Real Celestial Arcs

Not From A Lens

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Introduction

The title implies there are celestial arcs being described as not real but as an illusion from a gravitational lens. The goal here is to explain why those arcs which are claimed to be an illusion are real. The key realization is each is a plasma phenomenon. This document begins with describing the behaviors of light and plasma. This background is the foundation of the investigation into the true nature of these arcs which are found near only the large bright elliptical galaxies in distant clusters having many galaxies.

There are a variety of rings around celestial objects. These objects include several planets and even a few asteroids. The planet Saturn has a series of bright, real rings; the other gas giants have faint circular rings. Everyone agrees these particular planetary rings are real, because the rings contain particles which reflect light. Unfortunately, astronomers are not consistent when looking beyond our solar system.

The planet Jupiter is known to have a circular ring of non-luminous plasma, sometimes called a torus, in its magnetosphere.
A circular ring or arc (a segment of a circle) around a distant galaxy is consistently declared an illusion caused by a theoretical gravitational lens, despite the acceptance of the real rings within our solar system and a few notable rings on the scale of galaxies. One should expect a rational and justified explanation for unusual celestial objects. Even if the mechanism is not fully understood, a tentative explanation should be reasonable and with its uncertainty explained. The misleading 1919 solar eclipse experiment by Eddington set the pivotal precedent for an illusion to be acceptable in cosmology. This mistake resulted in the acceptance of more illusions having no basis in classical physics, like dark matter and dark energy. These conjectures remain undetected simply because they do not exist. Illusions are not solutions.
. All can see these celestial rings, but the claim the rings are not real. This claim of an illusion must have evidence (like done for mirages in the desert), or the claim of illusion should be unacceptable when lacking thorough evidence, especially when a suitable explanation is available, after considering plasma physics. Gravity is treated as the dominant force in modern cosmology, though the electromagnetic forces are also important. This mistake leads to others, like dark matter, which is the excuse for ignoring electric and magnetic fields when limited to gravity.

In every case of a distant celestial arc being an illusion caused by a lens, there is never proper evidence for the scenario's combination (like an object's type, its magnitude, mass, size, and distance for the respective participants: 1) real light source , and 2) the lens object, whose mass is causing distant light to bend creating the claimed illusion. If the exact angles and distribution of proposed dark matter are not explicitly defined, then it is an incomplete solution and so without all the details for verification, it is an unacceptable solution.

Several real rings are described. The well-known illusions are described. I tried to find as many as possible. There is no published list. There are probably many more. The likely mechanism for the real ring, to replace the illusion, is explained for each.
The Saturn rings have been the subject of many studies but its formation mechanism can never be conclusive because the formation of the planetary rings was never observed by astronomers.

Rings on the scale of galaxies could be difficult to demonstrate on the scale of Earth-bound experiments. Therefore, thorough experiments using distant giant elliptical galaxies are currently not practical on Earth.

This is a brief summary of the 11 sections:

1) Introduction describes the goal of this document and a summary of its sections.

2) Light section describes various aspects and behaviors of light

3) Plasma section describes various aspects of plasma, especially the tendency to form filaments. This section is a compressed course in some of plasma physics, where terms arise to subsequent sections.

4) Jupiter section describes the circular plasma ring in its magnetosphere.

5) Gravitational Lens section describes this theoretical behavior which is claimed to drive the illusion of distant celestial rings.

6) Eddington Experiment section describes the pivotal experiment which is the basis of claiming the lens effect by gravity on light is real.

7) Ring Galaxies section describes several ring galaxies, which are accepted as real rings, not illusions.

8) Section of Galaxies with external arcs describes the claimed illusions, using excerpts from the original sources.

9) Arc Mechanism section explains the proposed mechanism for these external arcs, which are found near bright galaxies in very distant clusters,

10) Final Conclusion summarizes the points in the book.

11) References section describes how to access the external, internet references on each page.

Some internet references include both text and accompanying images,

Most of the galaxies and clusters referenced in sections 7 and 8 have 2 links within this external web page: 1) its web article(s) having its description; 2) its image.

By clicking on the link to an image, the full color image can be quickly viewed, scrolled, and zoomed, as needed.

This format enables the reader to review only the images without having to find them within long articles. The page of references for this analysis of celestial arcs has many sources via links, often more than one link per page in this document.

2 Light

The mechanism for the propagation of light was explained by James Clerk Maxwell followed by contributions by others (noted below) around that time.

Einstein wrongly assumed mass had a velocity limit at c, the velocity of light in a vacuum.

There are various claims of a speed limit for light and for mass.

A helpful YouTube video is titled:
Why is the speed of light what it is? Maxwell equations visualized

This video clearly explains Maxwell’s propagation mechanism and its velocity limit, but unfortunately concludes with a drastic mistake when mentioning Einstein.

From Wikipedia topic on Maxwell's equations:

Maxwell's equations explain how these [light] waves can physically propagate through space. The changing magnetic field creates a changing electric field through Faraday's law. In turn, that electric field creates a changing magnetic field through Maxwell's addition to Ampère's law. This perpetual cycle allows these waves, now known as electromagnetic radiation, to move through space at velocity c.

Relative permittivity is the factor by which the electric field between the charges is decreased relative to vacuum.

(Excerpt end)

Observation:

There is also a factor for magnetic susceptibility.

The propagation of light is a self-propagating series of electric and magnetic fields. Its velocity is determined ONLY by the medium. An instantaneous change in medium causes an instantaneous change in propagation velocity. This transition is observed with the illusion of a break in a line at the surface of water.

This propagation begins and continues at the same velocity regardless of any velocity of the source of its propagation.

All of the above is correct, regardless of anything Einstein claimed.

He had nothing to do with the constant velocity of light. Maxwell thoroughly explained the basis of this limit.

Some question whether a moving light source affects the velocity of its light. Einstein had thought experiments about that, but he stated in his Second Postulate of Special Relativity that its velocity is the constant c.

The velocity of light propagation is always defined by the medium.

The velocity and direction of a light source affects the energy in the light but not its rate of propagation.

While the light source is moving, it has kinetic energy.

In thermodynamics, energy cannot be lost or gained but only exchanged or transformed.

Around the sphere of radiated energy, wavelengths are reduced in the direction of travel or increased in the opposite direction. Each wave length change is determined by the velocity and direction at that point relative to c, which is the constant velocity of light in a vacuum. If the light source is in a medium, the z is the same because the medium affects the propagation not the initiation. Energy is maintained around the radiated sphere at the instant of emission but its distribution can change by the Doppler effect and the propagation velocity of the light emission cannot be affected.

The velocity and direction of a moving light source has no effect on the velocity of its light.

Einstein did have something to do with the velocity of mass, which is a separate mistake.

He worked only with the context of a moving observer, the "special" observer in both "general" and "special" relativity.

Einstein's belief, of a velocity limit on mass, was shared by others in the 1800's, but has no justification in physics.

For many years, Einstein's unjustified belief of a speed limit on mass has been refuted.

Excerpt from Wikipedia:

In 1993, Thomson et al. suggested that the (outer) jet of the quasar 3C 273 is nearly collinear to our line-of-sight. Superluminal motion of up to ~9.6c has been observed along the (inner) jet of this quasar.

Superluminal motion of up to 6c has been observed in the inner parts of the jet of M87. To explain this in terms of the "narrow-angle" model, the jet must be no more than 19° from our line-of-sight.

(Excerpt end)

Observation:

The Doppler Effect and a redshift > 1 are explained in several of my books, including my free ones. That behavior is not relevant to rings around galaxies, but a thorough explanation of light is available if this section is inadequate.

A plasmoid, like in 3C 273 or M87, holds substantial electromagnetic energy. The sustained force of a magnetic field on charged particles can result in velocities far faster than c and this has been measured many times.

The motion of mass is not a process dependent on the medium.

Motion is affected by the medium only with its friction on the surface of the mass in motion. Friction is an exchange of kinetic energy to thermal energy. Friction does not define a velocity limit.

A force on a mass results in its acceleration, when not rigidly bound. The force can be maintained for a specific time of acceleration to achieve the desired velocity. This is a continuous transfer of energy from the source to kinetic energy.

This process of energy transfer is observed during every launch of a space probe. Power is the amount of force during a time. The force required is determined by the mass and the time required for the desired velocity.

