Re: Eric Gisse doesn't know the basics of Relativity

Source: http://sci.tech−archive.net/Archive/sci.physics.relativity/2007−08/msg00495.html

- *From*: "T.M. Sommers" <tms@xxxxxx>
- *Date*: Mon, 06 Aug 2007 08:57:34 −0400

Eric Gisse wrote:

> On Aug 5, 9:16 am, "T.M. Sommers" <t...@xxxxxx> wrote:
>
> > gu...@xxxxxxxxxxx wrote:
> >
> > > On Aug 5, 11:12 am, "T.M. Sommers" <t...@xxxxxx>
> > > wrote:
> > >
> > > > Temperature is not invariant. It transforms as
> > > >
> > > > T' = T * (1 − v^2/c^2)^(1/2)
> > >
> > > Come on. Rest Mass is a Lorentz invariant scalar.
> > >
> > > Never heard of invariant mass, M' = gamma M.
> > >
> > > M remains invariant.
> >
> > I thought we were talking about temperature. What has mass got
> > to do with it?
>
> Nothing. He seems to believe that the kludge known as "relativistic
> mass" somehow invalidates my argument.
>
> This has been going on since April. He didn't understand then, and
> doesn't understand now as evidenced by his latest little temper
> tantrum. Every so often he has to spam this newsgroup with about 20

> posts saying how stupid I am and whatever.
>
> http://groups.google.com/group/sci.physics.relativity/msg/8ec41d88e7511d62?dmode=source
>
> That is the argument for why temperature transforms as such.

I'm not so sure, anymore. Based on a quick search of arXiv, this seems to be an unsettled area of physics, with some saying

T' = T * (1 − v^2/c^2)^(1/2),

some saying

T' = T / (1 − v^2/c^2)^(1/2),

and some saying

T' = T.

See arXiv:gr−qc/9505045, arXiv:physics/0506214, and arXiv:physics/9610016, for instance.

That something so seemingly basic is still unsettled after 100 years suggests to me that there is something wrong with the question. I suspect, but cannot prove, that T does not transform at all (which is different from saying T' = T). I further suspect that this is because a system in equilibrium in one frame is not in equilibrium in another.

Consider an ideal gas in a box at equilibrium in its rest frame. The molecules will have the usual speed distribution, which, if I recall correctly, is symmetric with respect to direction. However, the speed distribution will not be symmetric as seen in a frame in which the box is moving, because the velocity addition equation introduces a bias. So the gas will not be seen to be equilibrium in the other frame, and it won't have a temperature.

Unfortunately, as I mentioned in another post, my thermal physics is so rusty that it will take more than a few cans of WS−40 to get it working again, so I may be completely wrong.

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Thomas M. Sommers −− tms@xxxxxx −− AB2SB

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