# Quasar Hypothesis

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**Abstract**

A quasar is a star-like object having a hydrogen emission line with a large redshift. This hypothesis explains the quasar's observed behaviors.

## Contents

# 1 Introduction

A quasar is a star-like object having a hydrogen emission line with a redshift which was unusual for several reasons. This hypothesis explains the quasar's observed behaviors. There are several which are notable.

Many quasars have a very high redshift.

Many quasars seem to be very bright for their calculated distance by their red shift. The large redshift implies a great distance. Potentially their brightness is not unusual when the distance is wrong.

Halton Arp observed the quasar red shifts appeared quantized or in repeated increments rather in just random, varying amounts This was observed with quasars having z ¡ 1. He also observed similar red shift values could appear in quasars on opposite sides along a Seyfert galaxy axis. This implied the redshift might have an intrinsic characteristic rather than a redshift due to an expected random velocity.

# 2 Terminology

## 2.1 Redshift

There is a separate paper by this author describing the causes and interpretations of a redshift. This reference includes some descriptions of a spectrum analysis. There is no reason for this paper to duplicate here the text written by this author in another paper.

pdf-link: Clarifying Redshifts

A summary of the other paper's conclusion for this paper:

A galaxy's redshift cannot be used for either velocity or distance. The galaxy's redshift is only an indicator of hydrogen in the intergalactic medium so its redshift indicates nothing about the galaxy.

A quasar is observed having a hydrogen Lyman-alpha emission line with a redshift. This redshift indicates the velocity of this atom when emitting that wavelength.

This atom's emission line's redshift provides no detail about the quasar, such as its velocity or distance.

If the quasar were moving to exhibit the Doppler effect its entire spectrum must shift, not only one wavelength of one emission line. Images of a quasar spectrum show the lowest wavelengths intact, though the Hydrogen Lyman-apha emission line is red shifted. With a high velocity quasar light source in recession these velocities should be shifted away but are not.

Therefore from a cosmological perspective regarding a quasar's velocity and distance the quasar redshift should be ignored. Its redshift is a behavior from an atom in the quasar vicinity.

However the quasar redshift requires an explanation even if not important beyond the quasar.

This paper will describe what information the redshift provides when associated with a quasar.

## 2.2 Quasar

A quasar is neither a star nor a galaxy.

excerpt from Brittanica:

The optical spectra of the quasars presented a new mystery. Photographs taken of their spectra showed locations for emission lines at wavelengths that were at odds with all celestial sources then familiar to astronomers. The puzzle was solved by the Dutch American astronomer Maarten Schmidt, who in 1963 recognized that the pattern of emission lines in 3C 273, the brightest known quasar, could be understood as coming from hydrogen atoms that had a redshift (i.e., had their emission lines shifted toward longer, redder wavelengths by the expansion of the universe) of 0.158. In other words, the wavelength of each line was 1.158 times longer than the wavelength measured in the laboratory, where the source is at rest with respect to the observer. At a redshift of this magnitude, 3C 273 was placed by Hubble's law at a distance of slightly more than two billion light-years. This was a large, though not unprecedented, distance (bright clusters of galaxies had been identified at similar distances), but 3C 273 is about 100 times more luminous than the brightest individual galaxies in those clusters, and nothing so bright had been seen so far away. (excerpt end)

my summary: The quasar has a noticeable hydrogen emission line red shifted indicating the hydrogen atom is moving at such an extreme velocity to be placed more than 2 billion light years away.

reference:

web-link: Quasar

## 2.3 Plasmoid

Wal Thornhill povides an excellent description of a plasmoid and its jets, as observed in the M87 galaxy whose plasmoid was imaged in radio frequency with much publicity, in April 2019.

reference:

youtube-link: Wal Thornhill: Black Hole or Plasmoid? — Space News

# 3 Arp's Observations

Halton Arp observed quasars with similar red shifts could appear in pairs around a Seyfert galaxy, as if from their parent. Their red shifts seemed to drop in quantized increments as the objects increased the distance from their parent. Both quasars and BL Lac objects could be associated with the same parent Seyfert galaxy but the BL Lac objects in Arp's study have no hydrogen emission line to compare red shifts.

