Why none of the record breaking galaxies observed by JWST are ovals? The simple geometrical optics consideration points toward much higher distance to them (in this case the resolution of telescope is not enough). Tired light theory easily explains this discrepancy while Big Bang is failing.

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Abstract.

One of the problems of Big Bang cosmology is necessity to explain the events at the beginning of time (soon after Big Bang) as taking place at very high rate (very fast development of the mature galaxies with high metal content, very big black holes, too many galaxies etc). This is because the Plank's temperature of cooled light (measured at ~2.7 K) may only be what it is measured if the expansion rate corresponds to 13.6 billions of years for total age. Since James Webb already reached z=14 (corresponding to 13.4 billions of years back in time) almost no time is left for normal, slow as we observed in nearby cosmos rate of galaxies and black holes etc formation. Big Bang theory can not "move" this time threshold further in time (accepting this would be suicide for Big Bang because it means the light itself may somehow be thermalized and red shifted according to tired light theory). Thus Big Bang theorists are inventing numerous "epicycles" like primordial black holes, black dark matter, even unification of Big Bang and tired light [1] - all in attempts to either accelerate the processes in the very beginning or move age of Universe further (say up to 27 billions of years [1]) to allow slow and well known growth of galaxies. The contradiction easily observed in James Webb Space Telescope images is discussed here - and it also because of the presence of this ~13 billions of years time boundary condition – in Big Bang cosmology the geometrical distance (what determines the optical resolution) to the galaxies with Z=8 and Z=14 is around 13 billions of light years with very high accuracy (13.1 billions of light years to z=8 objects and 13.4 billions of light years for Z=14 objects). From astronomy point of view the angular resolution of such objects is the same – yet at Z=8 galaxies are mainly ovals (as expected for poorly resolved objects) while at z=12-14 they are unresolved circles (which is not possible in either developed galaxies or so called primordial fast merging galaxies – in both cases ovals would be observed for poorly resolved galaxies). Such simple images like dots or circles hints onto the much further distance to the observed record breaking galaxies, where even JWST angular resolution is not enough to resolve at least something.

Main part.

The marvel of modern astrophysics, James Webb Space Telescope is making discovery after discovery and many of them puzzles the astrophysicists. Too many galaxies too early (according to Big Bang time line), little red dots with impossible velocities of gas near supermassive black hole (and such a black hole itself is too early for the young Universe etc.). While JWST already made several discoveries of galaxies at Z=13 and even 14, they all looks a little strange - all looks like circles, not even one has a classical oval shape (both spiral and elliptical galaxies at low resolution must be ovals). There is very low probability that all record-breaking galaxies are spirals observed at almost perpendicular to plane angle (that would make it looking perfect circle.

The explanation seems obvious - resolution of telescope is limited and by no means may JWST see details below its diffraction limit - approximately 3*10exp(-7) radian for wavelength of 2 um [2]. However, there is a problem here. Since according to Big Bang theory at high Z the difference at the observed distance with Z will be smaller and smaller, those galaxies are virtually all at the same distance of around 13 billions of light years. Even galaxy with Z=7 is actually 12.9 billions of light years away from us [3] - no real difference from the point of view of resolution of telescope. This is demonstrated on picture below:

Big Bang geometric optics consideration (no Tolman effect for simplicity)

