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Astrophysicists find evidence of shape of dark matter's distribution: report

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An international team of astrophysicists, including Japanese academics working at Academia Sinica, has discovered direct evidence about the shape of dark matter's distribution, a press release from the research institute said yesterday.

Dark matter is a cosmic enigma that has fascinated astrophysicists for many years. Because dark matter is invisible and no “dark matter particle” has been discovered, its existence is only inferred from a gravitational effect on other visible celestial matter or theoretical models, the scientists said.

Recently, astrophysicists from Japan and Taiwan, including postdoctoral fellow Nobuhiro Okabe from the Institute of Astronomy and Astrophysics at Academia Sinica, have found evidence that dark matter is distributed in an elliptical shape in massive clusters of galaxies, a finding that confirms a major prediction in the prevailing theory about dark matter.

The team observed the clusters of galaxies using the Subaru Telescope's Prime Focus Camera. Observations with the camera yielded wide-field images of massive clusters of galaxies — typically located 3 billion light years from Earth — which the team then used to measure and analyze dark matter distribution, the institute said in a press statement.

From analysis of the images, the team obtained evidence that the distribution of dark matter in the clusters has, on average, an extremely flattened shape rather than a simple spherical shape. The degree of the flattening was quite large, corresponding to a ratio of 2:1 in terms of the ratio of the major to minor axes of the ellipse.

The team's article, , entitled “Direct measurement of dark matter halo ellipticity from two-dimensional lensing shear maps of 25 massive clusters,” was published online on April 23 in Monthly Notices of the Royal Astronomical Society, a leading astrophysics journal.

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