# 4 BeppoSAX study of quasars

This study concluded the quasar has an X-ray synchrotron radiation source in its AGN, not a black hole and a hot accretion disk.

link: Quasar study by BeppoSAX

The study concluded quasars and BL Lac objects have the same AGN for its X-ray source.

# 5 Eric Lerner's Quasar

In his book, The Bang Never Happened, Eric Lerner had a section titled 'A Model of a Quasar' and there are other mentions of a quasar. Figure 6.14 in my copy of the book mentions a plasmoid and its jets. I agree with his plasmoid explanation.

There is no explicit description of the mechanism for the observed redshift of a quasar.

Much earlier in the book, in a section titled' Measuring the distance to a galaxy' there is never doubt but only apparent agreement that every redshift is due to velocity.

That assumption is a mistake. This author's paper cited above in Terminology - Redshift explains this mistake with redshifts. This author's referenced text does not require duplication again in this paper.

The quasar's redshift is not from the quasar's velocity. The redshift is from ions or protons approaching the AGN.

Eric's quasar model is incomplete.

This paper presents a complete description of a quasar.

# 6 Quasar Spectrum Analysis

## 6.1 Typical Quasar

a Caltech study in 2000 provided a "typical spectrum for a quasar" with z=1.34.

pdf-link: Quasistellar Objects: Intervening Absorption Lines

Its figure 1 is important for a comparison. image-link: Caltech study Figure 1

## 6.2 NGC 4258

NGC 4258 spectrum was provided in Figure 1-2 in Arp's book Seeing Red.

image-link: Arp's Figure 1-2

A copy of the figure is linked above. Arp called M106 a double lobed radio galaxy so the two spectra are called the "East" and "West" lobes which were considered by Arp to be 2 quasars.

Each spectrum identified specific emission lines and their emitted wavelength, enabling a red shift calculation. both East and West lobes have high energy emission lines at the right side (or long wavelength).

These emission lines have a high red shift but with no identified element.

The figure 1-2 in the book should have been completed as far as practical when such details are so important.

Neither lobe has an identified Lyman-alpha emission line which is observed in a typical quasar.

The possible identiifications for those lines will follow.

NGC 4258 details (first, top spectrum, then bottom):

from East lobe:

Fe II line emitted at 2382 Angstroms is observed at 3937 for z=0.653 Mg II line at 2798 Angstroms is observed at 4625 for z=0.653 Neon III line at 3869 Angstroms is at 6395 for z=0.653 H-beta line at 4861 Angstroms is at 8040 for z=0.653 O III line at 5007 is at 8280 for z=0.653

from West lobe:

Mg II line at 2798 Angstroms is at 3911 for z=0.398 Ne V line at 3426 Angstroms is at 4790 for z=0.398 H-beta line at 6861 Angstroms is at 6880 for z=0.398 O III line at 5007 is at 7000 for z=0.398 H-alpha line at 6563 Angstroms is at 9175 for z=0.398

All these atoms appear to have the same velocity toward the plasmoid.

The above velocities are consistent through those elements identified.

The East lobe had no H alpha line indicated (though the West lobe has it) but it could be the 1st peak of the 3 near the right side having no element identified. If it is then:

H-alpha line at 6563 Angstroms is at 9200 for z=0.0417

This z is inconsistent with the others. To be consistent:

H-alpha line at 6563 Angstroms would be at 10850 for z=0.653

This wavelength is off the chart though close to the emission line at the right edge, or the right one of the 3. This assignment still leaves the first of the 3 unidentified.

If the unidentified emission line at 9200 in the East lobe is the missing Ly-alpha then:

Ly-alpha line at 1216 Angstroms is at 9200 for z=6.65

If the unidentified emission line in the West lobe, which also has the highest energy in the spectrum, is the missing Ly-alpha line (like in a typical quasar) then:

Ly-alpha line emitted at 1216 Angstroms is at 9400 for z=8.16

These high z values are not in the book.

Both lobes indicate a quasar red shift of z ¿ 6 when using the hydrogen lyman-alpha emission line to be consistent with a typical quasar.