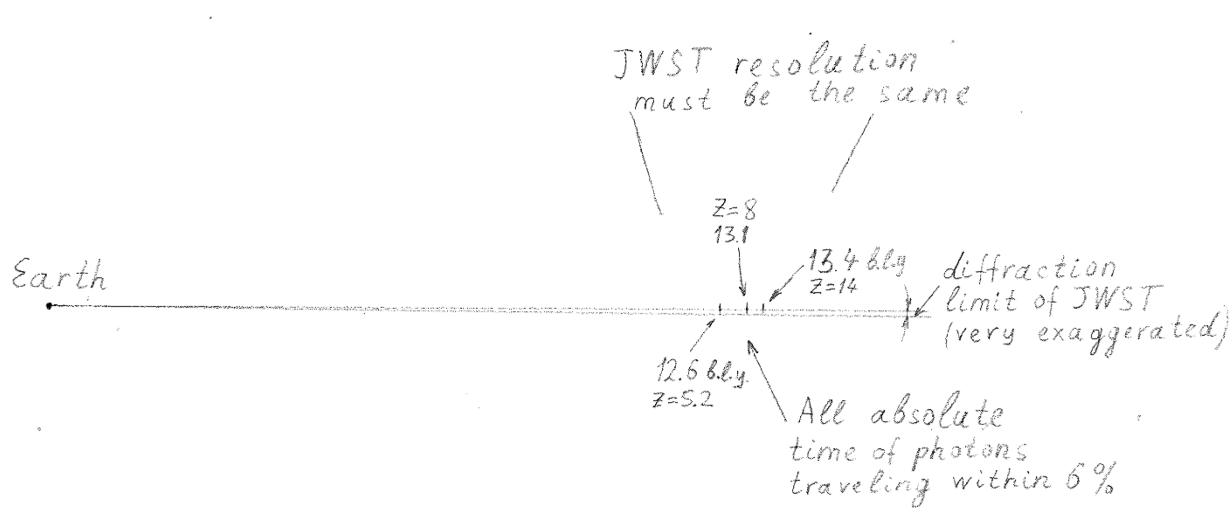


Fig.1 From pure geometric optics point of view the distance between galaxies at z=5-14 is almost the same ~ 13 billion of light years, b.l.y. (in Big Bang cosmology the distance is determined by light time travel)

The most common shape of formed galaxy (if it is not really resolved) in the nearby Universe is oval (the circle is possible only if the axis of spiral galaxy is directed toward the

Earth or for elliptical galaxy the long axis is directed toward the Earth). So the same shapes are expected for far galaxies if the resolution of the telescope is enough (angular resolution is larger than the minor axis of the oval at least 2-3 times). Indeed there are numerous examples of such galaxies:

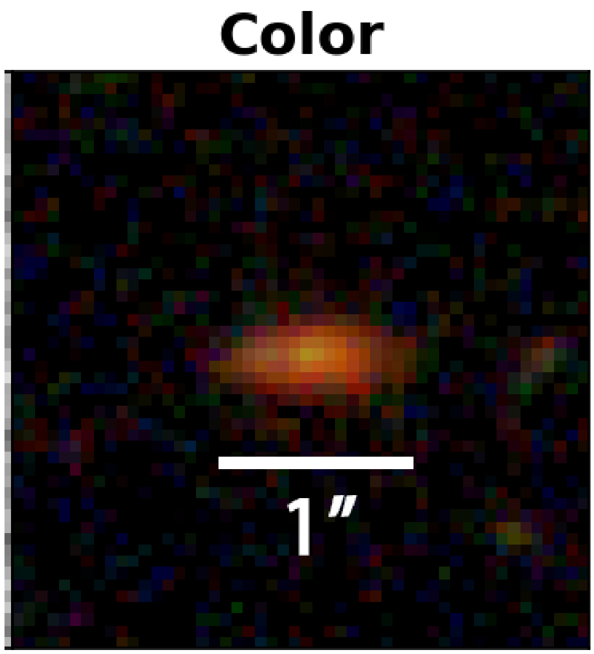


Fig.2 Good resolution example of edge-on galaxy at Z=5.289 (see the previous figure, 12.6 billions of light years light time traveling) from [4].

For Z=8 there is a publication about 6 such galaxies and 5 of them are ovals [5]:

