Astronomers measure weight of galaxies, expansion of universe

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Astronomers at the University of British Columbia have collaborated with international researchers to calculate the precise mass of the Milky Way and Andromeda galaxies, dispelling the notion that the two galaxies have similar masses.

While it was previously thought that the two galaxies weighed the same because of their similar size and structure, researchers found that neighboring Andromeda is about twice as heavy as our own Milky Way.

"Most of the weight of these galaxies is present in the form of invisible dark matter," says Yin-Zhe Ma, a postdoctoral fellow in the Department of Physics and Astronomy, adding that Andromeda has almost twice as much dark matter as the Milky Way.

"We don't know much about dark matter so this discovery means we'll get a chance to study it from within our own galaxy."

Ma and his colleagues were also able to measure the expansion of the universe by observing the motion of smaller "satellite galaxies" that orbit the Milky Way and Andromeda. Previous research used cosmic microwave radiation to measure the expansion of the universe from a great distance.

"It was surprising that we could see expansion happening from within our own local group of galaxies that is consistent with expansion on a universal scale," says Ma. "This is the first time we've captured evidence

that cosmic expansion is taking place so close to us."

Researchers hope to model the dark matter in our galaxy to better understand the interaction between dark matter and gravity.

Background

Researchers built computer models to simulate the two galaxies as a dumbbell structure in an expanding universe. The model showed the movement of small satellite galaxies around the larger galaxies. They measured the speed, position and motion of these satellite galaxies to infer the structure and mass of the Milky Way and Andromeda.

The study, a collaboration between the University of British Columbia, the University of Edinburgh, Carnegie Mellon University and NRC Herzberg Institute of Astrophysics, was published in *Monthly Notices of the Royal Astronomical Society*.

Provided by University of British Columbia