All these emission lines are from atoms in motion separate from the plasmoid inside the quasar. Their red shifts cannot be used for the quasar's velocity nor its plasmoid.

Arp's book assumed these lobes are z ¡ 1 which is lower than when the lyman-alpha emission line is used consistently. This observation puts any conclusions drawn by Arp from quasar red shifts in doubt, including:

a) These z values ¿ 6 are not compatible with the proposed quantized behavior in quasars with z ¡ 1.

b) The quasar red shift is the measurement of motion of atoms toward the plasmoid inside the quasar. There can be no relationship between these atoms in motion and deriving an age for the quasar.

c) the intrinsic red shift can be explained without a new theory giving quasars a special red shift behavior related to age.

# 7 Quasar Spectrum Explanation

The observed behaviors in a quasar spectrum indicate its red shift is driven simply by electrical charge differentials.

This conjecture relies on a plasmoid having a substantial negative charge, with free electrons. This negative charge seems likely but not verified. I can find nothing conclusive.

If it is not then the observed quasar behaviors are still lacking an explanation.

The observed quasar spectrum has these features:

a) an intense lyman-alpha emission line,

b) many fast metallic atoms,

c) these atoms are highly ionized,

d) emission lines dominate the spectrum,

e) all emission lines are red shifted,

f) the shift in (a) is different than in (b),

g) no absorption lines are noted.

The presence of the many metallic atoms is interesting. Arp observed quasars are apparently ejected from a Seyfert galaxy.

Most or all the content accompanying the plasmoid came from the Seyfert. The combination suggests the plasmoid ejection is the result of too much excess material in form of these metal elements, so in a crude phrase the plasmoid is given garbage on the way out the door.

With only those 7 details in conjunction with the very energetic plasmoid at the center, a simple explanation is suggested for quasar red shifts.

(g) indicates all these behaviors are in or around the quasar. Absorption lines usually arise from atoms in the line of sight, or external to the object.

A red shifted hydrogen absorption line is found in a galaxy spectrum and results from hydrogen atoms in the inter galactic medium. The red shifted H line should be there in a quasar spectrum but is hidden among (d). Its shift is not a velocity and would be ignored anyway.

Every object around this negatively charged plasmoid is positively charged, as either metallic ions or simple protons.

All the positive objects will move toward the strong negative.

This plasmoid has excess electrons around it.

As these ions capture an electron to address their deficiency, the atom will generate its characteristic wavelength for that element's state change. The captured electron must fall into the correct orbital missing an electron.

The ion is moving during this capture so the emission line is red shifted because it is moving toward the negative plasmoid.

The velocity of the ions is consistent because that velocity is driven only by the strength of the plasmoid's electric field. All the ions of varying atomic number exhibit the same red shift and so have the same velocity.

After the ions capture an electron, they remain in the plasmoid's high frequency radiation, so they will become an ion again shortly to repeat the cycle.

Arp observed in quasar's an apparent quantized behavior in these metallic velocities.

The observation indicates the plasmoid's electric field exhibits a quantized sequence of reduction in its strength. This is suggested by that quantized reduction in red shifts from the metallic atoms.

The plasmoid will apparently continue gathering protons. Many quasars generate jets of plasma so protons are circulating in the universe.

This is the logical conclusion but the exact mechanism for reducing the plasmoid electric field is not clear.

The high red shift hydrogen emission line also has a simple mechanism.

High speed protons exist in the universe coming from various sources, including a plasmoid's jets. The M87 plasma jets are at a velocity near or higher than c.

While these fast positive protons are approaching this negative plasmoid each proton can capture an electron becoming a hydrogen atom.

The captured electron must fall into one of the orbitals defined by the hydrogen element.

Either: 1) the electron takes the n=2 state (where n is the principal quantum number) in the Lyman series.

This action in the atom results in the emission of the lyman-alpha wave length.

This is the strongest wave length in a typical quasar spectrum.

or

2) the electron takes the n=3 state in the Balmer series.

This action in the atom results in the emission of the Balmer-alpha wave length.