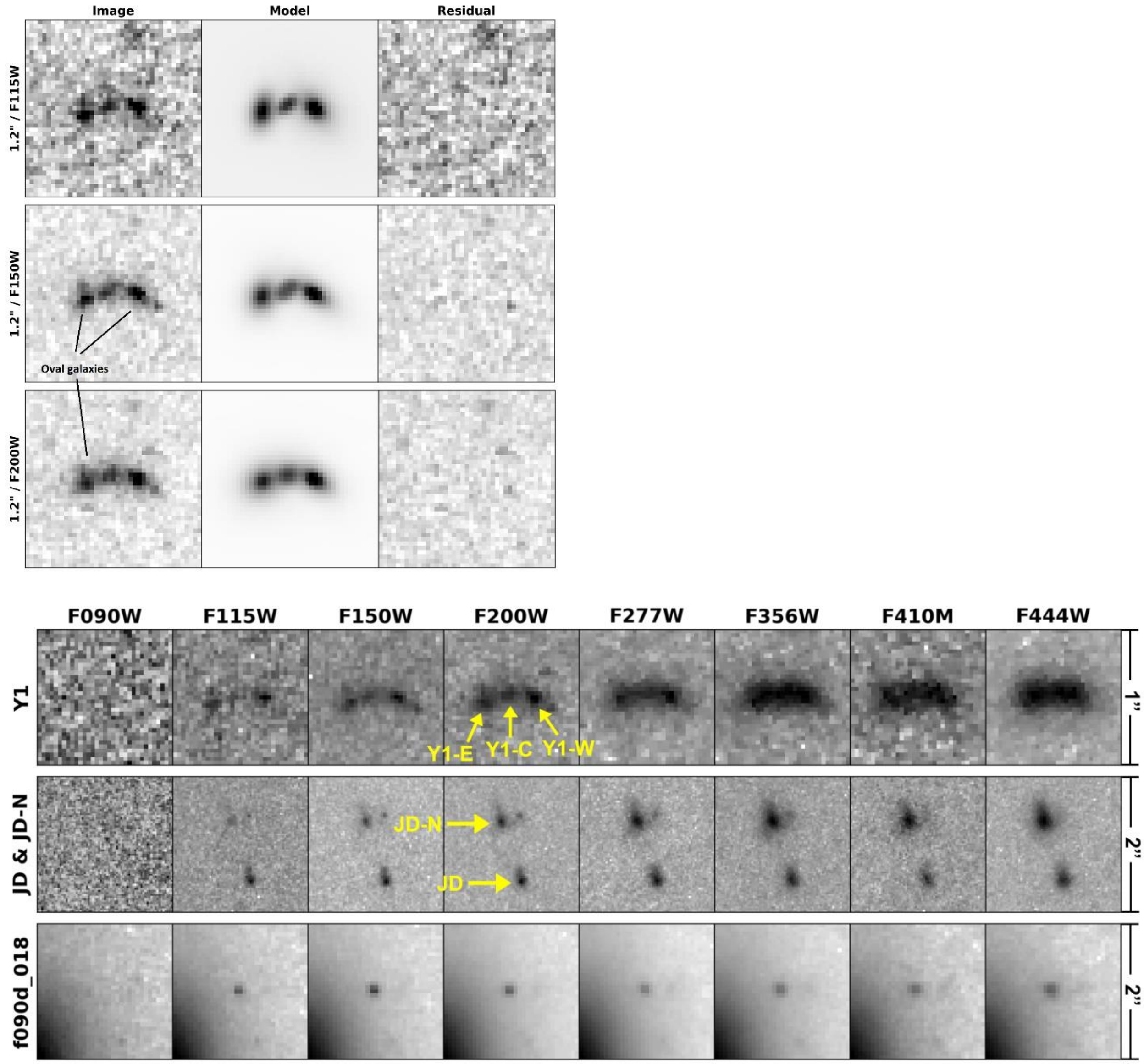
