

## Re: Is the universe spatially infinite?

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**From:** Joseph Lazio (*jlazio\_at\_adams.patriot.net*)

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Sam Wormley's already covered much of this, but let me through in my \$0.01 as well.

>>>> "d" == *dkomo* <*dkomoNoSpam@cris.com*> writes:

d> I was trying to get a verification of the following quotes:

d> "But if the universe is spatially infinite, there was already an  
d> infinite spatial expanse at the moment of the big bang. At this  
d> initial moment, the energy density soared and an incomparably large  
d> temperature was reached, but these extreme conditions existed  
d> everywhere, not just at one single point. In this setting, the big  
d> bang eruption took place everywhere on the infinite expanse.  
d> Comparing this to the conventional single-dot beginning, it is as  
d> though there were many big bangs, one at each point on the infinite  
d> spatial expanse."

d> Brian Greene, *\_The Fabric of the Cosmos\_*, p. 249

d> Why should we take this idea seriously?

What Greene is trying to do here is dispel the common misconception about the Big Bang. I just posted on this topic, but the basic problem is that most popular descriptions of the Big Bang do not distinguish between the Universe as a whole and the *\*observable\** Universe. The observable Universe is given roughly by  $c*T$ , where  $c$  is the speed of light and  $T$  is the age of the Universe. Obviously, in the past,  $T$  was smaller, so  $c*T$  was smaller.

That's what leads people astray. One can have an arbitrarily small observable Universe: Make  $T$  small, and  $c*T$  is small. That doesn't mean that the Universe is that size, though.

d> Because,

d> "We will see that there is mounting evidence that the overall shape  
d> of space is not curved, and since there is no evidence as yet that  
d> space has a video game shape [a 3-D torus], the flat, infinitely

sci.physics.relativity: Re: Is the universe spatially infinite?

d> large spatial shape is the front-running contender for the  
d> large-scale structure of spacetime."

d> Greene, p. 250

d> So what I got was a bunch of conflicting information in this  
d> thread.

Welcome to Usenet. Everybody claims to be an expert. The best you  
can do is keep reading, and try to judge by the references that people  
give or their other posts.

d> Several people denied that spacetime is flat on a cosmic scale,  
d> even though this is a key prediction of inflation theory and has  
d> been verified by CMB measurements. And [Wormley] claimed "that 12  
d> to 14 billion years ago, the portion of the universe we can see  
d> today was only a few millimeters across", which is not correct if  
d> the universe is spatially infinite.

See above. The observable Universe would have been a few millimeters  
across when the Universe was roughly a few picoseconds old. (Note  
that this is well after the epoch of inflation is thought to have  
occurred, as that is typically put at  $1E-35$  seconds, well before  $1E-12$   
seconds.)

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