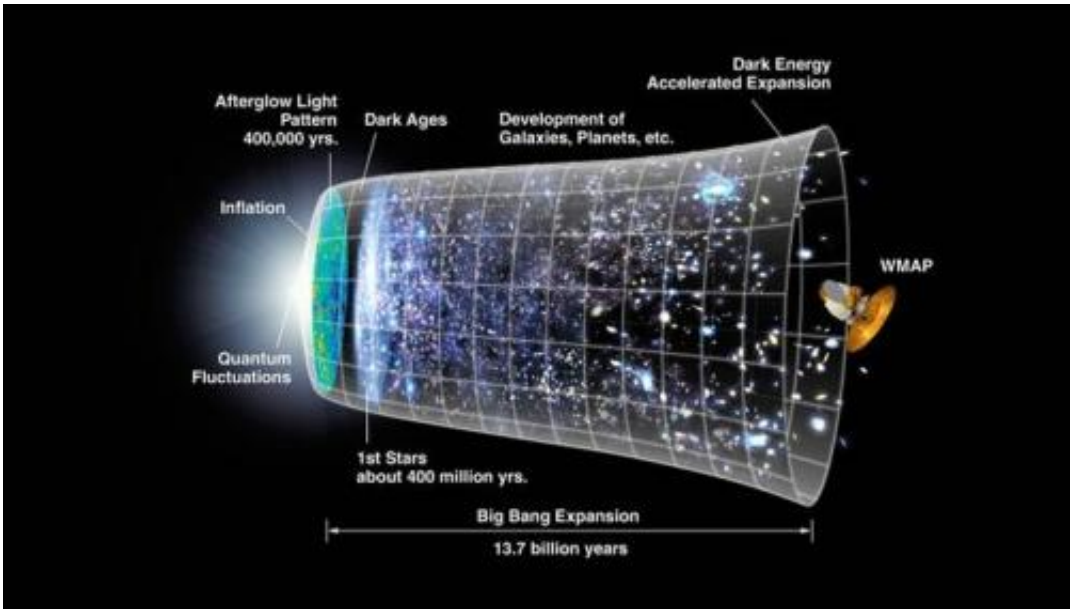
Is the universe actually shrinking?

February 3 2015, by Fraser Cain



Representation of the timeline of the universe over 13.7 billion years, and the expansion in the universe that followed. Credit: NASA/WMAP Science Team.

Whoa, here's something to think about. Maybe the Universe isn't expanding at all. Maybe everything is actually just shrinking, so it looks like it's expanding. Turns out, scientists have thought of this.

There are some people who would have you believe the Universe is expanding. They're peddling this idea it all started with a bang, and that expansion is continuing and accelerating. Yet, they can't tell us what force is causing this acceleration. Just "dark energy", or some other JK Rowling-esque sounding thing. Otherwise known as the acceleration that

shall not be named, and it shall be taught in the class which follows potions in 3rd period.

I propose to you, faithful viewer, an alternative to this expansionist conspiracy. What if distances are staying the same, and everything is in fact, shrinking? Are we destined to compress all the way down to the Microverse? Is it only a matter of time before our galaxy starts drinking its coffee from a thimble or perhaps sealed in a pendant hanging on Orion's belt? So, could we tell if that's actually what's going on?

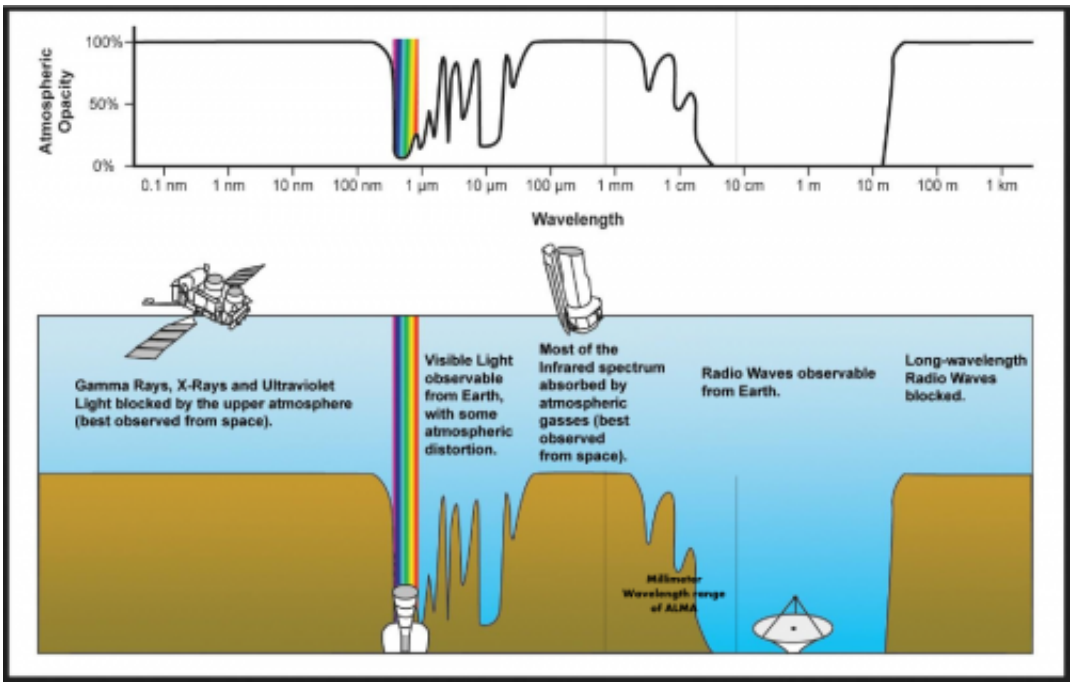
The first horrible and critical assumption here is that shrinking objects and an expanding universe would look exactly the same, which without magic or handwaving just isn't the case. But you don't have to take my word for it, we have science to punch holes in our Shrink-truther conspiracy.

