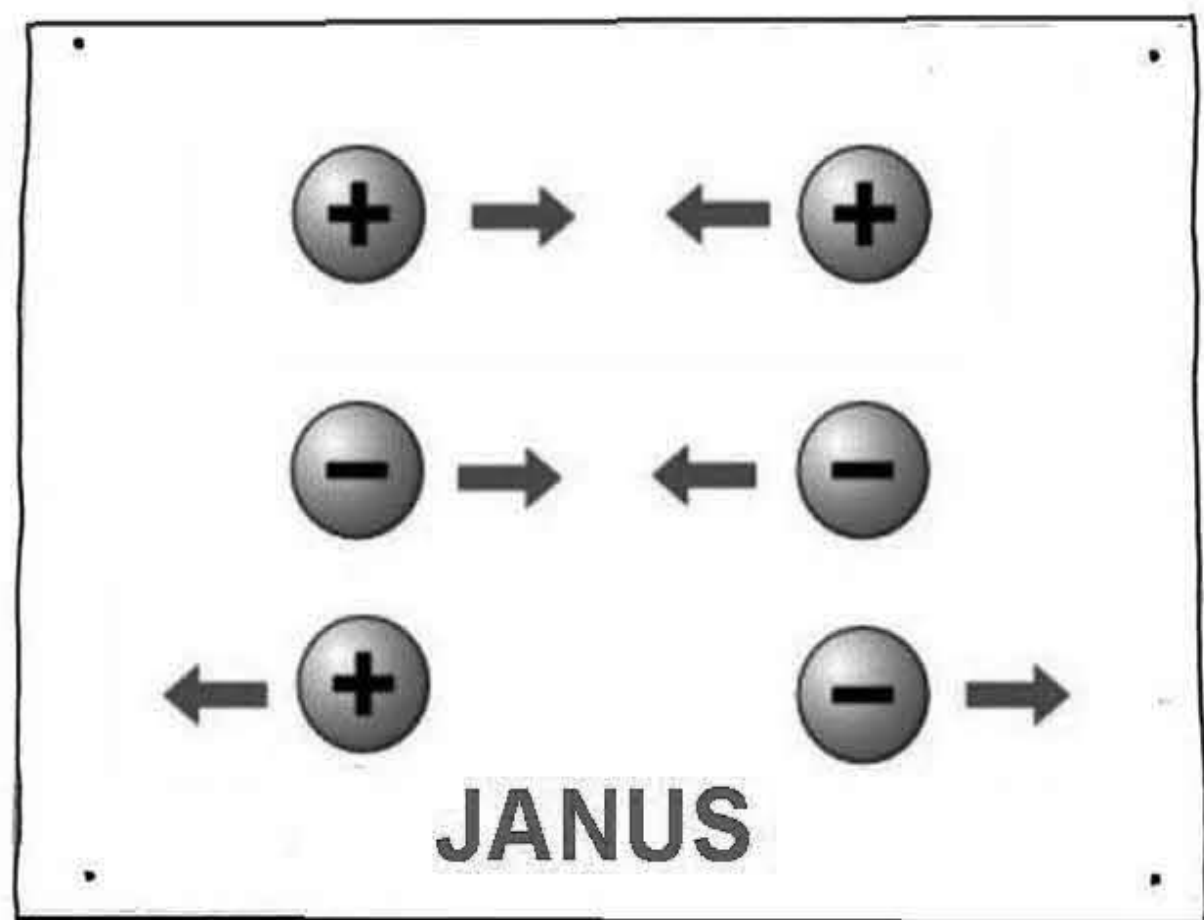
You can't "backtrack" along a geodesic. So ds so=-

Thus, where $f(r) < 0$ we have $dt < 0$

In this region, the TIME COORDINATE t is reversed. If we then opt for JANUS GEOMETRY, associating it with the work of mathematician JEAN.MARIE SOURIAU :

ENERGY AND MASS ARE REVERSED

Given the LAWS OF INTERACTION



These inverted masses, subject to the neutron star's gravitational field, will be expelled from the star. The mass of these neutron stars will then peak at 2.5 solar masses. They will then become :

PLUGSTARS(*)

Whether we're talking about 2.5-solar-mass neutron stars or the hyper-massive objects at the center of galaxies, the pressure at their core is mainly radiation pressure. As radiation pressure increases with the square of the speed of light, and light flies away in this region, the force of pressure alone can counterbalance the force of gravity, ensuring equilibrium.

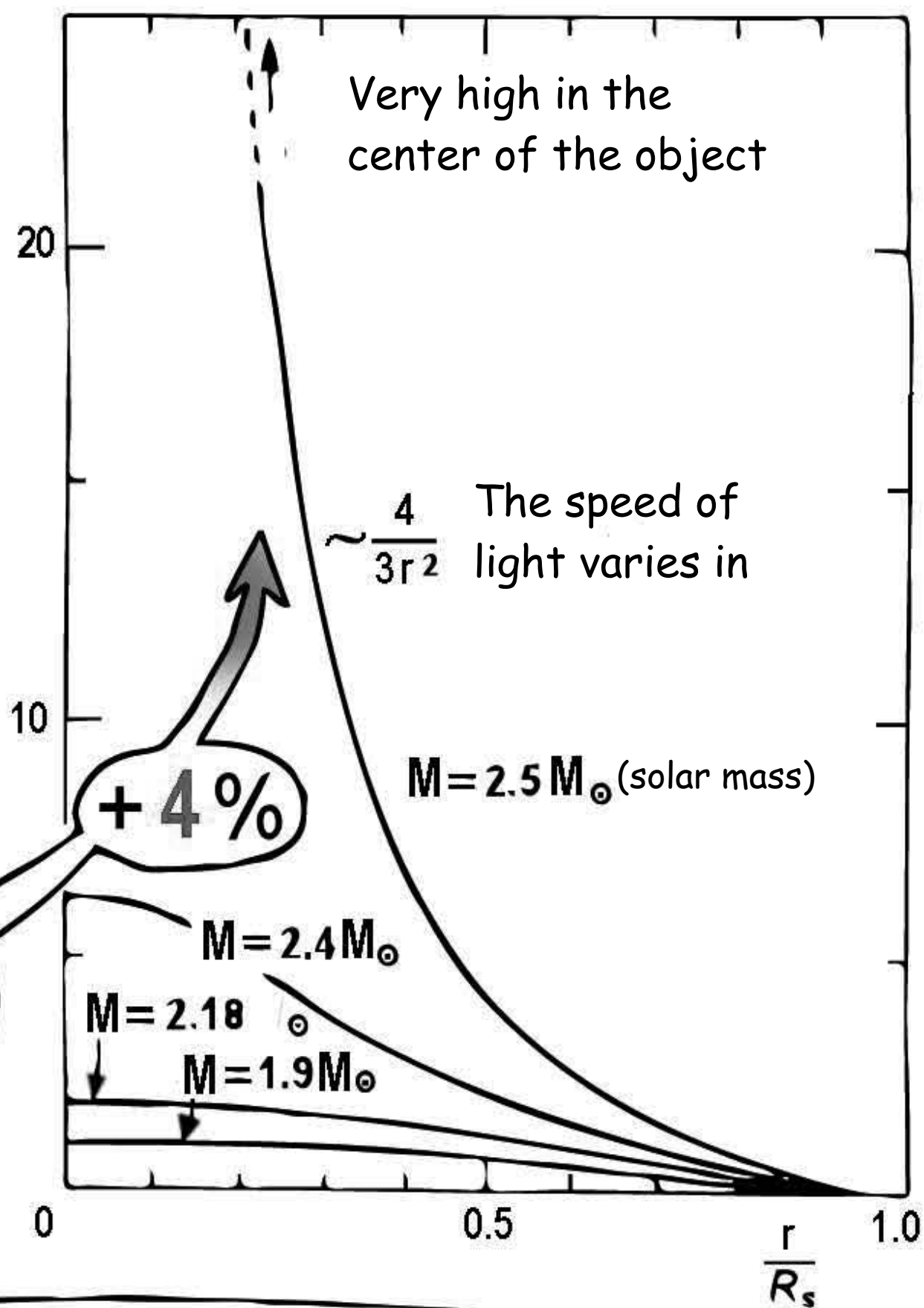
hypermassive objects at the center of galaxies are not "giant neutron stars"!

