Our universe is just curved spacetime

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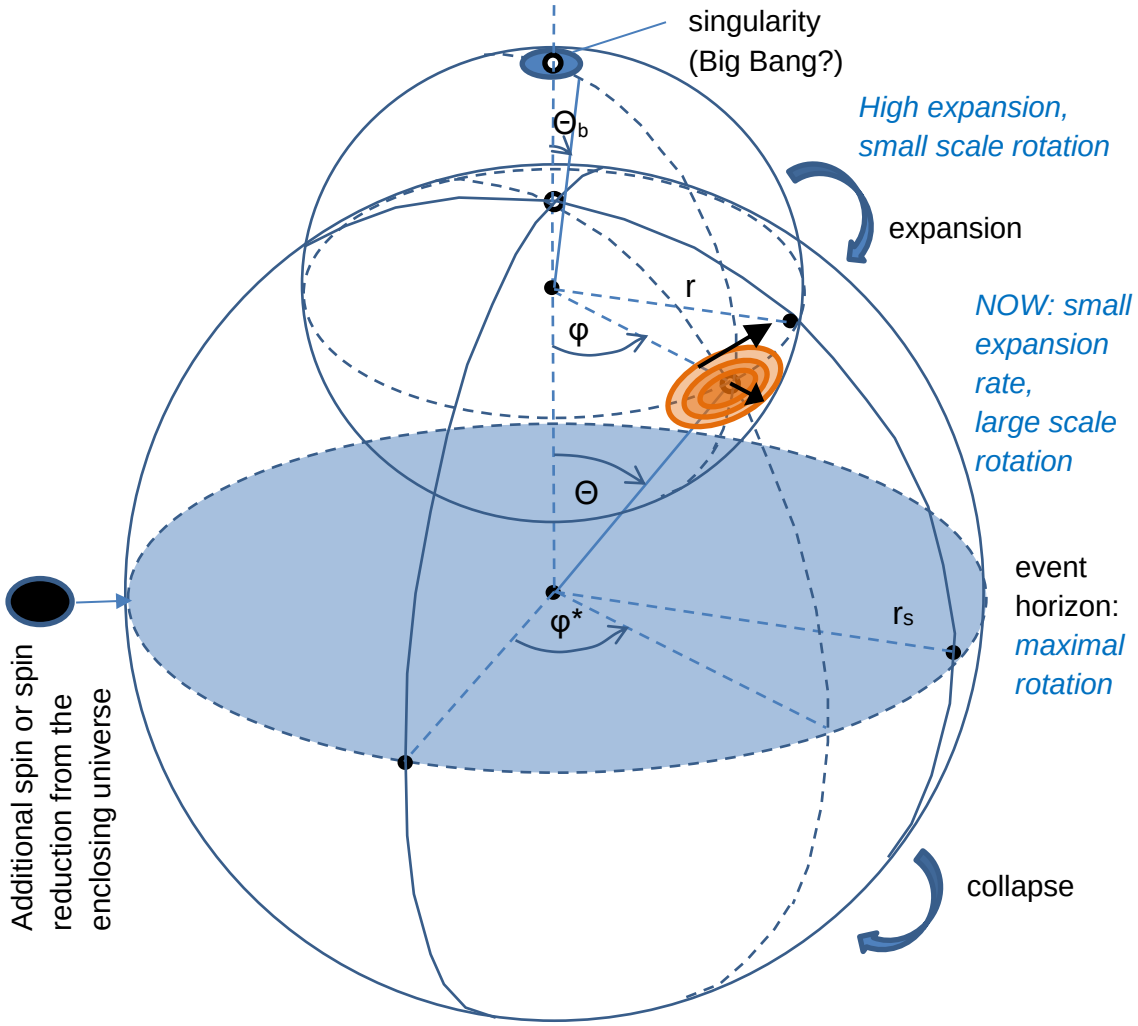
Project Agenda

