Re: Bending of light not well authenticated

Source: http://sci.tech−archive.net/Archive/sci.physics.relativity/2005−05/msg01053.html

- *From*: "Koobee Wublee" <kublai@xxxxxxx>

- *Date*: Sat, 14 May 2005 22:51:49 −0700

"Randy M. Dumse" <rmd@xxxxxxxxxxxxx> wrote in message
news:CMuhe.56$Jq.475@xxxxxxxxxxxxxxxxxxxx
>
> I'd say that's missing the point I was making slightly. The curvature is
> in spacetime, and the curvature factor effects both space and time, and
> both have a deflection effect on the path of a photon. Or put another way
> the curvature factor (1−2M/r) appears in the Schwarzschild equation both
> in the time component and in the radial distant component.

How would the photon behave in proper spacetime? According to GR, the spacetime of a photon is always equal to zero. So, we have

c^2 dt^2 − ds^2 = 0

Where

** dt = proper time
** ds = proper space

Clearly, the photon should behave with no anomaly in its orbit in the reference frame of spacetime. At infinite distance away where the gravitational effect of the sun is asyptotically approaching zero, I still would not observe a deflection in the photon using the parameters of the proper spacetime. So, with no bending of the photon in proper spacetime, it should also be reasoned that in observed spacetime, where the perception of the curvature in spacetime does take place, the photon undergoes no deflection at infinite distance away from the sun. Both sides of the spacetime equation must equate.

> In every analogy, there is a part that is analogous and the part that is
> not at all analogous. The difference is when something is like something
> vs. actually is something. The prism was an analogy. The analogous part
> was Fermat's principle applies to both. The light passing the sun would be
> deflected toward the sun from passing through a denser optical medium,
> just as light arriving at an angle to a slower medium would be bent toward
> a smaller angle. That's the analogous part. The unanalogous part would be
> the shap of the prism and the shape of space near the gravitating body.
> Now we could probably further define this shape with effort, but it's not

> worth bothering.

Not worth bothering! Hey, according to Schwarzschild metric, the curvature of spacetime behaves like a gradient where the severity of the curvature in spacetime is stronger as one moves towards the sun in any directions. In equal distance away from the sun, the degree of curvature in spacetime is the same. So, your excellent analogy of the gravitational lens behaves like a prism firmly applies. A photon will be deflected towards the sun as it travels towards the sun. However, the index of refraction reverses as it travels away from the sun. Therefore, logically, we should expect the photon to undo its bending as it leaves the sun. GR math should shows this, and it does.

> Well, I'm reasonably certain the first to derive the deflection after 1915
> was Einstein himself. So I don't really understand the references that
> follow.

Well, that explains it. Lacking any mathematical skills himself, Einstein had to rely on his creatively freelance style to do so. With the ingenious way of zeroing in on a 2nd order effect with only the 1st order tools, he was able to place himself among the Hall of Shame of the dozen or so predictors of Mercury's orbital anamoly. Remember he did that without a complete set of field equations nor the Schwarzschild metric.

>> That depends on dr which is related to an integration constant
>> associated with the conservation of angular momentum.
>
> The derivation indeed is based on the ratio of angular momentum and
> energy, which turns out in the no mass limit to be simply b, the impact
> parameter.

The no−mass limit is r0 where r0 is the distance of perhilion as if the sun has zero mass. Taylor's b is not r0. So, do you now agree with me?

> Far away from the gravitating body, where r is large the path of the ray
> will have a parallel ray which can go straight along a single radial to
> infall to the gravitating body. The distance between these two parallel
> rays in flat space is called the impact parameter.

You are not making any sense here. From what I have gathered, you are describing the deflected distance of the photon at its perihelion which is not defined as the impact factor in Taylor's derivation.

> So the geodesic motion of a massless particle depends on only two things,
> its effective potential defined by the Schwarzschild metric, and it's
> inital displacement from a straight in radial, the impact parameter.
> (MTW 673)

Are you quoting all these last few paragraphs from a book? The authors seem to try to make it as confusing as possible. So, not able to understand all these, the readers have to move on to address the issue of photon

deflection. It really does not require sophisticated mathematical skills to tell that the text book derivation of the photon deflection is totally bogus.

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- ***Follow−Ups***:
  - ♦ ***Re: Bending of light not well authenticated***
    - ◊ *From:* Randy M. Dumse
  - ♦ ***Re: Bending of light not well authenticated***
    - ◊ *From:* N:dlzc D:aol T:com \(dlzc\)

- ***References***:
  - ♦ ***Re: Bending of light not well authenticated***
    - ◊ *From:* Randy M. Dumse
  - ♦ ***Re: Bending of light not well authenticated***
    - ◊ *From:* Koobee Wublee
  - ♦ ***Re: Bending of light not well authenticated***
    - ◊ *From:* Randy M. Dumse

- Prev by Date: ***What are relativists?***
- Next by Date: ***Re: relativity of simultaneity − real or perceived?***
- Previous by thread: ***Re: Bending of light not well authenticated***
- Next by thread: ***Re: Bending of light not well authenticated***
- Index(es):
  - ♦ ***Date***
  - ♦ ***Thread***