(*) From the English word "PLUG" meaning "BOND".

Is this soaring pressure in neutron stars a new concept?

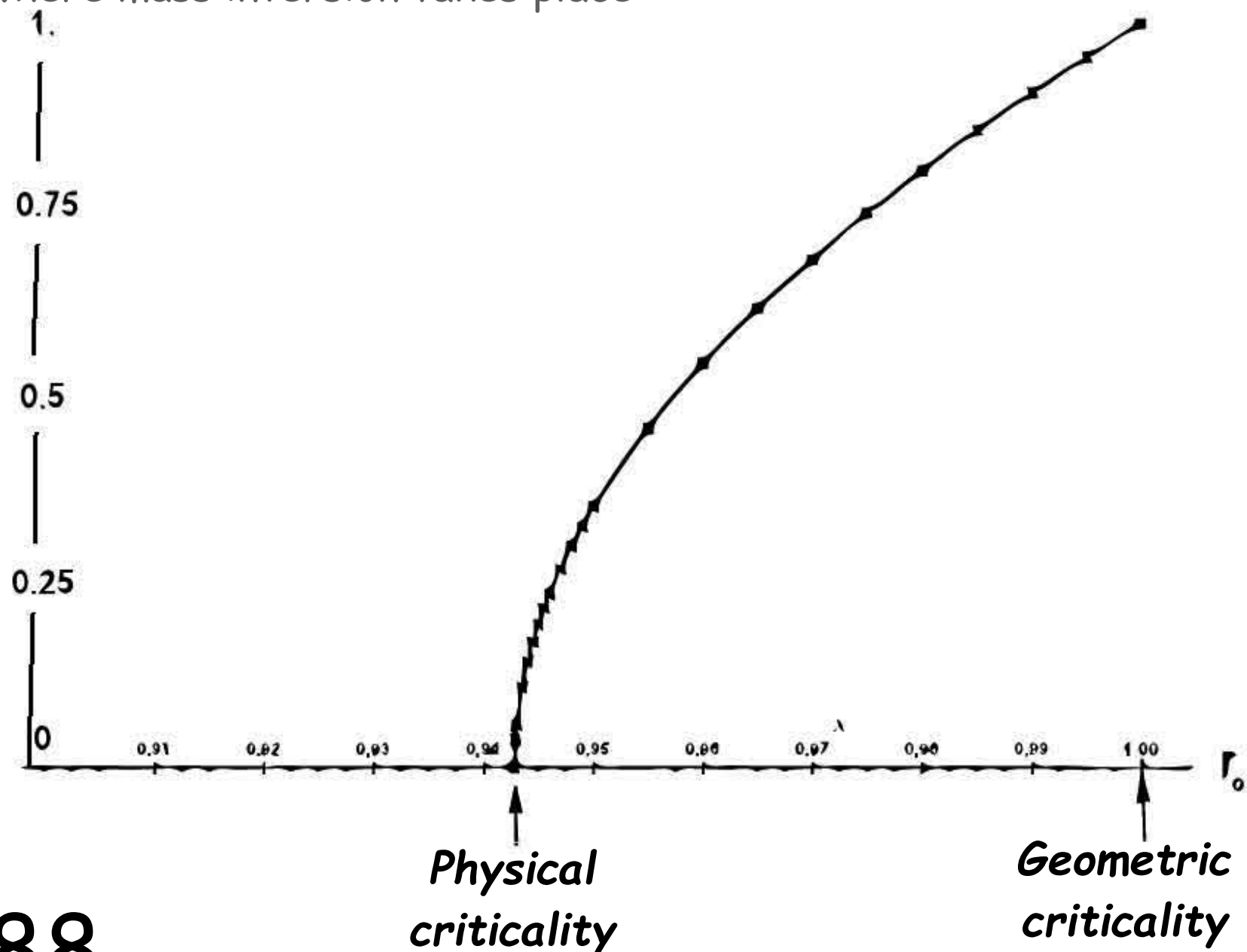
Not at all! It's in Schwarzschild 1916! It's even in the book *GRAVITATION*, by Wheeler, Thorne and Misner, page 611.

Pressure («GRAVITATION» p.611)

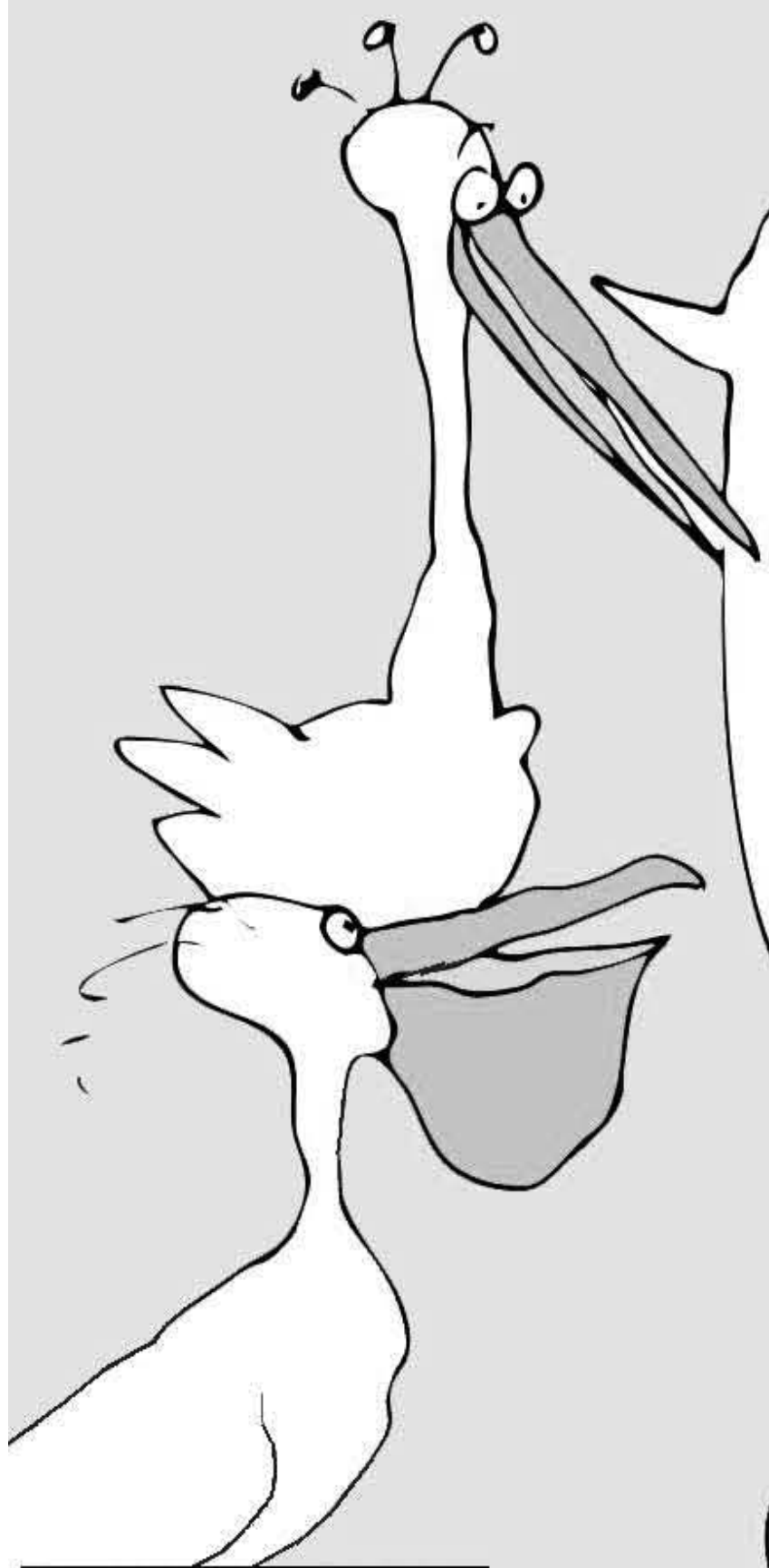


The system is self-stabilizing. When matter is added, an equivalent region opens up in the center of the object, where this mass is inverted and ejected from it.