If our universe – including elementary particles - would be just curved spacetime, what kind of manifolds would make up things we call objects? My suggestion is, that “matter” is built up by extreme manifolds, collections of black holes, building rotational systems. So, it is not mass, that is curving spacetime, but curved spacetime, that provides the illusion of masses. Through their encapsulation, different observers may recognize those collections of black holes, with may be slightly different properties – especially, of course, with respect to their velocity vector. But any observer will see (if at all) the system as rotating system. Some observer may see the beginning rotation of the system, some other its end phase, depending on the view of the observer with respect to the reached age in the evolution of the universe. The views result from transformations preserving the Minkowski metric up to scaling (shortly speaking: *scaling the Minkowski metric*) and map points of one 3-sphere, corresponding to a certain age, to another. So, evolution of the universe is mapping of “spacelike” slices, the spheres, onto one another. The squares of the radii of the spheres shall be multiples of l_p^2, with l_p being the Planck length. In order *not to confuse us* and so that increments differ smoothly, the mapping is ordered. As a side result we will get an overall minimum radial acceleration, valid for every rotational system, which value is that of MOND. So, the described model will explain, what we call *dark matter*. And we will end up with a *modified cyclic universe*: starting at the big bang, reaching the event horizon, eventually getting additional “mass” (which is just additional spin) at this point from the enclosing universe, and reversely shrinking again towards a ring singularity. In a paper called “On with the Big Bang” we will see, that there is no singularity at the big bang. The *radial velocity* will get c (speed of light), whereas, when reaching the event horizon the *rotational velocity* will reach c and the radial velocity will get zero. Since the radial acceleration will then be less than zero, the universe will collapse again.

In the cited document a modified metric M* will be introduced, which results from the Minkowski metric, if one allows velocity in transformations of Lorentz group - more precisely the generalized form, that scales the Minkowski metric - to be non constant. One could also say, that in the presented model of the universe the universe and its views on it is just dynamically changing metrics which are based on the Minkowski metric.

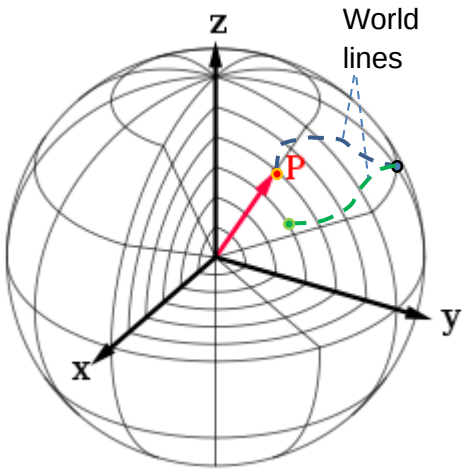
Moreover, since the views (as sequences of transformations scaling the Minkowski metric) are not unique (there is a tremendous amount of different world lines leading to the same view), neither the past nor the future of the views, i.e. of us, is determined. The uniqueness of the past is just an illusion, achieved by building large collections of views and calling them observer object.

The following picture illustrates the model.



with θ being the polar angle, describing the size of the universe reached (independent to the polar angle representing the point of a view there). So, $\theta = \theta_b$ near 0 stands for the ring singularity, where rotation velocity limit is reached, and $\theta = \frac{\pi}{2}$ represents the status $r=r_s$ with radius r and Schwarzschild radius r_s. φ is the azimuthal angle in spherical coordinates.

The 3-spheres (visualized as 2-spheres for simplicity), crossed by world lines, are ordered by radius, showed in the picture to the right, taken from WIKIPEDIA (without world lines). In the model, when reaching the event horizon, there is a phase where spin modification by an enclosing universe may take place – as part of an interaction. Then "our" universe enters its shrinking phase. In the view of the enclosing universe there is no such phase, since at the horizon space and time coordinates change their roles, and what is time for us is just space for an observer in the enclosing universe. So, the whole



