

THE EFFECTS OF NEGATIVE INERTIA ON SOME PROPERTIES OF THE UNIVERSE

ABSTRACT

NEGATIVE ENERGY particles.

From S. Hawking:- "Particle Creation of Black Holes" two quotes.

"Just outside the event horizon there will be virtual pairs of particles, one with negative energy and one with positive energy."

AND

"It should be emphasized that these pictures of the mechanism responsible for the thermal emission and area decrease are heuristic only and should not be taken too literally"

From a "standard physics point of view" the hypothetical NEGATIVE energy particle has, necessarily, other associated properties.

= breaks "standard physics point of view" laws.

[A] Negative energy :: (1) # negative Kelvin temperature!

[B] Negative mass :: (1) # negative mass, which cannot be anti-matter because it has positive mass!

[C] Negative velocity (The space distance & time is self-referenced to the NEGATIVE energy particle.)

[C1] Negative space :: (1) # negative space distance, where all "normal space" has positive space distances.

[C2] Negative time :: (1) # negative time difference, where all "normal time" has positive time difference.

I suppose that tacyons would fit into the [C] category, but I'm not aware of any observation confirming the existence of [A], [B] or [C]. Of course the "standard physics point of view" does not apply inside a black hole! Theoretically, nothing but tacyons could escape from a black hole!

NEGATIVE INERTIA particles.

I, somewhat cynically, posit a similar NON-"standard physics point of view" property of matter [impossible in my understanding of the laws of physics]:-

NEGATIVE INERTIA particles.

[BUT, it does have some predicted properties that are compatible with experimental observations!]

Basic consequences

[1] If a group of negative inertia "particles" were hit by another they would go flying off in all directions immediately.

[Normal matter would tend to have a "stay in the same place" tendency.]

[2] From the above, the negative inertia matter would not "clump together."

[3] It would be spread evenly, like a gas, throughout the universe.

[4] The negative inertia would also apply to how easy it is to add [or remove] angular momentum to [or from] a spinning body.

Possible assumptions (A) & conclusions (C)

[A1] It would be pushed away by photon pressure from stars & the accretion discs of galactic black holes much easier than normal matter.

[C1] The inner parts of galaxies would be emptied of negative inertia matter. The outer reaches of galaxies would have the "I want to go faster" type of negative inertia and, hence move faster!

[A2] Because the the negative inertia matter is so evenly and, hence "thinly" spread throughout the universe, its influence only becomes more noticeable as cosmic expansion increases. From our "newest time = greatest expansion", "localised viewpoint" of our universe we would see the greatest cosmic expansion around us.

[C2] [The normal matter is "spread out thinner & thinner" with time and also the greatest effect of negative inertia, because the negative inertia matter is initially, spread out fairly evenly [like a gas.]. The "I want to go faster" type negative inertia matter could cause the increased expansion of the universe. It would have a "pushing apart", "increased velocity" effect!

[C3] The negative inertia matter could account for increased star rotation speeds on edges of galaxies and dark energy too. It's an unexplored aspect of exotic matter!

[C4] The negative inertia matter could be viewed as "dark matter" or "shadow matter".

INTRODUCTION

From S. Hawking's "Particle Creation of Black Holes" : Commun. Math. Phys.; 43; p 199 - 220 (1975)

Excerpt from first new paragraph on page 202

As the mass of the black hole decreased, the area of the event horizon would have to go down, thus violating the law that, classically, the area cannot decrease. This violation must, presumably, be caused by a flux of negative energy across the event horizon which balances the positive energy flux emitted to infinity. One might picture this negative energy in the following way. Just outside the event horizon there will be virtual pairs of particles, one with negative energy and one with positive energy. The negative particle is in a region which is classically forbidden but it can tunnel through the event horizon to the region inside the black hole where the Killing vector which represents time translations is space like. In this region the particle can exist as a real particle with a timelike momentum vector even though its energy relative to infinity as measured by the time translation Killing vector is negative. The other particle of the pair, having a positive energy, can escape to infinity where it constitutes a part of the thermal emission described above. The probability of the negative energy particle tunnelling through the horizon is governed by the surface gravity (κ) since this quantity measures the gradient of the magnitude of the Killing vector or, in other words, how fast the Killing vector is becoming spacelike. Instead of thinking of negative energy particles tunnelling through the horizon in the positive sense of time one could regard them as positive energy particles crossing the horizon on past-directed world-lines and then being scattered on to future-directed world-lines by the gravitational field. It should be emphasized that these pictures of the mechanism responsible for the thermal emission and area decrease are heuristic only and should not be taken too literally.