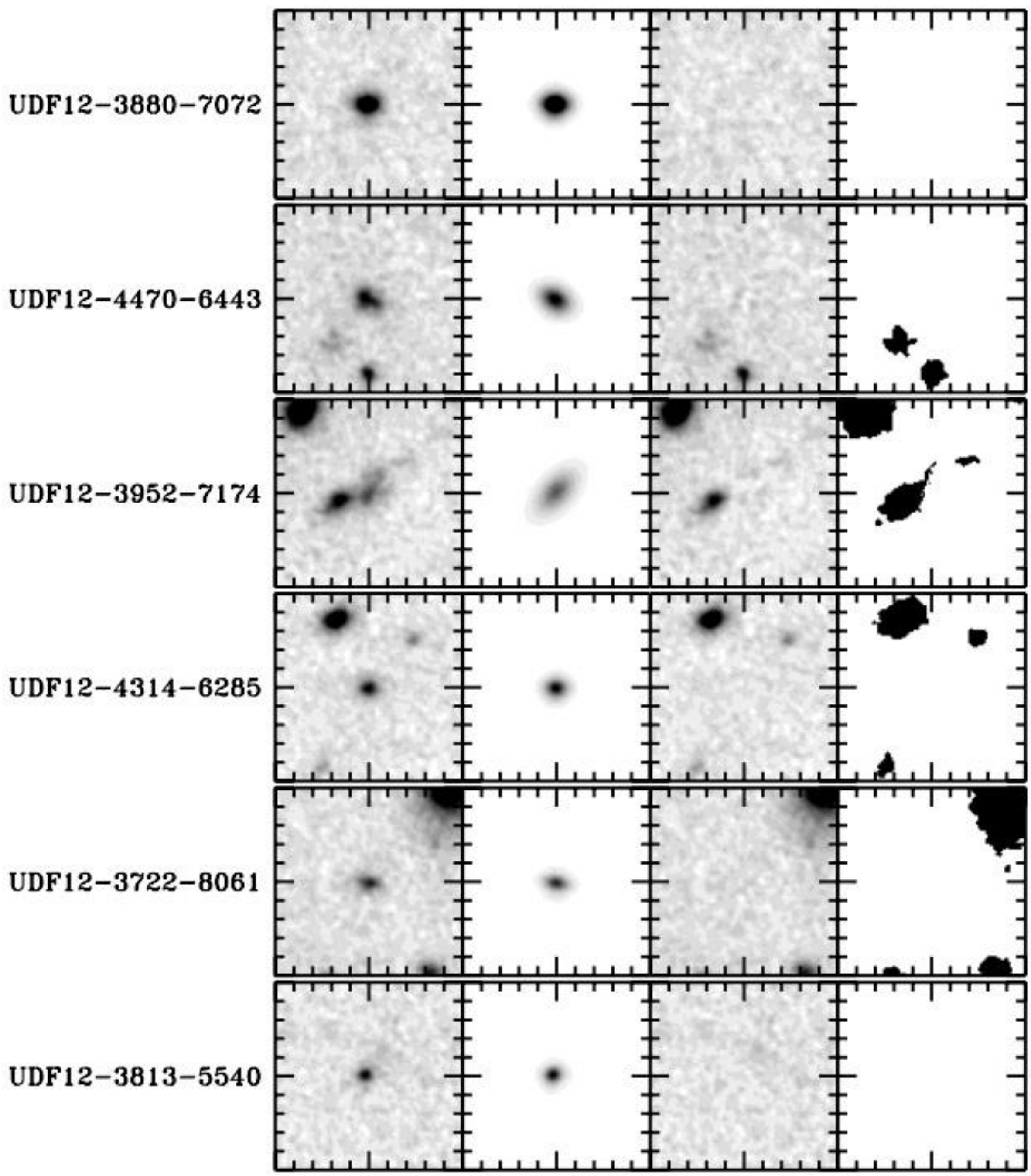


