Re: CMBR and neutron stars

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- *From*: Martin Brown <|||newspam|||@nezumi.demon.co.uk>
- *Date*: Thu, 18 Aug 2005 09:33:30 +0100

N:dlzc D:aol T:com (dlzc) wrote:

> "Steve Willner" <willner@xxxxxxxxxxxxxxx> wrote in message news:4303a492$1@xxxxxxxxxxxxxxxxxxxxxxxxxxx
>
> > I am asking if the inside of
> >
> > > an event horizon would not also appear to be opaque (in some reasonably butchered definition) and isothermal
> >
> > Neither one, as far as I can tell, though I don't know what you
> > might mean by "isothermal" in this context. There is no
> > reason light cannot fall in, and in general the spectrum of
> > infalling light will change with time. Also, after recombination,
> > the spectrum of infalling light will look nothing like a blackbody
> > (except perhaps if your black hole is at some very special
> > location, say the center of a star).
>
> I'm going to try for a couple of scenarios. A BH with a sacrificial companion, a free BH, and one at the center of a galaxy (which I would expect as our container, something large). Would you "approximate" the light output of a BH−consuming−a−companion(s) to be also directed inwards?

The mechanism and external effects of a BH consuming material as a power source for active galaxies was described originally in the Blandford & Znajek paper. It also works pretty well for other compact gravitating objects in close embrace with another star like SS433 for instance.

And you would expect an observer inside the black hole to see any photons and matter from the outside that happen go in his direction. Exactly what he sees will depend very strongly on the mass feed rate, but for low rates it would be hottest and densest near the equatorial belt accretion disk where frictional heating in the infalling matter was most extreme.

If he is really lucky he might even get a view of backflow from the relativistic polar jets. Intensity could also fluctuate wildly. You will need a pretty good space suit to survive in such a hostile environment.

A free black hole in isolation and you will see a blue shifted distorted version of whatever is outside (for your perhaps brief existence since there are no stable orbits inside the event horizon).

There will also be considerable distortion by gravitational effects. Has anyone done an accurate raytracer for the view from inside a BH?

> Basically, would there be an equivalent emission directed inwards? Not asking for proof, or to put your neck on a block, but as a "first pass"?

Not only that but the infalling matter would continue to travel according to the predictions of GR and relativistic fluid dynamics at least until it gets very close to the central singularity.

> need still more new physics to get the gas out of those large objects later on.

> Such as the "coincidence" of very large black holes, and container galaxies? Physics like that?

That doesn't seem too much of a coincidence.

> Absent new physics, straightforward extrapolation backwards forces an optically thick hydrogen plasma at z>1000 or so.

> Yes, I understand what you are saying. This is what the "blind men touching the elephant" would extrapolate... that the past looks like the present, only younger.

The universe was a lot more violent in its youth. Active galaxies and powerful radiogalaxies were much more common at high redshift.

> But "we" have GR, and particular models in GR sound like they might *also* provide a black body curve, if outer−time is integrated over the surface, and the coordinate r_outer = t_inner_Big_Bang is the instant that all infall must pass.

Viewed from the outside of the BH you fade away at ever more extreme gravitational redshift as you cross the surface of the event horizon. But in the comoving frame nothing exceptional happens to you crossing the event horizon provided that you choose a nice large quiescent BH. You will have considerable difficulty reporting any observations though.

> Well my "problem" will end up being one very similar to the constant creationists. How do you have a (potentially) infinite series of formed Universes, and not have only−iron left? Seriously, if we contain black holes, likely some of them formed "day one", why should our position in the "chain of Universes" be particularly different than any other? I'll try carving out the parts, and see if they fit into anything that someone can use.

It might be worth your while looking at some of the existing multiverse hypotheses before you go too much further. One idea floated there is that inside each BH in a given universe but isolated from it quantum fluctations can create an ensemble of new universes with inherited (or random) choices for the constants of nature. It has some appeal but as far as I can see it is not amenable to observational testing.

You might find Martin Rees book "New perspectives in Astrophysical Cosmology" worth a look.

> > The event horizon *is* a singularity. No?
>
> No, of course not, at least not a physical singularity.

> A neutron star is the most dense, physcially stable state. Are you so sure?

We can't be certain. ISTR a few serious papers have been written about the possibility of another repulsive force kicking in at ultra high energies to avoid the singularity forming at the centre of a BH.

> It is a
> coordinate singularity in some coordinate systems,
> just like the Earth's north pole.

I disagree. I don't think we "flatlanders" can sit back here and say that. Not and be entirely serious. Yes, coordinates based on "mostly flat space theory" points to a mathematical singularity. But physical theory points to physical singularities even before the event horizon is formed. And this has nothing to do with "a choice of coordinate systems".

There is a significan singularity in the mathematical and physical sense at the centre of a BH (assuming the classical geometrical interpretation of GR). But there is nothing so special about the event horizon beyond it being rather like a semipermeable membrane for energy and matter. (loose use of words that may get me into trouble)

I do appreciate the link, and the effort. I will go there next. Is there a similar study for the spectra of our Sun?

Try:
http://www.shef.ac.uk/physics/teaching/phy103/solspec.html

Regards,
Martin Brown
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