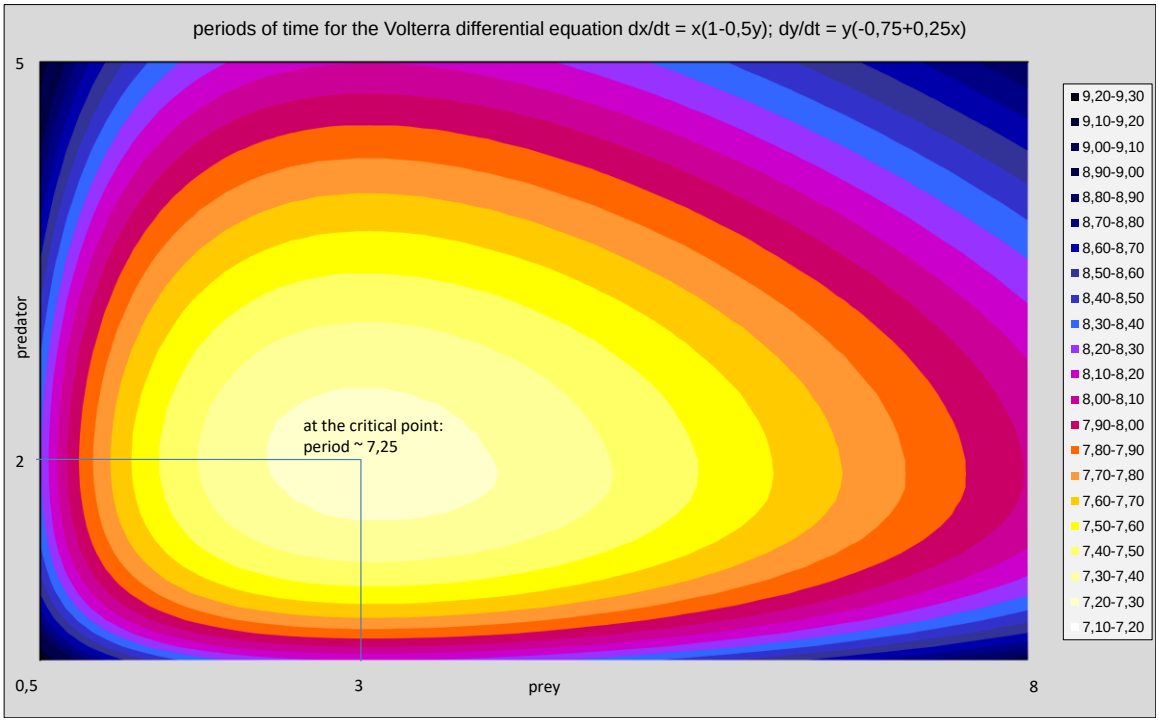
lifetime of our universe is just a moment for an observer outside. This will be part of a document to come.

Analogy to population theory

There is a model describing the evolution of populations of predators and preys called Lotka-Volterra model given by a nonlinear differential equation. For just one population of predator and prey respectively the differential equation may be written as:

$$\dot{x} = x(a - by)$$
$$\dot{y} = y(-c + dx)$$

with x = x(t) being the biomass of the prey, y = y(t) the one of the predator population, and $\dot{x} = \frac{d}{dt}x$, $\dot{y} = \frac{d}{dt}y$. The real, positive coefficients a, c describe the reproduction/mortality-rate of prey and predator respectively and b, d the effect of encounters on both prey and predator. It is well known, that the trajectories of evolution of prey and predator are cyclic curves in the first quadrant of a standard x-y-coordinate system.



The cyclic curves show the projection of the trajectories into the x-y-plane. So, time increases, when surrounding the critical point on one of the trajectories anti-clockwise. The transformation $x' := x(-t)$ and $y' := y(-t)$ (reversal of time) changes the roles of prey and predator.

Now, the model lacks 2 essential aspects:

1) Populations of prey and predator are not just biomasses but are to be discretized by individuals (which are defined using some fuzziness; see end of the document) and there is a limit on each, which falling below would yield extinction
2) Birth and death enlarge or reduce biomasses by discrete values and not continuously

Item 2) means, that (time viewed to go by continuously) birth and death of prey will result in a change of trajectory by shift to the left or right respectively. By the way, this will be the same when prey being some kind of fish and predator being mankind. Fishing at a phase where the prey is low (left side of the cyclic curves) will be difficult since prey being rare, but will increase the population of the prey in the long run, since trajectories will change for instance from yellow to blue (when noting restriction 1)). This is not very intuitive for mankind's common sense.

Now, what does such a shift in trajectories mean for ongoing time? Nothing. Another trajectory is just another story of evolution. And there is no line from the critical point crossing the trajectories, which would define a sensible set of starting points in order to compare different evolutions. The point, we enter a new trajectory just describes, how the story will go on, if evolution would be continuous. The effective ongoing of evolution is given by the discrete changes of trajectories.

Let us assume, that the trajectories represent spheres according to the model above. Then evolution would happen by interactions of elementary particles. Time would go on slightly different. The view has changed. And what we are measuring is not evolution of time but number of certain interactions of elementary particles.

Assumptions made within the project

The following assumptions are made within the project:

1 Our universe is a black hole and therefore its age is not that big as postulated by the standard model of cosmology. At CMB an immense mass/energy induced a gravitational redshift on photons, that tried to escape. Redshift totally is a product of *redshift by expansion* and *redshift by gravitation*. Thus, for early objects redshift due to expansion is not as big as currently assumed, meaning, that far away objects are not so old. The factor, induced by gravitation, is: $\lambda_{obs}/\lambda_{em} = \sqrt{\frac{1-\frac{r_S}{r}}{1-\frac{r_S}{r_0}}} = \sqrt{\frac{\frac{r_S}{r}-1}{\frac{r_S}{r_0}-1}}$ with Schwarzschild radius r_s of our universe and r_0 the radius of the observer (our location now) and r the radius corresponding to the emitter, λ_{obs} the observed wavelength, λ_{em} the emitted one. Near r_0 (Now) the gravitational redshift factor tends to 1, but for small r (near Big Bang) the factor may not be neglected.
Another consequence is, that there is no uniform movement (object with constant velocity and straight direction) in our universe. Movement follows lines of equal curvature, and no such line can be a straight line, because otherwise it would cross the event horizon of our black hole. So, in every region of our universe there is a minimal value of curvature greater than zero. The concept of uniform movement is only an approximation of reality. In contrast, any movement shall be accelerated and induces what is called a field. For elementary particles (objects of extreme curvature and additional dimensions within a certain Cayley-Dickson algebra containing spacetime) curvature will be such extreme, that we have the illusion of a separate field, different to gravitation. So, the model outlines a possible unification of gravitation and other "forces" by means of curvature of spacetime together with some additional dimensions rather than trying to expand quantum theory to gravitation.
2 Objects within the universe are extreme manifolds in curvature of spacetime and optionally additional dimensions (within the elementary particles) and collections of

those. The extreme manifold objects are called black holes, too, throughout the documents of the project. Especially, elementary particles – in this sense – are black holes, too.

3 Masses do not just warp spacetime, they are nothing else than warped spacetime (and additional dimensions within the elementary particles)

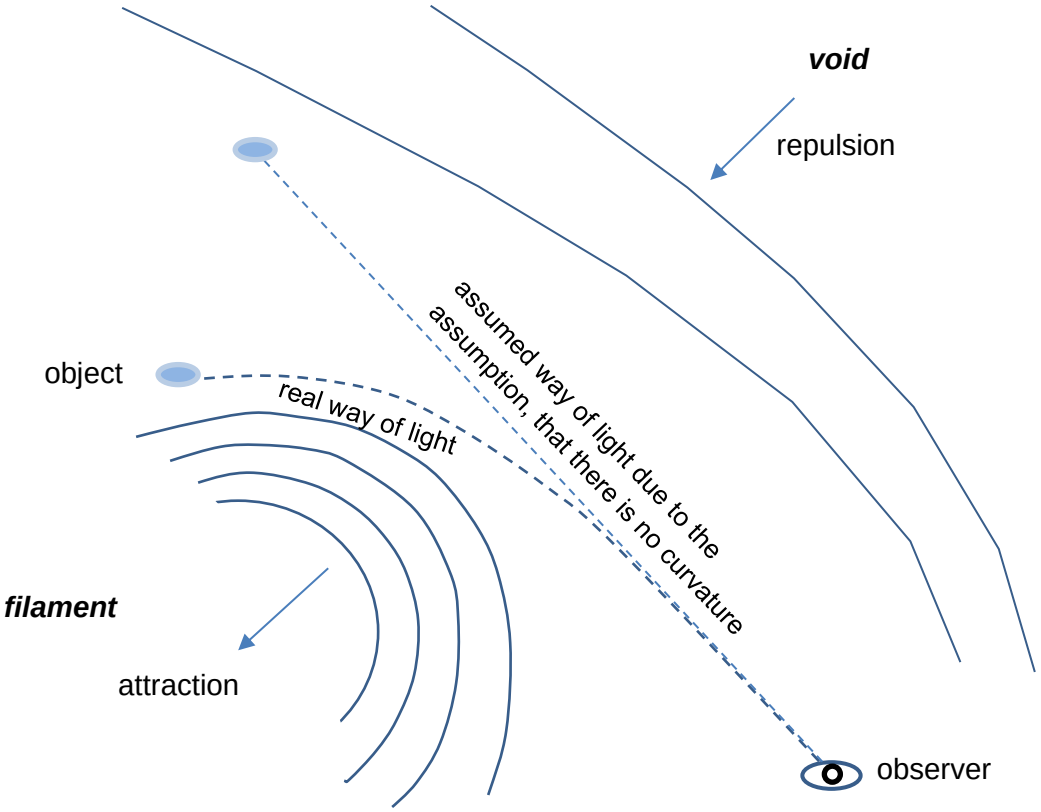
4 Natural coupling constants, especially fine structure constant α, reflect the development status (expansion) of our universe

5 Heisenberg's Uncertainty Principle shall be accomplished within the project by a non fixed past[1] or a principle, that any kind of object, we design, may only be designed up to an uncertainty inherent with its definition (see end of this document)

On flatness

Since we assume our universe to be just curved spacetime and to expand, till it reaches the event horizon, all hypersurfaces of equal curvature must be closed. So, such an universe cannot be flat. Moreover, there is no preservation of impulse but only of angular momentum. Impulse preservation would be just preservation of angular momentum for very low curvature (big radii). How does this picture fit to measurements, indicating that our universe seems to be flat up to a certain measurement inaccuracy?

