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Apparent Detection of a New Antimatter Galaxy in the Capella Region of the Night Sky

Ruggero Maria Santilli[1]

[1] Thunder Energies Corporation

1444 Rainville Rd, Tarpon Springs, FL 34589, U. S. A.

⋆ *Corresponding Author*. E-mail: research@thunder-energies.com

Abstract. By using a 102 mm telescope with concave objective lens (known as the Santilli telescope), recent works have indicated the apparent existence of an antimatter galaxy in the Vega region of the night sky, as well as the apparent existence of antimatter cosmic rays and antimatter asteroids. By using a 152 mm Santilli telescope, in this paper we present for the first time evidence suggesting the existence of a second antimatter galaxy, this time in the Capella region of the night sky. We also present evidence apparently confirming the existence of antimatter cosmic rays and antimatter asteroids. The author suggests that the new detection in the Capella region of the night sky be named "Rak antimatter galaxy" in recognition of the dedication to the advancement of basic scientific knowledge by Professor Jan Rak, of the University of Jyväskylä, Finland.

1. INTRODUCTION

Mathematical, theoretical, and experimental studies conducted over the past decades have confirmed the view by Albert Einstein, Edwin Hubble, Fred Hoyle, Fritz Zwicky, Enrico Fermi, Louis de Broglie, and other famous scientists, who died without accepting the conjecture of the expansion of the universe [1-6] (see also general references [7]).

Among other reasons, this historical view was due to the fact that Hubble's law for the cosmological redshift of galactic light, $z = Hd$ (where H is Hubble's constant and d is the distance), once interpreted as being due to the expansion of the universe, $z = Hd = v/c$, implies the same cosmological red shift z for all galaxies at the same distance *d in all 'radial' directions from Earth,* thus implying a return to the Middle Ages with Earth at the center of the universe (see Refs. [7] for brevity and Figure 1).

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Additionally, the conjecture of the expansion of the universe and its inherent acceleration are afflicted by serious inconsistencies, such as the fact that two galaxies at double distance from Earth must have a relative acceleration, although there exist an infinite number of observers in the universe for which the same galaxies have the same distance, thus prohibiting a relative acceleration and confirming the historical view by Einstein, Hubble, Hoyle, Zwicky, Fermi, de Broglie, and others [7] (Figure 1).

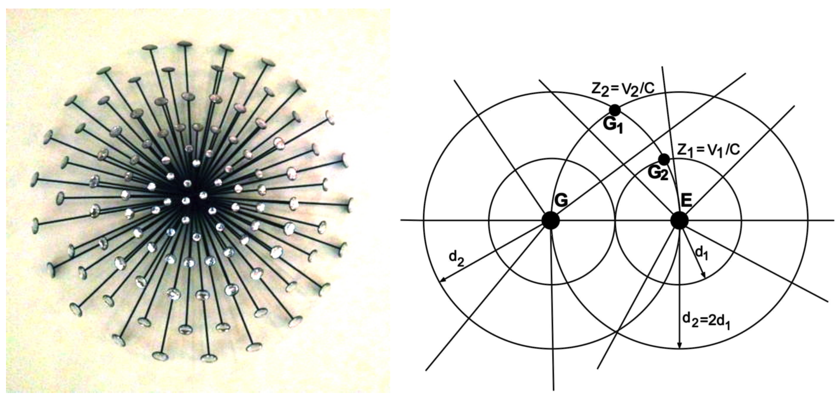


Fig. 1 Albert Einstein, Edwin Hubble, Fred Hoyle, Fritz Zwicky, Enrico Fermi, Louis de Broglie, and other illustrious scientists never accepted the conjecture of the expansion of the universe because, as illustrated by the sculpture in the left, its representation of Hubble's law on the cosmological redshift $z = Hd = v/c$ is 'radial' in all directions from Earth, thus implying a return to the Middle Ages with Earth at the center of the universe. Additionally, the conjecture of the expansion of the universe and its inherent acceleration are inconsistent because, as illustrated by the diagram on the right, galaxies G_1 and G_2 have double distance from Earth E, thus having a relative acceleration according to said conjectures. However, there exist an infinite number of observers in the universe, such as galaxy G, for which galaxies G_1 and G_2 have the same distance and, consequently, cannot have irrelative acceleration thus confirming the indicated historical view.

The validity of the indicated historical view has been confirmed by numerous experimental measurements, conducted in the U.S.A. as well as in Europe [1-6] confirming Zwicky's hypothesis of *Tired Light*, according to which the cosmological redshift is merely due to light losing energy without relative motion, and therefore decreasing its frequency, to the intergalactic medium composed by hydrogen, particles, light and other physical entities (Figure 2).

The evidence on the lack of expansion of the universe implies the return to a *static universe,* thus creating the problem of the stability of the universe because a universe solely composed by matter galaxies should have collapsed billions of years ago due to gravitational attraction.

As it is well known, Einstein attempted to achieve the stability of a static universe solely composed by matter galaxies by modifying his gravitational field equation, but failed to achieve the gravitational repulsion between matter galaxies need for the stability of the universe, and no quantitative cosmological model proving the stability of a universe solely composed by matter stars has been achieved to date to our best knowledge [7].