The available power is determined by the fuel supply, which is “full” at the moment of launch. The number and design of the respective stages determines the final velocity of the final stage which has the lowest mass, where individual stages provide the required amount of power for the velocity of the remaining stages. Increasing the initial power can increase the final velocity.

Once a mass is in motion it has kinetic energy. It must maintain that energy, so it remains in motion, until this energy is transferred, like with friction. Friction is a transfer of kinetic energy into thermal energy.

As long as a force continues to transfer more energy into kinetic energy of a body, the velocity must increase. There is no velocity limit from physics or thermodynamics during this energy transfer.

Einstein wrote equations causing changes to the moving observer when near the velocity of light, including relativistic mass, so their possible velocity limit was set in math not in physics. At c = v, the relativistic mass is a mass divided by zero which is either infinite or not allowed!

From Wikipedia:
"Oxford lecturer John Roche states that relativistic mass is not referenced in nuclear and particle physics, and that about 60% of authors writing about special relativity do not introduce it."

Observation:

This unverified prediction by relativity is widely ignored, while some continue to claim all predictions by relativity were confirmed, which is false.

That claim of relativistic mass is unverified and should be retracted for many reasons. Other problems with relativity are described in several other of my books, including my free ones.
Proposing mass has a velocity limit at c means when applying more force to a mass when nearing or at the velocity of c, energy is being lost rather than transferred to kinetic energy.

This energy loss is a violation of thermodynamics.

The practical velocity limit for a specific mass is set by the power required to reach that velocity.

It is critical to remember light always propagates at a velocity set by the medium at that instant.

Excerpt from Wikipedia topic on Prism:

Light changes speed as it moves from one medium to another (for example, from air into the glass of the prism). This speed change causes the light to be refracted and to enter the new medium at a different angle (Huygens principle). The degree of bending of the light's path depends on the angle that the incident beam of light makes with the surface, and on the ratio between the refractive indices of the two media (Snell's law). The refractive index of many materials (such as glass) varies with the wavelength or color of the light used, a phenomenon known as dispersion. This causes light of different colors to be refracted differently and to leave the prism at different angles, creating an effect similar to a rainbow. This can be used to separate a beam of white light into its constituent spectrum of colors. A similar separation happens with iridescent materials, such as a soap bubble.

Prisms will generally disperse light over a much larger frequency bandwidth than diffraction gratings, making them useful for broad-spectrum spectroscopy. Furthermore, prisms do not suffer from complications arising from overlapping spectral orders, which all gratings have.
Prisms are sometimes used for the internal reflection at the surfaces rather than for dispersion. If light inside the prism hits one of the surfaces at a sufficiently steep angle, total internal reflection occurs and all of the light is reflected. This makes a prism a useful substitute for a mirror in some situations.

(Excerpt end)

Observation:

A prism bends the path of light, because the prism is an inconsistent medium. Light cannot bend by any mechanism other than a change in the medium at that instant of its path.

3 Plasma

Plasma and its behaviors are very important in explaining the external rings.

To help with the references to plasma physics terminology, a term is in bold font when that term has a link to the online source of its excerpt.

Following excerpts are from several topics in Wikipedia:

Plasma is typically an electrically quasineutral medium of unbound positive and negative particles (i.e. the overall charge of a plasma is roughly zero). Although these particles are unbound, they are not "free" in the sense of not experiencing forces. Moving charged particles generate electric currents, and any movement of a charged plasma particle affects and is affected by the fields created by the other charges. In turn this governs collective behaviour with many degrees of variation.
Plasma is distinct from the other states of matter. In particular, describing a low-density plasma as merely an "ionized gas" is wrong and misleading, even though it is similar to the gas phase in that both assume no definite shape or volume.

Striations or string-like structures, also known as Birkeland currents, are seen in many plasmas, like the plasma ball, the aurora, lightning, electric arcs, solar flares, and supernova remnants. They are sometimes associated with larger current densities, and the interaction with the magnetic field can form a magnetic rope structure. High power microwave breakdown at atmospheric pressure also leads to the formation of filamentary structures. (See also Plasma pinch)

Birkeland currents are also one of a class of plasma phenomena called a z-pinch, so named because the azimuthal magnetic fields produced by the current pinches the current into a filamentary cable. This can also twist, producing a helical pinch that spirals like a twisted or braided rope, and this most closely corresponds to a Birkeland current. Pairs of parallel Birkeland currents will also interact due to Ampère's force law: parallel Birkeland currents moving in the same direction will attract each other with an electromagnetic force inversely proportional to their distance apart whilst parallel Birkeland currents moving in opposite directions will repel each other. There is also a short-range circular component to the force between two Birkeland currents that is opposite to the longer-range parallel forces.
Electrons moving along a **Birkeland current** may be accelerated by a plasma double layer. If the resulting electrons approach the speed of light, they may subsequently produce a Bennett pinch, which in a magnetic field causes the electrons to spiral and emit synchrotron radiation that may include radio, visible light, x-rays, and gamma rays.

A **double layer** is a structure in a plasma consisting of two parallel layers of opposite electrical charge. The sheets of charge, which are not necessarily planar, produce localised excursions of electric potential, resulting in a relatively strong electric field between the layers and weaker but more extensive compensating fields outside, which restore the global potential. Ions and electrons within the double layer are accelerated, decelerated, or deflected by the electric field, depending on their direction of motion.

A **pinch** is the compression of an electrically conducting filament by magnetic forces, or a device that does such. The conductor is usually a plasma, but could also be a solid or liquid metal.

[Among the types of pinches noted in the Pinch topic:]

Sheet pinch

An astrophysical effect, this arises from vast sheets of charge particles.

Z-pinch

The current runs down the axis (or walls) of the cylinder while the magnetic field is azimuthal

Theta pinch

The magnetic field runs down the axis of the cylinder, while the electric field is in the azimuthal direction (also called a thetatron)

Screw pinch

A combination of a Z-pinch and theta pinch (also called a stabilized Z-pinch, or θ-Z pinch)

Reversed field pinch

This is an attempt to do a Z-pinch inside an endless loop. The plasma has an internal magnetic field. As you move out from the center of this ring, the magnetic field reverses direction. Also called a toroidal pinch.

A **plasmoid** is a coherent structure of plasma and magnetic fields. Plasmoids have been proposed to explain natural phenomena such as ball lightning, magnetic bubbles in the magnetosphere, and objects in cometary tails, in the solar wind, in the solar atmosphere, and in the heliospheric current sheet.

Plasmoids produced in the laboratory include field-reversed configurations, spheromaks, and in dense plasma focuses.
The word plasmoid was coined in 1956 by Winston H. Bostick (1916-1991) to mean a "plasma-magnetic entity"
The plasma is emitted not as an amorphous blob, but in the form of a torus. We shall take the liberty of calling this toroidal structure a plasmoid, a word which means plasma-magnetic entity. The word plasmoid will be employed as a generic term for all plasma-magnetic entities.

Plasmoids appear to be plasma cylinders elongated in the direction of the magnetic field. Plasmoids possess a measurable magnetic moment, a measurable translational speed, a transverse electric field, and a measurable size. Plasmoids can interact with each other, seemingly by reflecting off one another. Their orbits can also be made to curve toward one another.

Magnetohydrodynamics (MHD; also magneto-fluid dynamics or hydromagnetics) is the study of the magnetic properties and behaviour of electrically conducting fluids. Examples of such magnetofluids include plasmas, liquid metals, salt water, and electrolytes. The word "magnetohydrodynamics" is derived from magneto- meaning magnetic field, hydro- meaning water, and dynamics meaning movement. The field of MHD was initiated by Hannes Alfvén, for which he received the Nobel Prize in Physics in 1970.

The fundamental concept behind MHD is that magnetic fields can induce currents in a moving conductive fluid, which in turn polarizes the fluid and reciprocally changes the magnetic field itself. The set of equations that describe MHD are a combination of the Navier–Stokes equations of fluid dynamics and Maxwell's equations of electromagnetism. These differential equations must be solved simultaneously, either analytically or numerically.

Electromagnetic or magnetic induction is the production of an electromotive force across an electrical conductor in a changing magnetic field.
Michael Faraday is generally credited with the discovery of induction in 1831, and James Clerk Maxwell mathematically described it as Faraday's law of induction. Lenz's law describes the direction of the induced field. Faraday's law was later generalized to become the Maxwell–Faraday equation, one of the four Maxwell equations in his theory of electromagnetism.
Electromagnetic induction has found many applications, including electrical components such as inductors and transformers, and devices such as electric motors and generators.