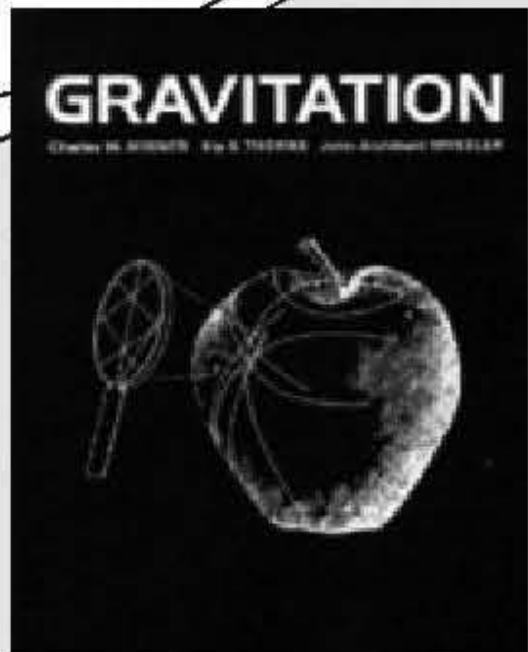
Parabolic growth in radius of central sphere where mass inversion takes place



It's all in Schwarzschild 1916!




What you're telling us is that for over a century, thousands of researchers have paid no attention whatsoever to this second Schwarzschild paper. There must be a reason!



This excellent reason I found in *GRAVITATION*, the Cosmology Bible by Wheeler and Co, page 609. Here's the argument:

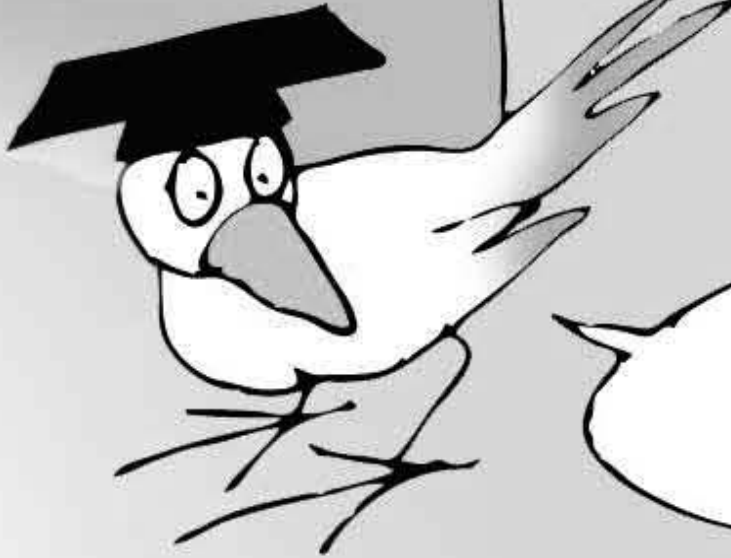
If we refer to the analytical solution of Karl Schwarzschild, 1916, which describes an object of constant density, this implies that the speed of sound (*) would tend towards infinity, and therefore exceed the speed of light, which is impossible and contradicts physics.

$$(*) v = \sqrt{\frac{dp}{d\rho}}$$




In neutron stars, as in hypermassive objects, pressure is RADIATION PRESSURE (*). Information travels at the speed of light c .

$$(*) , p_r = \frac{\rho c^2}{3} \text{ for a gas it is : } \frac{\rho V^2}{3}$$



And, at p constant, if the radiation pressure is increasing, this means that the speed of light is increasing.

as Karl Schwarzschild concluded
Karl Schwarzschild in 1916(**)



In those days, scientists were much freer in their minds than today's scientists, dumbed down by the formatting to which they are subjected.

(**) See extract on page 28

They've had all this in front
of them for over a century,
but they refuse to see it!

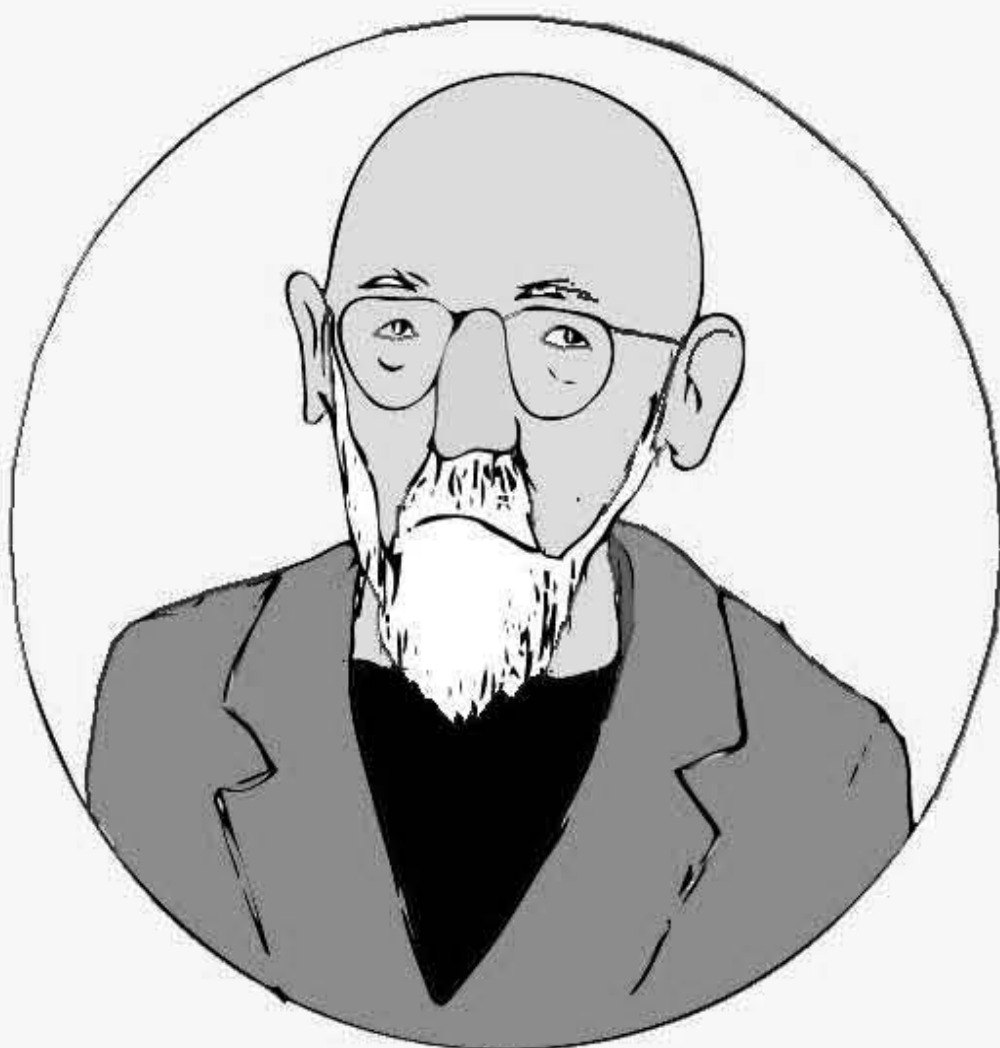


ALTERNATIVELY

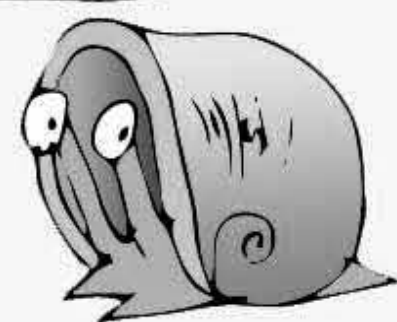
There should be no neutron stars with masses exceeding 2.5 solar masses. Any higher values are due to observational biases. **BLACK HOLES DON'T EXIST.**

Pairs of neutron stars **EXIST** - These stars are gradually moving closer together as a result of energy loss due to the emission of gravitational waves.

