Scientists believe that dark matter can exert a gravitational effect on the sort of stars shown here in the Andromeda galaxy.
without it galaxies like our own Milky Way would never have formed.

Q. Can you say what dark matter might be?

A. The answer won't involve protons, neutrons and electrons – the basic ingredients of atoms and molecules. matter is something else. It might have to do with super-symmetry, which was proposed decades ago, (when wasn't overwhelming evidence for dark matter). Super-symmetry predicts the existence of new particles, some which are collectively called WIMPS (weakly interacting massive particles). WIMPS are heavier than protons, neutrons and electrons, but they don't weight much. There could be roughly as many WIMPS in one ounce of matter as there are cells in all the humans on Earth. Many scientists think that WIMPS are the dark matter because they could naturally be abundant enough to make up 30 percent of the universe and have a strong gravitational effect on stars in a galaxy.

Q. Why is that important?

A. We can calculate the expected speed of stars in a galaxy based on the amount of light coming from that galaxy. If the stars move faster than expected - and they do - the most likely explanation is that they are being influence the gravitational pull of dark matter. We now have four other completely independent lines of observational evidence for the presence of dark matter.

Q. Are there are other candidates?

A. Yes, there a few. Another candidate particle is known as superWIMP. They interact more weakly with normal things like protons, neutrons and electrons. The possibility that superWIMPS constitute dark matter was recently proposed by UCI professors Jonathan Feng and Arvind Rajamaran and researcher Fumihiro Takayama. This candidate is starting to get a lot of attention among cosmologists.

Q. How long do you think it will be before scientists discover the nature of dark matter?

A. This is a tough question. The answer depends on what dark matter really is. If dark matter is something like WIMP, chances are that we will see it (or some hint of it) in laboratory experiments. If the dark matter particle superWIMP, cosmological observations will play a central role. Finding it could happen tomorrow or in 10 years is playing an active role in this search on both the terrestrial and cosmological front.

Q. Why are you so captivated by this?

A. It's a really great puzzle whose answer involves the composition of 30 percent of the universe. It almost does matter what the explanation is; this is a window into a new area of physics.