Recent studies [8] have indicated that the stability of the universe can indeed be achieved by admitting the existence of *antimatter galaxies* in the universe because the widely accepted gravitational repulsion (also known as antigravity) between matter and antimatter not only implies stability, but also explains the extremely large mutual distance of galaxies in the universe.

in view of the indicated historical views, the author has been interested since his graduate studies in the mid 1960's at the University of Torino, Italy, to achieve a representation of antimatter galaxies

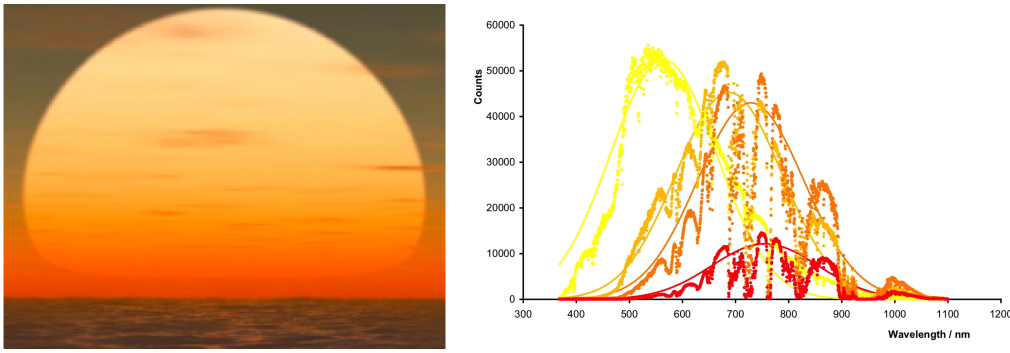


Fig. 2 Experimental works [1-6] have established that the redness of the Sun at Sunset (left view) is a redshift for about 90 nm (right view) without any relative motion between the source, the medium and the observer called isoredshift, merely due to loss of energy in our atmosphere. Consequently, the redness of the Sun at Sunset is visual evidence of the validity of Zwicky's hypothesis of the 'Tired Light,' namely, that the cosmological redshift is due to loss of energy by light to the intergalactic medium without any need for implausible conjectures that trillions and trillions of galaxies move away from Earth at accelerating speeds without any identification of the needed enormous energy. These experimental results have confirmed the view by Einstein, Hubble, Hoyle, Zwicky, and others that the universe is stationary. The most plausible hypothesis for the achievement of its stability is then the admission of antimatter galaxies in view of matter-antimatter gravitational repulsion [8[.

that must evidently hold for *neutral* antimatter bodies (because galaxies must be assumed as being neutral) at the purely *classical* level, prior to any quantization.

The author was aware that the sole 20th century representation of antimatter was that at the level of elementary particles, as well as in second quantization. The author was additionally aware of the 20th century belief that the photon has no anti-matter counterpart because it is invariant under charge conjugation.

However, such an assumption implies the lack of quantitative representation of matter-antimatter annihilation, because said assumption requires the representation of both, matter and antimatter, in the same Hilbert space with ensuing equivalent characteristics.

Additionally, said assumption implies known difficulties for the characterization of the antimatter counterpart of neutral particles, thus essentially restricting the conjugation from matter to antimatter solely to charged particles.

For the intent of achieving a quantitative representation of neural or charged antimatter at the classical and quantum levels, when in the faculty of Harvard University in the early 1980's under support from the U.S. Department of energy, the author constructed a new mathematics which is anti-isomorphic to the conventional mathematics used for matter, today known as *isodual mathematics* [9], under which all characteristics of matter are conjugated into opposite values for the characterization of antimatter.

The author then applied isodual mathematics for the construction of *the isodual theory of antimatter* for which, unlike the charge conjugation, the isodual conjugation applies for all particles irrespective of whether they are charged or not, and at the classical as well as the quantum level [10].

The isodual theory of antimatter then implied in the prediction of the antimatter counterpart of the photon, called *isodual photon,* whose characteristics are all opposite those of the conventional photon, thus being experimentally verifiable [11].

The PCT theorem requires that matter and antimatter annihilate into two light, the conventional and the isodual light, at all levels, from particle-antiparticle annihilation to cosmological matter-antimatter annihilation [9].

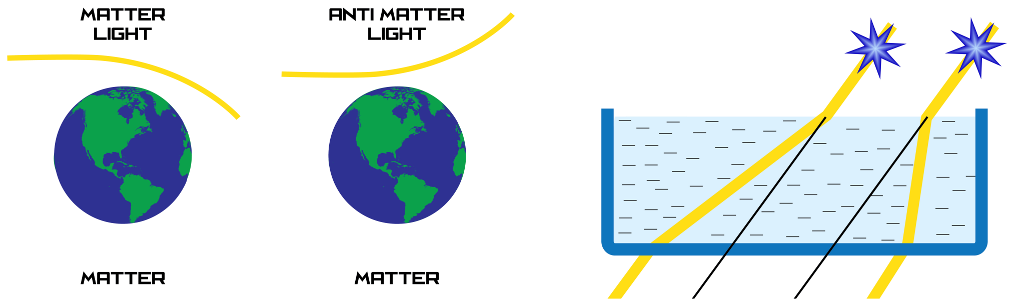


Fig. 3 In order to conduct quantitative studies on the expected presence of antimatter galaxies, the author constructed the isodual theory of antimatter [9] according to which all characteristics of matter are conjugated into opposite values in the transition to antimatter as a necessary condition to represent matter-antimatter annihilation. The latter condition implies that light emitted by antimatter, called 'isodual light, is different than that emitted by matter by having, in particular, negative energy as originally conceived by P. A. M. Dirac, although referred to negative units of energy [11]. Consequently, isodual light is predicted to be repelled by a matter gravitational field (left view) and have a negative index of refraction (right view).

