Re: Can inverse gravity waves cancel out Earth's gravity in selected areas?

Source: http://sci.tech−archive.net/Archive/sci.physics.relativity/2006−10/msg01796.html

- *From*: sal <pragmatist@xxxxxxxxxx>
- *Date*: Fri, 20 Oct 2006 17:17:50 −0400

On Fri, 20 Oct 2006 13:57:25 −0700, TrekJunky wrote:

> sal wrote:
>
> > On Fri, 20 Oct 2006 12:48:52 −0700, TrekJunky wrote:
> >
> > > Hello Sal and Sue,
> > >
> > > Are you both telling me that radiation pressure can be caused
> > > by
> > > massless photons?
> >
> > I confess I haven't been reading Sue's posts in this thread. But that's certainly what I've been telling you, and it's probably what she's been saying, too.
> >
> > But again, photons have zero _REST_ mass. That means that if you could stop a photon and weigh it, while it was _STOPPED_ it would have zero mass.
> >
> > !!BUT!! mass == energy and a photon carries energy, so a photon in flight can also be said to have mass.
>
> I am aware of the idea below, that is the main reason I suspect that for there to be Force over an area (Pressure), it must be caused by mass however little of it there is.

As I already said a moving photon has "mass", or as it's more often called, "mass−energy".

But _all_ the "mass" of a moving photon is due to its motion. If you could take that away, the "resting photon" would be found to have no mass.

> And I would argue that a photon at rest has
> something close to Zero mass but not quite. E=mc squared: m=c squared/E:
> c=square root of (E/m) so you could solve for m if E is known, or is
> this equation merely the transition between matter and energy?

Yes, that is just the conversion between mass and energy, and the "c^2" is just a somewhat irrelevant conversion factor. In relativistic units we define c=1, and it reads

E = m

and that's hard to do too much with, isn't it?

Conventionally, we define gamma = sqrt(1/(1−v^2)). If "m" is the rest mass of a particle, then when it's moving, its "mass−energy" or, if you will, its effective mass (the mass a stationary observer would measure) is given by

m*gamma

When v=1 (which is the speed of light in relativistic units) we have

gamma = 1/0 ~ infinity

and if the particle has NONZERO _rest_ mass, then its total mass−energy while traveling at SOL will be infinite.

But photons have zero rest mass, so when they're traveling at SOL their mass−energy isn't necessarily infinite.

Before you express any more opinions about what is "really true" of photons or light or mass or anything else having to do with relativity I would suggest that you learn enough about the field to have some idea what you're talking about. Get a book and read it (don't try to learn it exclusively from random websites on the internet and conversations with randoms on sci.physics.relativity, that's just a way to become a crank, not a way to get educated). There are a lot of reasonable introductory books on the subject. One is "Relativity, the Special and the General Theory" by Albert Einstein. It's a slim volume, it's readable, it's available cheap from Dover, it's available even cheaper as a used book, and it's available for free from Project Gutenberg.

> There is a point here which you should be aware of: It is often said,
> somewhat sloppily, that objects in motion "gain mass" as they

accelerate. When something is moving faster, it's "got more mass" than it has when it's moving slower. And the ratio of the "mass" of a particle moving at the speed of light, to the mass of that same particle AT REST, is _infinity_. Something moving at C is infinitely more massive than it is when it's stopped.

Photons, though, would have _ZERO_ mass when they're stopped (if they could be stopped). When they're moving at C they have infinity times that much ... and infinity times zero is, in this case, a _finite_ quantity.

So, photons _in_ _flight_, moving at C, do, indeed, carry mass.

They have momentum, and they even have a gravitational field, just like anything else which has mass.

Does this help at all?

(By the way I may get yelled at for this post, since I've been pretty sloppy with the terminology. But I think the main points, as stated here, are not too misleading.)

> Because energy reacts with matter? Has anyone ever heard that light
> sometimes acts as a wave and sometimes acts as a particle? I have a
> hard time understanding how energy can apply a force if it has no
> mass. I apologize for my ignorance, but I would like to learn. In my
> simple mind, the reaction in matter to light is heat. Is that heat
> from the matter or from the light? I am not good in math either and
> Sue sent me to a link that used variations on E=mc(squared).
> http://farside.ph.utexas.edu/teaching/em/lectures/node90.html
> In my
> mind m is mass which can be converted to E (energy) and back again.
> How does that relate to radiation pressure? sal wrote:
>
> > On Wed, 18 Oct 2006 08:59:19 −0700, Mike wrote:
>
> > Igor wrote:
>
> > Mike wrote:

TrekJunky wrote:

> Hello Sue,
>
> I would like to answer you question about how I would measure the mass of light. I would like to approach it by stating a few facts to see if you agree with them:

Light has no mass, or if it has some

it
is
beyond
any
measurement
accuracy.

1)
Solar
Sail
space
ships
are
propelled
by
the
pressure
of
light
on
the
"sails"
not
solar
wind(subatomic
particles)
as
some
might
think.

That
is
not
your
usual
notion
of
pressure.

Why not?
Light has
momentum.
Momentum
changing
direction
exerts
force.

> And force
> per unit area
> is pressure.
> It's that
> simple.

> Idiot. Are you the sam
> eposter asking these stupid
> questions? How
> do you make light change
> direction other than making
> it pass
> through a gravity field?

Well, as one example, a mirror works pretty well.

And by the way, that's what a solar sail is. In the simplest case of the sail perpendicular to the incoming light, the photons reverse direction when they hit the sail, their momentum flips sign as a result, and the sail gains twice the momentum of each photon in the process.

The sail feels a force as a result of reflecting the light, and if someone on the ship measures the force on the sail as a whole and divides by the area of the sail, they find the radiation pressure which is being exerted on the sail.

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Nospam becomes physicsinsights to fix the email I can be also contacted through http://www.physicsinsights.org

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