Summary Looking into Universe 2 2NdV.2S_EN.

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In **Looking into Universe**, in four parts, in four stages, the implications of using a model of curved space with constant curvature to represent the space of the Universe as a whole are elaborated. In the first part, the consequences for light propagation and observation in such a space are explained. In the second part, the consequences of expanding such a space are elaborated. In the third part, the consequences of a broader understanding of the space-time modeled in this way are presented, and in the fourth part, the consequences of the closed and open space model are compared.

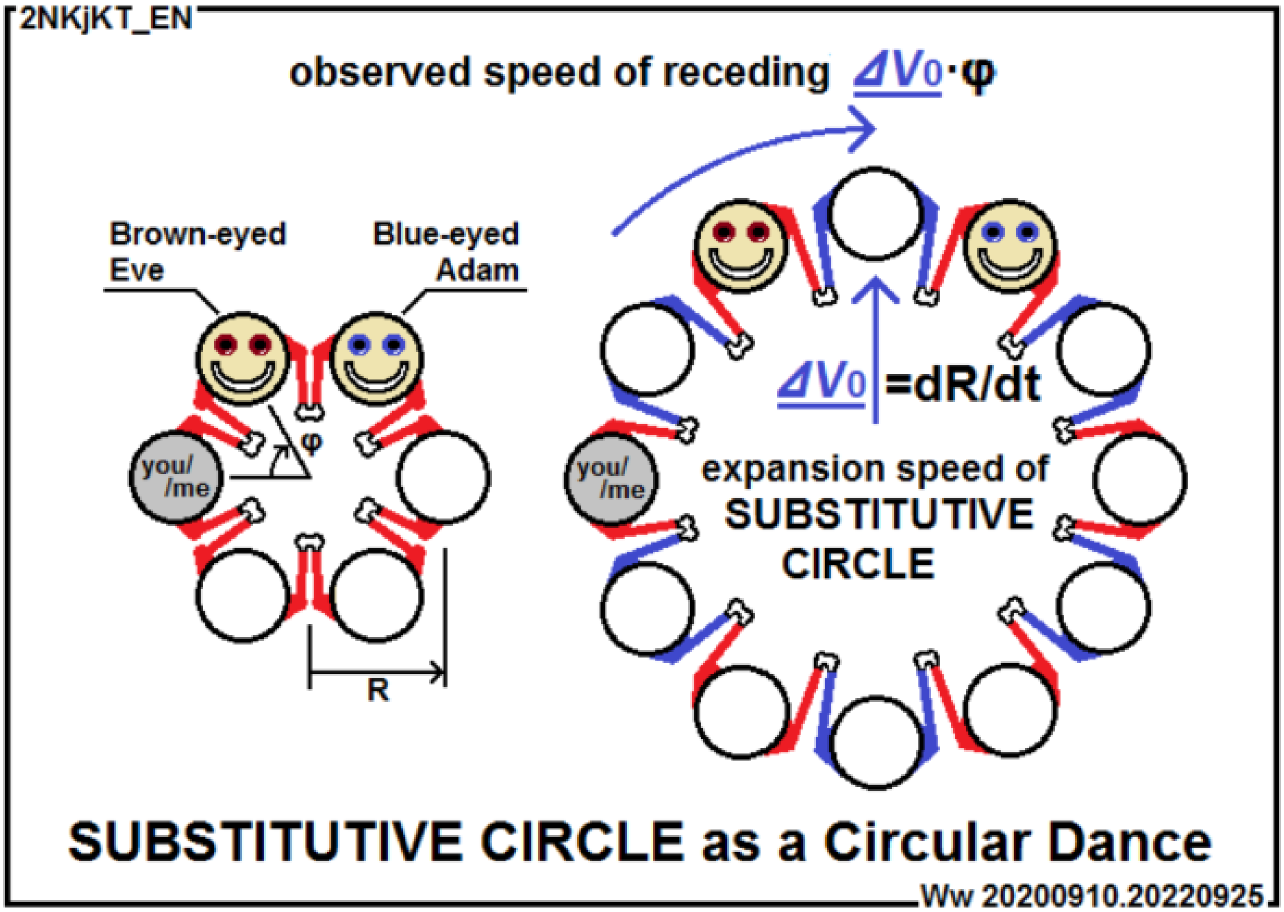
In this second part, we follow up on the consequences presented in the first part, which warn us that **in a closed space with constant curvature, simultaneous multiple observations of the same objects from different sides cannot be avoided**. The light spreads in it in a straight direction, which we replace with **SUBSTITUTIVE CIRCLES** when looking from the outside.

