

Re: Question about light clock and derivation of time dilation

Source: <http://sci.tech-archive.net/Archive/sci.physics.relativity/2005-07/msg00420.html>

- *From:* "Ken S. Tucker" <dynamics@xxxxxxxxxxxxx>
 - *Date:* 8 Jul 2005 11:27:49 -0700
-

I think we agree Daryl...

Daryl McCullough wrote:

> Ken S. Tucker says...

>

>>Daryl McCullough wrote:

>

>>>>Daryl McCullough wrote:

>>>>

>>>>> and (2) there

>>>>> is no need (and no point) to using a non-diagonal

>>>>> metric tensor.

>>>>>

>>>>>>Actually there is, it's aberration,

>>>>>

>>>>>> $g_{i0} = -g_{ij} dx^j/dt$.

>

>>> No. In Minkowsky coordinates, $g_{00} = -1$, $g_{i0} = 0$, $g_{ii} = +1$.

>>> Aberration has nothing to do with off-diagonal elements of the metric.

>>

>>Daryl solve $U_i=0$.

>

> You speak in non-sequiters, Ken. Aberration has

> nothing to do with off-diagonal elements of the metric.

>

> As far as solving $U_i=0$, what does that have to do

> with anything? It's impossible to solve without

> specifying a metric, but if the metric is diagonal

> $g_{00} = -1$, $g_{11} = g_{22} = g_{33} = +1$, then a

> solution is the spacetime path $x^u(s)$ given by

>

> $x^0 = s$

> $x^j = 0$

>

> (assuming that you mean $U^u = dx^u/ds$)

>

> --

> Daryl McCullough

Re: Question about light clock and derivation of time dilation

> Ithaca, NY

Using the light clock, the time axis "t"
is the path of the light-ray as it's used,
and that's fine.

In the rest frame vectors

$$t.x=0, g_{01}=0$$

The same clock in the moving frame has

$$t'.x' = -v/c \implies g'_{01} = -dx'/dt'$$

which is due to aberration.

Generally use the metric

$$g_{00} = g_{11} = 1, g_{01} = -v/c$$

then

$$ds^2 = (cdt)^2 - dx^2.$$

That's consistent with

$$U_i = dx_i/ds = 0, (i=1,2,3).$$

That's ok too.

The problem with the light clock itself is a
need to understand g_{0i} , which most can't.

Regards

Ken S. Tucker

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• *Follow-Ups:*

- ◆ *Re: Question about light clock and derivation of time dilation*
◇ From: Daryl McCullough

• *References:*

- ◆ *Question about light clock and derivation of time dilation*
◇ From: john_doe_ph_d
- ◆ *Re: Question about light clock and derivation of time dilation*
◇ From: Ken S. Tucker
- ◆ *Re: Question about light clock and derivation of time dilation*
◇ From: Daryl McCullough

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