Let's start with distances. If we assumed the Earth and everything on it was getting smaller, we'd also be shrinking things like meter sticks. In the past they would have been larger. If everything was larger in the past, including the length of a meter, this means the speed of light would have appeared slower in the past. So was the speed of light slower in the past? I'm afraid it wasn't, which really hobbles the shrinky-dink universe plot. But how do we know that?

You've probably seen spectral lines before or at least heard them referenced. Scientists use them to determine the chemical composition of materials. A changing speed of light would affect the spectral lines of distant objects, and because some people are just super smart and were able to do the math on this, we know that when we look at distant gas clouds we find the speed of light has changed no more than one part in a billion over the past 7 billion years.

Shrinking objects would also become more dense over time. This means

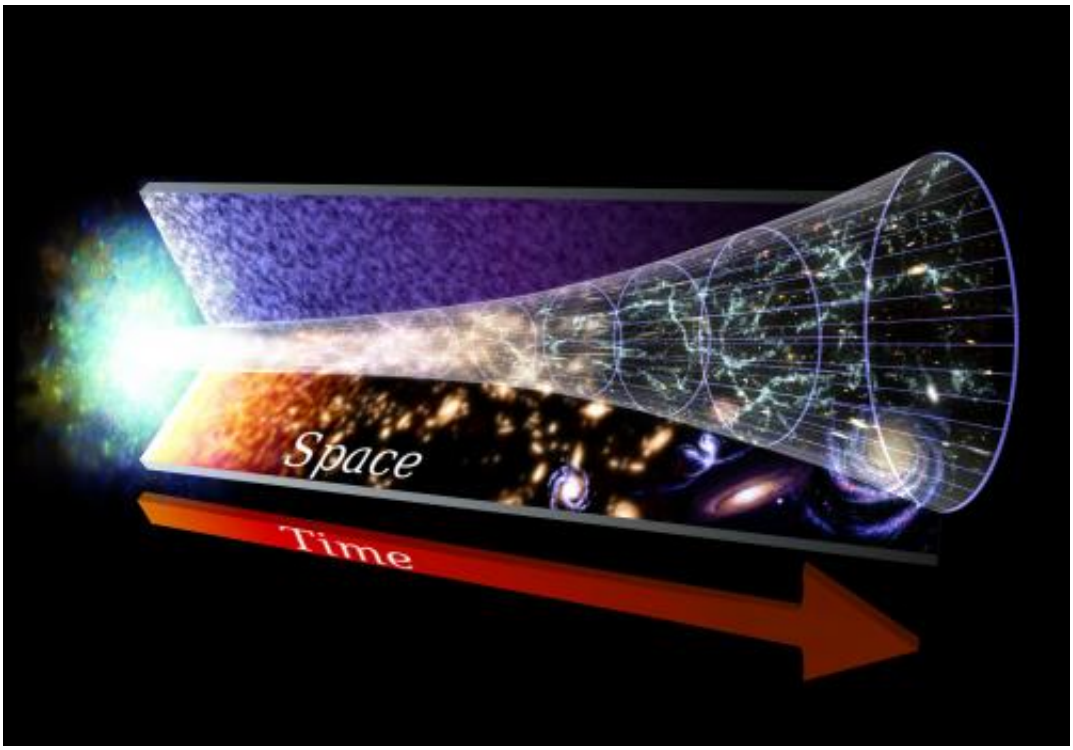
that the universal constant of gravity should appear smaller in the past. Some have actually studied this, to determine whether it has changed over time, and they've also seen no change.



The diagram shows the electromagnetic spectrum, the absorption of light by the Earth's atmosphere and illustrates the astronomical assets that focus on specific wavelengths of light. ALMA at the Chilean site and with modern solid state electronics is able to overcome the limitations placed by the Earth's atmosphere. Credit: Wikimedia, T.Reyes

If objects in the Universe were shrinking, the Universe would actually be collapsing. If galaxies weren't moving away from each other, their gravity would cause them to start falling toward each other. If they were shrinking, assuming their mass doesn't change, their gravity would be just as strong, so shrinking wouldn't stop their mutual attraction. A Universe of shrinking objects would look exactly opposite to what we observe.

So, good news. We're pretty sure that objects, and us, and all other things in the Universe are not shrinking. We're still not sure why anyone would name a thing Shrinky Dinks. Especially a craft toy marketed at children.



Artists illustration of the expansion of the Universe. Credit: NASA, Goddard Space Flight Center

Source: Universe Today