As an example, antimatter at large, and the isodual photons in particular, are predicted to have *negative energy* as originally conceived by P.A.M. Dirac (see Ref. [9] for historical references). The known violation of causality by negative energy is resolved by isodual mathematics because it is referred to *negative units* of energy.

The isodual theory of antimatter implies a full democracy between matter and antimatter by therefore allowing the study of antimatter at all possible levels, including: isodual Newtonian mechanics, isodual Minkowskian and Riemannian geometries, and isodual quantization [*loc. cit*].

In view of these features, the isodual theory of antimatter predicts the existence of antimatter galaxies, antimatter cosmic rays, and antimatter asteroids. This prediction appears to be verified by cataclysmic explosions that have devastated our planet in the past, such as the 1908 Tunguska explosion in Siberia that flattened the trees in a very large area without any crater [12].

The Tunguska explosion is widely assumed to be due to an ice comet that exploded in our upper atmosphere. However, according to known records, two days later people could read newspapers at midnight in Sydney, Australia, without any artificial light. The documented ionization in 1908 of the entire Earth's atmosphere can only be scientifically explained by an antimatter asteroid annihilating in the upper atmosphere with the ensuing release of very intense electromagnetic radiations of all frequencies [12].

Following the above studies, in the early 2000's the author initiated the search for a means to detect expected antimatter galaxies. The isodual theory of antimatter implies that all characteristics of antimatter are opposite those of matter, with no known exception. In turn, this implies that antimatter-light has negative energy, thus being repelled by a matter gravitational field, and that the index of refraction of antimatter-light must be opposite that of matter-light. (Figure 3).

These features imply that the focusing of images caused by antimatter light can only be achieved with telescopes with concave lenses, today known as the *Santilli telescope,* since concave lenses are

