

Offered Title: Where is Waldo?

I really don't care where Waldo might be, but I'd like to know where I am.

Neil deGrasse Tyson wrote a book recently titled *Astrophysics for People in a Hurry* and one of his many illuminating topics sparked my interest about our place in the universe. So, here I reduce one of his illustrations to this: Once we were the center of everything and now, because of better understanding, we're not in the middle of anything. So, where are we?

It appears from our perspective that the "observable" universe is the same distance in all directions. This puts us in the center, no? Could we really be at the center? Let's look at the universe.

From a point with essentially no volume but containing all the energy needed to form our universe, bursts forth our universe, yada-yada-yada...expansion occurs over 13-14 billion years, yada-yada-yada...and here we are. Our observable universe is around 28,000 mega parsecs (28 billion parsecs) in size. One parsec = 3.26 light years. One light year = 5.9 trillion miles. The light year is a measure of distance, how far light travels in one year. So, our observable universe is around 90 billion light years in size, but we really do not know the size of "the" universe. The whole universe is believed to be much larger based on early exponential expansion rates and age. The observable universe then contains those things we can detect, with the rest being too far away for photons to reach us in 13-14 billion years. Maybe next week something will pop into existence as its light reaches us. Basically, our universe is unimaginably large.

The shape of the universe is another question. Many if not most investigators now think the universe is flat, but spacetime is curved. I am not quite able to wrap my head around a flat universe, but if it is so very large I suppose the observable universe would look the same in all directions, more like a sphere.

But are we in the center? Seems no one knows but the consensus is it's unlikely. The best estimate is that since the universe is so large and spacetime is curved, no matter where you are, it appears to be the center. You are at the center of your observable universe sphere. So, while we, or maybe no one else is really at the center of the universe as a whole, we appear to be at the center of our observable universe. Waldo too.

What's in the Sky?

The Perseid meteor shower peaks in the early morning hours (between 2-6 am) of August 12th. Unfortunately, a waning gibbous Moon rises around midnight to interfere.

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