The blackhole that grew too fast and why Vega has no planets?

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Abstract

The James Webb telescope continues to produce surprises. One of the latest findings is a black-hole like object, which seems to gobble the matter from the environment 40 times faster than it should. Second finding of JWST is that Vega, which is rather near to the Sun, has around it a halo of matter but does not seem to have any planets.

The first finding has an explanation in terms of the TGD based view of the time-reversals of blackhole-like objects identified as volume filling flux tube spaghettis. The time reversals are whitehole-like objects. The second finding can be understood in terms of the TGD inspired model for the formation of planets as explosions of the outer shells of the star consisting of M_{89} nucleons, which are scaled variants of ordinary hadrons with mass scale 512 higher than the mass scale of the ordinary nucleons. These explosions require quantum criticality and the criticality condition would not be satisfied for the Vega.

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1 Introduction

Marko Manninen asked for the TGD view concerning the recently found black-hole like object (BH), which seems to gobble the matter from the environment much faster than it should. The findings described in the popular article with title "'Fastest-feeding' black hole of the early universe found. But does it break the laws of physics?" (see this). The article [E1] about the discovery is published in Nature (see this).

This BH, cataloged as LID-568, found by the James Webb telescope, identified as dwarf blackhole, existed 1.5 billion years after the Big Bang. It should have gotten its mass of more than 7 million solar masses in 12 million years. The rate for its formation would have been 40 times too high.

General Relativity poses an upper limit for the rate with which a blackhole can consume matter, known as the Eddington limit (see this). The limit describes the balance between the rate of the infalling matter and the rate of the radiation produced by the infall that then pushes back on the accreting matter. At the limit the feedback shuts down the accretion.

Objects thought to be black holes often differ in many respects from the black holes of general relativity. In particular, the giant BHs of the very early universe and BHs associated with quasars and the cores of galaxies do so. Star-born BHs could be ordinary blackholes but the giant BHs might be something different. Also the dwarf backhole found by JWST might be different. The basic mystery is why the giant BHs can be so large in the very early Universe if they are formed in the expected way. Do the BHs always grow by gobbling up matter from the environment? Recently I learned of two astrophysical anomalies. The first anomaly was blackhole which grew 40 times too fast.

The popular article with title "'Ridiculously smooth': James Webb telescope spies unusual pancake-like disk around nearby star Vega and scientists can't explain it" (see this) informs that James Webb telescope has found that star Vega probably has no planets.

JWST images reveal that Vega is surrounded by a surprisingly smooth, 100 billion-mile-wide (161 billion kilometers) disk of cosmic dust similar to the similar disk believed to have surrounded Sun for 4.5 billion years ago, confirming that it is probably not surrounded by any exoplanets. The standard model for the formation of planets and Sun from this kind of disc however predicts that Vega should have planets. This might mean a death blow for the standard narrative of the formation of planets.

2 TGD view of the blackhole that grew too fast

TGD leads to a view of BHs different from the GR view in many respects see for instance [K1, K2, K5] and more recent articles [L2, L3, L4, L7].

1. In TGD, BHs are not singularities containing their mass at a single point but correspond to portions of long cosmic strings (extremely thin string-like 3-surfaces), which have formed a tangle and thickened so that they fill the entire volume. The formation of this tangle could involve collision of two long cosmic strings. This could be the case for the spiral galaxies. BH property would mean that they are maximally dense.

2. The thickening of the cosmic string liberates part of the energy of the cosmic string and BHs would transform in an explosive way into ordinary matter, which is feeded into the environment. The accretion disk would not be associated with the inflowing matter, but would be formed by the outflowing matter as it slows down in the gravitational field and forms a kind of traffic jam. Radiation could however escape, especially if behaves like dark matter in the TGD sense meaning that it has non-standard value Planck constant h_{eff}, the hierarchy of which is predicted by the number theoretic view of TGD and plays a key role in the understanding of living matter. The situation would be in many respects similar to the standard picture where the outgoing radiation would be produced by the infalling matter. At the QFT limit of TGD, replacing many-sheeted space-time with a region of Minkowski space made slightly curved, the metric in the exterior region would be in a good approximation Schwartschild metric.

3. This kind of object would be more like a white hole-like object (WH). Zero-energy ontology indeed predicts objects resembling ordinary blackholes as the time reversals of WHs. Matter would really fall into them. One can make quite precise predictions about the mass spectrum of these objects [L7].