Fig.3 Upper image (from [5]) – three galaxies are placed together (Y1 group on lower image) and at better magnification they look like ovals (most probably shape for galaxy as observed from Earth). Lower image – galaxies JD-N and JD are clear ovals and only one galaxy f090d_018 is clearly circle (which is possible because there is some probability to see the galaxy along the axis of rotation for spiral galaxy and along main axis for elliptical one).

In order to evaluate the change of resolution from telescope to telescope, it is necessary first to see the galaxies at relatively high Z recorded by the predecessor of JWST - Hubble space telescope. Of course due to smaller mirror and absence of mid-IR capabilities it can not see galaxies at Z=13 and up (with some exceptions) but since galaxies with z=7-9 are almost at the same observational distance (~13 billions of light years if Big Bang is accepted) the comparison may be fair. The picture below is taken from [6] and the galaxies on photo are all with verified Z~8, and galaxies number 1,2,3,5 are looking like ovals. Some ovals are not elongated like in Fig.2 but it is clearly the shape which is expected to be.

Fig.4 (below) Hubble space telescope made photos of the galaxies at z=8 which have different shapes including some ovals. Image taken from [6]



James Webb Space Telescope has larger mirror and thus must have better resolution (approximately 3 times better). It is clearly observed in the nearby Universe (say for Z~1). See the enormous improvement in resolution (Hubble made photos for upper row and JWST is for lower row) for galaxy cluster at Z~0.4 [7]:

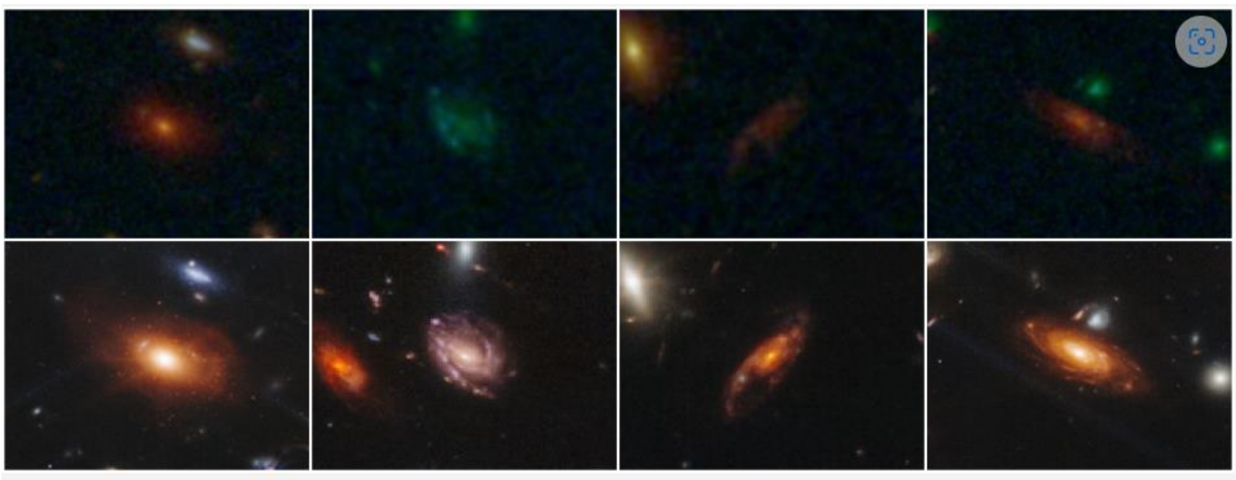
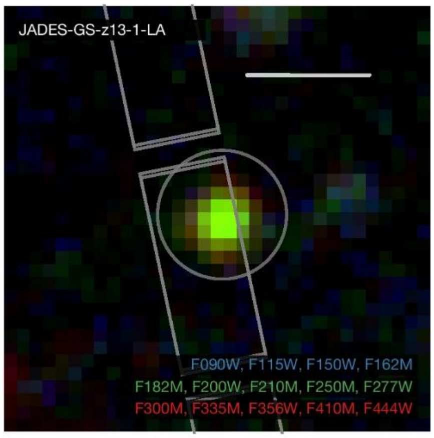


Fig.5 Galaxy cluster at Z~0.4 comparison Hubble (upper row) versus JWST telescope.

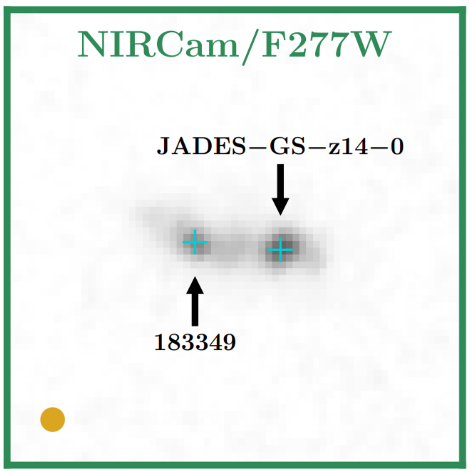
What would be the shape of the galaxies in the primordial Universe according to Big Bang? Theoreticians answer this question with mentioning of numerous galaxies merging and being disturbed by high rate stars formation. This is discussed in [8] : "Galaxies used to be considered as "island universes" that formed in the distant past and have since evolved in isolation from their surroundings. Such concept was replaced by the hierarchical growth scenario, which enrolls galaxy interactions, collisions and mergers to shape the mature galaxies in the current epoch."