Electric **discharge in gases** occurs when electric current flows through a gaseous medium due to ionization of the gas. Depending on several factors, the discharge may radiate visible light. The properties of electric discharges in gases are studied in connection with design of lighting sources and in the design of high voltage electrical equipment.

The **Townsend discharge** or Townsend avalanche is a gas ionisation process where free electrons are accelerated by an electric field, collide with gas molecules, and consequently free additional electrons. Those electrons are in turn accelerated and free additional electrons. The result is an avalanche multiplication that permits electrical conduction through the gas. The discharge requires a source of free electrons and a significant electric field; without both, the phenomenon does not occur.

Townsend put forward the hypothesis that positive ions also produce ion pairs, introducing a coefficient expressing the number of ion pairs generated per unit length by a positive ion (cation) moving from anode to cathode.

Townsend, Holst and Oosterhuis also put forward an alternative hypothesis, considering the augmented emission of electrons by the cathode caused by impact of positive ions. This introduced Townsend's second ionisation coefficient; the average number of electrons released from a surface by an incident positive ion, according to the following formula: [formula is not shown here]

Filamentation also refers to the self-focusing of a high power laser pulse. At high powers, the nonlinear part of the index of refraction becomes important and causes a higher index of refraction in the center of the laser beam, where the laser is brighter than at the edges, causing a feedback that focuses the laser even more. The tighter focused laser has a higher peak brightness (irradiance) that forms a plasma. The plasma has an index of refraction lower than one, and causes a defocusing of the laser beam. The interplay of the focusing index of refraction, and the defocusing plasma makes the formation of a long filament of plasma that can be micrometers to kilometers in length. One interesting aspect of the filamentation generated plasma is the relatively low ion density due to defocusing effects of the ionized electrons.

[Marklund Convection]

Marklund convection, named after Göran Marklund, is a convection process that takes place in filamentary currents of plasma. It occurs within a plasma with an associated electric field, that causes convection of ions and electrons inward towards a central twisting filamentary axis. A temperature gradient within the plasma will also cause chemical separation based on different ionization potentials.

In Marklund's paper, the plasma convects radially inwards towards the center of a cylindrical flux tube. During this convection, the different chemical constituents of the plasma, each having its specific ionization potential, enters into a progressively cooler region. The plasma constituents will recombine and become neutral, and thus no longer under the influence of the electromagnetic forcing. The ionization potentials will thus determine where the different chemicals will be deposited.
This provides an efficient means to accumulate matter within a plasma. In a partially ionized plasma, electromagnetic forces act on the non-ionized material indirectly through the viscosity between the ionized and non-ionized material.

Hannes Alfvén showed that elements with the lowest ionization potential are brought closest to the axis, and form concentric hollow cylinders whose radii increase with ionization potential. The drift of ionized matter from the surroundings into the rope means that the rope acts as an ion pump, which evacuates surrounding regions, producing areas of extremely low density.

(Excerpts end)

There are 8 goals for the above excerpts:

1) Background on plasma filaments,

2) Birkelund currents and the Z-pinch,

3) Double Layer,

4) Electric discharges in the filament can be visible,

5) Toroidal pinch is relevant to the known toroid around Jupiter,

6) Plasmoids, which are toroids, can be ejected from a Z-pinch and can sometimes become a quasar when the ejection is from the Z-pinch within a Seyfert spiral galaxy whose core provides the metallic ions accompanying the ejected plasmoid to become a quasar,

7) Townsend effect is driven by positive ions impacting on the plasma filament. This effect is relevant to the observed luminous arcs and circles found only in distant clusters of large galaxies. M31 or Andromeda Galaxy is known to emit positive ions. The absorption lines of these ions cause the galaxy’s measured blue shift, because we can measure the motion of these ions only in our line of sight.

This M31 blue shift explanation is also in my free pdf copies, if one needs further details. There is a link to my recent post about recent research by others into more of these **ions around M31**; this post is relevant here.

8) Marklund Convection explains the mixing of metallic ions into a plasma filament.

4 Jupiter

Jupiter has a known plasma ring in its magnetosphere. This ring involves interactions with ions emitted by the moon Io.

Excerpt from Wikipedia:

The magnetosphere of Jupiter is the cavity created in the solar wind by the planet's magnetic field. Extending up to seven million kilometers in the Sun's direction and almost to the orbit of Saturn in the opposite direction, Jupiter's magnetosphere is the largest and most powerful of any planetary magnetosphere in the Solar System, and by volume the largest known continuous structure.

Although overall the shape of Jupiter's magnetosphere resembles that of the Earth's, closer to the planet its structure is very different. Jupiter's volcanically active moon Io is a strong source of plasma in its own right, and loads Jupiter's magnetosphere with as much as 1,000 kg of new material every second. Strong volcanic eruptions on Io emit huge amounts of sulfur dioxide, a major part of which is dissociated into atoms and ionized by electron impacts and, to a lesser extent, solar ultraviolet radiation, producing ions of sulfur and oxygen. Further electron impacts produce higher charge state, resulting in a plasma of S+, O+, S2+, O2+ and S3+. They form the Io plasma torus: a thick and relatively cool ring of plasma encircling Jupiter, located near Io's orbit.The plasma temperature within the torus is 10–100 eV (100,000–1,000,000 K), which is much lower than that of the particles in the radiation belts—10 keV (100 million K). The plasma in the torus is forced into co-rotation with Jupiter, meaning both share the same period of rotation. The Io torus fundamentally alters the dynamics of the Jovian magnetosphere.
As a result of several processes—diffusion and interchange instability being the main escape mechanisms—the plasma slowly leaks away from Jupiter. As the plasma moves further from the planet, the radial currents flowing within it gradually increase its velocity, maintaining co-rotation. These radial currents are also the source of the magnetic field's azimuthal component, which as a result bends back against the rotation. The particle number density of the plasma decreases from around 2,000 cm^{-3} in the Io torus to about 0.2 cm^{-3} at a distance of 35 RJ. In the middle magnetosphere, at distances greater than 10 RJ from Jupiter, co-rotation gradually breaks down and the plasma begins to rotate more slowly than the planet. Eventually at the distances greater than roughly 40 RJ (in the outer magnetosphere) this plasma is no longer confined by the magnetic field and leaves the magnetosphere through the magnetotail. As cold, dense plasma moves outward, it is replaced by hot, low-density plasma, with temperatures of up to 20 keV (200 million K) or higher) moving in from the outer magnetosphere. Some of this plasma, adiabatically heated as it approaches Jupiter, may form the radiation belts in Jupiter's inner magnetosphere.

While Earth's magnetic field is roughly teardrop-shaped, Jupiter's is flatter, more closely resembling a disk, and "wobbles" periodically about its axis. The main reasons for this disk-like configuration are the centrifugal force from the co-rotating plasma and thermal pressure of hot plasma, both of which act to stretch Jupiter's magnetic field lines, forming a flattened pancake-like structure, known as the magnetodisk, at the distances greater than 20 RJ from the planet. The magnetodisk has a thin current sheet at the middle plane, approximately near the magnetic equator. The magnetic field lines point away from Jupiter above the sheet and towards Jupiter below it. The load of plasma from Io greatly expands the size of the Jovian magnetosphere, because the magnetodisk creates an additional internal pressure which balances the pressure of the solar wind. In the absence of Io the distance from the planet to the magnetopause at the subsolar point would be no more than 42 RJ, whereas it is actually 75 RJ on average.
The configuration of the magnetodisk's field is maintained by the azimuthal ring current (not an analog of Earth's ring current), which flows with rotation through the equatorial plasma sheet. The Lorentz force resulting from the interaction of this current with the planetary magnetic field creates a centripetal force, which keeps the co-rotating plasma from escaping the planet. The total ring current in the equatorial current sheet is estimated at 90–160 million amperes.

(Excerpt end)

Observation:

The interaction of the plasma ring with ions emitted by the Moon Io suggests a mechanism like the Townsend effect, but this Jovian torus is not luminous. Instead, the flow of ions to the ring maintains the torus.