The coordinate in the directions of observation along the arc can be expressed as $\mathbf{z=R\cdot\varphi}$, where **R** is the radius of curvature and the angle $\boldsymbol{\varphi}$ is measured in the arc measure with the origin at the point of observation. Then, for fixed points ($\boldsymbol{\varphi}$ constant) on a circle that changes its radius **R** over time, we can express the temporal change of the observed distance as $\mathbf{dz/dt= dR/dt\cdot\varphi}$, and by marking **dR/dt** with the symbol $\underline{\Delta V_0}$, as $\underline{\Delta V}=\underline{\Delta V_0}\cdot\boldsymbol{\varphi}$. So the **increasing rate of receding of observed objects** with distance $\boldsymbol{\varphi}$ ($\mathbf{dz/dt}=\underline{\Delta V}$ as a function of $\boldsymbol{\varphi}$) for expanding circles ($\mathbf{dR/dt}=\underline{\Delta V_0}>0$) **is an inherent property of the model.**

This is an effect that must be equally observed from all points of space, as we consider such observations to be valued equally. Therefore, even the expansion of space, which I call **ECSTASY** here ($\mathbf{dR/dt}= \underline{\Delta V_0} >0$), must be the same in all points of space, because there is no **EXCEPTIONAL** place in it where anything could happen differently.

Let´s imagine such a process of uniform expansion of space and thus the expansion of the

SUBSTITUTIVE CIRCLES that represent our observations in it, for example, as suggested by the figure **SUBSTITUTIVE CIRCLE as a Circular Dance [2NKjKT_EN]**:

- 

In the left part, we see schematically as if you, or I, were dancing in a circle next to brown-eyed Eve and blue-eyed Adam, all in a red suit. The radius of the circle **R** is indicated here, as well as how the angle **φ** is measured by us.

On the right part, other blue-clad dancers join the dance spatially evenly. It is easy to see from the sketch that Adam will move away from us faster than Eve (and we will also move away from Adam faster than Eve). Or to put it another way: The more distant dancers will automatically move away from us faster than the closer ones, despite the fact that their position angle **φ** on the circle does not change. The increase in the radius of the circle is indicated, i.e. the expansion of the SUBSTITUTIVE CIRCLE. For the expansion speed **dR/dt =**$\underline{\Delta V_0}$, the observed receding speed along the arc is $\underline{\Delta V} = \underline{\Delta V_0} \cdot \varphi$.

Since the **φ** of our observation can grow indefinitely, then for a sufficiently large **φ** the observed velocity of retreat will reach the limiting value of the speed of light propagation **c**, i.e. ΔV **=c**. This is an inherent effect of the model I call the **LIGHT BARRIER** of the Universe (**SB_V**). The closest equivalent established terms in physics are the **cosmological horizon** or the **Horizon of the Universe** (**H_V**), or the **limit of the observable Universe** from the observer's point of view.

