

QUASARS – RETROSPECT, PROSPECT AND A POINT OF DEPARTURE

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ABSTRACT

The discovery of the quasars along with the quantum phenomena in 20th century, represent as an epoch-making qualitative leap in natural science and as the great potential for social and intellectual advancement of man; as Darwin's theory of evolution was in 19th century. These two discoveries, one in the macrocosm and the other in the microcosm, compare in scope, with the discovery and control over fire by primitive man - a discovery that forever separated man from the animal kingdom. The two discoveries of the of 20th century, seen through the sharp focus of dialectics; offers the potential of a giant qualitative leap forward for man and his liberation from the alienation of class-rule and the myths it created; the latest one being "Big Bang creation of the universe. Liberation from class-rule, like the liberation from the animal stage will open up the way for the expanded **freedom of the will** for mankind; in all frontiers of activity and knowledge.

INTRUCTION:

Quasars represent the biggest embarrassment of the Big Bang creation cosmology, based on mathematical idealism and the General Relativity (RG) that has replaced theology as the ruling idea for monopoly capitalism. Since it was first suggested by Halton (Chip) Arp few decades ago that high red shift quasars are ejects from nearby (low red shift) active galaxies, mountain of rapidly accumulating observational evidence including quasar – galaxy associations, close pair of quasars, their alignments and groupings, red shift periodicities and quantized redshifts effect etc. [1 - 4] is making breeches in the high walls of closely guarded Big Bang paradigm that obstinately refuses to accept [5] the ejection theory. In one of the most famous cases involving NGC 4319 and the quasar Markarian 205 Arp and his associate Jack Sulentic demonstrated a luminous link between the two; both from the pictures of an amateur astronomer and the one taken later by Hubble Space Telescope as shown below (Fig. 1):

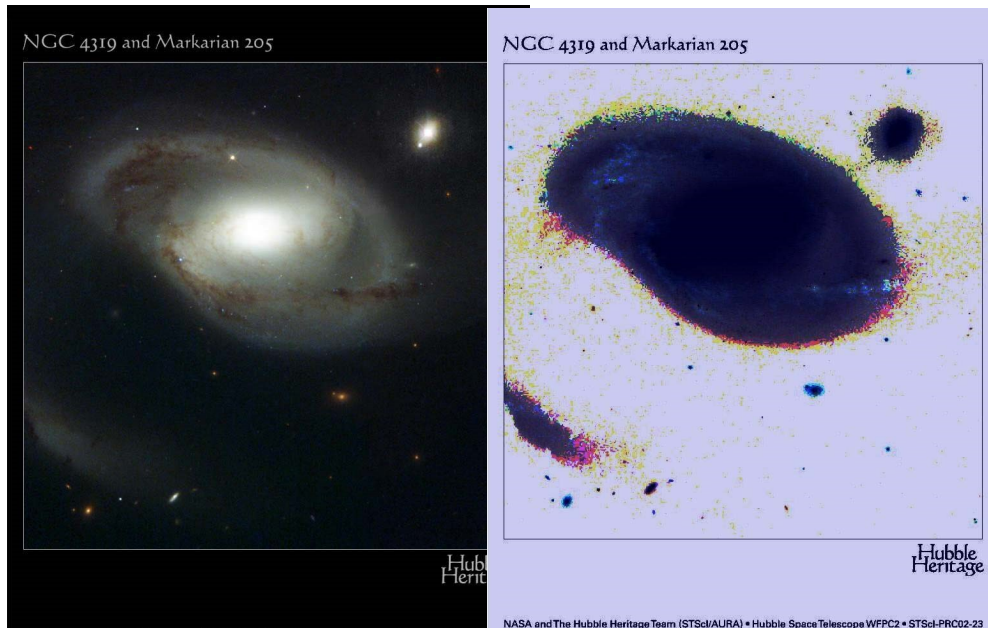


Fig. 1

But it was as usual strongly denied [6], as a line-of-sight occurrence. Statement by Arp [7]: *“Science, 11 Oct. 2002, p. 345, ran a small article on the statements from both sides, but most science magazines just accepted the NASA release as refutation of the connection. Personally, I can say that after more than 30 years of evidence disputed by widely publicized opinions that the bridge was false, I was saddened that not one prominent professional has now come forward to attest that it is, in fact, real”.*

