Subject: Particle and Theoretical Physics
Posted by Javaxcx on Thu, 26 May 2005 19:49:10 GMT
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Remember, light can be characterized as both a particle and a wave. That being said, we can measure energy in two forms.

E=mc^2 works wonders for stuff with mass. But conversely, E=hf works pretty well for stuff with no mass. You can't use them interchangibly because you'll always get a 0 answer for your energy outputs.

For example, if you were to say that because E=mc^2 and E=hf, then mc^2=hf. But mass doesn't have frequency (for the sake of argument) and waves don't have mass. Therefore, since h and c are always constant, your overall answers are going to be 0 net energy.

What it really comes down to, with my understanding of the photon, is that it has an apparent mass when travelling at c. Now, I know what you physics geeks are thinking, "it's impossible to have a mass and travel at c". But you can presuppose an apparent one using momentum theory. Remember, when dealing with relativity, p = E/c. But p also is mass x velocity.

Because of this, we can rearrange the whole system and solve for the apparant mass of a photon. That is;

m = hf/c^2

This should look pretty familiar. It's the combination of E=mc^2 and E=hf.

The trick is: E=mc^2 relies on one thing. That the object with mass, m, is withOUT momentum. Have you ever seen a wavelength of frequency 0? Of course not. Now, since I'm fairly sure that all of you know that the speed of light is consistent regardless of frame of reference, we make the assumption that light always has momentum when travelling in spacetime. This means that light ALWAYS has an "apparent" mass because of the equation aforementioned. Now, if light weren't a wave either, then it wouldn't have a frequency, wouldn't have mass, and wouldn't have any energy. But light clearly does have momentum! That is important!

I'm sure all of you at one time or another saw those little motors that were driven by light's momentum. They were little cardboard fans, one side was black, one was white, and it was balanced on a pin in a vacuum that looks a lot like a lightbulb. When white (and just about only white light, I'm not sure about blue) was shot at the BLACK side, it started to spin. I'm also sure your teachers told you that the light is absorbed by the black and reflected off the white. This is a perfect model proving that light must have energy AND momentum in it. And thus, it has an apparant mass as well.

Of course, this is just my understanding of it. Feel free to critisize or clarify.