

Re: Photon, Momentum, Mass

Source: <http://sci.tech-archive.net/Archive/sci.physics.relativity/2007-05/msg01635.html>

- *From:* pmb_phy@xxxxxxxxxx
 - *Date:* 10 May 2007 18:16:37 -0700
-

On Apr 19, 10:44 pm, Y <yanar...@xxxxxxxxxxxx> wrote:

But what still has me confused is this idea that a photon can be regarded at times to have a 'relativistic mass', while also having no-mass at other times. What I mean is this, does a photon change its behavior from a particle of mass to a particle of no-mass ?

No. What you are thinking about is the difference between two uses of the term "mass". One definition, sometimes called "inertial mass" or "relativistic mass" or just plain "mass." This is the ratio of a particle's momentum to the particle's speed. The other definition is sometimes called "rest mass" or "proper mass" or just plain "mass" (so you can see the source of confusion here). The value of the proper mass for a photon is always zero.

How was it determined that light exerts pressure on objects ?

To see the derivation that shows that light has momentum please see my website for this at http://www.geocities.com/physics_world/em/momentum_of_radiation.htm

If radiation has momentum then it can transfer that momentum to whatever absorbs the radiation or reflects it. This change in momentum of the object which is absorbing or reflecting gives a pressure [force/area = {dp/dt}area]

If light has this 'relativistic mass' is it a constant value, or does it change ?

When the momentum of the light changes then so too does its momentum.

I have read that if light is contained within a box with perfect

Re: Photon, Momentum, Mass

mirrors then it is considered that light adds mass to the box, and that there is energy but no momentum within the box's frame of reference. This is in contrast to freely moving moving particles.

See [i]The mass of a gas of massless photons[/i], H. Kolbenstvedt, Am. J. Phys. 63(1), January 1995

So, what happens when light is moving freely, then it gets trapped into the box then escapes the box.

Light always has inertial mass. Light has proper mass when the photons are traveling in random directions

Does this mean the photons of that light go from having no-mass to having mass within the box, to having no-mass again when its outside the box ?

No.

I mean to me, that sounds ridiculous.

Perhaps it does. But that is merely due to a lack of knowledge and usage of the concept.

Pete

.