Arp was forgotten by mainstream astrophysics community and ejection trails of the quasars were totally forgotten and even now vehemently denied, even after the following "Deep Spectroscopy in the Field of 3C 212" image turned up [8]. The quasar 3C 212 photo is shown (Fig. 2), overlaid with a green-tinted radio emission map. To the SE there is an optical feature nearly matched by a radio feature, but in the NW there is a brilliant horse-head-shaped radio emission which connects unbroken to the QSO with a long neck in between. Beyond this emission, further out from the QSO but in a perfect line with the QSO-radio horsehead axis, there is an optical horse's head, identical in every significant morphological way (i.e. they look just the same). Both radio & optical horseheads are revealed in the article to be close doublets, with one emission at the eye and another of the mouth of the horseheads.

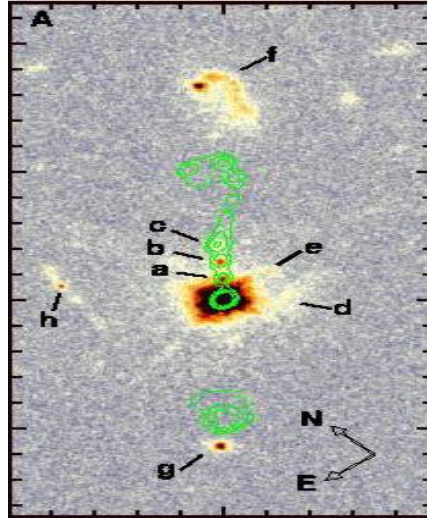


Fig. 2

In line with official cosmology, the original authors interpreted this image as, “.. *the horsehead featuresare ... not ...related*”. Now Bruno Leibundgut and Jesper Sollerman [9] have a good laugh and interpret the image in the following way, in line with poor Halton (Chip) Arp, long after he is gone and forgotten!

“Some reflection shows us what is happening in this photo. The QSO 3C212 is surrounded by a spherical shell of material similar to rings seen around stars (which are spherical shells seen edge-on). It has ejected the doublet f & g along its polar axis. The horsehead f represents a significant amount of material, and left a radio trace of its emergence out of 3C212. When f and g reached the spherical shell they splashed through, leaving a radio signature on the shell. The horsehead f left a horsehead-shaped splash. The simple object g splashed through and has left simple ripples in the shell. Go on, look -- there are two ripples, indicating the spherical shell has two layers. Simple, really, once you see it.

So now it becomes clearer. The QSO 3C212 is at redshift $z=1.049$, f is at $z=0.928$, and so is hurtling toward us with radial speed of about $z=0.121$ (ignoring “intrinsic” redshift component, see below). The redshift of g has been measured at 1.054, so has a small radial speed away from us of $z=0.005$. There, now that wasn't so hard, was it? All we need to do it accept that redshift can stem from more than just cosmological distance”.

It is also known that like the quasar 3C212, the quasars themselves being off-shoot from galaxies, can in turn shoot off matter/energy blobs triggered by delayed secondary explosive processes like the one in the case of the nearest quasar 3C273 shown below (Fig. 3), X-ray observations show that quasar 3C273 shoots out a jet of plasma blobs that seem to move faster than light. Credit: NASA/CXC/SAO/H.MARSHALL ET AL.

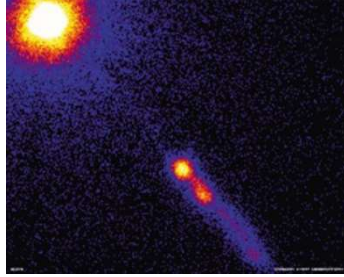


Fig. 3, Credit: NASA/CXC/SAO/H.MARSHALL ET AL.