5 Gravitational Lens

Excerpt from Wikipedia:

A gravitational lens is a distribution of matter (such as a cluster of galaxies) between a distant light source and an observer, that is capable of bending the light from the source as the light travels towards the observer. This effect is known as gravitational lensing, and the amount of bending is one of the predictions of Albert Einstein's general theory of relativity. (Classical physics also predicts the bending of light, but only half of that predicted by general relativity.)
Although Einstein made unpublished calculations on the subject in 1912, Orest Khvolson (1924) and Frantisek Link (1936) are generally credited with being the first to discuss the effect in print. However, this effect is more commonly associated with Einstein, who published an article on the subject in 1936.

[From the image caption:]

What's large and blue and can wrap itself around an entire galaxy? A gravitational lens mirage. Pictured above, the gravity of a luminous red galaxy (LRG) has gravitationally distorted the light from a much more distant blue galaxy. More typically, such light bending results in two discernible images of the distant galaxy, but here the lens alignment is so precise that the background galaxy is distorted into a horseshoe -- a nearly complete ring. Since such a lensing effect was generally predicted in some detail by Albert Einstein over 70 years ago, rings like this are now known as Einstein Rings. Although LRG 3-757 was discovered in 2007 in data from the Sloan Digital Sky Survey (SDSS), the image shown above is a follow-up observation taken with the Hubble Space Telescope's Wide Field Camera 3. Strong gravitational lenses like LRG 3-757 are more than oddities -- their multiple properties allow astronomers to determine the mass and dark matter content of the foreground galaxy lenses. (citation from APOD)

(Excerpt end)

2 Observations:

1) There is a critical error in this description, about classical physics.

I recently self-published a free pdf titled Return to Classical Physics. I consider classical physics as the foundation set by Isaac Newton and James Clerk Maxwell. The pdf has references to relativity.

In Newton’s time, no mass had been assigned to a photon simply because that term arose much later, with Einstein. Maxwell lived many years after Newton, so Newton had no worthwhile definition of light available to him. A photon remains a mass-less quasi-particle, immune to gravity.

Maxwell worked with light only has a wave, as oscillating electric and magnetic fields, not particles moving within a medium. For Maxwell, light was never a particle. Neither of these scientists, both living many years before Einstein, would have predicted a specific angle of light bending by gravity when light had no assigned mass value. I can find no online reference detailing where this “prediction by classical physics” was made by whom and when.

Isaac Newton was certainly interested in light, but his contributions do not match those of Maxwell. Newton was noted for his work with prisms and the colors in light.

Excerpt from Wikipedia:

In 1704, Newton published Opticks, in which he expounded his corpuscular theory of light.

He considered light to be made up of extremely subtle corpuscles, that ordinary matter was made of grosser corpuscles and speculated that through a kind of alchemical transmutation "Are not gross Bodies and Light convertible into one another, ... and may not Bodies receive much of their Activity from the Particles of Light which enter their Composition?

(Excerpt end)

Observation:

Given Newton’s speculation of light being convertible in its nature, I expect it unlikely or impossible for Newton to have assigned a precise mass to light for a precise prediction to be compared to Einstein’s. Claiming Newton made such a precise prediction requires evidence, but there is none.

This attempted comparison of a prediction before to one later by Einstein is utterly baseless.

2) The image and its caption reveal this object CANNOT be the result of a gravitational lens!

The complex ring has obvious structure. A lens can only bend the path of light and cannot change its color or appearance. The typical claimed arc by a lens is a very thin arc, not one with no magnification and often a varying structure along its length.

The hypothetical lens can only bend the path of light. The color of electromagnetic radiation is driven by the energy distribution within its continuum of wavelengths. To change its color, energy must be exchanged. Gravity alone has no energy to exchange with the passing light. Proposing just gravity can change the energy in light is a violation of thermodynamics. The Doppler Effect uses the kinetic energy in the matter moving which can absorb or emit radiation. The object claimed to be a lens is not participating in any energy transfers with the passing light. It does not absorb or emit anything. All mass outside the light path cannot affect the energy in the light.

The blue is not lensed because no galaxies possess that basic color; their spectrum is predominately synchrotron radiation which results in the color white from the mix in the continuum of wavelengths being emitted, though dust clouds can affect the appearance (darker or redder) depending on the line of sight and the viewing angle. Blue cannot result.

The most likely explanation for the color blue is most likely from the Lyman-alpha emission line which is in ultraviolet; when the protons are moving away during the electron capture, then the wavelength shifts toward a blue.
The topic's explanation of the colors within the complex ring violates thermodynamics.

The simple rule for a lensed object is no structure. This object violates that rule and cannot be a lensed object. None of them are, but this object breaking the rule remains the selection for Wikipedia. Its use reveals there is no verification of articles and images matching the desired narrative.

6 Eddington Experiment

Excerpt from Wikipedia for Eddington Experiment:

One of the first considerations of gravitational deflection of light was published in 1801, when Johann Georg von Soldner pointed out that Newtonian gravity predicts that starlight will be deflected when it passes near a massive object. Initially, in a paper published in 1911, Einstein had incorrectly calculated that the amount of light deflection was the same as the Newtonian value. There had been plans by an American team from the Lick Observatory to measure the amount of deflection by making observations of an eclipse in Brazil in 1912, but bad weather prevented observations being made. Eddington had taken part in a British expedition to Brazil to observe the 1912 eclipse but was interested in different measurements.
Although Einstein's main work on general relativity was not published until 1915, he was aware before then that his 1911 calculation had been wrong, and that in fact the predicted effect in the Newtonian model is only half the value predicted by general relativity. This suggested a possible test for his theory, and in 1913 Einstein asked George Ellery Hale to suggest a way of detecting the deflection of light from a star as it passed the Sun.

The eclipse was due to take place in the early afternoon of 29 May, at 2pm, but that morning there was a storm with heavy rain. Eddington wrote:

The rain stopped about noon and about 1.30 ... we began to get a glimpse of the sun. We had to carry out our photographs in faith. I did not see the eclipse, being too busy changing plates, except for one glance to make sure that it had begun and another half-way through to see how much cloud there was. We took sixteen photographs. They are all good of the sun, showing a very remarkable prominence; but the cloud has interfered with the star images. The last few photographs show a few images which I hope will give us what we need ...

Eddington developed the photographs on Principe, and attempted to measure the change in the stellar positions during the eclipse. On 3 June, despite the clouds that had reduced the quality of the plates, Eddington recorded in his notebook: "... one plate I measured gave a result agreeing with Einstein."

In the post-Newtonian tests of gravity, the parameterized post-Newtonian formalism parameterizes, in terms of ten adjustable parameters, all the possible departures from Newton's law of universal gravitation. The earliest parameterizations of the post-Newtonian approximation were performed by Eddington (1922). The parameter concerned with the amount of deflection of light by a gravitational source is the so-called Eddington parameter (γ). It is the best constrained of the ten post-Newtonian parameters.

The early accuracy of eclipse measurements, however, was poor. Dyson et al. quoted an optimistically low uncertainty in their measurement, which is argued by some to have been plagued by systematic error and possibly confirmation bias, although modern reanalysis of the dataset suggests that Eddington's analysis was accurate. In 1801 Johann Georg von Soldner had pointed out that Newtonian gravity predicts that starlight will bend around a massive object, but the predicted effect is only half the value predicted by general relativity as calculated by Einstein in his 1911 paper. The results of Soldner were revived by the Nobel laureate Philipp Lenard in an attempt to discredit Einstein. Eddington had been aware in 1919 of the alternative predictions. Considerable uncertainty remained in these measurements for almost fifty years, until observations started being made at radio frequencies. It was not until the late 1960s that it was definitively shown that the amount of deflection was the full value predicted by general relativity, and not half that number.

The theory behind the experiment concerns the predicted deflection of light by the Sun. The first observation of light deflection was performed by noting the change in position of stars as they passed near the Sun on the celestial sphere. The approximate angular deflection $\delta\varphi$ for a massless particle coming in from infinity and going back out to infinity is given by the following formula: [the formula is not shown here]

Although this formula is approximate, it is accurate for most measurements of gravitational lensing, due to the smallness of the ratio rs/b. For light grazing the surface of the sun, the approximate angular deflection is roughly 1.75 arcseconds. This is twice the value predicted by calculations using the Newtonian theory of gravity. It was this difference in the deflection between the two theories that Eddington's expedition and other later eclipse observers would attempt to observe.