Some of the signals recorded, when they correspond to the fusion of elements such that the sum of their masses is less than 2.5 solar masses, are correctly interpreted. Otherwise, these masses are overestimated, as the gravitational wave emission from mass inversion is not taken into account.



If the JANUS MODEL ever takes hold, the calculations of KIP THORNE, winner of the 2017 Nobel Prize, will have to be revised.



SCIENCE A NEW CONSUMER PRODUCT

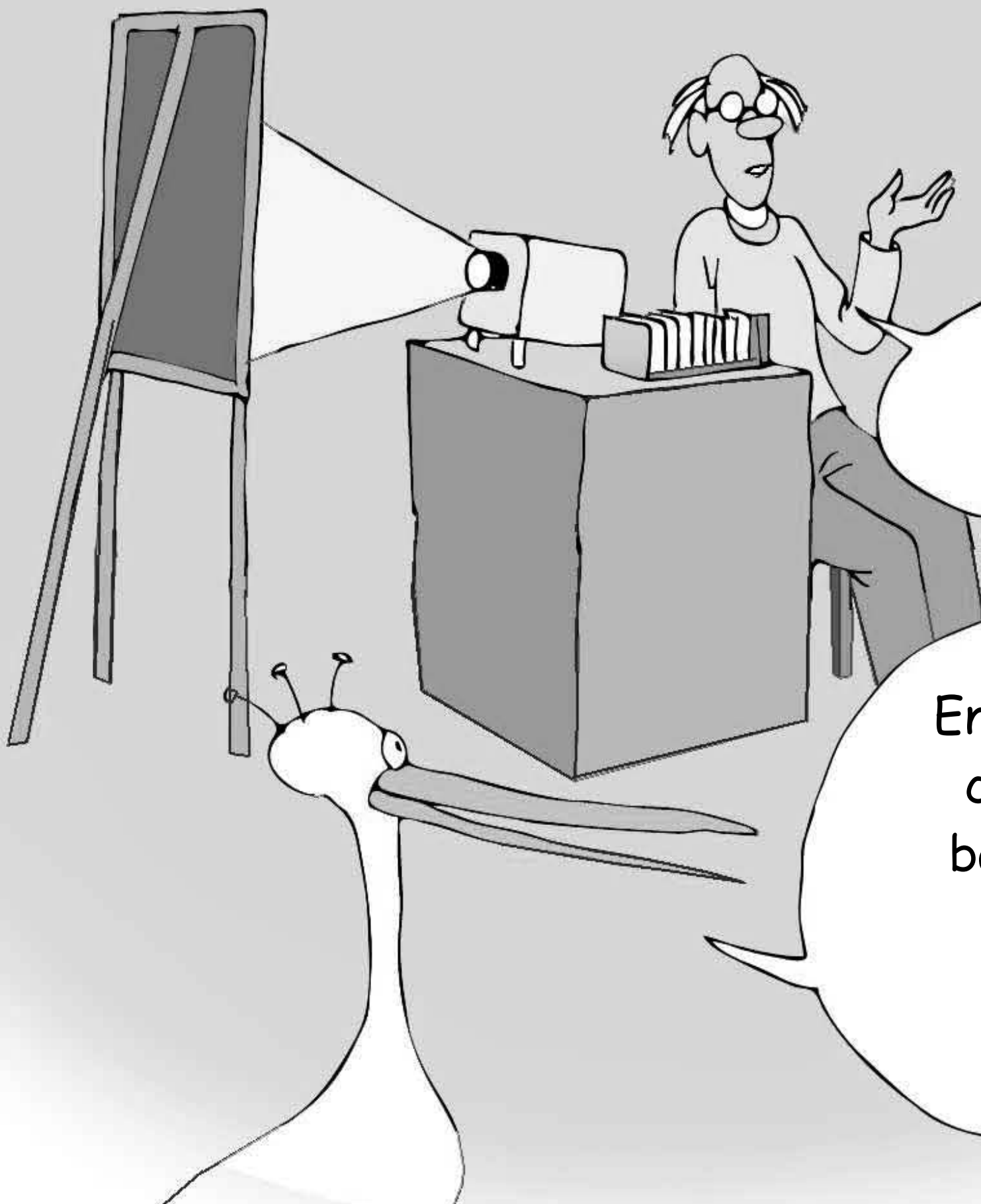
The closed strings are the particles and the open strings are the interactions, giving rise to a THEORY OF EVERYTHING capable of explaining everything.



Buy my strings!

In the absence of tangible results, the rhetoric of some scientists resembles that of windbag salesmen at fairs.

The magic lantern, projecting computer-generated images, replaces the telescope.



That's what it would look like to you.

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A French academician who doesn't understand the Janus model

The Janus cosmological model represents a profound change in the geometric representation of the universe. Einstein had described it as a "four-dimensional hypersurface". The Janus model extends this geometric vision by endowing this hypersurface with an "underside" where particles of negative energy and mass are located. Mathematically, this implies a "bimetric" description, where the two entities interact, hence the term "bigravity".

It so happens that the first person to propose such a thing was French academician Thibault Damour, in 2002¹ A French academician who understood nothing about the Janus model¹.



Thibault Damour, academician

The articles, cited in footnotes, are accompanied by an address from which they can be downloaded.

Damour and Kogan attempt to construct a bimetric theory, involving a spectrum of gravitons endowed with masses, but this 40-page article comes to a screeching halt. In passing, they show that such bigravity must obey a system of two coupled field equations :

$$2 M_L^2 \left(R_{\mu\nu}(g^L) - \frac{1}{2} g_{\mu\nu}^L R(g^L) \right) + \Lambda_L g_{\mu\nu}^L = t_{\mu\nu}^L + T_{\mu\nu}^L ,$$

$$2 M_R^2 \left(R_{\mu\nu}(g^R) - \frac{1}{2} g_{\mu\nu}^R R(g^R) \right) + \Lambda_R g_{\mu\nu}^R = t_{\mu\nu}^R + T_{\mu\nu}^R .$$

¹ T.Damour & I.I.Kogan : Effective Lagrangian and Universality classes of Nonlinear Bigravity. Phys. Rev. D **66** (2002). <http://www.jp-petit.org/papers/cosmo/2002-Damour-Kogan-bigravity.pdf>

Six years later, Germany's Sabine Hossenfelder ² (now a science blogger) takes a more precise approach. This time, it's a question of conferring an identity on the inhabitants of this second fold of universe, in the form of negative masses.

In 1957, cosmologist Hermann Bondi attempted to introduce these masses into Albert Einstein's model ³. But the appearance of the runaway phenomenon (see the album) brings physical contradictions to light (the runaway effect). The model contradicts fundamental principles of physics, such as the action-reaction principle and equivalence. Sabine Hossenfelder also constructs her system of two coupled field equations:

$$\begin{aligned} {}^{(g)}R_{\kappa\nu} - \frac{1}{2}g_{\kappa\nu}{}^{(g)}R &= T_{\kappa\nu} - \underline{V} \sqrt{\frac{\underline{h}}{\underline{g}}} a_{\underline{\nu}}^{\underline{\nu}} a_{\underline{\kappa}}^{\underline{\kappa}} \underline{T}_{\underline{\nu}\underline{\kappa}} \\ {}^{(h)}R_{\underline{\nu}\underline{\kappa}} - \frac{1}{2}h_{\underline{\nu}\underline{\kappa}}{}^{(h)}R &= \underline{T}_{\underline{\nu}\underline{\kappa}} - W \sqrt{\frac{\underline{g}}{\underline{h}}} a_{\underline{\kappa}}^{\underline{\kappa}} a_{\underline{\nu}}^{\underline{\nu}} T_{\kappa\nu} \end{aligned}$$

But she can't get rid of the discrepancy with physical principles. Believing that this is inexorably linked to bigravity, she gives up.