But aside from innumerable instances of galaxy-quasars association by Arp, Burbidge and other prominent astronomers and the direct cosmic bridges shown above, which points to a dialectical evolution of the galaxies; there are fatal gaps and inconsistencies in the narrative of Big Bang cosmology, and these are even getting worse as more and more information about the cosmos become known. Among major one, are:

a) Such enormous red shifts of the quasars based on the Hubble relation that impose impossible non-relativistic recess velocity of more than the speed of light. The observed quasar redshifts correspond to a speed range of .15 c to 0.91 c. Using a Hubble constant of 55 km/s per megaparsec to these redshifts, it can be shown that they are between 600 million and 29.36 billion light-years away (in terms of comoving distance [10]).

b) Enormous energy requirements for quasar luminosity at such great distances. Quasars are capable of emitting hundreds or even thousands of times the entire energy output of our galaxy, making them some of the most luminous and energetic objects in the entire universe," according to NASA. For instance, if the quasar 3C 273, one of the brightest objects in the sky, was located 30 light-years from Earth, it would appear as bright as the sun in the sky. However, quasar 3C 273, the first one to be identified, is supposed to be 2.5 billion light-years from Earth, according to NASA [11]. It is one of the closest quasars.

c) The great variability of the Quasars: Since the discovery of the first known changing-look quasar in 2014, astronomers [12] have chased down more of these phenomena—some of which appear to rapidly brighten as a galaxy suddenly flares into a luminous quasar. Here, too, the timescale had seemed impossible. Some have been caught vanishing, sometimes fading in less than a year. Overall, the team found 111 rapidly changing quasars to complement the 60 or so already known. But more than merely adding entries to a catalogue, the new paper constitutes a robust reality check for an emerging model of the physical circumstances responsible for this enigmatic phenomenon. Some of the quasars are a few light-days across, as evidenced by their periods of variability, and yet much brighter than our entire galaxy which is 100,000 light years across. This makes them about solar system size. Also, it was observed recently that within months, 6 quiet galaxies became blazing quasars [13] and scientists don't know how!

d) In addition, the quasars show unexpected phenomena of measurable proper motion and change in position, which would be inconsistent with their purported great distance.; also, high content of metals (iron etc.) as high as the nearby normal galaxies and the intergalactic media – presumably in the so far away and in the “infant universe”!

All these inconsistencies make the Big Bang narrative untenable. Renewed debate about the quasar redshift as a measure of distance is raging even in the “big bang camp” itself [14]. In a recent letter in Nature, “**Quasars still defy explanation**”, Robert Antonucci [15] one of the early pioneers of quasars astronomy, says in despair, “*Fifty years after finding that these cosmic beacons lie far away, astronomers need to think harder about how they radiate so much energy*”, says Robert Antonucci, “... *We have found thousands of quasars in the past 50 years, but we still don't have good physical models for how they radiate their prodigious energy. Without predictive theories we have nothing — our best hope for understanding quasars is that extraterrestrials might drop in and explain them to us! ... I urge my junior colleagues to spend 15 minutes a day thinking, palms down and eyes on the ceiling. That's just 3% of their time. As I saw recently on a Californian bumper sticker: “Don't just do something, sit there!”*”

A SHORT HISTORY AND THE OFFICIAL NARRATIVE OF THE QUASARS:

Quasars (**quasi-stellar [star-like] radio source**) were first identified during the 1950s as sources of radio-wave emission of unknown physical origin – and when identified in photographic images at visible wavelengths, they resembled faint, star-like point sources. Usually, quasars are categorized as a subclass of the more general category of AGN. Quasars are found over a very broad range of distances and are associated with strongly distorted or interacting galaxies.

The first quasars 3C 48 and 3C 273 were discovered in the late 1950s, as radio sources in all-sky radio surveys. They were first noted as radio sources with no corresponding visible object; which contained many unknown broad emission lines. The anomalous spectrum defied interpretation. While studying the quasar 3C273 – the brightest object in the nearby visible universe, Maarten Schmidt was able to find a visible counterpart to the radio source and obtained an optical spectrum of this source using the 200-inch (5.1 m) Hale Telescope on Mount Palomar. This spectrum revealed the same strange emission lines. Schmidt was able to demonstrate that these were likely to be the ordinary spectral lines of hydrogen redshifted by 15.8%. If this was due to the physical motion of the “star”, then 3C 273 was receding at an enormous velocity, around 47,000 km/s, far beyond the speed of any known star and defying any obvious explanation. So far, more than 750,000 quasars have been found (as of March 2022), most from the Sloan Digital Sky Survey. In March 2021, PSO J172.3556+18.7734 was detected and has since been called the most distant known radio-loud quasar discovered.