Dyson, when planning the expedition in 1916, had chosen the 1919 eclipse because it would take place with the Sun in front of a bright group of stars called the Hyades. The brightness of these stars would make it easier to measure any changes in position.

(Excerpt end)

Observation:

This description of the bad weather is important, but Eddington achieved his primary goal of seeking “a result agreeing with Einstein."

This experiment should have 2 goals:

1) Confirm Einstein’s prediction,

2) Verify there is no conflicting evidence.

The second goal should have been just as important as the first.

The description of the observation mentions only the one star on the solar limb, which was the primary goal for the expedition. Unfortunately for this pivotal experiment, this particular selection offers 2 distinct mechanisms for its light to bend.

1) Hypothetical bending by gravity,

2) Known behavior of bending by atmospheric diffraction.

At the solar limb, the solar atmosphere is at its maximum density by gravity pulling down loose plasma particles down to the photosphere surface. Their kinetic energy maintains an uneven distribution.

On the Earth: “you can actually see the Sun a few minutes before it rises and a few minutes after it sets” This is because of [atmospheric] refraction.” Many have observed this behavior, when having a clear view of the horizon.

This refraction is why the second goal was so important. The constellation of Hyades provided stars to check. Using stars in Hyades was noted in 2016.The cloudy conditions imply only the Sun and only the bright star on its limb might be captured in any images.

With gravitational lensing, ALL objects in the view should have been affected, but by their distance from the Sun. I recall web articles from 2019 stating other observers (not Eddington) noted several stars, and even a planet somewhat behind the Sun, were not shifted as expected. Those old articles must have been purged over time, and could not be found today, 2 years later.

When browsing for subsequent tests of stars not at the solar limb, no such tests are found. Apparently, these tests seek to repeat the original check of a prediction only at the limb.

Refraction occurs only at the limb. If that is the only star being checked, then refraction by the solar atmosphere has been confirmed numerous times.

Until all stars around the Sun are verified to match a prediction for each object’s distance, this experiment cannot be considered thorough.

Gravitational lensing remains unconfirmed. The force of gravity does not interact with the propagation of electric and magnetic fields. Gravity is a force limited to only particles having mass.

7 Ring Galaxies

Each galaxy has its section number as 7.x All have links in section of References.

7.1 Hoag's Object

Excerpt from Wikipedia:

Hoag's Object is a non-typical galaxy of the type known as a ring galaxy. The galaxy is named after Arthur Hoag who discovered it in 1950 and identified it as either a planetary nebula or a peculiar galaxy with eight billion stars, spanning roughly 100,000 light years.

A nearly perfect ring of young hot blue stars circles the older yellow nucleus of this ring galaxy c. 600 million light-years away in the constellation Serpens. The diameter of the 6 arcsecond inner core of the galaxy is about 17±0.7 kly (5.3±0.2 kpc) while the surrounding ring has an inner 28″ diameter of 75±3 kly (24.8±1.1 kpc) and an outer 45″ diameter of 121±4 kly (39.9±1.7 kpc). The galaxy is estimated to have a mass of 700 billion suns. By way of comparison, the Milky Way galaxy has an estimated diameter of 150-200 kly and consists of between 100 and 500 billion stars and a mass of around 1.54 trillion suns.
The gap separating the two stellar populations may contain some star clusters that are almost too faint to see. Though ring galaxies are rare, another more distant ring galaxy (SDSS J151713.93+213516.8) can be seen through Hoag's Object, between the nucleus and the outer ring of the galaxy, at roughly the one o'clock position in the image shown here.
Noah Brosch and colleagues showed that the luminous ring lies at the inner edge of a much larger neutral hydrogen ring.

In the initial announcement of his discovery, Hoag proposed the hypothesis that the visible ring was a product of gravitational lensing. This idea was later discarded because the nucleus and the ring have the same redshift, and because more advanced telescopes revealed the knotty structure of the ring, something that would not be visible if the ring were the product of gravitational lensing.

(Excerpt end)

Observation:

This explicit distinction of knotty structure to discard lensing is not applied consistently, because other external rings also show knots and structure but are still claimed to be an illusion by a lens.

7.2 Cartwheel galaxy

Excerpt from Wikipedia:

The Cartwheel Galaxy (also known as ESO 350-40 or PGC 2248) is a lenticular galaxy and ring galaxy about 500 million light-years away in the constellation Sculptor. It is an estimated 150,000 light-years diameter, and has a mass of about 2.9–4.8 × 10^9 solar masses; its outer ring has a circular velocity of 217 km/s.
It was discovered by Fritz Zwicky in 1941. Zwicky considered his discovery to be "one of the most complicated structures awaiting its explanation on the basis of stellar dynamics."
An estimation of the galaxy's span resulted in a conclusion of 150,000 light years, which is a moderate amount smaller than the Milky Way.
(Excerpt end)

Observation:

This galaxy is still waiting for an explanation after 80 years. Perhaps, cosmology must learn to apply MHD.

7.3 RX J1131-1231

Excerpt from Wikipedia:

RX J1131-1231 is a distant, supermassive-black-hole-containing quasar located about 6 billion light years from Earth in the constellation Crater.
In 2014, astronomers found that the X-rays being emitted are coming from a region inside the accretion disk located about three times the radius of the event horizon. This implies that the black hole must be spinning incredibly fast to allow the disk to survive at such a small radius. The measurement of the black hole's rotation is the first time astronomers have been able to directly measure the rotational speed of any black hole. This determination was made by a team led by Rubens Reis of the University of Michigan using NASA's Chandra X-ray Observatory and the European Space Agency's XMM-Newton telescopes. The team observed the X-rays generated in the innermost regions of the disk circling and feeding the black hole that powers the quasar. By measuring the radius of the disk, the astronomers were able to calculate the black hole's rotational speed, which was almost half the speed of light. The rapid spin of the quasar indicates that the black hole is being fed by a vast supply of gas and dust.
However, the measurements would not have been possible without a rare alignment of the quasar and a giant elliptical galaxy (which is itself part of a cluster of other galaxies in line with the quasar) which lies between Earth and RX J1131-1231. This line-up provided a quadruple gravitational lens which magnified the light coming from the quasar. The strong gravitational lensing effect associated with RX J1131-1231 has also produced measured time delays; that is, in one image the lensed quaser will be observed before the other image.
(Excerpt end)

Observation:

There is no evidence that an accretion disk, having a completely unknown composition (elements, density, etc.), can remain intact as condensed matter to emit thermal radiation having X-ray energy. Thermal usually spans from ultraviolet to infrared, never with X-ray. X-ray devices for medical applications employ a mechanism for synchrotron, never thermal. An accretion disk is pure conjecture.

This outer ring is emitting synchrotron radiation, which often spans from X-ray to infrared or even radio.

The black hole in the story is nonsense. The AGN in every quasar is a plasmoid, like the one recently imaged in M87 elliptical galaxy using radio wavelengths. Wal Thornhill provided a good explanation of a plasmoid in a YouTube video.

There is no evidence of a “quadruple gravitational lens.”

Gravity cannot increase the intensity or energy of the light wavelengths passing by! And by 4x!

This is an undefined energy transfer with no identified source of the external energy.

Apparently, Cosmologists must try to violate accepted physics when no other explanation can be found. They refuse to recognize the known sources of synchrotron radiation which can attain X-ray energies.

7.4 AM 0644-741

Excerpt from Wikipedia:

AM 0644-741, also known as the Lindsay-Shapley Ring, is an unbarred lenticular galaxy, and a ring galaxy, which is 300 million light-years away in the southern constellation Volans.
The yellowish nucleus was once the center of a normal spiral galaxy, and the ring which currently surrounds the center is 150,000 light years in diameter. The ring is theorized to have formed by a collision with another galaxy, which triggered a gravitational disruption that caused dust in the galaxy to condense and form stars, which forced it to then expand away from the galaxy and create a ring.

The ring is a region of rampant star formation dominated by young, massive, hot blue stars. The pink regions along the ring are rarefied clouds of glowing hydrogen gas that is fluorescing as it is bombarded with strong ultraviolet light from the blue stars.
(Excerpt end)

Observation:

The “glowing hydrogen gas” is area of protons capturing electrons and emitting the Lyman-alpha line in UV, as the fresh neutral atoms form.

