

# Re: Special relativity, the expanding universe and dark energy

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Ace wrote:

> *I thought the big bang theory argued that the universe originated as a  
> point,*

That's a popular misconception. The theory says only that the universe started from an infinitely dense state. That doesn't had to be a point.

And even that statement of the theory is accepted by essentially no one as probably true – people think that for describing the very earliest stages of the universe, one needs a working Quantum Theory of Gravity.

> *and is forever expanding*

Probably true – although there is still a faint possibility that it might recollapse again.

> *(BTW, the brane theory, involving a  
> collision between dimensions, seems more coherent to me. The  
> inflation part of the big bang theory doesn't seem rational.)*

Why not?

And, BTW, "collision between dimensions" does not make much sense. You probably mean a collision between branes, i.e. the ekpyrotic model, right?

> *If the universe has no outer bound, then what does it mean for it to  
> be expanding?*

That all distances in it increase.

> *Trying to simplify my thought, imagine two objects in orbit around  
> each other. Both objects are ejecting energetic particles at high  
> speed, and they are slowly converting mass into energy. So their  
> mass is going down over time, and the density of mass (and energy) at  
> a distance is going up. Won't they drift apart from each other as a*

sci.physics: Re: Special relativity, the expanding universe and dark energy

> *result?*

Depends on the details of the process, I would say.

For example, if the energy is radiated off in a spherical symmetric way, there will be only a spherically symmetric energy distribution around the bodies – and such a distribution does not influence the motion of the bodies inside it.

- > *Or does the symmetry of the change in mass/energy*
- > *distribution result in no net change in the forces of gravity acting*
- > *on the objects?*

Sorry, I don't understand what symmetry you are talking about here.

> *I need to learn more about general relativity.*

What is your background? Can you understand the math, or do you want to have a non-technical introduction?

- > *I know about*
- > *gravitational lensing, but I've never read a concise summary of it*
- > *that made any sense to me.*

What are your problems with it?

- > *Does it come down to the fact that energy*
- > *also has gravity?*

No, mass alone is sufficient to explain it.

> *Can anyone summarize GR in a few sentences for me,*

Energy curves space, and objects move in that curved space following the curvature. That's the essence.

> *or point me to a good source to read about it?*

Sorry, I know of no good pop science source... :-(

For the Big Bang theory, you could try "Kosmologie fuer die Westentasche" by Kippenhahn, if you understand German...

- > *On a related note, I was reading about a dark energy study that's*
- > *looking for the disappearance of gravitons as potential proof of*
- > *multiple dimensions.*

I never heard of that. Where did you read that?

> *I thought gravitons were still theoretical.*

sci.physics: Re: Special relativity, the expanding universe and dark energy

Better word here: hypothetical.

> *Have they actually been observed?*

No, AFAIK.

> *How much is known about them?*

They are hypothetical... There isn't even a working theory which would predict them and tell us more about their properties!

[snip sig]

Bye,  
Bjoern