In 2014 we publish the first exact solution of our system of coupled field equations, which is physically and mathematically consistent, but which limits the solutions to a description of a homogeneous, unsteady isotropic universe. ⁴

$$\begin{aligned} R_{\mu\nu}^{(+)} - \frac{1}{2}R^{(+)}g_{\mu\nu}^{(+)} &= \chi \left[T_{\mu\nu}^{(+)} + \left(\frac{a^{(-)}}{a^{(+)}} \right)^3 T_{\mu\nu}^{(-)} \right] \\ R_{\mu\nu}^{(-)} - \frac{1}{2}R^{(-)}g_{\mu\nu}^{(-)} &= -\chi \left[\left(\frac{a^{(+)}}{a^{(-)}} \right)^3 T_{\mu\nu}^{(+)} + T_{\mu\nu}^{(-)} \right] \end{aligned}$$

Mathematical consistency translates into a generalized conservation of energy. The exact solution derived from the equations shows that the "dark energy" driving the acceleration of cosmic expansion is none other than that of negative mass, the majority. In 2018 Gilles

² S. Hossenfelder : A bimetric Theory with Exchange symmetry Phys. Rev. D78, 044015, 2008 and arXiv : 0807.2838v1 (gr-qc)17 july 2008. <http://www.jp-petit.org/papers/cosmo/2008-Hossenfelder.pdf>

³ H. Bondi: Negative mass in General Relativity : Negative mass in General Relativity. Rev. of Mod. Phys., Vol 29, N°3, july1957

⁴ J.P.Petit, G.D'Agostini : Negative Mass hypothesis in cosmology and the nature of dark energy. Astrophysics And Space Science, A **29**, 145-182 (2014). <http://www.jp-petit.org/papers/cosmo/2014-AstrophysSpaceSci.pdf>

d'Agostini⁵ exploits this exact solution and shows that the model, named Janus, perfectly accounts for the data from type Ia supernovae, which earned S.Perlmutter⁶, A.G. Riess and Schmidt the Nobel Prize for showing that the expansion of the universe, far from slowing down, was actually accelerating. Here's how G.D'Agostini's curve fits perfectly with the data:

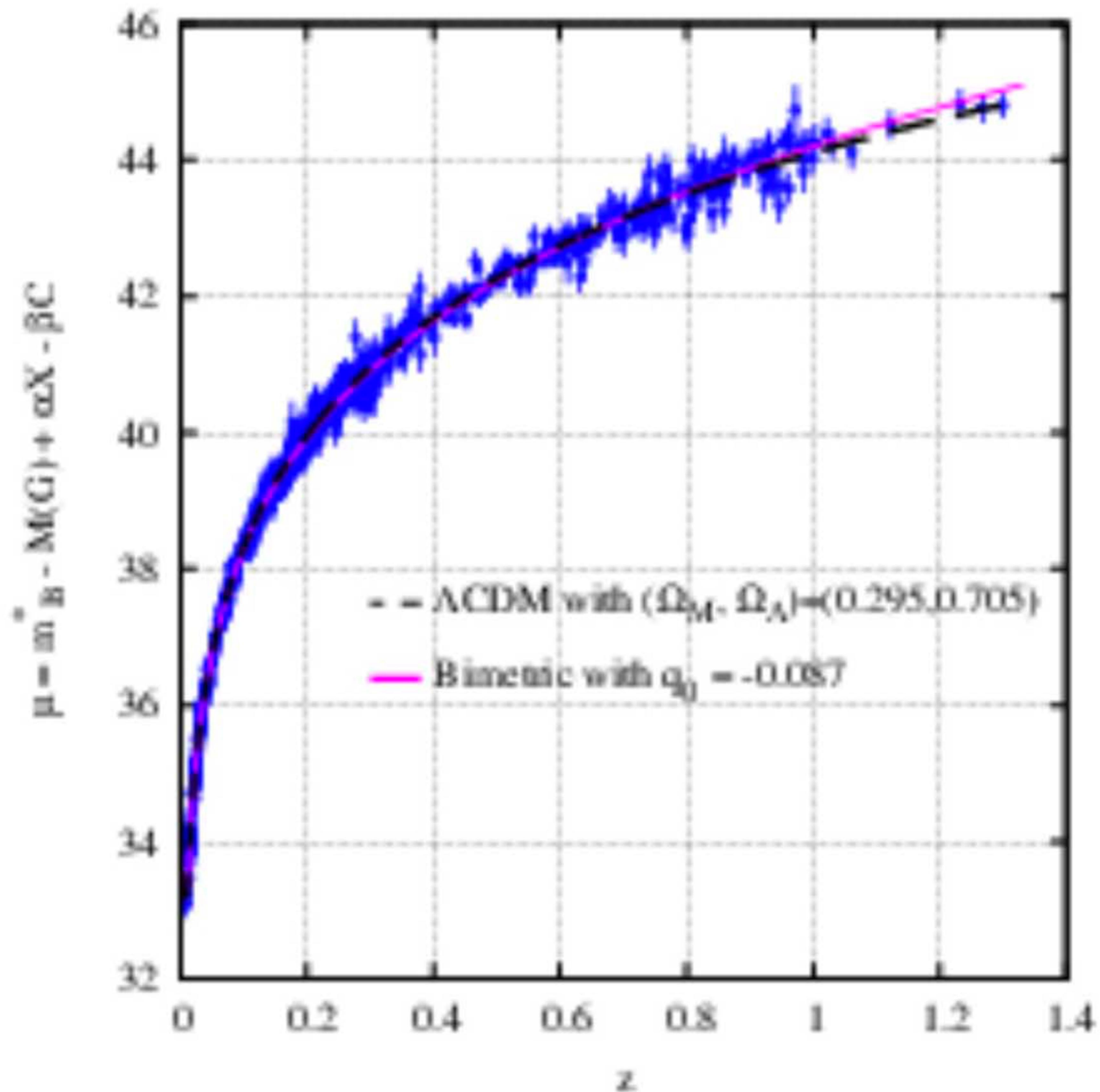


Figure 7: Hubble diagram of the combined sample and comparison with the 2 models (linear scale)

The mathematical consistency of the system of coupled field equations dictates that the terms of both members of the equations must have zero covariant derivatives. This applies to their first members, by construction. In physical terms, this translates into the satisfaction of conservation equations. The Einstein equation provides only two types of solution.

First, there are unsteady solutions under conditions of isotropy and homogeneity. Satisfaction of the condition translates into conservation of energy. We have seen that the same applies

⁵ G. D'Agostini and J.P.Petit : Constraints on Janus Cosmological model from recent observations of supernovae type Ia, Astrophysics and Space Science, (2018), <http://www.jp-petit.org/papers/cosm/2018-AstrophysSpeSci.pdf>

[1] ⁶ Perlmutter, S., et al. 1999, ApJ, 517, 565

to the Janus equations. In the second article of 2014⁷ the extension had been operated with two different light speeds.

The second set of solutions refers to stationarity (invariance by temporal translation), combined with assumptions of spatial symmetry. As in Einstein's model, the Newtonian approximation provides the $1/r^2$ law and the sign of the forces. The forces deduced from the Janus equations (see comic strip) are in line with the principles of action-reaction and equivalence. In a vacuum, the mathematical consistency of the equations poses no problem, since both second members are zero.

