OBLER'S PARADOX

*** Olbers' paradox, simply stated, is "Why is the sky dark at night?" (By the way, note the spelling of "Olbers"; this has to be the most misspelled name of all time!)

This may seem like a simple question, but it has profound implications. Suppose the Universe is infinite both in space and time. If all of it looks like our corner of it (in other words, it is homogeneous), then no matter what direction you look in, eventually you will see a star. If that is true, then the whole sky should be as bright as the surface of a star! (At this point, you may be thinking "Wait a minute! Things get dimmer as they get farther away! If a star is really far away, it would be a lot fainter. That is true, but the amount of light per area on the sky is the same no matter how far away a star is! Even though the star gets fainter, it *looks* smaller in the sky. So if you took a bunch of stars and piled them all up, the light would still add up. If you had an infinite number of stars, all their light would pile up until the whole sky looks like the surface of a star.)

The obvious conclusion is that the Universe is not infinite, either in space or time, or both. Now we think that the Universe had a finite beginning, the Big Bang, and is not infinite in extent.

Now, when I look at your question, I think you may be confusing Olbers' paradox with another issue, called the Missing Mass problem. When we look at clusters of galaxies, we can tell how much mass must be in the cluster by seeing how the galaxies move; the more mass there is, the higher the gravity, and the faster the individual galaxies move. Now, we know the mass of the Sun, and we know how much light it puts out. We use this *mass to light ratio* to estimate the mass of galaxies given the amount of light they emit. When astronomers looked at clusters, and compared the mass needed to hold the cluster together (found by looking at the velocities of the individual galaxies, remember) to the mass to light ratio, they found that the actual cluster mass was MUCH higher than the light implied. In other words, most (perhaps as much as 90%) of the mass of the cluster must be dark-- matter that literally did not emit light.

So what was this "missing mass"? Dark stars (like black holes), or planets, or perhaps some weird particle no one had discovered yet, like axions or gravitinos? No one knew, and no one knows yet!

However, as I write this, just today there was a press release by some astronomers that have been making computer simulations of some of the new solar systems discovered. They found that a solar system that forms with two giant Jupiter-like planets tend to eject one of them, as well as eject any smaller planets. Literally, the planets are flung out of the system and into interstellar space. They also theorize that this will happen quite commonly! If true, this could help explain part of the missing mass problem: planets, floating alone and frozen in the depths of intergalactic space. Mind you, this is *highly* speculative, but provocative nonetheless!

DERYA SÖZEN
L1A / 48