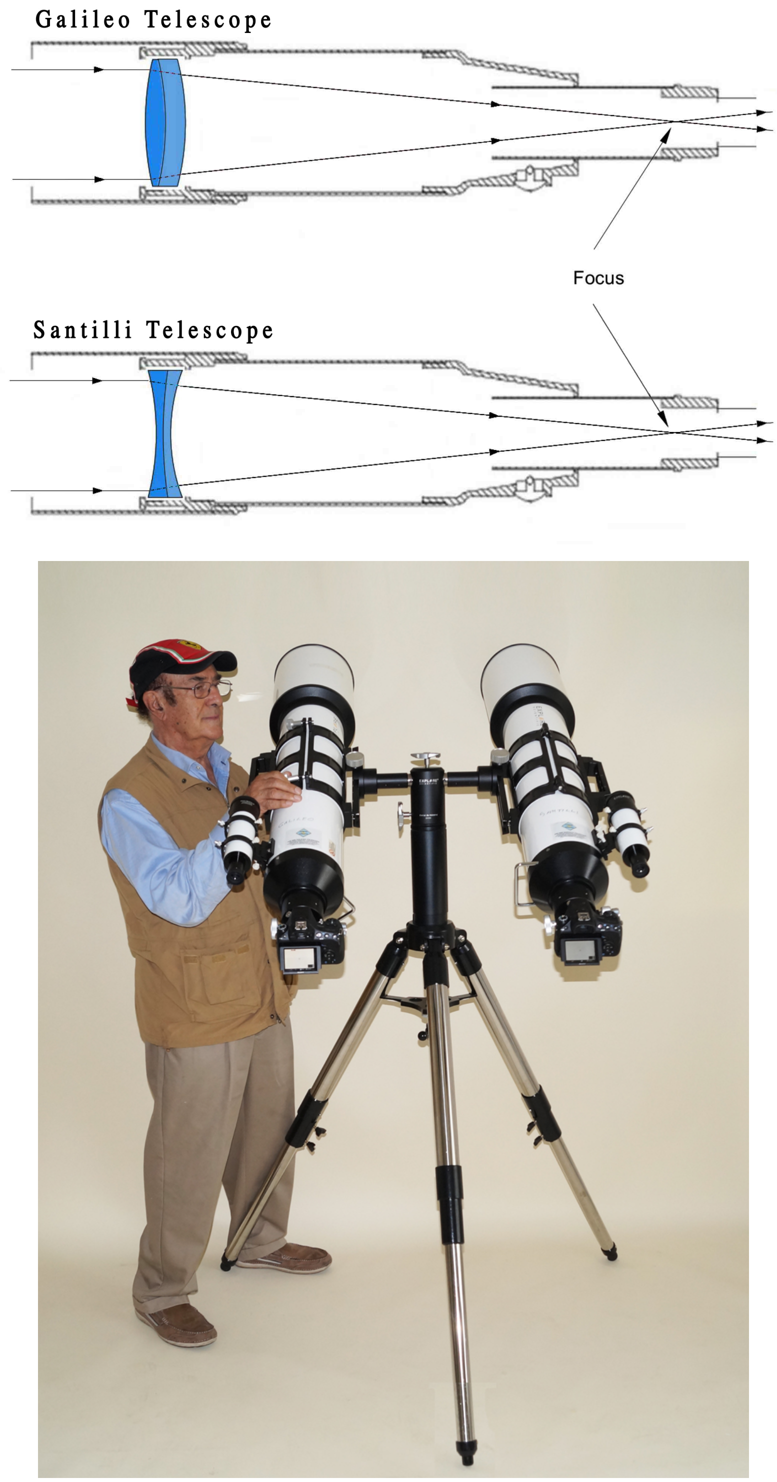


Fig. 4 In the top image, the structure of a pair of Galileo and Santilli telescopes. Isodual light entering the Galileo telescope is dispersed by its convex lens into the internal walls, thus causing no interference with the focusing of images of ordinary light. Conversely, ordinary light is dispersed into the internal walls of the Santilli telescope due to its concave lenses, thus allowing the focusing of images caused by antimatter-light without interferences from ordinary light. In the bottom image, we show the pair of 152 mm Galileo and Santilli telescopes used by the author for the tests reported in this paper.

the necessary conjugate of the convex lenses of conventional, refractive *Galileo telescopes* (Figure 4) [13].

Due to manufacturing delays, in 2012 the author finally managed to obtain a pair of 102 mm Galileo and Santilli telescopes according to the specifications of isodual optics, and initiated scanning of the night sky in 2013 by comparing images in the two telescopes.

The two parallel telescopes were equipped with a digital camera to achieve focus in the Galileo telescope and then the focusing data was transferred to the Santilli telescope. By remembering that antimatter-light is predicted to have negative energy, its detection could only be made as a dark streak in the conventional background of the digital or film camera.

It should be indicated that our human eyes will never allow us to see images caused by antimatter light since our cornea is convex and, as such, it will disperse said images all over our retina, and a similar occurrence holds for Galileo telescopes, thus suggesting detections via film or digital cameras attached to both telescopes.

For this reason, the author initiated systematic scans in the Vega region of the night sky, since Vega is the brightest star in the sky, thus producing the needed conventional background. Following systematic scans, the author published in 2014 scans suggesting the apparent existence of an antimatter galaxy in the Vega region of the night sky, as well as the apparent existence of antimatter cosmic rays and antimatter asteroids [14].

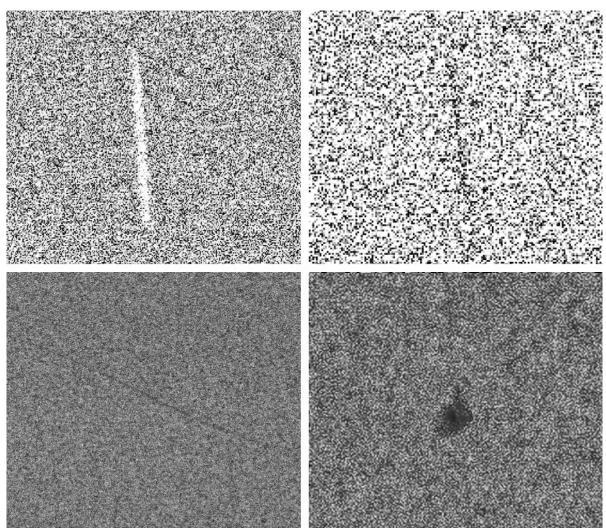


Fig. 5 Selected scans from Refs. [16] of the Vega region of the night sky taken with a film camera attached to the pair of Galileo and Santilli telescopes under 15 seconds exposure. The scans provide from the top left: 1) A view of Vega star; 2) A view of an apparent antimatter galaxy; 3) An instantaneous streak in a direction different than that of the Vega star expected to be due to an antimatter asteroid annihilating in our atmosphere; 4) The view of dots also taken under 15 seconds exposure that can only be a virtually instantaneous event expected to be the isodual light of antimatter cosmic rays annihilating in our upper atmosphere.

These findings were then preliminarily confirmed by two independent measurements of the same region of the sky using the same pair of 102 mm Galileo and Santilli telescopes [15,16] (see Figure 5 for representative scans, Ref. [17] for an independent review, and Ref. [18] for the general bibliography).

In this paper, we report for the first time evidence suggesting the apparent existence of a second antimatter galaxy, this time in the Capella region of the night sky, via the use of a pair of 152 mm Galileo and Santilli telescopes.

2. THE DETECTIONS

On April 29, 2016, the author inspected the Capella region of the night sky beginning at 9:25 pm with the use of a pair of 152 mm Galileo and Santilli telescopes in regular production and for sale in various sizes by the U. S, publicly traded company *Thunder Energies Corporation* (stock symbol TNRG and web site www.thunder-energies.com).

The objective lens of the refractive Galileo telescope consists of a conventional doublet with 152 mm outside diameter and 885 focal distance. The objective lens of the refractive Santilli telescope consists of a 152 mm doublet whose curvatures and focal distance, in accordance with isodual optics, have values opposite to those of the Galileo telescope.