7.5 SPD.81

Excerpt from EarthSky story:

[caption:]
Composite image of the gravitational lens SDP.81. The lensing object – a large quantity of mass between us and a more distant galaxy – is shown here as the blue center object (Hubble optical image). The more distant galaxy is shown in the red arcs (acquired by the ALMA telescope). The white dot near left lower arc segment shows the possible location of a dark dwarf galaxy. Image via Y. Hezaveh, Stanford Univ.; ALMA (NRAO/ESO/NAOJ); NASA/ESA Hubble Space Telescope.

A fascinating area of research in astronomy nowadays is the search for dwarf galaxies containing large amounts of dark matter. A superabundance of dwarf dark galaxies is thought to exist in our universe. They're thought to be much like our Milky Way's known satellite galaxies in that they orbit a larger galaxy, but different because they contain substantial amounts of unseen matter, the mysterious dark matter believed to make up much of the mass of our universe. To have so much mass in an unknown form of course tantalizes astronomers. Late last week (April 14, 2016), scientists with the ALMA telescope array in Chile announced their conclusion that they've found a dwarf dark galaxy via a gravitational lens. They're excited because it might mean a new way of studying dark matter in the distant universe, and because it might reveal the presence of more dwarf dark galaxies, which astronomers hope – for the sake of their current theories about the universe – do exist.
A detailed analysis of the image above of the gravitational lens SDP.81 – located some 4 billion light-years away – indicated the little dark galaxy's presence. The astronomers said in their statement that:
… this discovery paves the way for ALMA to find many more such objects and could help astronomers address important questions on the nature of dark matter.
And it could help them answer questions about dwarf dark galaxies, which have so far proven difficult to find.

One of these experimental images was that of an Einstein ring, which was produced by the gravity of a massive foreground galaxy bending the light emitted by another galaxy nearly 12 billion light-years away.
(Excerpt end)

Observation:

The center galaxy must have a magnetic field causing the Lorentz tangential force to push protons in their circular path.

The red arc is probably the loose protons capturing electrons and emitting the Balmer-alpha line having its red wavelength, as the fresh neutral atoms form.

The term "experimental images" implies this image is a computer generated illusion.

There is no dark matter.

8 Galaxies With External Arcs

Each galaxy or cluster has its section number as 8x. All have links in section of References. Their order is not significant.

8.1 Abell 370

Excerpt from Wikipedia:

Abell 370 is a galaxy cluster located approximately 4 billion light-years away from the Earth (at redshift z = 0.375), in the constellation Cetus. Its core is made up of several hundred galaxies. It was catalogued by George Abell, and is the most distant of the clusters he catalogued.
In the 1980s astronomers of Toulouse Observatory discovered a gravitational lens in space between Earth and Abell 370. A curious arc had been observed earlier near the cluster, but the astronomers were able to recognize it as this phenomenon.

(Excerpt end)

Observation:

There is a bright filament to the right of a giant elliptical galaxy. This filament is definitely not an arc, which would have a constant radius as part of a circle. This filament has structure at its bottom end. That discards the lens mechanism. The filament appears slightly red. The Balmer-alpha emission line is at 6563 A, or the color red. That emission line comes from a proton capturing an electron at a lower kinetic energy, than the Lyman-alpha line, which is in ultraviolet.

This “curious arc” cannot be from a lens when having structure.

8.2 Abell 383

Excerpt from Wikipedia:

Abell 383 is a galaxy cluster in the Abell catalogue.
[From the image caption:]

The giant cluster of elliptical galaxies in the centre of this image contains so much dark matter mass that its gravity bends light. This means that for very distant galaxies in the background, the cluster's gravitational field acts as a sort of magnifying glass, bending and concentrating the distant object's light towards Hubble.

(Excerpts end)

Observation:

There is a bright filament to the lower right of a giant elliptical galaxy. This filament is definitely not an arc, which would have a constant radius as part of a circle. This filament has varying intensity along its length. That inconsistency should discard the lens mechanism.

Apparently, dark matter must be invoked to explain this "concentration" of light in the filament, so the fictitious lens can remain as its explanation.

Plasma filaments nearly always get fictitious dark matter, because cosmologists ignore plasma physics.

8.3 Abell 1413

Excerpt from Wikipedia:

Abell 1413 is located 2 billion light years away from Earth between the constellations of Leo and Coma Berenices. It is one of 4,073 clusters of galaxies at redshift (meaning they are moving away from earth,) that are somewhat close to the Earth. Abell 1413 holds about 300 galaxies together with its strong gravity. Due to the strong interactions in the cluster, the material is heated up to 100 million degrees. Because of this intense heat, strong X-ray radiation is emitted from the cluster.

(Excerpt end)

Observation:

When the intracluster medium is generating X-rays, the source must be synchrotron radiation, with electric currents interacting with magnetic fields. X-rays cannot come from thermal radiation which requires condensed matter. This cluster's "material" is not a liquid or solid. The stated extreme temperature has no justification.

The 300 galaxies are widely separated despite "strong gravity" in the cluster. This suggests the inverse-square-distance application of gravity's force is being violated. The electromagnetic force is much stronger than gravity.

8.4 Abell 1689

Excerpt from Wikipedia:

Abell 1689 is a galaxy cluster in the constellation Virgo nearly 2.2 billion light-years away.
Abell 1689 is one of the biggest and most massive galaxy clusters known and acts as a gravitational lens, distorting the images of galaxies that lie behind it. It has the largest system of gravitational arcs ever found.
Abell 1689 shows over 160,000 globular clusters, the largest population ever found.
There is evidence of merging and gases in excess of 100 million degrees. The very large mass of this cluster makes it useful for the study of dark matter and gravitational lensing.
At the time of its discovery in 2008, one of the lensed galaxies, A1689-zD1, was the most distant galaxy found.

(Excerpt end)

Observation:

One can only wonder how the total mass in this cluster could be calculated, given its diversity.

This cluster's "material" is not a liquid or solid. The stated extreme temperature has no justification.

There are many short, bright filaments scattered within this cluster. Some of the galaxies have unusual shapes, like a red one at upper right. The particular objects making up this "largest system of arcs" are not identified.

The bright blue filaments could be from Lyman-alpha emissions in ultraviolet. Red is from Balmer-alpha emissions.

A1689-zD1 has a claimed redshift of z=7.6, but the NASA/IPAC Extragalactic Database site has no spectra to justify this value. Every galaxy redshift comes from atoms in the line of sight from Earth. This z value does not arise from the galaxy. It certainly has nothing to do with the galaxy's velocity or distance.

There is no justification for the stated distance to this cluster.

8.5 Abell 1835

Excerpt from Wikipedia:

Abell 1835 is a galaxy cluster in the Abell catalogue. It is a cluster that also gravitational lenses more-distant background galaxies to make them visible to astronomers. The cluster has a red shift of around 75,900 km/s and spans 12′.
In 2004, one of the galaxies lensed by this cluster was proposed to be the most distant galaxy known, Galaxy Abell 1835 IR1916.
(Excerpt end)

Observation:

Abell 1835 IR1916 is not in the NASA/IPAC Extragalactic Database site at this time. Every galaxy redshift comes from atoms in the line of sight from Earth. Its z value does not arise from the galaxy. It certainly has nothing to do with the galaxy's velocity or distance.

Since cosmology fails to disconnect redshift from velocity and distance, a gravitational lens is the excuse for the mistake with the awkward redshift.

8.6 Abell 2218

Excerpt from Wikipedia:

Abell 2218 is a cluster of galaxies about 2 billion light-years away in the constellation Draco. Acting as a powerful lens, it magnifies and distorts all galaxies lying behind the cluster core into long arcs. The lensed galaxies are all stretched along the cluster's center and some of them are multiply imaged. Those multiple images usually appear as a pair of images with a third — generally fainter — counter image, as is the case for the very distant object. The lensed galaxies are particularly numerous, as we are looking in between two mass clumps, in a saddle region where the magnification is quite large.

Abell 2218 was used as a gravitational lens to discover the most distant known object in the universe as of 2004. The object, a galaxy some 13 billion years old, is seen from Earth as it would have been just 750 million years after the Big Bang.
The color of the lensed galaxies is a function of their distances and types.
The orange arc is an elliptical galaxy at moderate redshift (z=0.7). The blue arcs are star-forming galaxies at intermediate redshift (z=1–2.5). There is a pair of images in the lower part of the picture of the newly discovered star-forming galaxy at about redshift 7.