All these measurements base on distance measuring of far distant objects, but, in my opinion, lack of inadequate methods. There are 3 methods for distance measurement in this context: 1) The so-called parallax, 2) via standard objects with known luminosity and 3) red shift. Let us look on the following picture of a sector in a curved universe:



[1] Interactions of elementary particles will not only change the future but also the past (in a sense given by Huygens Principle), breaking causality to some extent

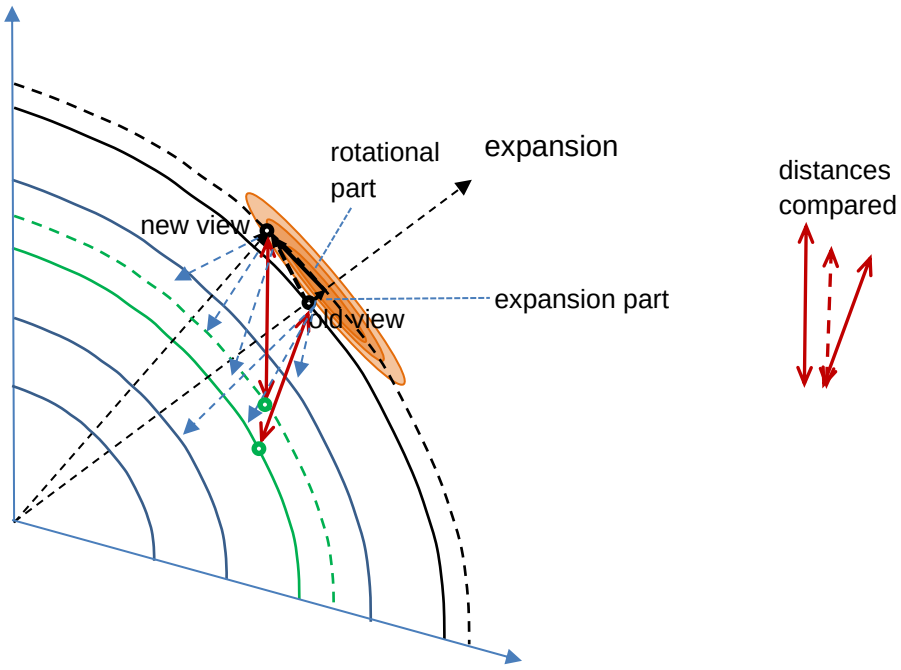
So, in case 1) we just assume, that the way of light is not curved. This assumption is not because we would know, but because we do *not* know about the curvature between an observer and the object. In case 2) this is the same, only the distance is calculated due to known luminosity, but again we ignore a (unknown) curvature. In case 3) we ignore that in the picture red shift due to gravity must be considered. So, the factors of redshift due to gravity and expansion must be multiplied to get the correct distance. In case of supernovae Ia or far distant quasars even Doppler effects have to be considered (see https://www.researchgate.net/publication/349168890_On_Doppler_effects_of_supernovae_Ia_On_Doppler_effects_of_supernovae_Ia). In some cases, we know, that we look at objects via curved spacetime, as for gravitational lenses. In such case we are able to estimate the curvature.

Note, that I focus on curvature given by the total mass/energy of objects we see, not just the one given by some clusters of galaxies.

On expansion

First note, that expansion velocity is stated to be non constant, in accordance with recent results based on supernovae Ia. Therefore, it induces a “force” (compare model picture above).

Next, since the model presented here states, that expansion velocity slows down, whilst rotation velocity increases, the standard method to measure expansion by a quotient of physical and comoving distance coordinates shows to be insufficient. This shall be illustrated in the next picture.