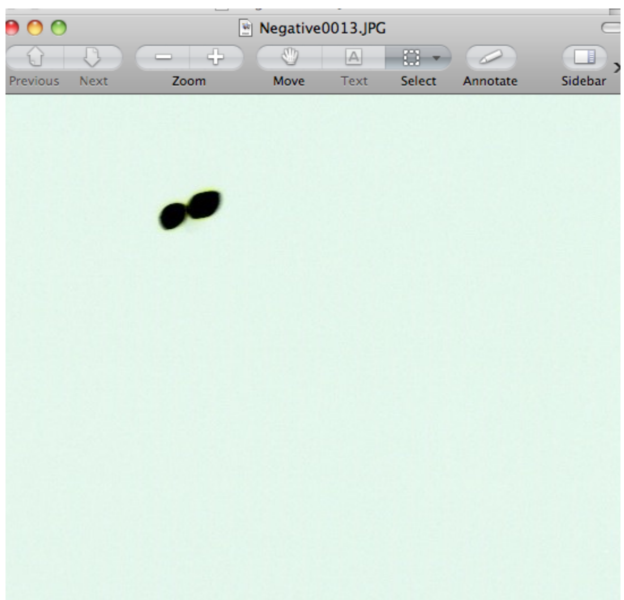


Fig. 6 A view of Capella from frame 0013 under 10 seconds exposure showing its double star structure as well as the apparent direction of motion caused by Earth's rotation.

Detections were done at GPS Coordinates: latitude 28.117201 (North), longitude -82.76894700000003 (West), and elevation 1 meter, with the use of a Canon film camera model F-1 using Fujichrome Professional Provia 100F 35 mm film produced by Fujifilm. The roll comprising 38 pictures, was developed by Zebra-Color Inc, 2036 Central Ave., St. Petersburg, FL 33712. Copies of all pictures used in this paper as well as copies of the complete set of all 38 original jpg scans quoted below can be downloaded from Ref. [19].

The two telescopes were optically aligned to be parallel and mounted on their tripod as illustrated in Figure 4. The two parallel telescopes were oriented toward Capella. Focusing was done in the Galileo telescope via the screen of a digital Canon camera model 600D, until Capella appeared as sharp as possible, and the focuser of the Galileo telescope was locked with the related fastener.

The elongation of the focuser of the Santilli telescope was then adjusted to be the same as that in the Galileo telescope, and said focuser was locked with the related fastener. These preliminary steps were done by using a Canon camera 600d in ISO-800 and the exposure.

Following these preparatory steps, the Galileo telescope was equipped with the film camera, Canon F1 using Fujichrome Professional Provia 100F 35 mm film. The author then took a number of pictures of Capella under a 10 second exposure to avoid overexposure.

A representative picture is provided in Figure 6 showing the double star structure of Capella as well as the apparent direction of motion caused by Earth's rotation. Note that Capella appears dark over a bright background since the scans refer to negatives.

Subsequently, the author transferred the camera and ongoing film to the Santilli telescope and took all remaining pictures of the roll under 30 seconds exposure, so as to have a good conventional background as well as clear directions of the expected streaks.

The pictures were taken in a random orientation contained in a cone of about 3 degrees centered on Capella. No accurate identification of the scanned region was possible due to the limitations of the available equipment.

The roll of film was developed by Zebra Color Inc. which also provided the jpg scans of the frames. Frame 001 and 0048 were discarded due to possible contaminations, and all remaining frames were inspected, first without enlargement, and then under suitable enlargement and contrast, resulting in the detection of:

1. Straight streaks parallel to Capella's streak reported in Figures 7, 8. 9, that appear bright over a dark background since they refer to negatives;
2. Numerous dots throughout the roll of pictures reported in Figure 10; and
3. Generally curved streaks in random directions other than that of Capella reported in Figure 11.

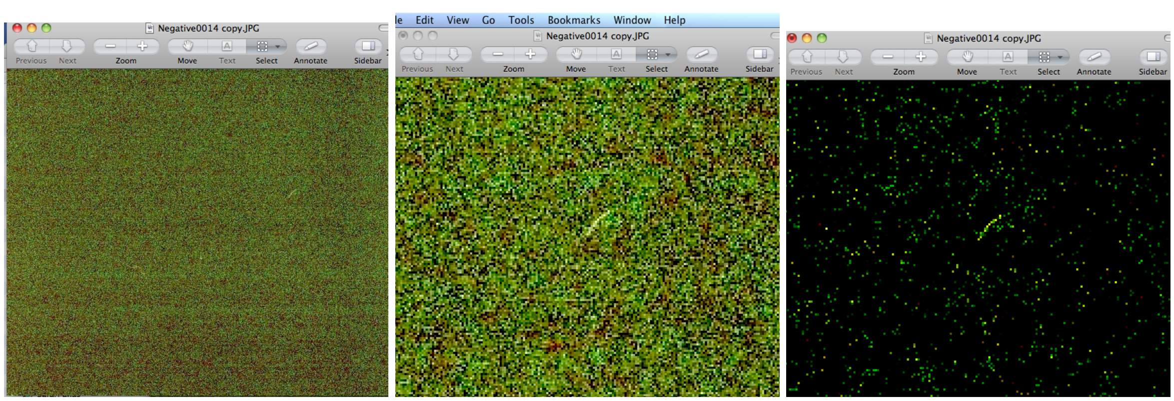


Fig. 7 The scans of the negative frame 0014 taken with a film camera via the 152 mm Santilli telescope under 30 seconds exposure showing the apparent detection of a second antimatter galaxy. this time in the Capella region of the night sky following the detection of the first antimatter galaxy in the Vega region (Figure 5). The top view present the streak visible without enlargement; the middle view shows the same streak under enlargement; and the third view shows the same streak under enlargement and maximal contrast. Note that: the streak has the same direction as that of Capella taken with the Galileo telescope (Figure 6); the streak is fully and sharply focused by a telescope with concave lenses, thus being generated by light with a negative index of refraction expectedly being antimatter light; and the streak annihilates the conventional light background, thus confirming Dirac's original conception of antimatter as having negative energy, although referred to a negative unit of energy to preserve causality [9].