[From the image caption:]

This image shows the full overview of the galaxy cluster Abell 2218 and its gravitational lenses. This image was taken by Hubble in 1999 during the Early Release Observations made immediately after the Hubble Servicing Mission 3A.
(Excerpt end)

Observation:

This cluster’s image has so many plasma filaments having structure, it is difficult to find the lens candidates.

Near the bottom and to the left there are 2 segments of a plasma filament which seems to terminate at a bright object (which is a knot so it’s not lensed) at roughly 8 o’clock from the cluster’s brightest elliptical galaxy (BCG).

Below this structured segmented filament, there is a broken bright blue thin filament with arc segments at 6 o, 8 o, and 9 o’clock. The blue is not lensed because no galaxies possess that color; their spectrum is predominately synchrotron radiation which results in white from the mix.

At about 2 o’clock from BCG is another elliptical galaxy which is emitting a long orange plasma filament at 4 o’clock, which ends at a knot, so it’s not lensed. In exactly the opposite direction form this galaxy, a similar knot was ejected. Opposing jets are not unusual, from the plasmoids at the center of ellipticals.

The top right corner of the image is clipped. In that remaining space, there are 2 ellipticals with vertical plasma filaments having notable structure so they are not lensed.

8.7 Abell 2667

Excerpt from Wikipedia:

Abell 2667 is a galaxy cluster. It is one of the most luminous galaxy clusters in the X-ray waveband known at a redshift about 0.2.
This cluster is also a well-known gravitational lens.
On 2 March 2007, a team of astronomers reported the detection of the Comet Galaxy in this cluster. This galaxy is being ripped apart by the cluster's gravitational field and harsh environment. The finding sheds light on the mysterious process by which gas-rich spiral-shaped galaxies might evolve into gas-poor irregular- or elliptical-shaped galaxies over billions of years.

[Caption of image:]

While looking at the galaxy cluster Abell 2667, astronomers found an odd-looking spiral galaxy (shown here in the upper left hand corner of the image) that ploughs through the cluster after being accelerated to at least 3.5 million km/h by the enormous combined gravity of the cluster's dark matter, hot gas and hundreds of galaxies.
(Excerpt end)

Observation:

That “odd-looking spiral galaxy” is definitely not the most interesting object in this cluster.

On the right-half of the image is a very bright elliptical galaxy, emitting a blue jet in the 10 o’clock direction. To its left is a bright, long, plasma filament, which exhibits both structure and color variation. This filament cannot be a lens illusion.

One might suspect this filament is just an undesirable distraction, to be avoided by diverting attention to the spiral on the opposite corner of the image.

Whatever the high redshift value is of that “ploughing” galaxy, it is certainly not its velocity. Every galaxy redshift is obtained from atoms in the line of sight. There is no galaxy in the universe with a measured 3-dimensional proper velocity. We use only atoms in the line of sight. This mistake leads to the false expansion, false dark energy, and the preposterous big bang creation event.

8.8 Abell S1063

Excerpt from Wikipedia:

Abell S1063 is a cluster of galaxies located in the constellation Grus.

[Caption of image:]

Abell S1063, a galaxy cluster, was observed by the NASA/ESA Hubble Space Telescope as part of the Frontier Fields programme. The huge mass of the cluster — containing both baryonic matter and dark matter — acts as cosmic magnification glass and deforms objects behind it. In the past astronomers used this gravitational lensing effect to calculate the distribution of dark matter in galaxy clusters. A more accurate and faster way, however, is to study the intracluster light (visible in blue), which follows the distribution of dark matter.

(Excerpt end)

Observation:

The image is not clear whether the blue haze around the bright giant elliptical galaxy is valid or a false color. The Lyman-alpha emission line is in ultraviolet, so any motion of the proton away from Earth, and toward the galaxy, would redshift its wavelength from UV toward blue.

The high radiant energy from the central galaxy is probably ionizing the surrounding hydrogen atoms which subsequently recombine to emit the Lyman-alpha line.

There are many blue arcs in the image around the central galaxy. These suggest the plasma filaments of protons and electrons are moving tangential, like by the Lorentz force from the galaxy’s magnetic field.

8.9 SDSS J103842.59+484917.7 - Cheshire Cat

Excerpt from the Chandra story:

This group of galaxies has been nicknamed the "Cheshire Cat" because of its resemblance to a smiling feline.

Some of the cat-like features are actually distant galaxies whose light has been stretched and bent by the large amounts of mass contained in foreground galaxies.

This is an effect called "gravitational lensing," predicted by Einstein's Theory of General Relativity that is celebrating its 100th anniversary.

X-rays from Chandra show that the two "eye" galaxies and the smaller galaxies associated with them are slamming into one another in a giant galactic collision.

(Excerpt end)

Observation:

After clicking on the Optical wavelength tab, one can imagine the center of a circle between the 2 bright galaxies. Relative to that center there is an arc from about 2 o'clock to a bright knot at 8 o'clock.
The segments of a circle with changing emission lines to get different colors cannot be from a lens.

The hypothetical lens can only bend the path of light. The color of electromagnetic radiation is driven by the energy distribution in its continuum of wavelengths. To change its color, energy must be exchanged. Gravity alone has no energy to exchange with the passing light. Proposing just gravity can change the energy I light is a violation of thermodynamics. The Doppler Effect uses the kinetic energy in the matter moving which can absorb or emit radiation. The object claimed to be a lens is not participating in any energy transfers with the passing light. It does not absorb or emit anything. All mass outside the light path cannot affect the energy in the light.

The Chandra explanation of the colors in the cat-like features violates thermodynamics.

With no measurement of the 3-dimensional proper motion of any object, any mention of a collision, of any magnitude, is unjustified conjecture. Using only atoms moving in the line of sight is incorrect.

8.10 RCS2 032727-132623

Excerpt from the news release:

A team of astronomers aimed Hubble at one of the most striking examples of gravitational lensing, a nearly 90-degree arc of light in the galaxy cluster RCS2 032727-132623. Hubble's view of the distant background galaxy, which lies nearly 10 billion light-years away, is significantly more detailed than could ever be achieved without the help of the gravitational lens.

Thanks to the presence of a natural "zoom lens" in space, NASA's Hubble Space Telescope got a uniquely close-up look at the brightest "magnified" galaxy yet discovered.
This observation provides a unique opportunity to study the physical properties of a galaxy vigorously forming stars when the universe was only one-third its present age.
A so-called gravitational lens is produced when space is warped by a massive foreground object, whether it is the Sun, a black hole, or an entire cluster of galaxies. The light from more-distant background objects is distorted, brightened, and magnified as it passes through this gravitationally disturbed region.
A team of astronomers led by Jane Rigby of NASA's Goddard Space Flight Center in Greenbelt, Md., aimed Hubble at one of the most striking examples of gravitational lensing, a nearly 90-degree arc of light in the galaxy cluster RCS2 032727-132623. Hubble's view of the distant background galaxy is significantly more detailed than could ever be achieved without the help of the gravitational lens.

The distorted image of the galaxy is repeated several times in the foreground lensing cluster, as is typical of gravitational lenses. The challenge for astronomers was to reconstruct what the galaxy really looked like, were it not distorted by the cluster's funhouse-mirror effect.
Hubble's sharp vision allowed astronomers to remove the distortions and reconstruct the galaxy image as it would normally look. The reconstruction revealed regions of star formation glowing like bright Christmas tree bulbs. These are much brighter than any star-formation region in our Milky Way galaxy.
Through spectroscopy, the spreading out of light into its constituent colors, the team plans to analyze these star-forming regions from the inside out to better understand why they are forming so many stars.

Scientists rely on gravitational lenses in order to get a glimpse at the frenetic star-formation regions of distant galaxies in the early universe. Nearby galaxies tend to appear more mature and in the waning stages of star-formation, researchers said.
In the new Hubble image, astronomers aimed the space telescope at the galaxy cluster RCS2 032727-132623, which is surrounded by a nearly 90-degree arc of bright light from an even more distant galaxy. Because of the gravity distortions, the image of the background galaxy is repeated several times — a hallmark feature of gravitational lenses, researchers said.

"The challenge for astronomers was to reconstruct what the galaxy really looked like, were it not distorted by the cluster's funhouse-mirror effect," according to NASA's image description.