But in 2014, when the model was being developed, it was not possible to determine the geometry inside the masses. Indeed, the equation translating the physical and mathematical coherence in this region of space simply translates into the fact that the forces of gravity within the masses must be balanced by the forces of pressure. In 2018, we had finally succeeded in this project and were in dialogue with a peer-reviewed journal to publish a first result, restricted to the conditions of the Newtonian approximation, which accounts for 99% of astrophysical phenomena. The article⁸ is published in the early days of January 2019.

At the same time, French academician Thibault Damour, considered the country's foremost expert on cosmology, published an article entitled⁹ *Sur le Modèle Janus* (About the Janus Model) . He's a member of the Institut des Hautes Études, the French equivalent of Advanced Studies in Princeton, USA. He also sent me a registered letter with acknowledgement of receipt, informing me of the publication of an article which, according to him, put an end to what he considered to be ramblings.

Flabbergasted, we immediately replied, telling him that we had just solved the problem through an article, a copy of which we sent him, and proposing a meeting.

No reply.

Months and years went by without Mr Damour replying to any of our messages. In 2022, three years after his article went on line, we sent a letter to Mr. Damour, detailing the calculations on which our article was based.¹⁰, co-signed by them, demanding a reaction from him.

The reaction was immediate. On December 12, 2022, he published a second article on the IHES website, a veritable act of authority, entitled "Incohérence Physique et Mathématique

⁷ J.P.Petit, G.D'Agostini : Cosmological Bimetric model with interacting positive and negative masses and two different speeds of light, in agreement with the observed acceleration of the Universe. Modern Physics LettersA, Vol.29 ; N° 34, **2014** ; Nov 10th. <http://www.jp-petit.org/papers/cosmo/2014-ModPhysLettA.pdf>

⁸ J.P.Petit, G. D'Agostini, N.Debergh : Physical and mathematical consistency of the Janus Cosmological Model (JCM). Progress in Physics 2019 Vol.15 issue 1. <http://www.jp-petit.org/papers/cosmo/2019-Progress-in-Physics-1.pdf>

⁹ <http://www.jp-petit.org/papers/cosmo/2019-Damour-IHES-eng.pdf>

¹⁰ <http://www.jp-petit.org/papers/cosmo/2022-Duval-to-Damour.pdf>

du Modèle Cosmologique Janus" (Physical and mathematical inconsistency of the Janus cosmological model).¹¹

He then bases this new article on the fact that in the Janus model "negative masses attract each other, whereas it is well known that they repel each other". He thus demonstrates that he hasn't actually read our articles, and bases his argument on Herman Bondi's result from 1950. In the Einsteinian model, indeed, these negative masses repel each other. But in the Janus model, they attract. But there's none so deaf as those who don't want to understand.

It's easy to deduce the direction of the forces by constructing geodesics in a vacuum. The result is :