The author submits following comments on streaks 1:

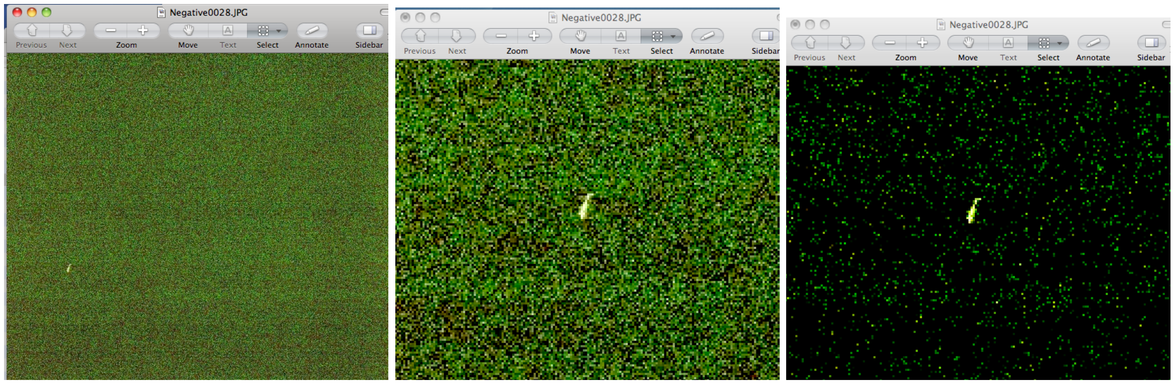


Fig. 8 The scans of the negative frame 0028 obtained with the 152 mm Santilli telescope under 30 seconds exposure apparently confirming the corresponding scans of frame 0014 (Figure 7).

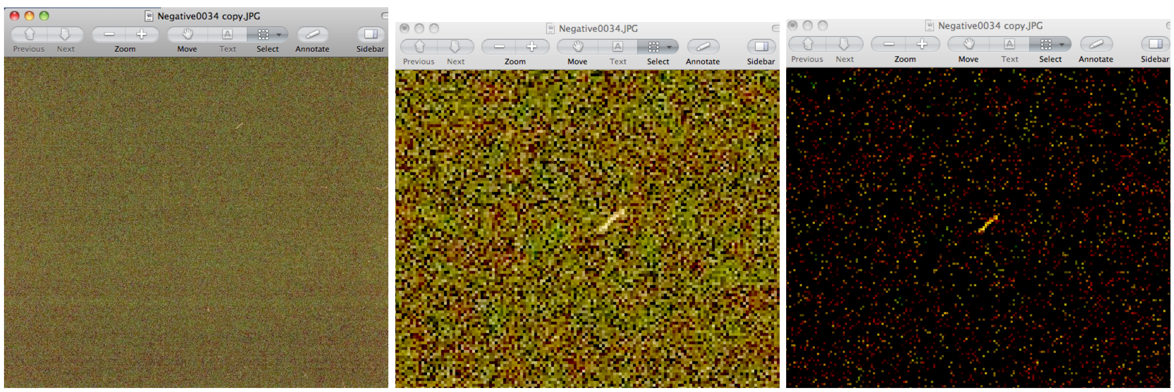
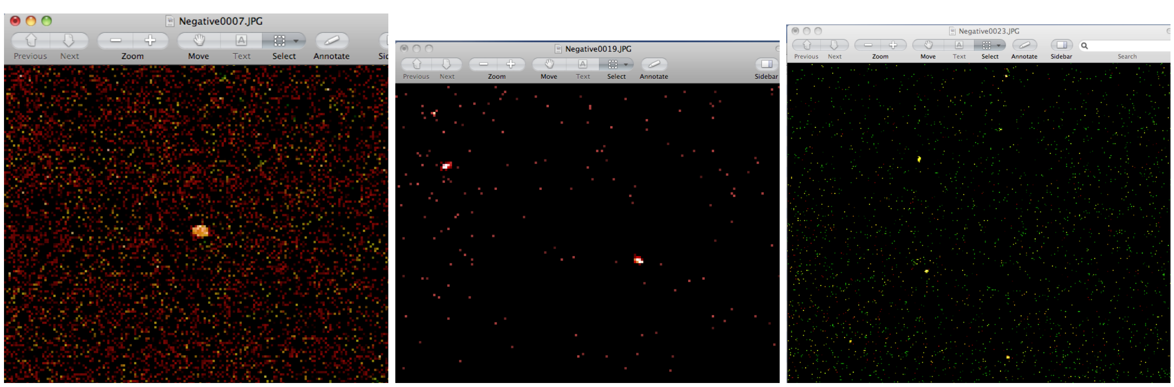


Fig. 9 The scans of the negative of frame 0034 obtained with the 152 mm Santilli telescope under 30 seconds exposure apparently confirming the corresponding scans of frames 0014 (Figure 7) and frame 0028 (Figure 8). The small variations of orientation between frames 0014, 0028 and 0034 are due to corresponding changes in the orientation of the manually operated camera attached to the Santilli telescope.