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NEGATIVE INERTIA

The above article excerpt posits the [impossible in my understanding of the laws of physics] negative energy particle to describe the evaporation of black holes. There has [to my knowledge] been no observation of black holes evaporating. The negative energy particle would require [a] negative mass from $E = m * c^2$ or [b] negative Kelvin temperature for the energy in the form of heat!

I, now, somewhat cynically, posit [impossible in my understanding of the laws of physics] negative inertia particles. When it comes to the properties of black holes or the matter falling into them the property of inertia rarely gets mentioned. For simplicity of understanding, it could be thought that, when it comes to movement, mass is very indecisive. It can't make a choice from "I'll stay at the same speed"; "I want to go slower" "I want to go faster". It is so indecisive that it doesn't change! The negative inertia type I posit is the "I want to go faster" type. This is not 3 impossibles in one!

Basic consequences

- [1] If a group of negative inertia "particles" were hit by another they would go flying off in all directions immediately. [Normal matter would tend to have a "stay in the same place" tendency.]
- [2] From above negative inertia matter would not "clump together."
- [3] It would be spread evenly, like a gas, throughout the universe.
- [4] The negative inertia would also apply to how easy it is to add [or remove] angular momentum to [or from] a spinning body.

Possible assumptions (A) & conclusions (C)

- [A1] It would be pushed away by photon pressure from stars & the accretion discs of galactic black holes much easier than normal matter.
- [C1] The inner parts of galaxies would be emptied negative inertia matter. The outer reaches of galaxies would have the "I want to go faster" type negative inertia and, hence move faster!
- [A2] Because the the negative inertia matter is so evenly and, hence "thinly" spread throughout the universe, its influence only becomes more noticeable as cosmic expansion increases. Because of our "localised viewpoint" of our universe we see the greatest cosmic expansion around us and also the greatest effect of negative inertia.
- [C2] The "I want to go faster" type negative inertia matter may cause the increased expansion of the universe locally too, because the negative inertia matter is initially, spread out fairly evenly [like a gas.]. As the normal matter is "spread out thinner & thinner", the negative inertia matter has an increasing effect. It has a "pushing apart", "increased velocity" effect!
- [C3] The negative inertia matter accounts for increased star rotation speeds on edges of galaxies and dark energy too. It's an unexplored aspect of exotic matter!
- [C4] The negative inertia matter could be viewed as "shadow matter".

REFERENCES

[1] S. Hawking: "Particle Creation of Black Holes" : Commun. Math. Phys.; 43; p 199 - 220 (1975)
Particle Creation by Black Holes

[1] S. Hawking: "Particle Creation of Black Holes" : [1975] [pdf 22 pp]
http://www.itp.uni-hannover.de/~giulini/papers/BlackHoleSeminar/Hawking_CMP_1975.pdf

Quote:-

(pdf page 3 = "book page" 201: last paragraph)

"For a black hole of solar mass (10^{30} kg) black holes of this size would be absorbing radiation faster than they emitted it and would be increasing in mass."

(pdf page 4 = "book page" 202: line 7 in first new paragraph)

"Just outside the event horizon there will be virtual pairs of particles, one with negative energy and one with positive energy."

"negative energy particle"

[not found in physics? Suggests negative mass and or negative kelvin temperature.]

(pdf page 4 = "book page" 202: 14 lines up from bottom of page)

"It should be emphasized that these pictures of the mechanism responsible for the thermal emission and area decrease are heuristic only and should not be taken too literally."