An extreme redshift could imply great distance and velocity but could also be due to extreme mass or perhaps some other unknown laws of nature. Extreme velocity and distance would also imply immense power output, which lacked explanation. The small sizes were confirmed by interferometry and by observing the speed with which the quasar as a whole varied in output, and by their inability to be seen in even the most powerful visible-light telescopes as anything more than faint starlike points of light. But if they were small and far away in space, their power output would have to be immense and difficult to explain. Equally, if they were very small and much closer to our galaxy, it would be easy to explain their apparent power output, but less easy to explain their redshifts and lack of detectable movement against the background of the universe.

So, how to resolve all these conflicting issues in astrophysics and cosmology. Official physics has an easy and historically tested approach – i.e., take resort to Fairy Tales and mathematical idealism driven fantasy that Isaac Newton initiated [18] and now taken to its apex by Albert Einstein by the turn of the

20th century through his theories of relativity. The keys to the official narrative are: Big Bang creation, Inflation (at unimaginable speed) and Expansion (which even accelerated in its recent history) and the Dark/Black entities (Black Holes, Dark Matter, Dark Energy) are behind the phenomenology of the universe. It is now “known” [19] that the quasars are distant but extremely luminous objects, so any light that reaches the Earth is redshifted due to the metric expansion of “spacetime”. Quasars supposedly inhabit the centers of active galaxies and are among the most luminous, powerful, and energetic objects known in the universe, emitting up to a thousand times the energy output of the Milky Way galaxy, which contains 200–400 billion stars and powered by supermassive “Black Holes”. This narrative of official cosmology is very well known, courtesy of Official Physics, the Vatican and the Nobel Committee and needs no further elaboration. Halton (Chip) Arp’s name -one of the most prominent astronomer and astrophysicist of 20th century, does not even merit any mention in the official narrative!

But there is only a little dark spot in this colorful celebrations and “achievements” at enormous expense of humanity. Aside from the deep skepticism of astrophysicists Antolucci [15], quoted above; Albert Einstein, in whose name the edifice of official cosmology is built, never accepted the key features of this cosmology – “Black Holes” and “Gravitational Waves” (GWs). Einstein in a rich publication [20], now totally suppressed; dismissed the possibility of “Black Holes” even in theory. In Einstein’s words, *"The essential result of this investigation is a clear understanding as to why the "Schwarzschild singularities" do not exist in physical reality. Although the theory given here treats only clusters whose particles move along circular paths it does not seem to be subject to reasonable doubt that more general cases will have analogous results. The "Schwarzschild singularity" does not appear for the reason that matter cannot be concentrated arbitrarily. And this is due to the fact that otherwise the constituting particles would reach the velocity of light. This investigation arose out of discussions the author conducted with Professor H. P. Robertson and with Drs. V. Bergmann and P. Bergmann on the mathematical and physical significance of the Schwarzschild singularity. The problem quite naturally leads to the question, answered by this paper in the negative, as to whether physical models are capable of exhibiting such a singularity."*

A DIALECTICAL AND QUANTUM ELECTRODYNAMICAL APPROACH TO QUASARS AND COSMOLOGY:

During the past few decades and active support from Halton (Chip) Arp; this author is in the process of developing a coherent dialectical narrative of the universe from the subatomic to the cosmic, which in essence the exact opposite of the causality-based official one. Hegel’s philosophy of Space and Time. Quantum Electrodynamics (QED) of Paul Dirac and the discoveries on Quasars by Halton (Chip) Arp feature prominently in the dialectical narrative of the universe, which is uncreated (in the “Big Bang” sense), infinite, eternal and ever-changing. As envisioned by Hegel the manifestation of the universe is conditioned by contradictions of the “unity of the opposites”; mediated by blind chance’ but with an iron necessity that is inherent in chance itself. The contradiction “Being-Nothing” is the primary contradiction and the fundamental condition of the quantum vacuum that pervades through this infinite, eternal and everchanging universe and through which quantum particles eternally “comes into being and goes out of existence. A any certain period of time and due to quantum and dialectical necessity, some finite matter in motion must exist and evolve historically through the resolution of the successive contradictions.

