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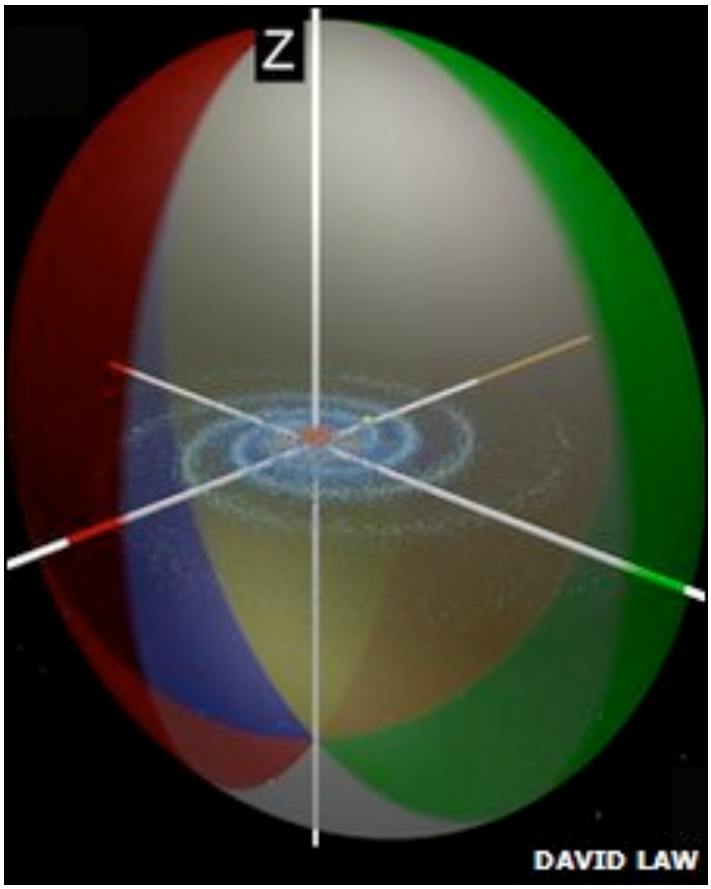
Dark matter 'beach ball' unveiled



More dark matter appears to lie above and below the plane of the galaxy

The giant halo of dark matter that surrounds our galaxy is shaped like a flattened beach ball, researchers say.

It is the first definitive measure of the scope of the dark matter that makes up the majority of galaxies' masses.

The shape of this "dark matter halo" was inferred from the path of debris left behind as the Sagittarius dwarf galaxy slowly orbits the Milky Way.

A team of US astronomers announced the findings at the American Astronomical Society meeting in Washington.

Dark matter is a mysterious kind of matter that makes up nearly a quarter of the mass in the universe, but does not interact with light and so has until now remained invisible to scientists.

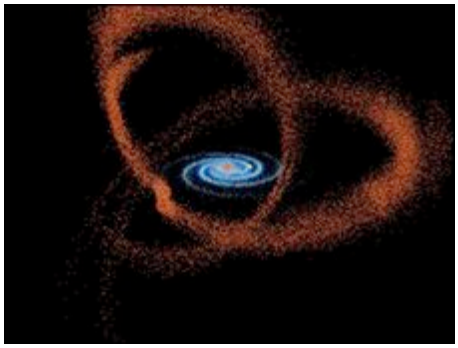
Mass transit

However, because it has mass, it acts on matter as we know it through gravity.

"You can't actually see it directly, you can see it through its effects on stellar structure, star clusters, and dwarf galaxies orbiting around the Milky Way," explained David Law of the University of California, Los Angeles, the researcher presenting the work.

"So what you want to do is map where these star clusters and dwarf galaxies go and use that to reconstruct their orbits and where the mass is."

Dr Law and his colleagues turned to the Sagittarius dwarf galaxy as one of the best-studied cosmic neighbours orbiting the Milky Way.



The trail of matter left by an orbiting galaxy hints at the dark matter's shape

Using data from telescope surveys of stars across the full scope of the sky, including the Two Micron All-Sky Survey (2MASS) and the Sloan Digital Sky Survey, the team was able to identify individual stars that had been dragged out of the tiny Sagittarius galaxy as it skims past our galaxy.

But in thinking about the Milky Way's dark matter halo as a sphere surrounding it, something didn't fit; the positions of the galaxy and its apparent speed didn't line up.

Dr Law's team then came up with the idea that the halo might be different sizes in different directions, and allowed for this in their gravity model.

What came out is what Dr Law described as a "cosmic beach ball, squashed from the side", flattened along the direction corresponding to the plane of the Milky Way.

The fact that the un-flattened direction should be above and below the galactic plane remains a mystery.

"It's a little weird in current dark matter models, but it'll be very useful in helping constrain future models, not only of dark matter itself but also how galaxies such as our own form in the universe."

The 215th American Astronomical Society meeting was confirmed on Wednesday as the largest astronomy meeting in history, with more than 3,400 attendees.