Astronomers usually treat the strongest single emission line as a red shifted Lyman-alpha emission line.

If the emission were actually the Balmer-alpha line then the calculated red shift is in error by the difference between the two hydrogen alpha wave lengths. Using the Balmer line wave length will get a slightly lower red shift than using the Lyman line.

The hydrogen atom is moving fast at the moment of electron capture so a red shift occurs proportional to that atom's velocity in each direction.

This hydrogen emission line's red shift shows no quantized behavior. The velocity of an incoming proton's velocity is not necessarily related to the electric field strength, like with the nearer metallic ions.

A possible scenario is a stronger electric field will attract more protons from a further distance.

# 8 Basic Quasar Hypothesis

A quasar AGN is a plasmoid

A quasar is a plasmoid with an unusual redshift in its spectrum having emission lines from metallic atoms and from hydrogen which exhibit high z values, even z >1.

An elliptical galaxy like (M87 has a plasmoid at its core. The plasmoid is a source of the broad spectrum synchrotron radiation.

There are 2 possible red shift values for a quasar. 1) using the Lyman-alpha emission line, or 2) not using it.

With (1) a higher red shift is found. With this selection no quantized red shift will be observed.

With (2) a much lower red shift is found. With this selection a quantized red shift can be observed.

# 9 Extreme Redshift

The electron in the new atom quickly relaxes to the atom's ground state which results in the Hydrogen Lyman-alpha emission line. This wavelength is in the ultraviolet range. Because the atom is moving at the instant of this emission the wavelength is shifted based on velocity and direction. The hydrogen atoms zooming toward the plasmoid get a redshift so depending on velocity UV could become visible or infrared ray. The emission line from will be stronger with a larger number of atoms.

This atom's emission line is observed as the quasar's redshift.

Relativity claims matter cannot move faster than the speed of light. There has never been experimental evidence to support that assumption. A neutral hydrogen atom would have its motion affected by only the weak force of gravity or a collision.

The observation of hydrogen atoms indicating a velocity exceeding c clearly falsifies that assumption. This measurement is not an anomaly of a single observation but rather it is many different measurements for many quasars in different locations.

With one assumption in relativity demonstrated to be false, other unproven assumptions by relativity relevant to this limit are also in doubt. These include an increase in mass (possibly to infinite) or no elapsed time when a mass reaches the velocity of light.

# 10 Quantized Redshift

Over time with successive jets the plasmoid loses energy. That reduction is in increments due to the jet ejection process which includes a collapse and recovery. The jets are affected by the sequential decreases in the amount of energy in the plasmoid, not a simple linear reduction over a time span.

The motion of protons and electrons at extreme velocities requires a very strong magnetic field to accelerate those charged particles but they are tiny particles. From basic physics: acceleration = Force / mass.

As the strength of this magnetic field progressively weakens, its force results in less acceleration on the tiny protons and electrons.

The quasar's redshift is an indicator for the strength of the plasmoid's magnetic field which is generating the jets.

Arp observed this quantized behavior and attributed it to the age of the quasar caused by the loss of mass. The quantized behavior is from an electric field which decreases over time but that field change is not really due to the age or mass of the quasar, but just the progressive release of electrical energy.

# 11 Quantized Redshift

# 12 Crucial Observation

A quasar has 2 internal processes so it can have 2 red shifts. There are few published spectra for quasars and among them, the lower of the 2 values was published, so this possibility must be recognized when dealing with any published quasar red shift value.

The processes: 1) the metallic ions moving toward the AGN,

2) the high velocity protons moving toward the AGN which capture an electron to become a hydrogen atom.

The red shift value from (1) will be less than from (2).

# 13 Conclusion

The observed behaviors of a quasar are explained. The AGN is a plasmoid like found in M87 which is both a radio and X-ray source, via synchrotron radiation.

A quasar spectrum can be explained.

A quasar can have either of 2 red shift values depending on the person doing the analysis.

Either value is from the motion of atoms so neither value should ever be used as a quasar velocity.

One part of this hypothesis is impossible to test by the author as such a test of the quantized step reductions of a plasmoid's electric field requires special conditions in a plasma physics facility here on Earth.