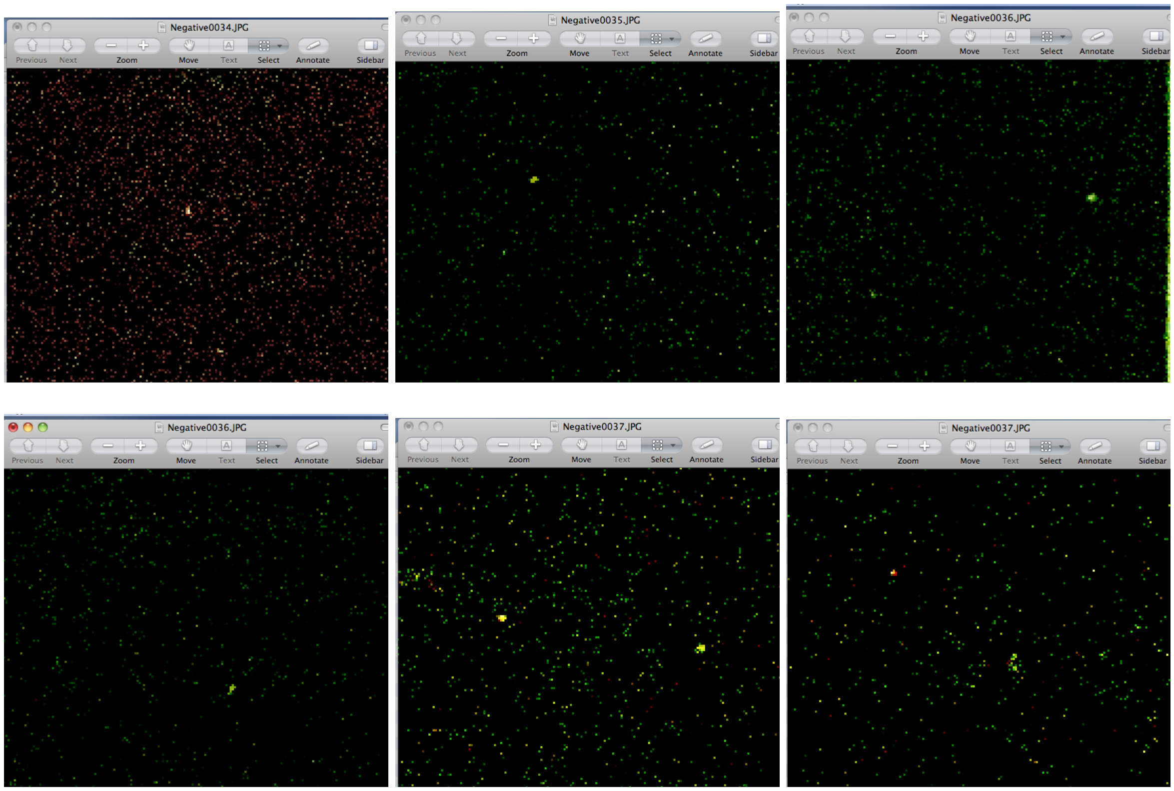


Fig. 10 Here we report some of the numerous dots of darkness (appearing in the negative as dots of light) from frames 0007, 0019, 0023, 0024, 0035 0026, and 0037 which cannot be due to dust in the isodual lens since the dots appears in different locations, and have to be caused by an instantaneous event, since the pictures were taken under 30 seconds exposure, thus suggesting the most plausible origin as that due to antimatter cosmic rays annihilating in the upper atmosphere and releasing isodual light, as well as ordinary light not visible in the Santilli telescope.

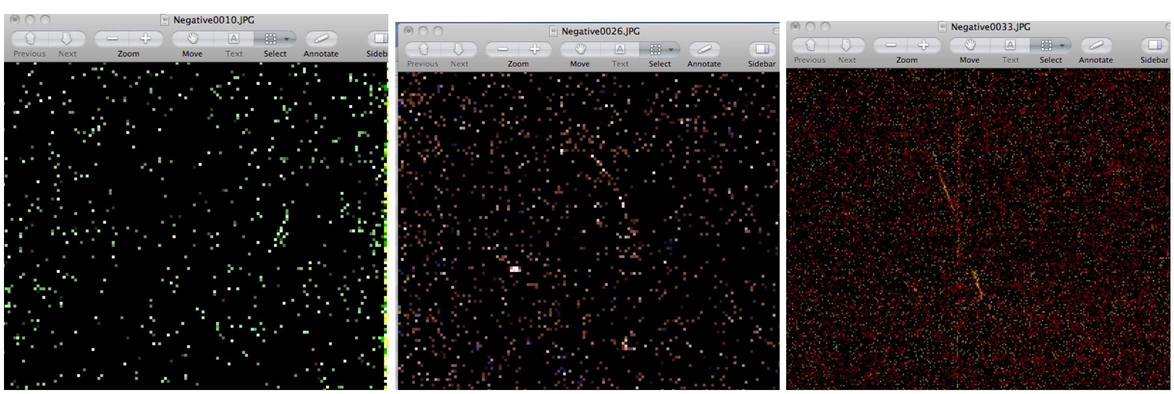


Fig. 11 Here we report dark streaks (which appear as bright streaks in the negative) from frames 0010, 0026 and 0033l, taken from the Santilli telescope which are due to virtually instantaneous events since they have been taken under 30 seconds exposure, but the orientation of the trajectory is not that of Capella (Figures 6 and 7), thus suggesting as the most plausible origin that of small antimatter asteroids annihilating in our upper atmosphere. Various frames also show events that cannot be of astrophysical origin and, as such, they are not reported in this paper.

