Re: big bang "everywhere at once"?

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From: Bjoern Feuerbacher (*feuerbac_at_thphys.uni−heidelberg.de*)
Date: 06/01/04

Date: Tue, 01 Jun 2004 10:27:35 +0200

Jaxtraw wrote:
> "Bjoern Feuerbacher" <feuerbac@thphys.uni−heidelberg.de> wrote in message
> news:c971h4$7pb$1@news.urz.uni−heidelberg.de...
>
>>Jaxtraw wrote:
>>
>>[snip lots]
>>
>>
>>
>>>The cosmological constant was a futz introduced by Einstein to make the
>>>universe static;
>>
>>IMO that's not a good argument against using it. Einstein constructed
>>his theory by using certain postulates. One of them was "a space with no
>>matter and no radiation in it should be flat, i.e. have no curvature".
>>If one drops that postulate, the cosmological constant appears
>>automatically in the equations of General Relativity! That Einstein
>>introduced the constant simply to salvage his idea of a static universe
>>is thus not an adequate argument against using it.
>
>
*> True, but there's no actual evidence *for* it either,*
> or at least there certainly wasn't in Einstein's day,

Yes, obviously back then, there was none. Today, there is.

> other than a wrong assumption that the
> universe is static. Einstein's theory showed that the universe must be
> dynamic; but then so did Newton's. Einstein introduced the Cosmological
> Constant to balance the attractive force of gravity, to make his universe
> static, because he assumed it must be.
>
> Then the evidence came in that the universe isn't static at all, and the
> constant was dropped.

And *that* dropping was the error, IMO, not the introduction of the
constant. Only because the universe was seen to be dynamic was not a

sensible reason to simply assume that a parameter of the theory has to
be zero!

> IOW, if there is a long range repulsive force, it
> isn't Einstein's cosmological constant.

It has another value − but essentially, it is still the same (type of)
constant.

> It would be a classic case of
> getting a lucky right answer for the wrong reasons.

Einstein's "answer" wasn't right numerically.

>> > if there's a long−range repulsive force in the universe
>>
>>>nobody has really any idea what it is or what the mechanism is...
>>
>>Quantum Field Theory predicts the existence of "vacuum energy" (the energy
>>of the zero point fluctuations in the fields). Such a vacuum energy
>>would have exactly the properties of Dark Energy − it would provide a
>>long−range repulsive force.
>>
>>Granted, the predictions of QFT for that are not yet quantitative (or
*>>better, the attempts to make quantitative predictions were off by *huge**
>>factors) − but that's not very surprising, cause in order to make
*>>sensible predictions about this, one first would need to know *what**
>>fields there are in the universe. I.e. we need to know more about
>>supersymmetry and probably also about String Theory and Quantum Gravity
>>before we can attempt to make any sensible prediction of the value of
>>the cosmological constant from QFT.
>>
>>
>
>
> The magnitude of vacuum energy tentatively predicted by theory is so far
> removed from what is observed as to be a meaningless prediction.

Well, that's what I said above in parentheses.

> If there is
> a long−range force speeding the expansion of the universe (which is highly
> tentative) then it may well be something else entirely.

Might be, yes. But as long as we don't know, assuming that it somehow
corresponds to QFT vacuum energy is IMO a sensible first guess.

> We may well find
> that better theory will show that the vacuum energy rounds to a very neat
> zero :)

Perhaps, yes. But as long as we don't know, I think that is a better idea than simply assuming that there is yet another field, for which we have no direct evidence ("quitessence" or "cosmon").

Bye,
Bjoern