The Mechanism of Gravity
„Quantumgravity“

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Just a man with an insight.

Gravitation is still not a fully deciphered phenomenon. Neither Newton nor Einstein could name the real reason for gravity. Our current theory of gravity is difficult to represent visually and therefore difficult for non physicists like me to grasp. And the mathematical description by General Relativity (GR) is highly complicated. With this paper I would like to bring you closer to my concept of gravitation. In this concept, I am going to give you a reason for gravity. I will bring GR and Special Relativity (SR) closer together. I will describe known phenomena like the light deflection at the sun, the Shapiro Delay, gravitational lensing and the perihelion rotation of Mercury with the inner logic of my model. All in a simple and clear way. I will introduce a new term for matter – Spacematter. After reading this paper, I hope you will get an idea of my insight and will find it as helpful in understanding gravity as I do.

Overview

The most important takeaway from this essay is that I am going to give a simple, physical explanation for the reason for gravity.

Neither Newtons force based gravitation, nor Einsteins spacetime based GR provide a reason for gravitation. Neither they provide any reason for the weakness of gravity compared to the other three forces of nature.
My hypothesis can be used for Newtons and Einsteins theory of gravitation.
I have chosen do use Einsteins GR to explain this new theory.

Despite the great difficulties that the tensor-based description of the spacetime metric brought me, I was able to find my own tensor values and design a metric, that fits with my hypothesis.

The concept ist very simle and I deliberately use as little mathematics as possible.
My concept describes matter as its own entity with its own space requirements within spacetime. In order to clarify this, I introduce the term spacematter.
In the following spacematter stands for the term matter. (mass/volume/density)
Whereby only the density of matter describes the term holistically.

This means that physically every form of matter has space because it forms an entity independent of spacetime. I now give this space of matter its own spatial dimensions to make it clear that matter represents a completely separate entity that has nothing to do with spacetime.

The spacematter works as we are used to. Like matter it interacts with spacetime to the usual degree. It bends and twist spacetime. This is to be understood as an interaction between spacetime and spacematter.

In addition to what has already been mentioned, the spacematter displaces spacetime!
And that is exactly the difference to all previous theories. That is the reason for gravity in my hypothesis.

In this logic, every entity has a space requirement. As in physics 2 entities or objects cant share the exact same space at the same time.

In my theory it isn't the mass, it's the volume of the elementary particles needed to build up the structure of matter. So this Volume corresponds exactly to the displacement of spacetime in my theory. This mechanism changes the spacetime density around objects. The geometry of spacetime changes due to this reason.

At this point it is important to understand, that only the volume of elementary particles is what counts. Its only the Schwarzschild radius of any object, which is countable for the displacement of spacetime.
It's a different approach of understanding gravity. Its not any more the masses, it's the volume although they are strongly connected.

My new theory would like to turn out to be a normal physical law that 2 objekts / entities with obvious space requirements cannot be in the same place at the same time.
Of course that has consequences. When considering the known phenomena caoused by gravitation, I was able to describe all of them with this theory without contradictions.
In this term we have to consider that spacetime behaves similarly to GR.

With the difference that the space of spacetime is not stretched radially, but compressed.
Since the mechanism of spacetime displacement only makes a plausible sense in this way. So time continues to be dilated as known from Special Theory of Relativity (SR) and GR. In both cases the time is thus dilated.

Not only do I now treat space and time alike through space contraction, I even treat them alike according to SR. Lorentz contraction is now also finding its way into GR.
So in this theory spacetime is displaced by the presence of spacematter and finds itself as denser spacetime around objects.

The density of spacetime decreases from the surface of objects to distant points in space, naturally also the gravitational effect. In this theory, as with Einstein, it can be assumed that the spacetime curvature is the effect that causes gravity.

In the following I will describe my new theory mainly with the simple black holes (BH). Since BHs like elementary particles no longer have any spacetime in their inner structure and their Schwarzschild radius is their real radius.

Again its important to understand the difference between GR and my model.
I now treat spacetime as a unity as originally conceived from Minkowski.

What about experiments and observations? Rather, is it compliant with the highly affirmed GR?