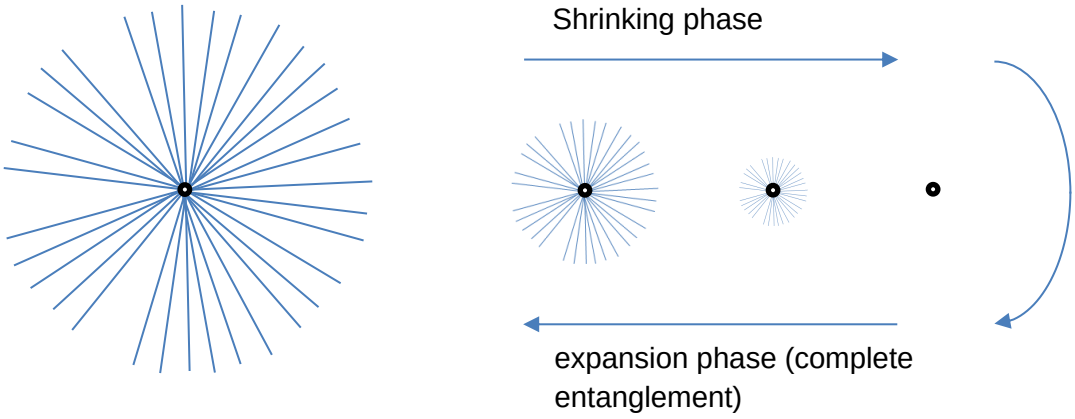


So, the space between 2 points of spacetime may not only increase because of expansion, but of large scale rotation, too. If we measure expansion rate by means of redshift of light, we will get in a phase of highly increasing large scale rotation expansion rates, that are too large. This could yield to a seemingly accelerated expansion, although expansion may decrease.

Such a model would not contradict the measured homogeneity and isotropy of our universe. Looking back the spheres we would see a homogeneous distribution of galaxies. And if rotational scale is large enough, in our snapshot of the universe we would not detect the rotation in our velocity. But such things as the great attractor would of course fit the picture. Of great interest would be the already reached scale of the rotation.

On Big Bang

In this model the end of the shrinking phase and the begin of expansion phase will be associated with an explosion of dimension of space. Creation of spacetime at Big Bang will not at all be creation of a 4-dimensional space (as an expanding sphere or being there at once), but will be associated with the picture of a »hedgehog«.



Note, that between the lines in the picture above there is no space. So – together with an appropriate topology -, the lines represent separate dimensions. The singularity does not belong to space. Space is filled in between the lines on expansion by interactions, reducing entanglement.

In fact, the radial lines represent planes (one dimension being time, the other a spacelike »radial« dimension) containing elementary objects and radiation. Elementary objects being *roots of unity* in a 2^n-dimensional Cayley-Dickson algebra (with large $n \in \mathbb{N}$)[2]. In the very early moment of expansion, dimensions collapsed to spacetime we see now and elementary particles preserving rolled up additional dimensions. Why did rules work, that are defined in a vector space but not within a hedgehog topology? I guess, this has to do with a Darwinian process of evolution of the universe. First, the rules enabled the evolution of our 4-dimensional world together with rolled up dimensions within elementary particles[1]. Second, we just see the result as it is, because we are part of it. There may be other parts not relevant to us.

In the last moment of shrinking space is getting precious. Other than shrinking of mass to black holes in our present world, there will be no space to build accretion disks. Particles »fall into« the singularity in a radial manner. What about conservation of angular momentum? Whether objects, originally built up from elementary particles represented by

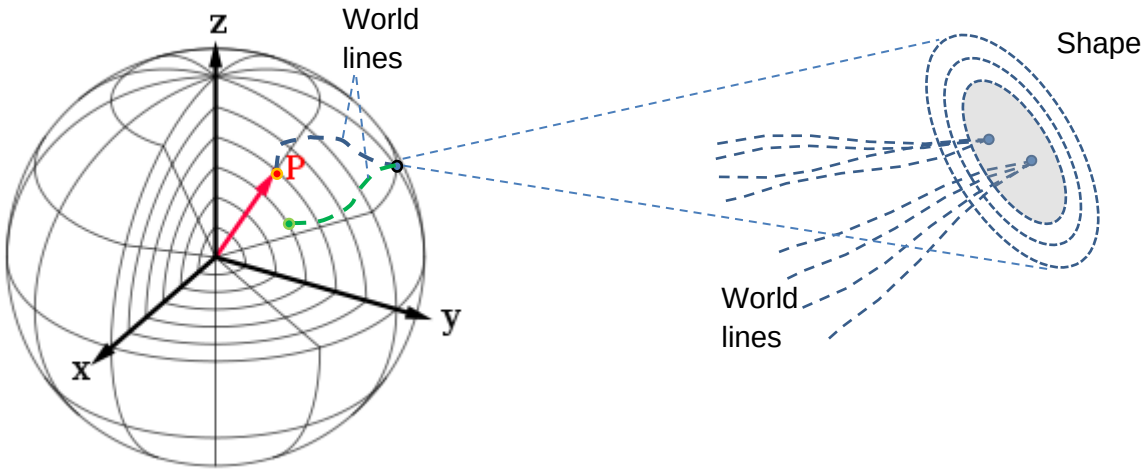
[2] See (PDF) On Black Holes and Hidden Dimensions On Black Holes and Hidden Dimensions (researchgate.net)

radial directions, rotated like lighthouse light or the planes rotated around time axis, it would no longer matter in this phase due to separation and isolation of space.

