# Re: CMBR and neutron stars

***Source:*** http://sci.tech−archive.net/Archive/sci.astro/2005−08/msg00144.html

- *From*: "N:dlzc D:aol T:com \(dlzc\)" <N: dlzc1 D:cox T:net@xxxxxxxxxx>
- *Date*: Wed, 17 Aug 2005 19:36:11 −0700

Dear Steve Willner:

"Steve Willner" <willner@xxxxxxxxxxxxxx> wrote in message
news:4303a492$1@xxxxxxxxxxxxxxxxxxxxxxxxx
> SW> I would have guessed that the SW> integrated stellar output
> would
> SW> be greater [than the microwave background]
>
> In article <0PdLe.25722$E95.14693@fed1read01>,
> "N:dlzc D:aol T:com \(dlzc\)" <N: dlzc1 D:cox T:net@xxxxxxxxxx>
> writes:
>> Now expand the stars away from the hole, in an expanding
>> Universe. The intensity goes down, as the light is also red
>> shifted.
>
> The ratio between CMBR and starlight must be a function of
> time. At early times, the CMBR dominates, but its energy
> density diminishes as the fourth power of scale factor. Energy
> density from stars formed at any epoch diminishes at the same
> rate, but new stars keep forming.

We don't see any new galaxies springing into existence, however.

> Thus the relative contribution from stars increases with time.
> As noted in my original message, I'm not sure where the
> balance stands in today's Universe.

COBE (as you provided below) will likely be a start. If I am going to model "it", I likely need a star (as a companion to be consumed), a galaxy, and COBE's data (which might include the Milky Way).

>> Steve, I am not *asserting*, I am asking. The CMBRM is
>> opaque and isothermal (as I was assured).
>
> Indeed it is, or at least very nearly isothermal. (WMAP and
> other projects have measured very small temperature
> differences.)
>

>> 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? 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"?

>> If you
>> integrate the entire light history of light passing an average
>> point/volume "somewhere", over a period of time shortly after
>> the
>> Big Bang, to say, 100 Gy, would the entire history so
>> delivered
>> not be "isothermal" to a first approximation?
>
> As above, I don't understand "isothermal," but the spectrum
> changes
> with time and subsequent to recombination never looks anything
> like a
> blackbody (again with the possible exception of special
> locations).

My hypothesis is that internal time has no correlation to external time. So "ever passing the event horizon" always arrives at the same *internal* time as a starting point... the Big Bang. So I have to estimate the light infall of a container Universe from the time the BH is formed, to the time it evaporates. And as George Dishman pointed out, the "ingested" Hawking radiation will also be a contributing factor. How dominant I don't know. I presume that Hawking radiation includes photons, since photons are their own anti−particles... does anybody know?

> SW> If you want
> SW> to avoid the medium being optically thick at that epoch,

> you
> SW> have to show why this extrapolation is wrong.
>
>> Simple. There was no medium. Coalescence had already
>> occurred.
>
> "Coalescence" into what?

Proto−galaxies, for a start. Not sure what infall might have
done to "gravitationally bound structures" that the BH might have
ingested.

> Are you saying the hydrogen was created
> subsequent to recombination (new physics)?

No, the hydrogen may have been fully formed in the container, or
the container of the container, ad infinitum. Or it may have
been such a sharp gradient on infall that the hydrogen was formed
by shredding other elements to quarks.

> Or that somehow the
> ordinary Saha equation didn't work, so the gas was neutral
> when according to its temperature and density it should
> have been ionized (new physics)?

Note: temperature and density *assumed*, based on the physical
model called "standard Big Bang theory". I am not trying to
supplant it... I obviously cannot. I could be "right" and still
the Universe was filled with a "Universe filling, opaque plasma".
But maybe we don't have to have the plasma, to describe what we
see.

> Or that the hydrogen was bound into large objects,
> which have to be >1E5 solar masses unless you invoke
> new physics?