The contradiction of “Being -Nothing” is related to the contradiction “Objective - Subjective”, “Ideal – Real” of the conscious and the perceiving mind of man and resolves this contradiction in an evolutionary

process of history without any termination. The contradiction of the ideal and abstract Space and Time is resolved to the virtual pair of matter and antimatter particles in motion [21] of the quantum vacuum; eternally popping-up and passing out of existence (“Being – Nothing”). This contradiction is resolved to the appearance – disappearance of real matter and antimatter particles (mostly existing in the form of hydrogen and antihydrogen); which evolve separately to give larger units of matter and antimatter. In cosmic scale, the major energetics (in addition to fusion processes of the elementary particles) are mediated by annihilation of chance accumulated matter/antimatter patches of various proportions - from the elementary particles to star cluster and even larger units; producing the galactic gamma ray halo to gamma ray bursts GRBs), active galactic nuclei (AGN) expelling jets of matter and energy. It was proposed by this author [22, 23], that quasars are chunks of nearby active galaxies expelled with enormous speed along the minor axis of the spiral galaxies powered by the largescale annihilation of matter with antimatter that chance-accumulate at the galactic core. This gives credence to the claim of Arp et al., that the quasars are ejects from nearby low redshift galaxies expelled at tremendous speed.

Matter/antimatter annihilation process is the only conceivable way by which, such large scale of energy in such short time could be generated. And only a dialectical perspective of the simultaneous generation but separately chance-accumulated existence of matter/antimatter patches as clouds, stars, star-cluster or larger aggregates within a galaxy [22, 23] can make it feasible. Similar speculation of quasars being propelled by enormous energy generated from matter/antimatter annihilation processes were reported elsewhere before (1965) [24], the independent publications by this author (2003) approved by Chip Arp and much later (2020) [25]; but none of them considered such possibility in the context of the general dialectical evolution of the universe; as was done by this author.

In an infinite, eternal and everchanging universe – the only one possible from the perspective of dialectics, the luminosity of the cosmic bodies would be strictly defined by their size and distance from us. But their redshifts would be a combined effect of many factors as discussed separately below. But the high redshifts of the quasars are due to their high recession velocity and Doppler’s Effect. The fact that quasars (as opposed to the radio galaxies) generally appear to be single jet systems, and quasars always appear as red shifted was explained in the 1960s, by Strittmatter [Re. 4], who suggested that quasars selectively radiate in the backward direction as it is ejected from the galactic centers and an observer therefore, only sees those quasars that are receding from that location and are necessarily red shifted. Kembhavi and Narlikar [4] gave an explanation for this effect in terms of the ram pressure of the intergalactic medium on the light originating from the quasars. According to them, the emission from the quasars is confined to a backward cone; the ram pressure from the intergalactic medium blocks the forward emission, but it does not affect the backward jet. This explains why the quasars unlike radio galaxies are single jet systems and are always redshifted.

THE REDSHIFT OF THE GALAXIES:

In an infinite universe, there can be no cosmological expansion to account for redshifts as proposed by “Big Bang” cosmology. The redshift of the cosmic bodies would depend on many factors, the primary ones being distance, relative speed towards and away from an observer. It has been shown recently that the galaxies and even stars have concentric shells, which may be considered as graviton orbitals where matter preferentially accumulate giving a shell-like structure [26]. In addition, all cosmic bodies have an expanded halo of dust particles that merge with the dust particles of the intergalactic media. Any radiation passing through such clouds would be affected in a number of ways, leading to redshift of a

distant body, which is known as “tired light”. The way the energy of light from distant galaxies is reduced is not well understood, but a number of possible mechanisms have been proposed. One possible mechanism that the non-homogenous matter clouds in the galactic halo may induce Brillouin type scattering of the quasar emission thereby increasing the redshift. In classical physics, Brillouin scattering occurs when light interacts with density variations as it passes through a media such as water and changes its path. From a quantum mechanical point of view, Brillouin scattering is explained by the interaction of light photons with the phonons (vibrational quanta) of the media. Some other possible mechanisms have been proposed [27 – 29]. Roy et. al. [28] in particular proposed the Dynamic Multiple Scattering Theory (based on Wolf effect) that “*provides mechanism for non-cosmological red shift of quasars and a simple interpretation of the discordant red shifts in galaxy-quasar associations*”. They used this theory to provide additional support for the specific galaxy-quasar association of the classic case of NGC 4319 and Markarian 205, investigated by H. Arp and J.W. Sulentic; discussed above.

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