Shapes of views

What is an observer?

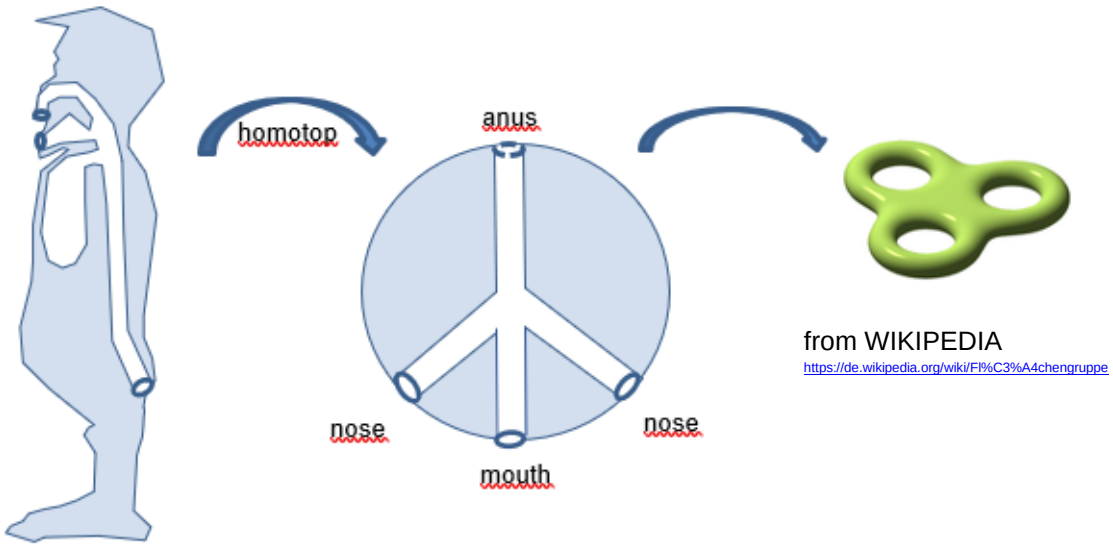
We saw, that a lot of world lines may meet at a certain point on a sphere in the evolution of our universe. Now, let us define a region on such a spacelike sphere around such a point a shape of views, shortly shape.



One often hears of multiple worlds or possible worlds. To my opinion, this idea results basically from the variety of shapes, we may design. So, to me, it is the objects, that are not properly defined. In fact, they are not definable over time at all, since of course such a shape at an instant of time can only exist with a certain fuzziness, as time evolves.