Proto−galaxies perhaps. Seed BHs from which galaxies are formed.

> (You might try a web search on "Jeans mass," though
> not all the references you will find are mistake−free.) And
> if you do somehow form large, coalesced bodies you
> 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?

> 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.

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.

> If you want to get
> round that, you need to explain what new physics you are
> assuming.

None. Just one interpretational difference of a MODEL.

> In messsage <81xLe.35947$E95.12374@fed1read01>:
>> I will admit that the "uniformly distributed, opaque plasma"
>> bothered me, because:
>> 1) I didn't think that any "normal matter" could be made to do
>> that at 3000 K; and
>> 2) I didn't think that that matter, once cooled and somewhat
>> coalesced, wouldn't write its absorption lines in the CMBR
>> light;
>> and
>> 3) Structures are being found close to the CMBRM, indicating
>> that
>> galaxy formation is going to have to be revised to be very
>> fast
>> indeed.; and
>> 4) The presence of heavy metals in any given spiral galactic
>> disc
>> requires a rate of supernova occurence that is not "seen" even
>> today, much less close to the CMBRM.
>
>> I have been relieved of my incorrect notions 1) and 2).
>
> Glad we have made some progress.

My thanks to both you and George for that.

> 3) is a problem, but no one claims to understand structure
> formation very well. In particular, the effects of dark matter
> and dark energy are at best guesses, and numerical models
> are known to be limited by inadequate computer power even
> today. I suppose there may come a time when difficulty
> forming structures forces a rethink of the Big Bang model,
> but we are not there yet.

I am trying to throw a sighting off in a direction that I think holds promise. The "road less travelled" is sometimes a dead end.

> You might, by the way, have added "3a)" formation of heavy
> elements very early. Objects at z>5 with near−solar metal
> abundances have been observed. As with structure formation,
> though, little is known about early generations of stars
> ("Population III"), so it's premature to claim this is a
> serious
> challenge to the basic Big Bang model.

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.

As and analogy, imagine a tank with many layers of sucessively denser clear liquids, layered top to bottom (if any). Add a quantity of dark ink, with a density equivalent to the lowest strata, to the top of the top layer. As the ink drops through each layer (black hole formation), it spreads out across the interstitial boundary layers (Universes). Of course, someone has to clean up the mess afterwards... ;>)

> I'm not sure I understand why you think the metal abundance
> "today" (if that's what you meant by 4) is a problem. Metals
> are formed by high−mass stars, which have short lifetimes.
> Presumably a bunch of them formed and exploded long ago,
> and indeed we see evidence of that in the distant Universe.
> Star formation appears to have peaked between redshifts 2
> and 4 and is at least an order of magnitude lower today than
> it was then. Plenty of details are still murky, but I
> don't see any great problem with the overall picture.

OK. Perhaps my "bandage" will not be required.

> In <DrxMe.57073$E95.48764@fed1read01>:
>> 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?

> 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".

>> I just need spectrum data... the Sun, and some of the full sky
>> surveys that mapped the CMBR... which will not do a good job
>> with
>> individual spectral lines most likely. Do you have some ideas
>> where I can look?
>
> I have no idea what you are looking for, but you might start
> with the
> COBE data: http://lambda.gsfc.nasa.gov/
> (This web site has moved; I had some trouble finding it.)

I do appreciate the link, and the effort. I will go there next.
Is there a similar study for the spectra of our Sun? Just some
search terms, if they come easily to mind. I could probably use
it for a "companion". DON'T DO THE SEARCH YOURSELF. You and
George are spending far too much time engaging my fantasy as it
is.

Again, thanks,

David A. Smith

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- ***Follow−Ups***:
  - ♦ ***Re: CMBR and neutron stars***
    - ◊ *From:* Martin Brown

- ***References***:
  - ♦ ***Re: CMBR and neutron stars***
    - ◊ *From:* N:dlzc D:aol T:com \(dlzc\)
  - ♦ ***Re: CMBR and neutron stars***
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