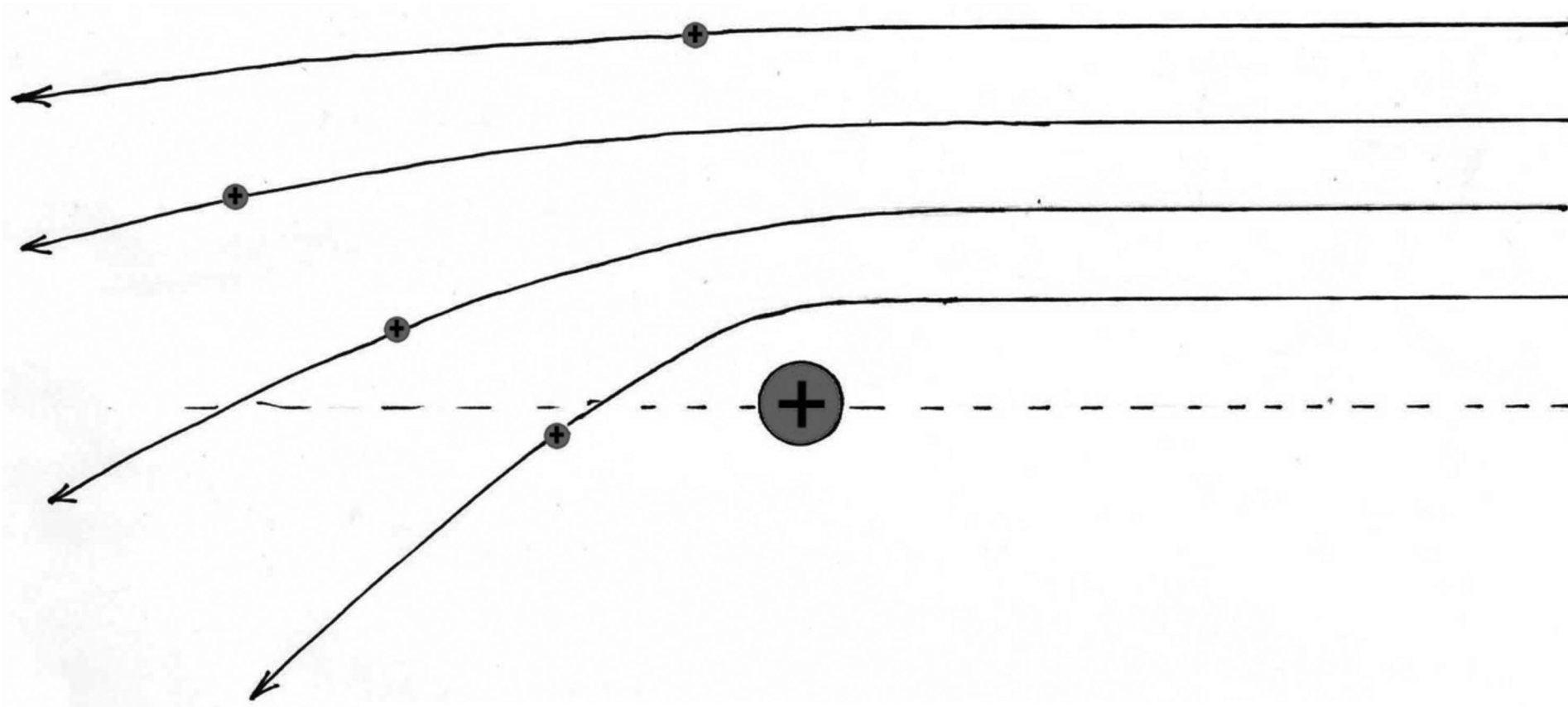


Fig.1 : Positive masses attract each other

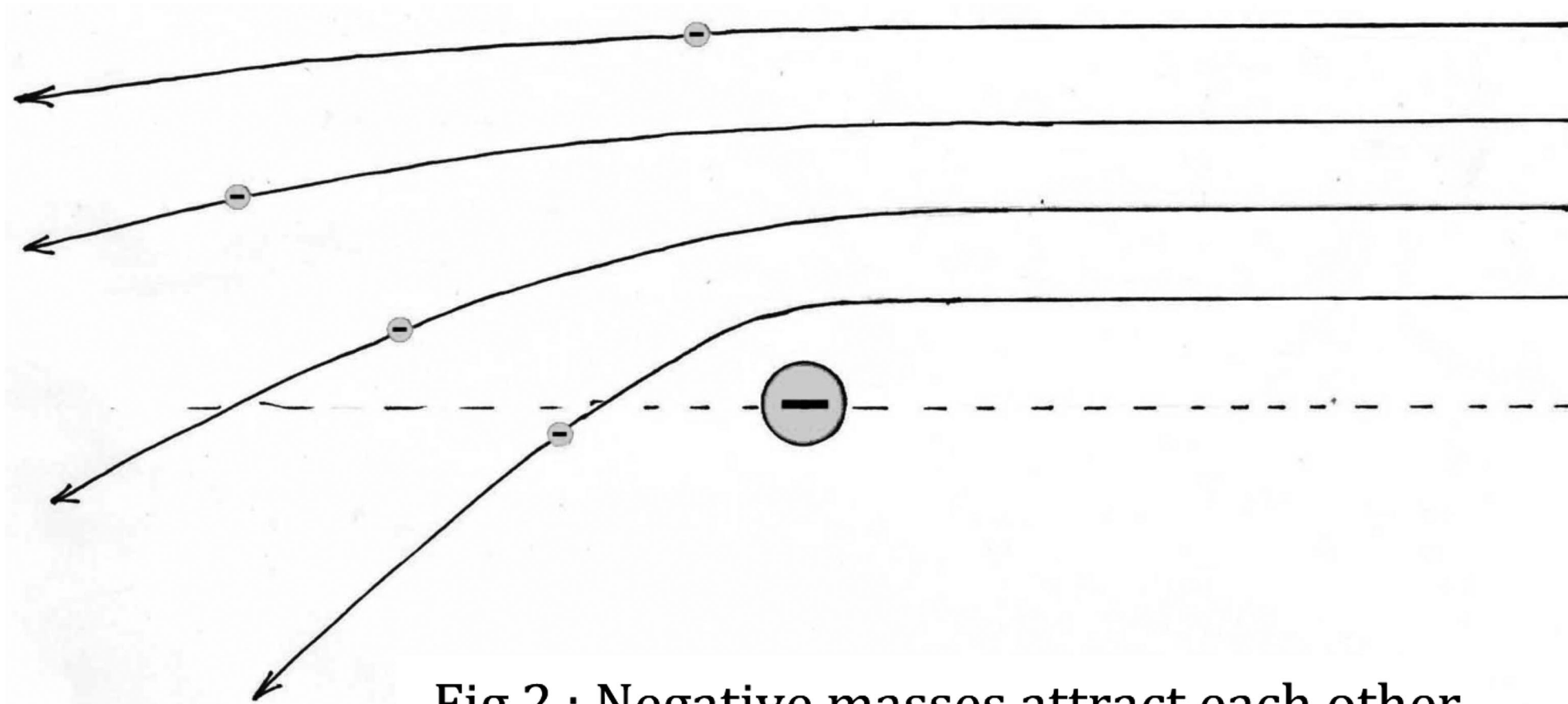


Fig.2 : Negative masses attract each other

Not having read our work and published articles, Damour didn't understand the effect of this "minus" sign in the equations, indicated here in red.:

$$R^{(+)\nu}_{\mu} - \frac{1}{2} R^+ \delta^{\nu}_{\mu} = \chi \left[T^{(+)\nu}_{\mu} + \sqrt{\frac{g^-}{g^+}} \hat{T}^{(-)\nu}_{\mu} \right]$$

¹¹ <http://www.jp-petit.org/papers/cosmo/2022-12-12-Damour-IHES.pdf>

$$R^{(-)\nu}_{\mu} - \frac{1}{2} R^{-} \delta_{\mu}^{\nu} = -\chi \left[\sqrt{\frac{g^{+}}{g^{-}}} \hat{T}^{(+)\nu}_{\mu} + T^{(-)\nu}_{\mu} \right]$$

On December 14, 2022, we immediately pointed out his error. ¹².

He then abandons this criticism and replaces this second article with a third one ¹³, posted on December 18, 2022, still on his IHES page, and then falls back on the alleged impossibility of integrating the neutron star model.

But here again, this last criticism doesn't hold water.

There is no need to explain the form of the "interaction tensors":

$$\hat{T}^{(+)\nu}_{\mu} \qquad \hat{T}^{(-)\nu}_{\mu}$$

All we need to do is specify that their respective divergences must be zero. This is what Damour says in his 2002 article. But he doesn't know what else to say. In fact, it is this condition of compatibility and coherence that dictates the form of these two tensors. At this point, we should remember that general relativity, which translates into cosmic geometry being based on Albert Einstein's field equation, is in fact based on only two types of solution:

- Unsteady solutions (invariance of the solution by time translation) with isotropy and homogeneity.

- Stationary solutions with invariance under the action of the SO(3) (spherical symmetry) and SO(2) (axisymmetry) groups.

For the moment, the axisymmetric, SO(2)-invariant stationary solution of Einstein's equation is represented by the Kerr exterior metric¹⁴ (1963) (describing geometry in vacuum, outside a field-creating mass). This solution should logically be completed by its complement, the solution expressed in the form of an interior metric. But this has never been produced. The Janus equations provide the joint exterior metrics, two-sheet extensions of this Kerr exterior metric. As these solutions follow from the equations without a second member, their mathematical consistency follows automatically. The system must therefore be physically and mathematically consistent in both configurations;

- Unsteady solutions (invariance of the solution by time translation) with isotropy and homogeneity.

¹² <http://www.jp-petit.org/papers/cosmo/2022-12-14-to-Damour.pdf>

¹³ <http://www.jp-petit.org/papers/cosmo/2022-12-18-Damor-IHES.pdf>

¹⁴ R.Kerre : Gravitational field of a spinning mass as an example of algebraic special metrics. Physical Review Letters Vol. 11#5 1963 set. 1st. <http://www.jp-petit.org/papers/cosmo/1963.pdf>

- Stationary solutions with invariance under the action of SO(3) groups (spherical symmetry).

The question has been solved in the first case with our 2014,2015, 2018 papers. The compatibility equation then translates into the generalized conservation of energy:

$$E = \rho^{(+)}c^{(+2)}a^{(+3)} + \rho^{(-)}c^{(-2)}a^{(-3)} = \text{Cst}$$

In the second case, as Damour agrees in the article posted on his page of the IHES website on December 18, 2022, these conditions are also fulfilled in the Newtonian approximation (low curvature, low velocities ahead of the speed of light).

This includes the geometric description of the region of space corresponding to the Great Repeller phenomenon, both inside and outside the formation. The geodesics followed by positive-energy photons (which alone lend themselves to confrontation with observation) can be deduced from the pair of inner and outer Schwarzschild metrics generated by a negative-mass source.

This left us with the problem of describing the geometry inside a neutron star, which is based on this Newtonian approximation. Everything that could be done in this direction was fully described in Karl Schwarzschild's two papers of 1916¹⁵, the equation of state, known as the TOV equation (Tolman-Oppenheimer-Volkoff ¹⁶) which is simply a reformulation of the 1916 solution in another coordinate system and through a differential equation.

This can be reconciled as a solution of the Janus system, based on the fact that these neutron stars are automatically located (positive and negative masses are mutually exclusive) in a region where negative mass is practically absent, and the system is reduced to equation :

$$R^{(+v)}_{\mu} - \frac{1}{2}R^{(+)}\delta_{\mu}^v = \chi T^{(+v)}_{\mu}$$

This equation is none other than Einstein's equation, in mixed notations, which explains in particular why the Janus model satisfies all local relativistic data (perigee advance of planetary orbits, deviations of light rays by masses). A more detailed technical description can be found in the reply to T.Damour, in French. ¹⁷.

