

Dark Matter



Have you ever lost your wallet? Embarrassing, isn't it? Scientists have a similar problem; it seems they can't find most of the, um, universe. More than 90% of everything seems to be... missing.

The problem came to light in 1933 when astronomer Fred Zwicky measured the mass of galaxies by using their brightness to estimate the number of stars, and thus the galaxy's mass. Then he used a different method to estimate mass based on the velocity of stars in the outer rim of galaxies – the answer he got was *400 times greater* than the answer based on the brightness method.

The problem is, galaxies spin rapidly, but don't fall apart. They are like our solar system, but on a much larger scale. If our solar system didn't have the Sun at the center, the planets wouldn't orbit; they'd just fly off into space like a child being thrown from a merry-go-round. Similarly, galaxies are made up of stars held together by *something*, but that *something* doesn't seem to exist. Put simply, there's a whole bunch of stuff out there that humans can't find.

That stuff is called dark matter, and there are two main theories as to what it might be. It could be massive dark objects - like brown dwarf stars or black holes - that have mass but are hard to see. The problem is, current technology such as the Hubble space telescope, *can* detect brown dwarfs and black holes... and there aren't nearly enough of them.

The other theory is that there are a lot of WIMPs in the universe. WIMP stands for Weakly Interacting Massive Particles. The theory is that these are subatomic particles that don't interact with what we call normal matter. Physicists now think that WIMPs are the best candidate for resolving the dark

matter problem.

But there's some delicious irony here; if WIMPs are real, their total mass is a *lot* more than the mass of what we call normal matter... in fact, *WIMPs* are normal, and everything that humans can see and interact with is sort of... unusual.

Just a few hundred years ago humans had to accept the fact that the world didn't revolve around us, it revolved around the Sun. Later, we had to accept that the Sun isn't a particularly big star and even our galaxy is small potatoes compared to the rest of the universe. Now we have to deal with the idea that the entire universe as we know it is small potatoes compared to... well we don't *know* what to compare it to. By definition, it's hard to even *interact* with WIMPs, let alone know much about them.

So science tells us of a vast, unknowable world, present but unseen, just out of range of our most sophisticated instruments. Hmmmm... it sounds a little religious doesn't it? After all if there's nothing, really, that we *can* say about the non-normal world of dark matter, it's also true that there's nothing we *can't* say. Speculation about heaven, the Tao, astral planes, other dimensions, disembodied intelligence... could all be true.

Science and religion both try to figure out the place of humans in the world, and it's interesting that they both seem to be ending up in the same place... completely flummoxed by mysterious worlds we can't even see.

Now, if you'll excuse me, I have to go find my wallet.

