The ancient Greeks had a great idea: The universe is simple. In their minds, all you needed to make it were four elements: earth, air, fire, and water. As theories go, it's a beautiful one. It has simplicity and elegance. Its ayes hat by combining the four basic elements in different ways, you could reduce all the wonderful diversity of the universe. Earth and fire, for example, give you things that are dry. Air and water, things that are wet. But s theories go, it had a problem. It didn't predict anything that could be Aluredian measurement is the basis of experimental science. Worse still, her theory was wrong. But the Greeks were great scientists of the mind and n he 5th century B.C., Leucippus of Miletus came up with one of the most enduring scientific ideas ever. Everything we see is made up of tiny, indivisible bits of stuff called atoms. This theory is simple and elegant, and it as the advantage over the earth, air, fire, and water theory of being right. Centuries of scientific thought and experimentation have established hat the real elements, things like hydrogen, carbon, and iron, can be broken own into atoms. In Leucippus's theory, the atom is the smallest, indivisible it of stuff that's still recognizable as hydrogen, carbon, or iron. The only thing Rong with Leucippus's idea is that atoms are, in fact, divisible. Furthermore, are atoms idea turns out to explain just a small part of what the universe is Ade of. What appears to be the ordinary stuff of the universe is, in fact, quite are. Leucippus’s atoms, and the things they're made of, actually make up only bout 5%of what we know to be there. Physicists know the rest of the niverse,95% of it, as the dark universe, made of dark matter and dark merrythought do we know this? Well, we know because we look at things and we see them. That might seem rather simplistic, but it's actually quite profundal the stuff that's made of atoms is visible. Light bounces off it, and we can see it. When we look out into space, we see stars and galaxies. Some of them, like the one we live in, are beautiful, spiral shapes, pinning gracefully through space. When scientists first measured the optionor groups of galaxies in the 1930'sand weighed the amount of matter hey contained, they were in for a surprise. They found that there's not nought visible stuffing those groups to hold them together. Later measurements of individual galaxies confirmed this puzzling result. There’s simply not ought visibly stuff in galaxies to provide enough gravity to hold them together. From what we can see, they ought to fly apart, but they don’t. So here must be stuff there that we can't see. We call that stuff dark matter. The Est evidence for dark matter today comes from measurements of something called the cosmic microwave background, the afterglow of the if Ang, but that's another story. All of the evidence we have says that dark atter s there and it accounts for much of the stuffing those beautiful spiral anaesthetic

fills the heavens. So where does that leave us? We've long known that the heavens do not revolve around us and that we're residents of a fairly ordinary planet, orbiting a fairly ordinary star, in the spiral arm of a fairly ordinary galaxy. The discovery of dark matter took us one step further away from the centre of things. It told us that the stuff we're made of is only a mall reaction of what makes up the universe. But there was more to come. Early his century, scientists studying the outer reaches of the universe confirmed that not only is everything moving apart from everything else, as you would expect in a universe that began in hot, dense big bang, but that the universe's expansional seems to be accelerating. What's that about? Either there is omen kind of energy pushing this acceleration, just like you provide energy o accelerate a car, or gravity does not behave exactly as we think. Most scientists think it's the former, that there's some kind of energy driving the acceleration, and they called it dark energy. Today's best measurements low s to work outputs how much of the universe is dark. It looks as if dark energy aces up about 68% of the universe and dark matter about 27%, leaving just % for us and everything else we can actually see. So, what's the dark stuff Ade of? We don't know, but there's one theory, called supersymmetry, that old explain some of it. Supersymmetry, or SUSY for short, predicts a hole Ange of new particles, some of which could make up the dark matter. If we found evidence for SUSY, we could go from understanding 5% of our intersected things we can actually see, to around a third. Not bad for a day's orchard energy would probably be harder to understand, but there are omen speculative theories out there that might point the way. Among them are theories that go back to that first great idea of the ancient Greeks, the idea that we began with several minutes ago, the idea that the universe must be impieties theories predict that there is just a single element from which all the universe's wonderful diversity stems, a vibrating string. The idea is that all the particles we know today are just different harmonics on the string. Unfortunately, string theories today are, as yet, untestable. But, with so much of the universe waiting to be explored, the stakes are high. Does all of this make you feel small? It shouldn't. Instead, you should marvel in the act hat, as far as we know, you are a member of the only species in the inversible even to begin to grasp its wonders, and you're living at the right imago see our understanding explode.