¹² <http://www.jp-petit.org/papers/cosmo/2022-12-14-to-Damour.pdf>

¹³ <http://www.jp-petit.org/papers/cosmo/2022-12-18-Damor-IHES.pdf>

¹⁴ R.Kerre : Gravitational field of a spinning mass as an example of algebraic special metrics. Physical Review Letters Vol. 11#5 1963 set. 1st. <http://www.jp-petit.org/papers/cosmo/1963.pdf>

Conclusion:

The challenge introduced by the Janus model is obviously a major one. We need to consider adopting a geometrical extension of general relativity, replacing the Einstein equation with the system of two coupled field equations of the Janus model:

$$R^{(+)\nu}_{\mu} - \frac{1}{2} R^+ \delta^{\nu}_{\mu} = \chi \left[T^{(+)\nu}_{\mu} + \sqrt{\frac{g^-}{g^+}} \hat{T}^{(-)\nu}_{\mu} \right]$$

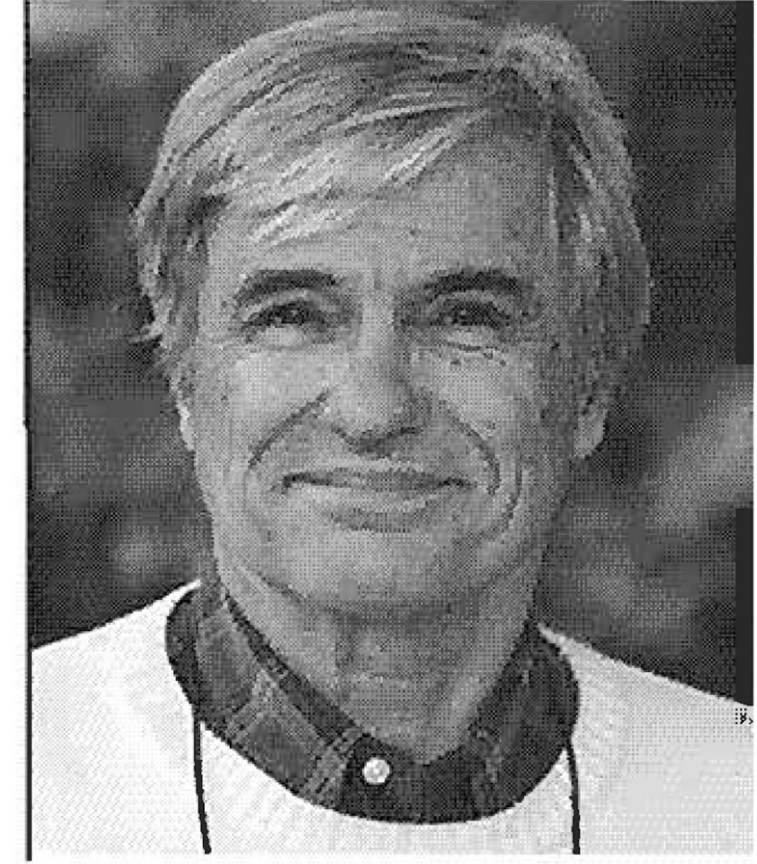
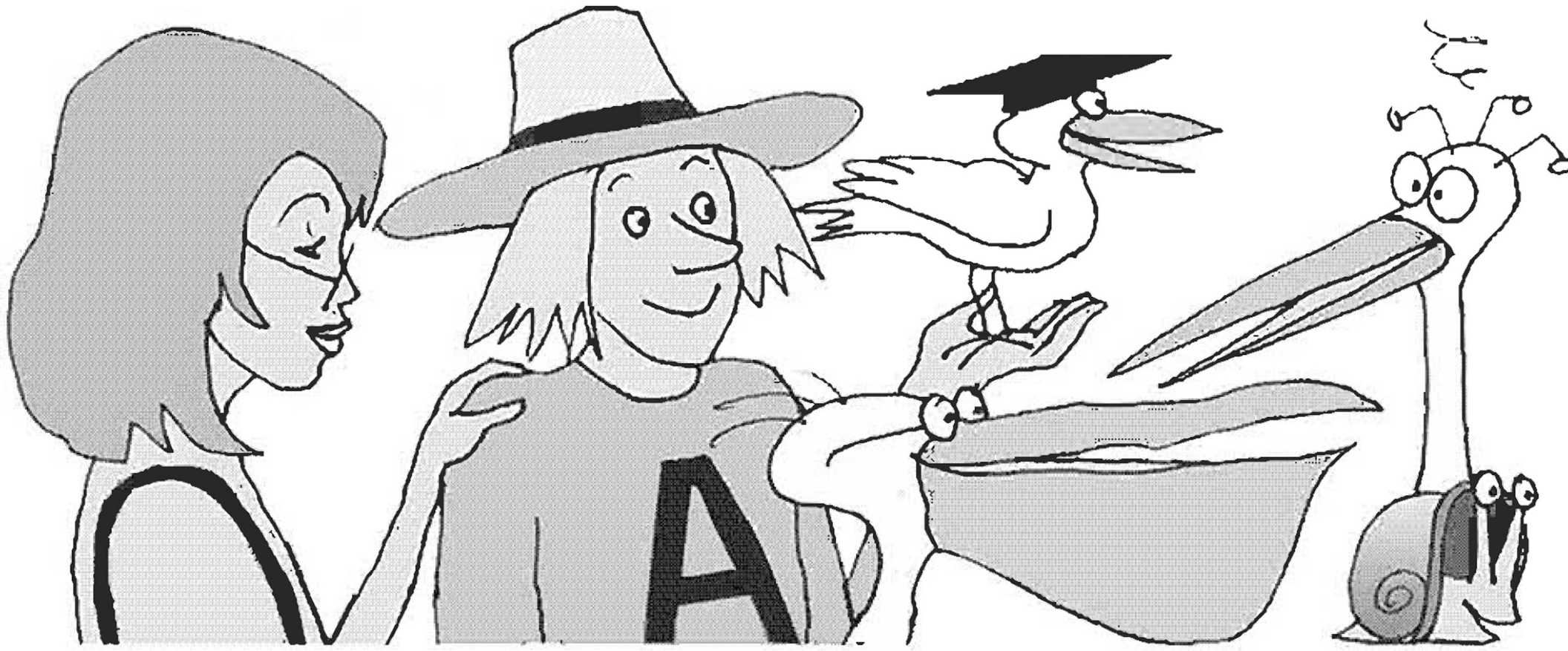
$$R^{(-)\nu}_{\mu} - \frac{1}{2} R^- \delta^{\nu}_{\mu} = -\chi \left[\sqrt{\frac{g^+}{g^-}} \hat{T}^{(+)\nu}_{\mu} + T^{(-)\nu}_{\mu} \right]$$

On such an important issue, it is totally anomalous that the French academician Thibault Damour should have contented himself, in the form of an act of authority, with publishing on the website of the institute to which he belongs two articles entitled:

Physical and mathematical inconsistency of the Janus model

Instead of publishing this criticism in due form in a peer-reviewed journal, which would have been an ethical response. On the contrary, he refused any exchange, any debate, any legitimate expression of a scientific right of reply.

The Adventures of Archibald Higgins



Decades have passed. Higgins and his companions, Max the blackbird, Léon the pelican and Tiresias the snail, realize that "the boss" has decided to "reactivate" them. But after years spent in the pages of the first albums, a "Dark Science" has emerged, presented to them by Aurélien, the rat. Sophie points out that the resulting model is increasingly contradicted by observations. So begins a fantastic adventure in which the emergence of a new model, the "Janus Model", an extension of Mr. Albert's model, solves the problems raised one by one.

Jean-Pierre Petit, born in 1937, who combines the qualities of a broad-spectrum scientist and a draughtsman, created this collection in 1977.

From the same author:

- 1 - Computer Magic
- 2- Flight of Fancy
- 3- Here's Looking at Euclid
- 4- Everything is Relative
- 5- The Black Hole
- 6- Big Bang
- 7- Run, Robot, Run
- 8- The Silence Barrier
- 9- The Economicon
- 10- Yours, energetically
- 11- Cosmic Story
- 12- A Thousand Billion Suns
- 13- For a Fistful of Amperes
- 14- Topo the World
- 15- The Chronologicon
- 16- The Logotron
- 17- Around the World in 80 Minuts
- 18- The Spondyloscope
- 19- Have a Nice Apocalypse
- 20- Cinderella 2000
- 21 - Vertical Passion
- 22- The scientific thousand and one nights
- 23- Amber and Glass
- 24- The Twin Universe
- 25- Faster than Light
- 26- Pyramids, the secret of Imothep.
- 27- Flighty Mechanics
- 28 -Janus Model versus Dark Science

These works, translated into 40 languages, can be downloaded free of charge from the website of the Savoir-sans-Frontières association, created in 2004 by the author and his colleague and friend, Gilles d'Agostini :