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<p>Video Podcast Episode 5: Hubble discovers ring of dark matter</p> <p>FOR IMMEDIATE RELEASE 19:00 (CEST)/1:00 PM EDT 15 May, 2007</p>	
<p>00:00 [Visual starts]</p> <p>00:02 [Narrator] An international team of astronomers using the NASA/ESA Hubble Space Telescope has discovered a ghostly ring of dark matter formed long ago during a colossal collision between two galaxy clusters. This is the first time that dark matter has been found with a distribution that differs substantially from the distribution of ordinary matter.</p> <p>00:19</p> <p>00:36 [Woman] This is the Hubblecast!</p> <p>News and Images from the NASA/ESA Hubble Space Telescope.</p> <p>Travelling through time and space with our host Doctor J a.k.a. Dr. Joe Liske.</p> <p>00:49 [Dr. J] Welcome to the Hubblecast!</p> <p>Scientists reckon that most of the matter in our Universe is something called "dark matter", an unknown type of matter that neither emits nor reflects light.</p> <p>But does dark matter really exist? Can scientists prove it? The NASA/ESA Hubble Space Telescope is helping to answer these questions.</p>	<p>Best zoom/pan on ACS CL0024+17</p> <p>Dark matter ring fades in</p> <p>Image explosion</p> <p>Hubblecast Logo + web site</p> <p>Presented by ESA and NASA</p> <p>TITLE Slide: Episode 5: Hubble discovers ring of dark matter</p> <p>Virtual studio. Dr J on camera</p> <p>Nametag</p>

<p>01:12 [Dr. J] In 2004 an international team of astronomers pointed Hubble towards the constellation of Pisces, the Fish, to observe a galaxy cluster that goes by the telephone number of CL0024+17 and which is located 5 billion light-years away from Earth.</p> <p>Hubble's Advanced Camera for Surveys produced a stunning image of the cluster. The galaxies in the cluster are seen here in yellow.</p> <p>Analysing the image over the last couple of years the team discovered a ring of dark matter – seen here in blue - and realised that its position of this ring did not match at all the position of the hot gas and the galaxies in the galaxy cluster. The ring itself is 2.6 million light-years across.</p> <p>This is the first time that dark matter has been found with a distribution that is so radically different from the distribution of the ordinary matter.</p> <p>02:22 [Narrator] This remarkable finding is attributed to the collision of the cluster with another cluster 1 to 2 billion years ago. The team's computer simulations show – here seen from the side - that when the two clusters smashed together, the dark matter fell to the centre of the combined cluster and sloshed back out.</p> <p>In reality the collision occurred along our line of sight, so that we have a head-on view of it. From this perspective, the dark-matter structure looks like a ring, just like the new observations show.</p> <p>02:56 [Dr. J] So how did astronomers spot the ring of dark matter? Tracing dark matter is not an easy task, the reason is of course that dark matter does not emit or reflect any light. The most direct way to detect its influence is to study the way its gravity deflects light.</p> <p>To do this, astronomers study the faint light from galaxies that lie behind the cluster, and whose light gets distorted and smeared into arcs and streaks by the gravity of the dark matter in the foreground cluster. This powerful trick called gravitational lensing.</p> <p>To illustrate this, imagine that I am a background galaxy being lensed by a massive foreground cluster. [PAUSE WHILE LENS PASSES]</p> <p>So by mapping the distorted light, astronomers can deduce the mass of the cluster and they can trace the distribution of dark matter within the cluster.</p> <p>03:57 [Narrator] This amazing image shows us some spectacular examples of</p>	<p>ZOOM</p> <p>ACS image with DM superimposed – full screen</p> <p>Dr J on camera</p> <p>Collision Sim 1 : Sideways</p> <p>Collision Sim 2 : With line of sight perspective</p> <p>Virtual studio. Dr J on camera</p> <p>Gravitational lensing animation</p> <p>Dr J being lensed</p> <p>Pan on lenses.</p>
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<p>faint background galaxies that had their light bent by the cluster's strong gravitational field.</p> <p>One of them, located about two times farther away than the yellow cluster galaxies in the foreground, has been multiple-imaged into five separate arc-shaped pieces. Hubble's high resolution can even show the details of this background galaxy.</p> <p>04:20 [Dr J] The ring's discovery is among the strongest evidence that dark matter actually exists and it increases confidence in our current theory of gravity .</p> <p>This is Dr. J signing off for the Hubblecast.</p> <p>Once again nature has surprised us beyond our wildest imagination ...</p> <p>04:37 [Outro] Hubblecast is produced by ESA/Hubble at the European Southern Observatory in Germany. The Hubble mission is a project of international cooperation between NASA and the European Space Agency.</p> <p>04:55 END</p>		<p>Full image. 5 x galaxy is zoomed up in boxes.</p> <p>Virtual studio. Dr J on camera</p>
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Shotlist

TIMECODE	DESCRIPTION
	A-ROLL
00:00:00	
00:00:12	
00:00:21	
00:00:39	
00:00:50	
00:01:13	
00:01:29	
00:01:50	
00:01:58	
00:02:01	
00:02:15	
00:02:28	
00:02:46	
00:02:53	
00:03:11	END A-ROLL
	B-ROLL
00:03:16	A-roll animations and footage unedited
00:09:56	END B-ROLL