Formal explanation of the effect

The reason for the gravitational effect is the compressed and thus denser spacetime. This affects all objects that are in its area of effect. The effect is further described as in Einsteins GR, only that no rubber mat may be used to the visual description, but a deep framework equipped with very elastic rubber bands, into which a spherical object is inserted.
The "metric" of the now radially compressed rubber bands corresponds to the real spacetime metric around objects. With colored rubber bands we can even visualize the time component.
One no longer needs 4D spacetime or other complicated entities to easily visualize the metric. It should become easier to get a picture of the spacetime curvature.
With the mechanism and the visual conception of spacetime I would now like to describe the phenomena.

Unfortunately I cant avoid using a little mathematics either. I would first like to show you the exact difference of the line elements commonly used by Schwarzschild and later also the difference in the metric.

You will see that not much will change. But it changes decisively in the consideration and the simpler description of phenomena or observations. The simplified line element from Schwarzschild (the simplest form of describing a static unmoving and uncharged BH or the spacetime metric).

Formula symbols used:

R = radius of the uncurved flat minkowski space time
Rs = Schwarzschild radius
r = local space, the result from the second term
t = time of flat spacetime
τ = local time, the result from the first term

Simplified Schwarzschild line element

$$ds^2 = \left(1 - \frac{Rs}{R}\right) * c^2 dt^2 - \left(\frac{1}{1 - \frac{Rs}{R}}\right) * dR^2 \ldots . \left[- R^2 d\theta^2 - R^2 sin^2\theta\varphi^2\right]$$

The part behind the … is left out in this consideration, only included for the sake of completeness. We're just looking at the x axis, or R, which describes the radial axis, the difference in the formula is only about the second term. This changes in my line element and thus this changes my metric.

The first term gives the time dilation at a given distance from the BH's event horizon (EH). Expressed by R. And converted to dτ.

The second term indicates the radial space curvature. Since the first term corresponds to a compression, the reciprocal of 1-Rs/R in the second term corresponds to a stretch in Schwarzschild and other metrics.

We have always known it that way and it is accepted as such, although very few people understand what that means.
You somehow associate stretched space with gravitational attraction. But without a concrete mechanism, it is difficult to understand exactly how it works.

At this point I would like to point out that GR compresses time as in SR, but treats space in the opposite way.

It is not Lorentz contracted, but stretched, that's different in my metric.

My simplified line element

$$ds^2 = \left(1 - \frac{Rs}{R}\right) * c^2 dt^2 - \left(1 - \frac{Rs}{R}\right) * dR^2 \ldots \left[- R^2 d\theta^2 - R^2 sin^2\theta\varphi^2\right]$$

$$> \quad [- R^2 - R^2 \sin(\theta)^2]$$

As you can see, I just manipulated the 2nd term to express a contraction of space, namely depending on the Rs.

In tensor notation you will now be able to see the similarity to SRT.

[1]

$$g_{\mu\sigma} \to \begin{pmatrix} 1 & 0 & 0 & 0 \\ 0 & -1 & 0 & 0 \\ 0 & 0 & -r^2 & 0 \\ 0 & 0 & 0 & -r^2 \, \text{Sin}[\sigma]^2 \end{pmatrix} \qquad g_{\mu\sigma} \to \begin{pmatrix} 1 - \frac{2}{r} & 0 & 0 & 0 \\ 0 & -1 + \frac{2}{r} & 0 & 0 \\ 0 & 0 & -r^2 & 0 \\ 0 & 0 & 0 & -r^2 \, \text{Sin}[\sigma]^2 \end{pmatrix}$$

Minkowski's tensor metric is shown on the left and my tensor metric of the new theory on the right.

As you can see, I just put the term 1-Rs/R in the ones. The program has already set values for Rs here. Swap the 2 for Rs and you'll see it better.

So G00 and G11 are also the same in my tensor metric as in Minkowski's spherical coordinates. This simplifies a lot of calculations that used to involve difficult cross terms. In this model, you no longer have to.
The model now treats space and time symmetrically the same. A Lorentz transformation is easy to do.

Another advantage is that spacetime is now treated as a unit again, which I think is a factor that should not be underestimated.
Why did Schwarzschild come up with a radial stretch?
Well, he didn't had a clear source of gravity. He could only work with flat spacetime. He didn't had repressed spacetime at his disposal like I do.

