

Re: a few simple questions (from a layman)

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Source: <http://sci.tech-archive.net/Archive/sci.physics.relativity/2006-01/msg01400.html>

- *From:* lamoore0777@xxxxxxxxxxxxxxxx
 - *Date:* 22 Jan 2006 14:43:18 -0800
-

Eric Gisse wrote:

- > We call it the equivalence principle.
- >
- > Although it has been greatly extended into ways that are harder to
- > explain, it basically means that under identical conditions, two
- > objects dropped will fall at the same rate. What I mean by identical
- > conditions is equal amounts of drag, or lack of. The famous style of
- > testing of the EP is called Eotvos, named after a Hungarian fellow.

Thanks Eric,

I visited the site you suggested and came away with this (in addition to much more): "The simplest way to state the equivalence principle is this: inertial mass and gravitational mass are the same thing. Then, gravitational force is proportional to inertial mass, and the proportionality is independent of the kind of matter. This implies the Universality of Free Fall(UFF): in a uniform gravitational field, all objects fall with the same acceleration, e.g. 9.8m/s² near the surface of the earth".

And if I may, impose on you once more, can you clarify a few terms mentioned above? Being I suppose a rhetorical question given I'm going to ask you whether or not you respond. lol. Seriously though, I much appreciate your understanding and your ability to communicate it in non-rocket-scientist type terms. So to speak. No easy feat.

Here's one of the things I'm trying to understand: Is inertial mass and gravitational mass considered to be the **same thing** owing to a universal predictability in regards to both? Hmmm. that was muddy. Let me go back to the opening words I read at the site and try it from there: I read: "Gravitational mass is the charge to which gravity couples. Inertial mass is a measure of how fast an object accelerates—given the same force, increasing the inertial mass implies decreasing acceleration".

Let me ask this (#1.): is the term or phrase **inertial mass** meaningless in the absence of being a measurement of how fast an object

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is accelerating? And if the question is stupid, please, once again, I beg your indulgence. I'm trying to construct my own (simple yet accurate) understanding of physics, from square one. With the help of only human resources on the internet and the web sites those humans refer me to, for further consideration, contemplation and study. As you did. And I did.

#2. Does the phrase: "gravitational mass is the charge to which gravity couples" mean that all mass in the universe has a measurable *gravitational mass* independent of the gravitational field that mass exists in? or does the gravitational mass of an object change relative to the gravitational field it is found in? It seems to me the word *charge* is what I am most unclear about. And how it relates to mass and it's measurability relative to gravity. I know, I know, still muddy questions. I intend to get better, each day.

#3. In terms of how fast an object accelerates. i.e. it's inertial mass (or gravitational mass): does light itself escape these perimeters? I guess what I'm asking is whether or not light has mass? It seems to me light must not have mass, either gravitational nor inertial owing to the, well, universal speed of it, regardless of the gravitational field in which it finds itself. So to speak. In other words it seems to me light is not bound by the laws of gravity. Which necessarily requires I consider it to without mass. Or, continue to study. Lol.

Thanks again Eric for your input. As you know a number of other considerate folks here offered their help in the development of my understanding. And, something having to do with the psycholocial equivalence principle, demands I can only fall in one place at one time.

Lar

- >
- >
- > We have no reason to think that it wouldn't work on other planets.
- > Regarding that, we have a principle called the Copernican principle
- > which states that Earth doesn't have a special place in the universe.
- > What that means is that we don't assume physics is different
- > everywhere, or that things are unique just for us. Without that, we
- > would have a hard time justifying all the extrapolations that are done

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- > to far, far away.
- >
- > The equivalence principle has been tested to high precision without
- > fail to this point.
- >
- > <http://www.npl.washington.edu/eotwash/equiv.html>
- >
- >>
- >> #2. Does Light always travel? I mean, well, does it ever stand still?
- >> And if it does stand still, what makes it start traveling again
- >> (assuming it was traveling before it stopped for a rest)? I'm basically
- >> familiar with the accepted notion that light has a speed limit. Along
- >> the lines of 186,000 miles per second, I believe. But does some light,
- >> say for example, travel in the slow lane? Clipping along at a pace of
- >> say, 12.5 miles per hour? And if so, why so? And if not, why not?
- >
- > Light always travels, as far as we can see. We still see the echo of
- > the big bang, which was about 14 billion years ago.
- >
- > But light doesn't so much have a limit as it has one speed. The only
- > time light has a different speed is when it is traveling through
- > something. The speed of light in a medium can be really, really slow
- > though. Artificial conditions have been made such that light travels
- > around 30 miles per hour.
- >
- >>
- >> #3. Ok, here's my biggy (which has stumped me for years): When someone
- >> speaks of our Universe, as a closed system, what exactly does that
- >> mean? I can't seem to shake the notion of reaching the edge of the
- >> universe and being met with a sign that says, stop, go back, you have
- >> reached the end of the Universe. Your are off limits. As a practical
- >> matter, as far as practicality and theoretical matters can converge, I
- >> seem to experience the mental equivalent of reaching a physical black
- >> hole when confronted with such thought.
- >>
- >> Restated, is there one universe or more than one universe (in physical
- >> terms)?. And if so, why? Ok, just kidding there. I've crossed the
- >> boundaries of Science and Alice. In scientific terms, restating the
- >> question: is space regarded as being infinite, composed of a finite
- >> quantity of energy, in various stages of motion and rest, appearing in
- >> the form of matter and anti-matter?, which relationship Einstein
- >> clarified? Being, in laymans terms, the quantity of the total amount of
- >> energy (relative to the total mass) in the Universe is equal to the
- >> velocity of light squared?
- >
- > I would say that we don't know. We can't say whether the universe is
- > open or closed yet, but that isn't to say people have not been looking.
- >
- > Though I will say this: the anti-matter from the beginning of the
- > universe is gone. "Why" would be a great question, which I can't answer
- > satisfactorily.

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>
> $E=mc^2$ is a great soundbite but you have to be careful. It is *only*
> true when the particle in question is not moving [there is a different
> expression for massless particles], and *only* true in the context of
> special relativity. Gravity permeates the universe, and there is a
> separate but related theory called general relativity that handles
> gravitation. Unfortunately in GR, energy is less than well-defined in
> the general sense. At least when compared to SR.
>
> You should check this fellow's page out. Read near the bottom, he has a
> fantastic series of pages that introduce folks to cosmology and
> relativity.
>
> <http://www.astro.ucla.edu/~wright/intro.html>
>
>>
>> Lastly, in an earlier post to this forum a gentlemen responded to an
>> inquiry of mine by saying, in effect: all sincere questions are welcome
>> here. With that in mind, my inquiries here are sincere (though
>> admittedly tortured).
>
> If someone replies to you and says anything about relativity being
> false, they are full of shit. This newsgroup has a lot of folks who
> don't understand highschool algebra but feel they can adequately
> assault Einstein's theories.
>
>>
>> Thanks for your insights,
>> Lar

• **Follow-Ups:**

- ◆ **[Re: a few simple questions \(from a layman\)](#)**
 ◇ From: Eric Gisse
- ◆ **[Re: a few simple questions \(from a layman\)](#)**
 ◇ From: Joe Fischer

• **References:**

- ◆ **[a few simple questions \(from a layman\)](#)**
 ◇ From: lamoore0777
- ◆ **[Re: a few simple questions \(from a layman\)](#)**
 ◇ From: Eric Gisse

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