(Excerpt end)

Observation:

There are 4 bright elliptical galaxies roughly together near the center.

the large filament to the left of the center-4 has visible changes in structure along its length; so this filament is plasma, and not a lensed object.

A lensed object should exhibit a consistent arc radius from the lens. These do not. The lens cannot create structure in the illusion.

There are 2 blue plasma filaments above and to the right of the center-4. Both exhibit structure and cannot be lensed objects.

As with other blue filaments in other clusters, they have Lyman-alpha emission regions.

The description implies the astronomers intend to take these individual plasma filaments having Lyman-alpha emission lines, and reconstruct the galaxy's original stars, despite the fact an intact galaxy exhibits the flat continuum of synchrotron radiation. These arcs are not pieces of a picture but are distinct plasma filaments.

Their "funhouse-mirror effect" is just new unproductive time replacing their current waste of time looking for fictitious gravitational lenses.

There are no lensed objects here. There is no galaxy to reconstruct.

8.11 SDSS J0146-0929

Excerpt from space.com story, starting with its caption:

The graceful arcs at the center of this image from the Hubble Space Telescope are actually the distorted light of distant galaxies, twisted to form an "Einstein ring" by the gravitational influence of the closer galaxy cluster SDSS J0146-0929. (Image credit: ESA/Hubble & NASA; Acknowledgment: Judy Schmidt)
The perfect circle surrounding a galaxy cluster in a new Hubble Space Telescope image is a visual indicator of the huge masses that are bending time and space in that region.
The galaxy cluster, called SDSS J0146-0929, features hundreds of individual galaxies all bound together by gravity. There's so much mass in this region that the cluster is distorting light from objects behind it. This phenomenon is called an Einstein ring.

The ring is created as the light that comes from distant objects, like galaxies, passes by "an extremely large mass, like this galaxy cluster," NASA said in a statement. "In this image, the light from a background galaxy is diverted and distorted around the massive intervening cluster and forced to travel along many different light paths toward Earth, making it seem as though the galaxy is in several places at once."

The ring is named after Albert Einstein, who wrote his theory of general relativity in the early 1900s. In it, he suggested that a massive object would warp space and time. This process is known today as a gravitational lens. When the most massive galaxies and galaxy clusters get in line with a more distant object, they produce an Einstein ring – a type of gravitational lens.

Einstein rings (and gravitational lenses more generally) give astronomers a huge advantage when they are trying to look at faraway objects. The rings and lenses magnify objects that otherwise would be too distant and dim to see in today's telescopes.
(Excerpt end)

Observation:

The ring appears as 3 individual arcs. Each has its own unique varying structure. The arc at the lower left has a knot, all break the rules established for Hoag's Object. These 3 arcs are luminous plasma filaments and cannot be lensed objects, as claimed.

Astronomers are piling much garbage onto Einstein to justify their delusions.

I cannot find a public archive of Einstein's declaration of space-time enabling a magnification or multiplication of light sources, in addition to the bending of light. Bending was the only goal of Eddington's 1919 expedition. There were never measurements of changes in stellar magnitudes in those experiments prior to 1930.

Einstein had several basic, wrong assumptions in relativity:

1) Velocity of mass cannot exceed velocity of light. Quasars with a high redshift from superliminous protons frequently break this rule.

2) Acceleration from a gravitational field is equivalent to the acceleration which could result from Newton's force. Unfortunately, they are definitely not equivalent. Newton's force affects both bodies, where each mass gets its own acceleration from the mutual force, while Einstein's context simply ignores the other body. This mistake renders Einstein an invalid replacement for Newton.

To enforce his first mistake, he needed consequences for someone violating his unjustified first rule, so that rule-breaking observer must have their special, personal time altered to preserve the illusion that Einstein's velocity rule remained intact.

There is no object in the universe subject to only gravitational fields. Every object in the universe, depending on its charge, is subject to the instantaneous combination of the 2 fundamental forces from all the objects around it: gravity and electric, with each diminished by inverse-square of distance between them. Magnetic force affects only charged objects in motion.

When Einstein ignored the special observer's charge and mass and applied only 1 of 3 possible forces on any object, and then used only one narrow context for gravity, he offered a flawed theory.

There is no object in the universe affected by the fictitious warped source and time, in the restricted context of space-time. I tried to dispose physics of this nonsense in my free pdf, Return to Classical Physics.

10 Arc Mechanism

The arcs noted in section 8 with a variety of galaxy clusters are rather diverse. They are claimed to be an illusion created by a theoretical effect where gravity, rather than the medium, can affect the path of light.

There are 2 distinct types of these arcs:

1) Plasma filament having observed structure. The rule for a lensed object is it has no visible structure. This rule established Hoag's Object as having a real ring, not an illusion looking like a ring.

When an arc has structure, then it cannot be an accepted, lensed object. The explicit rule, set by cosmologists, is being violated.

2) Thin filaments having color but no observed structure.

Explaining the colored fragments requires familiarity of plasma filaments. They usually contain electrons, with ions or protons.

When an ion captures an electron, it emits a characteristic wavelength, when the atom's energy level falls to its ground state. This transfer of internal atomic energy, being held in the electron shells, to radiated energy conforms to thermodynamics.

The Doppler Effect also conforms to thermodynamics, where the kinetic energy of the ion or proton also participates and can be exchanged with the wavelength emission, causing a slight variation in the wavelength depending on the particle's direction. This mix of opposite charges can move long distances without captures within the filament, observed as a gap. Some arcs are observed as fragments wile others maintained the motion through the captures, observed as a continuous arc.

Marklund Convection described a mechanism for ions to be collected in a plasma filament. This explains the presence of metallic ions in a plasma filament. As noted earlier, some spiral galaxies (including M31) are known to emit metallic ions. These external rings are observed in distant galaxy clusters which always have spiral galaxies with the giant ellipticals.

11 Final Conclusion

There are several distant celestial objects having accepted real rings. Both Hoag's Object and the Cartwheel Galaxy are known to many astronomers.

Galaxies with ring or arc features are too distant for space probes.

Rings and arcs around very distant galaxies are always dismissed as only an illusion. Plasma behaviors are never considered.

These claims of an illusion can be dismissed by providing a reasonable explanation for each observation.

I offered my tentative explanation for an arc around a distant galaxy. Some claimed lensed objects are clearly plasma filaments having definite structure so claiming those are lensed objects is just a mistake. With others, the arc is a plasma filament with an ion or proton capturing an electron to emit the atom's characteristic wavelength. When these captures are periodic within the travel of particles within the filament, then it can be seen as arcs rather than as a continuous arc.
It is impossible for a direct confirmation without direct spectrum measurements of ever component, or by a closer observation of an arc.

These claimed illusions are just avoiding classical physics, and its progression to include plasma physics (which arose so long ago, in 1970).

All of the arcs can be explained by applying known plasma physics behaviors.

There is no evidence for the theoretical gravitational lens behavior. Gravity cannot bend the path of light. Per James Clerk Maxwell, only the medium at the instant can affect the propagation velocity of the synchronized, perpendicular electric and magnetic fields which is the combination serving as the mechanism for carrying the energy within electromagnetic radiation.

As noted early in this document, I recently self-published a free pdf titled Return to Classical Physics. I consider classical physics as the foundation set by Isaac Newton and James Clerk Maxwell.

LIGO is not relevant to celestial arcs, but LIGO represents the failure of modern physics to self- correct its mistakes, as it has become diverted so far from classical physics.

LIGO suffers from its own illusion.

An earth tide (usually from the Moon) is the real event in the Earth's crust, during the daily rotation, driving the illusion of a gravitational wave.

LIGO is another demonstration of physicists and cosmologists being unable: first, to resist the dogma, second, recognize its failure, and finally third, seek a better explanation, even among other disciplines, like plasma physics. A science which does not learn from new theories and their accompanying evidence is a failed science.

LIGO claims to exist non-existent entities and the claims are accepted by the scientific community with no evidence.

I recently self-published a free pdf, titled LIGO Legacy, to thoroughly describe the failure of LIGO, and the distorted physics associated with it.

12 References

The references in the book are available as clickable links from a page in the author's web site.

1. Start web browser
2. Go to this site: www.cosmologyview.com
3. Make sure the browser is on the correct home page:

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