But if you want to manipulate the space, i.e. bend it, you only have a stretch.

A compression without extra space would have meant a spacetime-free-area.

That would of course be an absurd result. Therefore, it was probably decided to stretch space. That's my assumption, since I had to overcome a similar problem.

My inconspicuous change from stretching to contraction/compression of space has remarkable consequences.
Now things become easy to explain.
I would like to illustrate this with the following examples.

The deflection of light from the sun

We have known experimentally since 1919 that light near the sun is deflected. Sir Arthur Eddington made Einstein famous in one fell swoop. Because he had predicted it based on his GR published in 1915.
There are at least 2 ways to describe or calculate the phenomenon from the point of view of this theory. I use the simplest.
I have to mention briefly that a light deflection can also be considered as light refraction. This is common in optics.
Just as we know that light is deflected or refracted by a denser medium, the same can be said of light deflection at the sun.
If a ray of light has to pass through a denser medium, it is refracted towards the axis of incidence and loses speed. An example is the refraction of light in water.
This is expressed by n = the refractive index.
I will spare you the length and breadth of illustrating the mode of action with pictures and mathematical angles.
The mode of action is self-explanatory.
Now let's take a closer look at the observed phenomenon.
The light is refracted towards the axis of incidence. That means it must have been exposed to a higher density of space-time.
If the space were stretched, as in Schwarzschild's and other solutions, the light would be scattered concavely.So light will be broken away from the axis of incidence.

Stretched part of space and dilated time would cancel each other out and it would not be Refraction of light measurable! Here I am surprised about the same result of the other metrics.
I wonder if a mathematical description by using the metric with stretched space would come to the right results. As I hopefully showed, that logically we have to assume a denser spacetime.

As described, it must therefore be a question of denser spacetime and this is also clearly evident from the displaced spacetime. So there is more spacetime per volume than in a flat spacetime or vacuum.

What about the speed of light, (c)? We should also have to detect a decrease in speed when light passes through a denser medium
propagated. Unfortunately, no additional measurement of the actual speed (c) of light was made in 1919.

Shapiro Effect

But we have the well-known Shapiro effect. This states that if we use electromagnetic signals that pass close to the sun, we are measuring c to experience a delay.
So light experiences a deceleration. As is to be expected with the new theory. Considering these two phenomena together, they now form a complete picture. Rays of light are deflected and slowed down, exactly as the optics predict, and as the model predicts. So the simple conclusion is permissible to assume that the light had to propagate through a denser spacetime region.
The theory of denser spacetime around objects therefore fits perfectly with the observations made. And can explain them in a simple way. C is still a constant. In the Minkowski flat space, the vacuum, c remains constant. Furthermore, the deceleration compared to c can be explained logically by a denser vacuum or a denser spacetime. And so no longer leads to a contradiction between GR and SR that is difficult to describe or eliminate.

The Gravitational Lens Effect

If one speaks of light deflection in this context, the gravitational lens effect comes to mind.
Here, too, we observe a light deflection towards the axis of incidence. Rays of light are thus refracted convexly towards us.
The reasoning is the same as for the deflection of light near the sun.
A refraction of light towards the axis indicates a denser spacetime region.
I do not know whether the photon velocity was measured in this context.
According to my new theory, the refracted light must also undergo a slowdown. With a large gravitational effect, according to my theory, there has to be an even greater deceleration of the photons.

With this test, my theory would be falsifiable, or if correct, verifiable.
However, an expansion of spacetime would mean a less dense spacetime.
The light would then have to be refracted away from the axis, or as I said just fly straight through, because time and space would balance each other out.

So here I would like to see to put my theory to the test.

Perihelion of Mercury

Now we look at the perihelion rotation of Mercury. The explanation is just as simple here.
The closer Mercury gets to the Sun, the denser spacetime becomes. As a result, Mercury experiences a shift towards the axis.
The sun has only a Rs of 3 km. Therefore this effect is relatively small, but it is observable.
Unfortunately, my mathematical skills are not sufficient for a calculation that leads to the 43'.
But even without complicated calculations, we can now determine and understand the movements of objects with large masses.