This vision leads to a model for the formation of galaxies and generation of ordinary matter from the dark energy assignable to the cosmic strings, which would dominate in the very early Universe [L4, L7].

1. The collisions of the cosmic strings during the primordial string dominated cosmology are unavoidable for topological reasons and would lead to their thickening and heating inducing the formation of WHs and their explosive decay to ordinary matter. This would generate a radiation dominated phase, perhaps when the temperature approaches the Hagedorn temperature as a maximal temperature for string-like objects. These WHs would be the TGD

equivalent for the vacuum energy of inflaton fields of inflation theory to decay to the ordinary matter.

2. The energy of cosmic strings would have Kähler magnetic and volume parts and have interpretation as dark energy. There is now rather convincing evidence for a connection between dark energy and the giant blackholes (see this).

3. The galactic dark matter would be dark energy of a cosmic string transversal to the galactic plane and containing galaxies along it: this has been known for decades [E2]! There would be no dark matter halo nor exotic dark matter particles. This predicts without further assumptions the flat velocity spectrum of the distant stars rotating around galaxies associated with very long cosmic strings and also solves the many problems of the halo models and MOND [**?**]. The gravitational force transforms from $1/r^2$ force created by the visible galactic matter to $1/\rho$ force created by the cosmic string at a critical radius. Under additional assumption this corresponds to a critical acceleration as in MOND [L5].

4. TGD also predicts dark matter-like macroscopically quantum coherent phases of ordinary matter for which the effective Planck constant h_{eff} is large. In particular, the gravitational *resp.* electric Planck constants associated with long range classical gravitational *resp.* electric fields can be very large. The generation of these phases at gravitational magnetic bodies, for example in biology, solves the problem of missing baryonic matter, that is why baryonic (and also leptonic) matter gradually disappears during the cosmic evolution. There is evidence for this process also in particle physics [L1].

Let's return to the question whether TGD can explain why the BHs in question grow so fast. They would not do so by gobbling the matter from the environment but receive it from the long cosmic string. The energy of the thickening string filament is converted into matter and generates a WH. This could happen much faster than the growth of a black hole in the usual way. At this moment it is not possible to estimate the rate of this process but it could also explain how the early Universe can contain these giant blackhole-like objects.

3 Vega doesn't seem to have planets at all: Why?

It is good to start with some basic data of Vega and its role in TGD is in order.

1. Vega is a bluish colored star about twice as massive as the Sun and located at a distance of about 25 light-years from Earth and is therefore rather near to the Sun. By its large mass Vega is predicted to be short-lived. The radius and mass of the Vega are roughly twice those for the Sun so that surface gravity is 1/2 of that for the Sun and average density is 1/4:th of that for the Sun.

   Vega is .5 billion years old, which is roughly 1/10 shorter than the age of the Sun and its planetary system, believed to have condensed simultaneously from a proto disk 4.6 billion years ago. Due to its fast spin, the close proximity to Earth and the fact that its magnetic pole is pointed right at us, Vega appears very bright in the night sky. Vega is the fifth-brightest star visible from Earth to the naked eye in the Northern sky. Vega is in direction differing by 5 degrees from that for Stella Polaris.

2. Quite recently Vega found a place in TGD. The precession of equinoxes is difficult to understand in the standard model and the assumption that monopole flux tubes connecting the Sun to Vega allows us to understand the precession as being induced by the periodic motion of Vega: the period of precession is predicted with 1 per cent accuracy. The precession could also allow the average period between the geomagnetic excursions [L6].

The TGD based model for the formation of planets predicts that planets were formed in mini bigbangs, that is explosions in which the parent star lost a surface layer consisting of closed flux monopole flux tubes flowing along the surface of the Sun in North-South direction. The surface layer hand roughly the mass of the planet to be formed and condensed later to the planet [L2, L3, L4].

The model is developed in more detail in [L7] and differs dramatically from the standard model view of the stellar energy production. Stellar wind and radiation would be produced at the surface layer consisting of nuclei of a scaled up variant of ordinary hadron physics predicted by the padic length scale hypothesis [K3, K4]. I refer to this hadron physics as $M_{89} = 2^{89} - 1$ hadron physics. M_{89} nuclei would have mass scale, which is 512 times that of the nuclei of ordinary hadron physics, which corresponds to $M_{207} = 2^{107} - 1$.

