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Heic0309 Video News Release

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HUBBLE TRACKS DOWN A GALAXY CLUSTER'S DARK MATTER

Hubble zooms on the sky

By staring in the direction of the constellation Pisces for five days with the NASA/ESA Hubble Space Telescope, astronomers have made a extensive 'mass map' of a galaxy cluster. This has given new clues about how clusters assemble and what role dark matter plays in cosmic evolution.

Despite being 4.5 billion light-years away, the cluster called CL0024+1654 – one of the most massive known - extends over an area as wide as the full Moon. To make a mass map that covers the entire cluster required a record number of 39 Hubble observations.

Images of a galaxy cluster

Clusters of galaxies are the largest stable systems in the Universe. They are like laboratories for studying the relationship between the distributions of dark and visible matter. The visible component of a cluster - the billions of stars in each of the thousands of galaxies - represents only 15-20% of the total mass. The rest is the invisible mysterious 'dark matter'.

Gravitational lensing

A European and American team of astronomers used the powerful trick of gravitational lensing in the galaxy cluster to make a unique map of its hidden dark matter and for the first time on such large scales, see how the dark matter is distributed with respect to the galaxies.

The observations

Tracing dark matter is not an easy task because it does not shine. To make a map, astronomers accurately measured the shape of fainter, more distant galaxies behind the cluster. The shapes of these distant systems are distorted into small 'bananas' by the gravity of the foreground cluster. This distortion provides a measure of the cluster mass.

The mass map

The overall association of dark matter and 'glowing matter' seen by the astronomers is very convincing evidence that structures like this galaxy cluster grow by the gobbling up smaller groups of galaxies.

END

Shotlist

TIMECODE	DESCRIPTION
	A-ROLL
10:01:00:00	Hubble zooms on the sky: 1. Sky map showing the stars as seen by the naked eye (data from ESA's Hippacos satellite) 2. 2.5 degree image from Digitized Sky Survey 2 3. Ground-based image of CL0024+1654 from the Canada-France-Hawaii Telescope (CFHT) using the CFHT12k camera 4. The 39 Hubble Space Telescope images (WFPC2 camera)
10:01:48:00	Images of galaxy cluster Abell 1689 and CL0024+1654
10:02:14:00	Illustrations of the light-bending effect of gravitational lensing
10:02:32:00	Images of galaxy cluster CL0024+1654 with CFHT and the Hubble Space Telescope
10:02:56:00	The unique mass map
10:03:10:00	**END A-ROLL**
	B-ROLL
10:03:20:00	A-roll animations: Hubble zooms on sky Images of galaxy cluster Abell 1689 Images of galaxy cluster CL0024+1654 with CFHT Images of galaxy cluster CL0024+1654 with the Hubble Space Telescope
10:06:01:00	Miscellaneous stock footage of the NASA/ESA Hubble Space Telescope
10:09:33:00	**END B-ROLL**

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