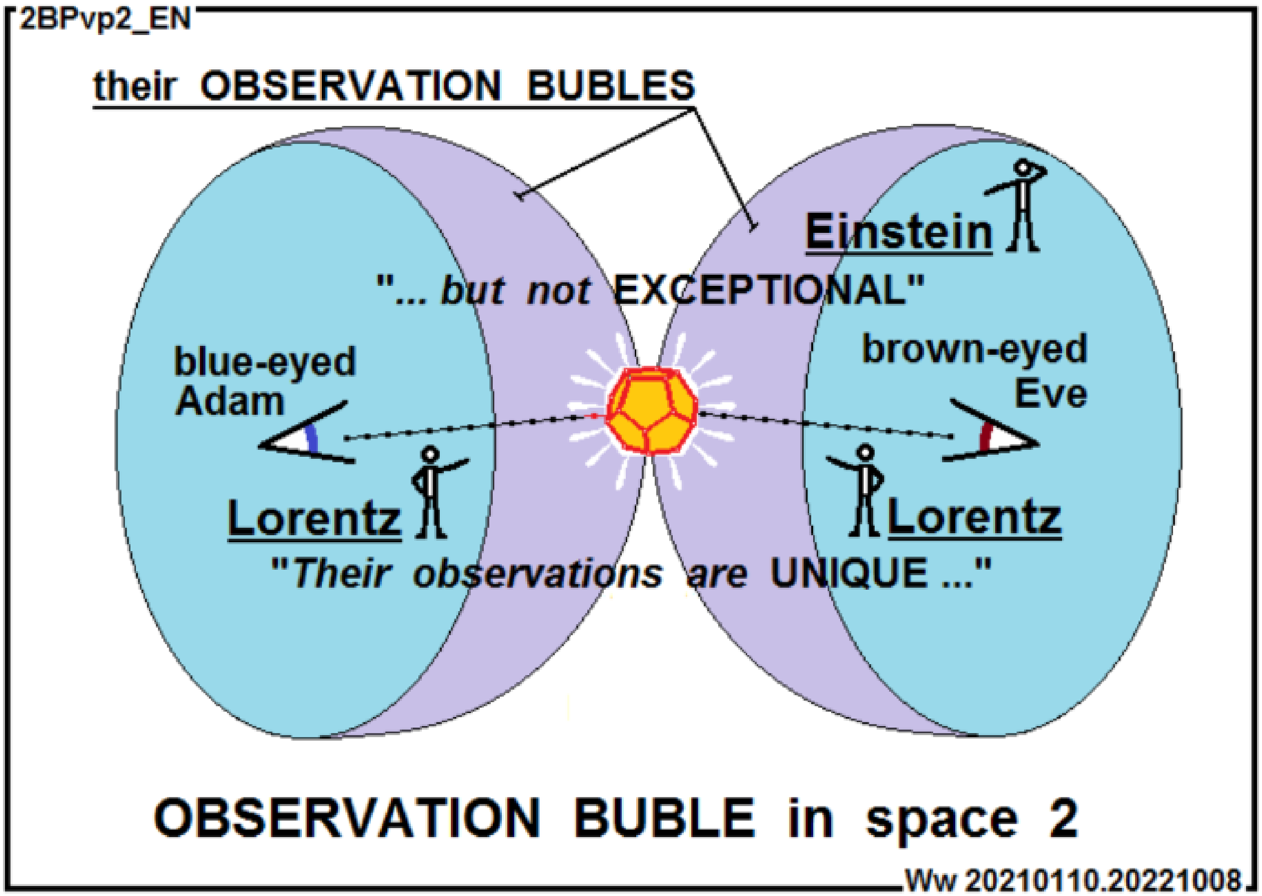
Because light travels to us at speed **c**, this distance corresponds to a certain interval of the passage of time at our point of observation, which we will call the **AGE of UNIVERSE** (**V_V**). So then **HV≡ SBV= $c \cdot V_V$**. For the expansion of

the Universe by ECSTASY at a speed of ΔV_0, we can then call the **Observable SIZE of UNIVERSE RP_V** as the distance to which the space was carried away by ECSTASY from us in all directions during the **AGE of UNIVERSE V_V**. This gives us $RP_V = \Delta V_0 \cdot V_V$.

However, since the most distant object observed along a circular arc can never lie further than on the opposite side of the circle, i.e. at a distance of **$\varphi = \pi$** from the observer, then the corresponding **SIZE of UNIVERSE** comes out as $Rv = R \cdot \pi$.