Whether the properties of Vega, for instance the fact that according to the standard theory it has lower abundances of elements heavier than ^{4}He, could explain why these mini bigbangs did not occur for Vega, remains an open question. This would require a more precise understanding of what causes these mini bigbangs. These explosions should have been induced by the decay of M_{89} hadrons to ordinary hadrons. The entire flux tube layer would have exploded as a spherical shell and decayed to ordinary matter which would haved condensed to form a planet. There is an obvious analogy with supernova explosions. Ordinary solar wind would correspond to similar local explosions. This suggests a similarity with the TGD based models for the sunspot cycle [L7] and for the geomagnetic reversals and excursions [L6].

Could the explosion be some kind of quantum critical phenomenon, stimulated by an external perturbation and occurring at critical values of parameters? The TGD based stellar model predicts that stars have flux tube connections to other stars and also to the galactic blackhole-like object and this could make possible this kind of perturbations. Vega has flux tube connections to the Sun if the explanation for the precession of equinoxes is correct [L6]. Why would Vega not be quantum critical against the producing planets?

The quantum criticality against the explosions means criticality against reconnections of the nearby flux tubes at the M_{89} surface layer. The reconnections do not occur if this distance is too large. One can estimate this distance from that for the Sun. Assume that the fraction y of the mass of M_{89} layer of the total mass and the density of mass per unit length for the M_{89} flux tubes are the same as for the Sun. The mass of the M_{89} surface layer would be therefore roughly $yM_{Vega} \sim 2yM_{Sun}$. The number N_{Vega} of flux tubes of length $L_{Vega} = \pi R_{Vega} \sim 2L_{Sun}$ from the North Pole of Vega to the South Pole is determined by the condition $N_{Vega}L_{Vega} = yM_{Vega}$ giving $N_{Vega} = N_{Sun}$. Therefore the equatorial transversal distance $d_{Vega} = 2\pi R_{Vega}/N_{Vega} = 2d_{Sun}$. This could mean the loss of the criticality against reconnections.

REFERENCES

Cosmology and Astro-Physics

[E1] Suh H et al. A super-Eddington-accreting black hole 1.5Gyr after the Big Bang observed with JWST. *Nature Astronomy*, 2024. Available at: `https://www.nature.com/articles/s41550-024-02402-9`.

[E2] Shandarin SF Zeldovich YaV, Einasto J. Giant Voids in the Universe. *Nature*, 300, 1982.

Books related to TGD

[K1] Pitkänen M. Tgd view about quasars.

[K2] Pitkänen M. Cosmic string model for the formation of galaxies and stars. Available at: `https://tgdtheory.fi/pdfpool/galaxystars.pdf`, 2023.

[K3] Pitkänen M. New Physics Predicted by TGD: Part I. In *p-Adic Physics. https://tgdtheory.fi/tgdhtml/Bpadphys.html*. Available at: `https://tgdtheory.fi/pdfpool/TGDnewphys1.pdf`, 2023.

[K4] Pitkänen M. New Physics Predicted by TGD: Part II. In *p-Adic Physics. https://tgdtheory.fi/tgdhtml/Bpadphys.html*. Available at: `https://tgdtheory.fi/pdfpool/TGDnewphys2.pdf`, 2023.

[K5] Pitkänen M. TGD view of the engine powering jets from active galactic nuclei. Available at: `https://tgdtheory.fi/pdfpool/galjets.pdf`, 2023.

Articles about TGD

[L1] Pitkänen M. Two different lifetimes for neutron as evidence for dark protons. Available at: `https://tgdtheory.fi/public_html/articles/nlifetime.pdf`., 2017.

[L2] Pitkänen M. Magnetic Bubbles in TGD Universe: Part I. `https://tgdtheory.fi/public_html/articles/magnbubble1.pdf`., 2023.

[L3] Pitkänen M. Magnetic Bubbles in TGD Universe: Part II. `https://tgdtheory.fi/public_html/articles/magnbubble2.pdf`., 2023.

[L4] Pitkänen M. About the Recent TGD Based View Concerning Cosmology and Astrophysics. `https://tgdtheory.fi/public_html/articles/3pieces.pdf`., 2024.

[L5] Pitkänen M. Could the TGD view of galactic dark matter make same predictions as MOND? `https://tgdtheory.fi/public_html/articles/MONDTGD.pdf`., 2024.

[L6] Pitkänen M. Geomagnetic reversals and excursions and the anomaly of equinox precession from the TGD point of view. `https://tgdtheory.fi/public_html/articles/BErevprec.pdf`., 2024.

[L7] Pitkänen M. Some solar mysteries. `https://tgdtheory.fi/public_html/articles/Haramein.pdf`., 2024.