For this scenario the merging galaxies at poor resolution would have the oval, angle, T-shape or something even more strange, by no means simple circles. Once JWST is offering at least the same resolution to already formed and primordial galaxies, the conclusion is – we must see predominantly ovals because anything merging at poor resolution must have features protruding away from diffraction limited circle

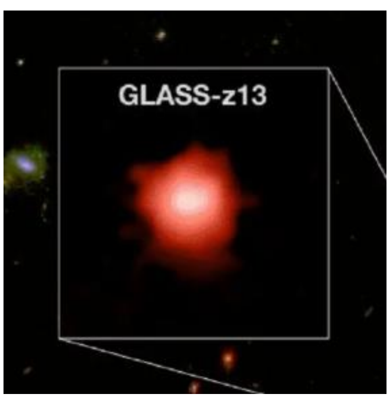
James Webb Space Telescope has larger mirror and thus must have better resolution (approximately 3 times better). It is clearly observed in the nearby Universe (say for Z~1). But since the galaxies at Z=12,13, 14 and up are almost at the same distance as galaxies at Z=8, JWST must deliver much better resolution of those galaxies (2-3 times better depending upon the wavelength of the filter) and must see normal galaxies shapes (not dull circles all over again). Yet the discovery after discovery delivers the galaxies which looks like plain circle or irregular circle. The examples are: galaxy at Z=13 [9]



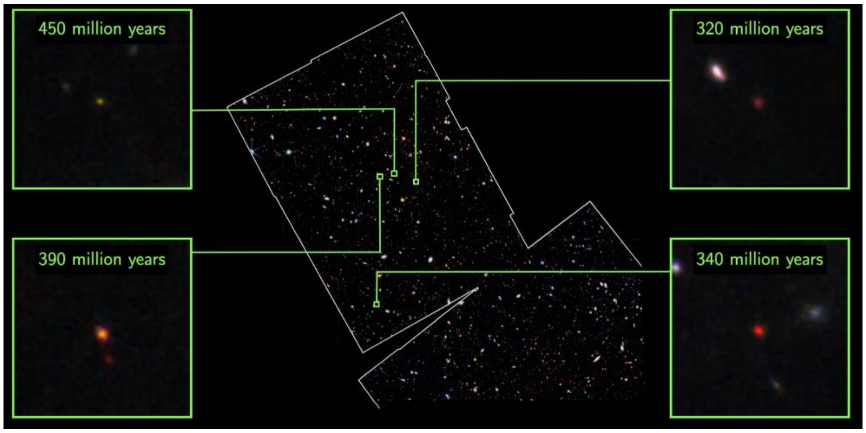
Galaxy at Z=14 [10] to the right looks more like circle while the next to it galaxy 183349 (z=3.4) looks more like oval (as it should be for most probable angle of view)



