Ask A Genius 36 - Informational Cosmology 12

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Scott: Persistent structures at all scales in the universe have evolved to be resistant to decay, informational decay. They're like buffers – like the shielding of solar systems from the interstellar medium because of the heliosphere. What about these informational decay buffers?

Rick: Solar systems are stable orbitally for the most part because all of the stuff that has crashed into stuff has either been knocked away from the solar system or agglomerated into planets or settled into stable orbits across the 5 billion or more years that the Solar System has taken to form.

The Solar System has been formed during the 99% of that time. During the initial 1% or 8%, there was crashing into everything all of the time. However, over time, that became more stable. The universe has solar wind coming and knocking some stuff away. The Earth is protected. One reason we're able to live reasonable lifespans on Earth is because of the Van Allen Belt.

We've got a rotating iron core that generates a massive field that deflects incoming radiation, cosmic rays, away from the temperate parts of Earth and towards the poles. There are protective deals, shields, and dynamic systems that contribute to continued stability. It is structures like

solar systems and galaxies, where an average galaxy consists of $10\text{^}11^{th}$ stars. The vast majority of which are not crashing into each other at any given time.

The vast majority of galaxies are not crashing into each other at any given time too. This happens at various scales. In a time-based system that includes increasing order, persistent things persist. That seems to be a base deal. There are reasons why persistent things persist. The big reason is that they are resistant to outside disturbance.

The Solar System is resistant to disturbance because it, over a period of time, got rid of most of the disturbing objects. Also, the Solar System is part of a universe that is itself persistent and part of the universe's persistent nature is there is an ass load of space.

With all of this space, it makes it less likely for things to have to crash into each other because there's so much space for things to not crash into each other. If you look at the night sky, if you viewed the night sky as a sphere, as a globe, only 1 trillionth of the globe is painted star color. That is, it has the disc of a star there. The rest is pretty much empty space.

Empty space, where a photon can go 10 billion light years without crashing into anything, but I think it can; once something can become gravitationally deflected, it can probably get diffracting in some ways by passing through clouds of sparse matter without getting absorbed, but they can get messed with.

Living in a persistent universe, living in a universe with an apparent age of 13.8 billion years, there are things that you can look at as contributing to the persistence of that universe with the major things being gravitational locking and clustering in vast and mostly empty space.

For most things, there's a combination. If it's gravitational locking, it is something that happened once among the things that collided and locked together. Now, they're stable together – either on increasingly large scales or as planets, or stars. Then you have a bunch of systems that are stable because they're locked together in orbit.

They're not going to crash into each other in the few billion years because the bodies that are part of an orbital system, and are orbiting bodies, have sufficient kinetic energy to keep themselves from crashing into the things that they are locked to. You have permanent locks from things that lock together and form matter clusters.

And then you have permanent locks in the things that form systems, in a big empty universe, that are highly persistent. The closest star from us is 4 light years away. I don't know what the average distance between galaxies is. But it is probably millions of light years, I guess.

At the very least, many, many tens or hundreds of thousands of light years. Even if 2 galaxies are on a collision course, it is going to take 400 million or a billion years before they crash into each other. Even when they do crash, all of the stars in a galaxy have sufficient kinetic energy that they don't fall into the center of the galaxy. Galaxies themselves are sparsely enough stringed in space that even when 2 galaxies crash into each other the vast, vast majority of stars do not slam

into each other. They spin around each other and have different trajectories and things are chaotic, but those settle down.

First, into a new globular galaxy, then over a few billion years of getting things figured out, then a spiral galaxy.

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