Objects of large scale

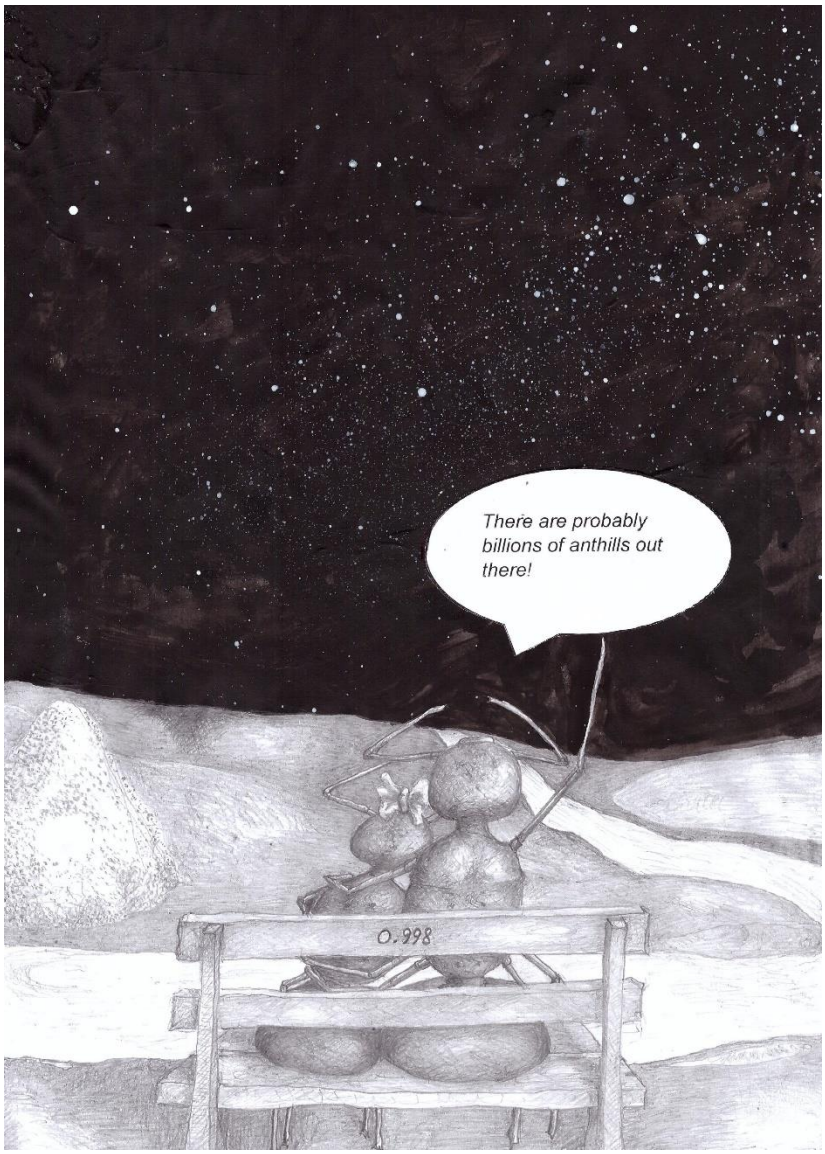
Let us inspect a certain shape, one we call our *self*:



from WIKIPEDIA
https://de.wikipedia.org/wiki/Fl%C3%A4chengruppe

Let us call the shape (our observer) *Mister X*. Now, *Mister X* loses a tremendous amount of dander every day, every second. When getting older, the same may be true for his hair. Had he lost a part of himself? Also, he just digests a specialty from Austria called «Salzburger Nockerl». So, are the «Nockerl» part of his self? When they left - in changed form -, lots of bacteria go with them. Bacteria, that are essential for the digestion of *Mister X*. (We know by now, that he is in fact kind of a superorganism.) Had the bacteria been part of him? Innumerable neutrinos pass *Mister X* every moment. Are they part of him? Does he change, when the amount changes? *Mister X* would die in a few minutes without air to breathe. So, is the air part of him? *Mister X* loses a lot of water every day. To compensate this, he drinks some bottles of bear every day. But is this the same, he lost? *Mister X* has gotten old. He once published work on the universe, but now he is showing the first signs of dementia. He stands up in a hurry, but than immediately stands still, since he has forgotten, where he wanted to go to. Some say, there is an essence, that makes up the self of *Mister X*. Some say, this essence will even survive, when *Mister X* dies. They do not precise, what this essence might be. In the picture above, there is no such essence, but only construction of objects from an innumerable set of views. Objects that change every Planck time unit, our universe progresses. Objects that do not really exist. At our end, it is hard to deny, that «our self» vanishes. As the Buddhists say (adapted to the universe): *Void is form, and form is void*.

The picture on the right illustrates the enormous dimensions of our universe:



Objects of small scale

History of defining smallest objects from ancient Greek Democritus to actual field theories on elementary particles is well known. Today's standard model on elementary particles defines the smallest objects (known) by defining them as classes of fields with respect to certain symmetries. The definitions are purely mathematical and highly abstract. Whereas the ancient Greeks created their ideas of atomic particles by mere thinking, nowadays physicists do highly sophisticated experiments to proof their ideas of special elementary particles. But the precision is limited. The quotient of the Compton-radius of an electron and the Planck length is of order $>10^{22}$. Some physicist noted, that in order to measure on Planck scale one would need a particle accelerator with the size of our galaxy. To me it was amusing to imagine a physicist, starting a measurement cycle, that would yield results millions of years in the future. To shorten it: we are far away from being able to verify, that the objects we defined in field theories are really such well defined.

I will argue, that whatever object we are going to define, it will be defined only up to an *uncertainty*. In my document *on black holes and hidden dimensions* I will show, that for elementary particles Heisenberg's uncertainty principle can be defined as uncertainty inherent to the mere definition of such objects. In this document I also will argue, that the *masses of the elementary particles* are nothing else than our view on the extra dimensions, more precise those combinations of spacetime dimensions and extra dimensions involved in the definition of the »root of unity« associated with the elementary particle.