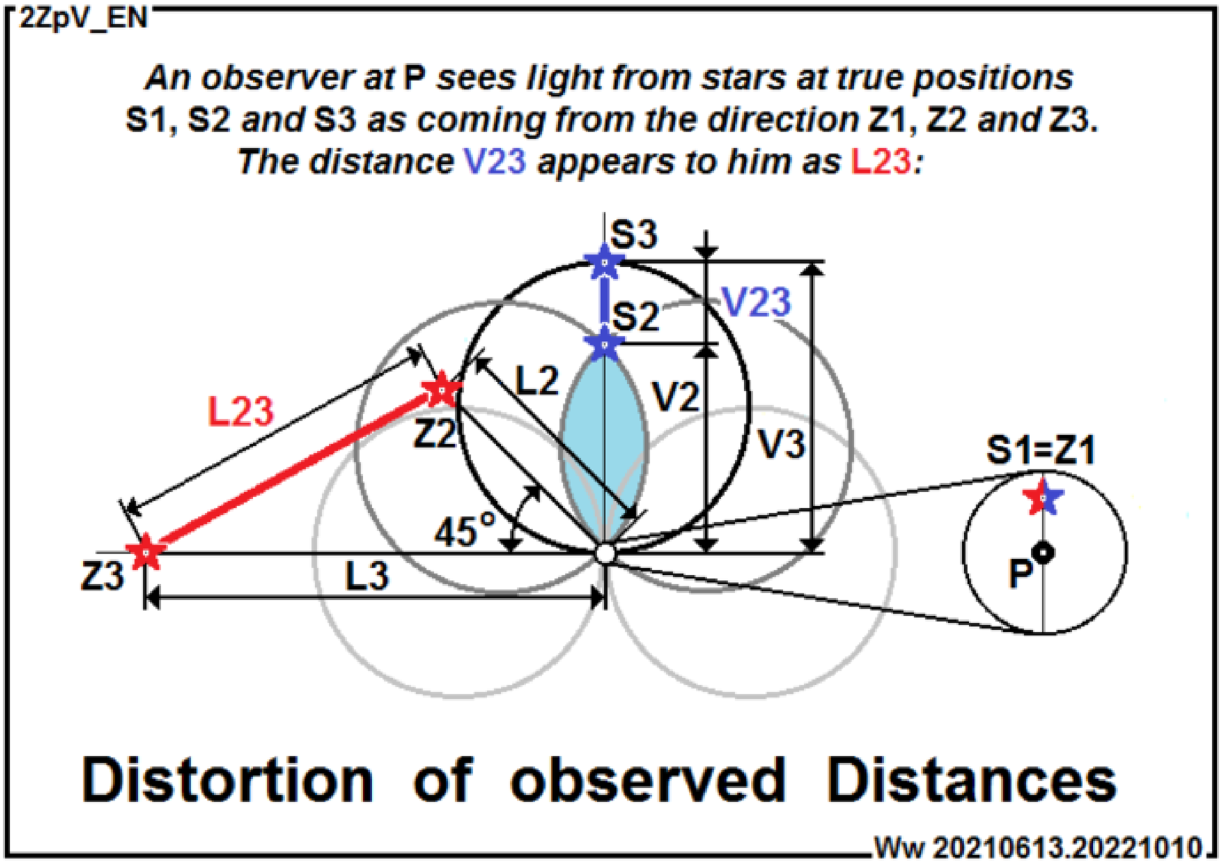
Another consequence of observation in such a model concerns the so-called **Twin Paradox** in physics, which corresponds to two opposing views on observation in the space of the Universe. One that **Albert Einstein** created for us, and which rules out the existence of any **EXCEPTIONAL** **frame of reference** in the Universe. All reference systems to which we formulate physical laws must be equal to each other, none must be EXCEPTIONAL. And the second one, which **Hendrik Lorentz** made for us, and in which it is required that there should be at least one **UNIQUE** reference system for observers in the Universe to which our IDEA of relativity could be related.

The considered model separates the local system, in which each of us subjectively looks into the Universe, from the system of the entire objective curved space with constant curvature.