On Wikipedia on the subject of gravitational lensing:

[4]"The gravitational lensing effect was at distant astrophysical observed sources, but it is difficult to experimentally control the conditions and it is uncertain how the results should be classified under ART."

This effect has been clearly described in my theory of gravitation. Likewise, this theory may be measured against the predictions.

Summary:
The mechanism of gravitation can be recognized in a simple way.
The cause of gravitation is the displaced and thus denser spacetime.
Spacematter needs space because it brings its own space with it.
Spacematter interacts in a special way with spacetime, it represses it, bends it, compresses it and twists it. (Lense-Thirring-Effect)
Spacetime remains a unit and is only treated symmetrically SR and GR are essentially the same. Both treat spacetime the same. One Transition from GR to SR is very easy to do with this metric. Cross terms will be much easier to handle.
Phenomena can be explained in different ways. The effects match the rest of the physics. See optics.
Spacematter offers possibilities for explaining the quantum mechanical Phenomena (My actual work, with which I incidentally got the reason for gravity)

The new knowledge about the cause of gravity and its weakness can now also be applied to all elementary particles.
Singularities of elementary particles (idealized point-like particles) should disappear. They should be described with a mass and a volume.
The coordinate singularity at the EH of the SL vanishes, since it is clear that r>Rs.
On r = Rs it should be the surface of a BH.
The singularity inside a BH disappears because the formula for the ART may not apply to the interior of a BH. Spacematter has its own dimensions, which require their own description, that is independent of spacetime.
Spacematter offers the opportunity to see the BH for what it is, a Collection of elementary particles, without spacetime shares.
The BH is now only with mass/volume and density described. The gravitational effect can be determined without a complex energy-momentum tensor. Only the Rs is important for this, which can be easily determined from the mass.
The delimitation of matter to spacetime through the introduction of spacematter was, in my opinion, long since obsolete in order to make QM explainable.
An amalgamation of the smallest objects, the elementary particles to the largest objects is accomplished. BHs are pure (space) matter
All other objects have a spacetime component, like atoms, suns, planets and neutron stars.

Further consequences of the discovery of the mechanism of gravitation

We can now apply this insight to make a better cosmological description.
The question of quantum gravity is thus practically resolved. Each elementary particle displaces spacetime and thus has a gravitational effect.

The question that still arises is how strong this effect is calculated on the respective volume or density. For me as a layman it is not possible to have an overview of all possible consequences if the theory is correct.
Due to the observations that fit this theory, I felt compelled to publish a possible, previously unknown mechanism of gravitation.
After all, this is a centuries-old mystery in physics.

I hope I could make a contribution to physics.

This is not a complete work! It's just a shortened version, kept as simple as possible.

For more information about the tensors and effects on the metrics commonly used so far, please send me a request.

Furthermore, I reserve the right to make changes if I have more specific data.

Richard Feynman also has clear words for how one can lose the true sense and meaning of the mathematical description for physical correspondences by setting axioms in mathematics.
[3] „If you say such and such is so and such and such is so, and such and such is so, then the logic can be carried out without knowing what the such and such words mean.“

„Mathematics is not physics and physics is not mathematics, one helps the other. But you have to have some understanding of the connection of the words (terms) with the real world."

General theories should be easy understandable by the general public.

We need to get back to understanding the laws of physics and move away from purely mathematical descriptions.

The physical understanding of a theory should come first, not the mathematical description.
I hope I was able to contribute a little with the new theory of gravitation.

[1] I got pictures of the tensor metrics from www.Yukterez.org, with kind permission and help to create them.

[2],[4] Quoted from Wikipedia.de "Tests of General Relativity"

In the section: "Deflection of light by the sun" and "Gravitational lensing"

[3] From a video on Youtube: https://youtu.be/B-eh2SD54fM „Feynman – what differs physics from mathematics“

Thanks also to Mr. Josef Gaßner, who was able to impart a lot of physical knowledge to me with the series from Aristotle to string theory.
Youtube link to the series: https://youtube.com/playlist?list=PLmDf0YliVUvGGAE 3CbIEoJM3DJHAaRzj