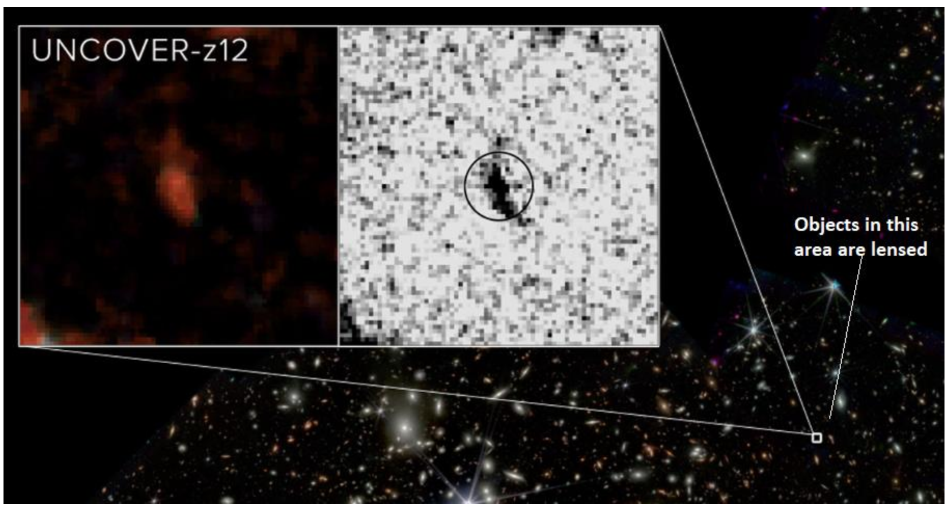
Another galaxy at Z=13 [11]: very nice circle no resolution.



Another example of 4 galaxies all at the distance of ~13 billions of light years and all looking like circles [12]:



Sometimes galaxy with high Z has the elongated shape but it is situated in the field of strong lensing (so obviously distorted by lensing) [13]:



No improvement in resolution may be seen in resolution, despite from Big Bang idea they all are at approximately the same distance (around 13 billions of light years) as well as galaxies with Z~8 which are observed more or less normal already by Hubble telescope.

Even assuming for high Z Hubble space telescope made pictures at central frequency around 1.6 um versus 2 um for James Webb Space Telescope (resolution is 1.25 worse for wavelength of 2 um compare to 1.6 um) the improvement in resolution still should be at least (6.5/2.4)*(1.6/2.0)=2.167 times (provided the Big Bang is correct, no light scattering is allowed and galaxies are at approximately the same distance of ~13 billions of light years). But obviously JWST only provides enormous improvement only at relatively low Z, not at high Z. (see Fig.5)

On the contrary, if the tired light hypothesis is accepted [10] situation changes dramatically. Now the distances for Z~14 would be much larger (Z~1 corresponds to ~10 billions of light years, Z=3 corresponds to ~20 billions of light years, Z=7 corresponds to ~30 billions of light years and Z=15 corresponds to ~40 billions of light years), so it is obvious that galaxies at high Z may be resolved poorer and it would need many hundreds of hours of accumulation to get the spectra. Even more, the inevitable light scattering [14] will make the far galaxies blurred to the extent they may be only seen as a circle (and this circle is only having information about the light scattering properties, not initial galaxy oval view) [2,14]

It seems that even visual appearance of galaxies at high Z hints toward the paradigm shift from Big Bang cosmology to tired light cosmology. Both standard objects like supernovae at high Z (already visible at Z=3.6 and JWST is continuing the search) and non-standard objects like galaxies hints toward this decision. Another reason for the galaxies at Z=12-14 being not primordial -the spectra from those high Z galaxies show a good content of oxygen, which means that stars already experienced many supernova events. Once the stars are already experienced so many perturbations, the galaxy itself must be already relatively developed (even Big Bang supporters admit this, they merely inventing the ways the galaxy is developing so fast, like primordial black holes or black dark matter). In this case the galaxy shape is also expected to be one of the few standard ones – and this is not circle again.

Conclusion.

Sometimes the simple application of the geometric optics laws points onto the great inconsistency in the theory. From Big Bang point of view the galaxies with Z from 5 till 14 are actually placed on the thin shell at the distance of ~13 billion of light years (the thickness is only 0.8 billions of light years, <<13 billions of light years distance). The resolution of the telescope must be the same for all of them, yet galaxies at higher Z of 12-14 are all dull circles without any features – impossible from all considerations. Not even mentioning Tolman effect which will make the resolution of those galaxies much better [15]. This huge contradiction to the Big Bang cosmology is easily corrected by tired light cosmology – the real distance between galaxies at Z=14 and Z=5 is enormous, galaxies at Z=12-14 are so far away that even James Webb Space Telescope can not resolve them – they are imaged as dull circles indeed.

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