- 

The picture OBSERVATION BUBBLE in space 2 [2BPvp2_EN] shows, as an example, how brown-eyed Eve and blue-eyed Adam observe one and the same object, perhaps a jewel, at the common point of their **OBSERVATION BUBBLE**, onto which they seem to project all observations. For both observers the observation is UNIQUE according to Lorenz, but at the same time neither of them is EXCEPTIONAL according to Einstein. Our model does not create any Twin Paradox for us

Another consequence that the model draws our attention to is that **we observe distances between objects in the distant Universe greater** than they are in space. This distortion of our observation is the reason why there seems to be a lack of gravity in the distant Universe, as if there is a **GRAVITY DEFICIT**. This is made visible, for example, by the figure **Distortion of Observed Distances [2ZpV_EN]**, which combines all 3 sketches from the figure STARS and LIGHT PROPAGATION G [2phG_EN] from the first part of this file into one:



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But we will simplify the situation by considering the drawn stars “**S1**“, “**S2**” and “**S3**” as if they existed at the same time. Therefore, we stop the flow of time for a while, so we freeze their positions in space-time. Although, for example, the light from **S2** flew to us observers at point “**P**” along an arc at a distance of **L2=R·π/2** and from **S3** at a distance twice **L3=R·π** (**R** is the radius of curvature of space), and thus we are actually observing the star **S3** in a double past than the **S2** star, we will consider their positions unchanging in space by freezing the passage of time.

From the observer at point **P**, star **S2** is distant **V2=R·√2** and star **S3 V3=2·R**, resulting in their actual mutual distance marked in blue **V23=(2-√2)•R ≈0,5858·R**. But we, as observers in **P**, observe the star **S2** in its apparent position **Z2** from us at a distance **L2=R·π/2** in a direction **45°** deviated from the **P-S2** connecting line. And we observe the star **S3** in its apparent position **Z3** from us at a distance **L3=R·π** in a direction **90°** deviated from the same connecting line. Their mutual angle in our observation will therefore be **45°**.

According to the cosine theorem, the square of their mutual distance observed by us is $\mathbf{L23^2=L2^2+L3^2-2\cdot L2\cdot L3\cdot cos45°=R^2\cdot\pi^2\cdot(5/4-1/\sqrt{2})\approx 5,35814\cdot R^2}$, and their observed distance $\mathbf{L23\approx 2,3148\cdot R}$ versus the actual distance $\mathbf{V23\approx 0,5858\cdot R}$, so $\mathbf{L23/V23\approx 3,95}$. The distorted **L23** distance is almost four times larger (!) than the true **V23** distance, and thus the corresponding mutual gravitational effect would be almost sixteen times weaker (!!) for this situation.

Similarly, if we consider that the star **S1** is close to us ($\mathbf{L1\approx V1\approx 0}$) and thus the influence of the curvature of space on its observation is still negligible, we calculate the observed distortion and the actual distance between **S1** and **S2** as $\mathbf{L12\equiv L2= R\cdot\pi/2\approx 1,5708\cdot R}$ and $\mathbf{V12\equiv V2= R\cdot\sqrt{2}\approx 1,4142\cdot R}$, so $\mathbf{L12/V12\approx 1,11}$. Due to the distortion, the observed distance also increased, but only slightly by approximately 11% compared to the actual distance.

Although we consider the special case of observing objects from us in a straight line behind one another, and by freezing the passage of time we limit the validity to their mutual distances significantly smaller than the radius of curvature of space, and the speed of their changes in position in space significantly smaller than the speed of light, we have shown how

the model predicts an amplifying effect of increasing the mutual distances of observed objects with their increasing distance from us.

If we consider such large distortions of mutual distances between distant objects observed in the Universe, as the described model predicts, we cannot avoid considering a large GRAVITY DEFICIT between them.

This could point to a hitherto misinterpreted curvature effect, which may have required so-called **dark matter** to be introduced to compensate for the missing gravity. That is, some invisible mass whose inertial effects we do not observe, only its gravitational effects. Its amount is estimated in the quote https://en.wikipedia.org/wiki/Dark_matter: "**Dark matter** is a form of matter thought to account for approximately 85% of the matter in the universe". That is such a large amount that only 15% (!!!) of observable "light matter" would be left in the Universe.

In conclusion, the second challenge is presented: to determine the consequence of the distortion of the mutual distances that the model predicts, in specific situations, and thus also to determine the size of the GRAVITY DEFICIT. It would be verified to what extent the observed lack of gravity is due to the predicted distortion of the observed mutual distances.