1.1. The negatives of frames 0014, 0028, and 0034 show streaks in a direction parallel that of Capella that are bright over a dark background because we are dealing with scans of negative films.

1.2. Since said streaks have been clearly focused by a telescope with concave lenses, they can only originate from light with negative index of refraction, whose most plausible origin is that of an antimatter astrophysical body.

1.3. Since antimatter stars cannot possibly exist in the vicinity of our Milky Way, the most plausible origin of the streaks is that of an antimatter galaxy.

1.4. Even though the streaks appear in different frames, we assumeicity that they refer to the same antimatter galaxy since the pictures were taken in a small region of the night sky. However, we cannot exclude the possibility that fututre tests withn more accurate teelescopes identify different galaxies in the same region of the night sky but at different distances from Earth..

1.5. Matter-antimatter gravitational repulsion suggests that the antimatter galaxy is millions of light years away from Earth.

1.6. Since the streaks are visible in frames 0014, 0028 and 0034 without enlargement, while the streaks of the apparent antimatter galaxy in the Vega region could only be seen at maximal enlargement, it appears that the former is closer to Earth than the latter.

1.7. All streaks show the capability to annihilate conventional light apparently confirming Dirac's original conception that antimatter carries negative energy, nowadays referred to negative units to verify causality.

1.8. Besides the regions in the vicinity of Vega and Capella, no additional scans of the night sky have been done to date with the Santilli telescope.

1.9. The possible detection of additional antimatter galaxies in different regions of the night sky and at different distances, would confirm the achievement of the stability of the universe thanks to the presence of antimatter galaxies.

The following comments may be significant in connection with dots 2:

2.1. The dots of darkness (appearing as dots of light in the negative of Figure 10) have been detected everywhere in the cone of about 3 degrees centered in the Capella region of the night sky.

2.2. Since the dots appear in different locations of the frames, they cannot possibly be due to dust in the Santilli lens.

2,3, Since the pictures were taken under 30 seconds exposure, the dots can only be due to a virtually instantaneous event.

2.4. Since the dots are clearly and sharply focused by a concave lens, they can only be due to light with a negative index of refraction.

2.5. Since the detected dots are a confirmation of dots obtrained via digital camera in the preceding tests, they cannot all be specs of dust in the negative.. Consequently, their most plausible interpretation is that they are caused by antimatter cosmic rays annihilating in our upper atmosphere.

2.6. The dots are expected to be created by isodual light emitted in the annihilation of antimatter cosmic rays, expectedly, antiprotons.

2.7. The corresponding emittance of ordinary light cannot be focused by the Santilli telescope, but appears to be confirmed by flashes of light seen by astronauts and cosmonauts in our atmosphere when in darkness.

The following comments are submitted for the random streaks 3:

3.1. The streaks reported in Figure 11 were also taken under a 30 seconds exposure. Their orientation other than that of Capella suggests that they are caused by very rapid events.

3.2. The most plausible interpretation of said streaks is that they are caused by small antimatter asteroids penetrating at high speeds, and therefore annihilating in our upper atmosphere in random directions.

3.3. Independently from the detections reported Figures 7 to 11, the existence of antimatter galaxies implies the necessary existence of antimatter asteroids, and vice versa.

3.4. Due to the repulsion by Earth's gravitational field, the collision of antimatter asteroids with Earth is substantially less frequent than that of matter asteroids, yet their existence is confirmed by the 1908 Tunguska and other explosions.

3.5. The streaks reported in Figure 11 refer to the isodual light emitted by matter-antimatter annihilation. The expected joint emittance of ordinary light cannot be focused by the Santilli telescope and requires separate joint identifications with conventional telescopes.

3. CONCLUSION

Preceding detections [14-16] present evidence on the apparent existence of an antimatter galaxy in the night region of the Vega star, although at expected millions of light years from Earth, the same detection presents evidence on the apparent existence of antimatter cosmic rays and antimatter asteroids.

In this paper, we have presented for the first time evidence on the apparent existence of a second antimatter galaxy, this time, in the Capella region of the night sky, that appears to be closer to Earth than the preceding one. We have also presented additional evidence apparently confirming the detection of antimatter cosmic rays and antimatter asteroids presented in preceding works.

Since pairs of Galileo and Santilli telescopes are now available from Thunder Energies Corporation, in various sizes, including 204 mm objective lenses, it is hoped that astrophysicists interested in a deeper understanding of the universe will conduct the necessary, systemic, independent tests in the Vega, Capella and other region of the night sky to provide final evidence on the existence e or lack of existence of antimatter galaxies.

The author suggests that the new detection in the Capella region of the night sky be named "Rak antimatter galaxy" in recognition of the dedication to the advancement of basic scientific knowledge by Professor Jan Rak, of the University of Jyväskylä, Finland.

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