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Heic0701 Video News Release **First 3D map of the Universe's Dark Matter scaffolding** **FOR IMMEDIATE RELEASE 19:30 (CET) / 01:30 PM EST 7 January, 2007**		
00:00 **[Visual starts]** **00:03** **[Narrator]** The stars and galaxies we see in the night sky represent only one sixth of the total matter in the Universe. The remainder is a mysterious component - dark matter - that neither emits nor reflects light. So, for astronomers, the challenge of mapping the Universe has been similar to mapping a continent from just the lights of the cities. **00:21** For the first time ever, astronomers have been creating a three—dimensional map of how this dark matter is distributed across the Universe. To this end, an international team of scientists, among them groups from Marseille, the Max-Planck Institutes and Paris have been using data from the NASA/ESA Hubble Space Telescope. The results are published in nature online of 8 January 2007, and at the meeting of the American Astronomical Society in Seattle. **00:50** Although the invisibility of dark matter makes it hard to detect and has eluded scientists for decades, the team of astronomers led by Richard Massey of the California Institute of Technology made this map after years of painstaking analysis of the Hubble COSMOS survey - the largest survey of the Universe ever conducted by the Hubble Space Telescope. **01:13** The map offers a first glimpse of the web-like large-scale distribution of dark matter in the Universe. The map reveals a loose network with a sponge-like structure of long filaments, intersecting in massive condensations where clusters of galaxies are located.	21" 29" 23" 16"	*Stars and galaxies* *Earth with city lights* *Zoom on COSMOS survey* *Hubble in space* *COSMOS and 3D rotates* *3D dark matter*

01:29 The survey encompasses an area of the sky nine times that of the full Moon and was carried out by an international team of 70 astronomers led by Nick Scoville of Caltech. The exceptional image depth and resolution of COSMOS has made it possible to cover the large areas spanned by the dark matter structures and to obtain details of its distribution.	21”	*Moon-COSMOS comparison*
01:50 Currently, astronomers can best probe dark matter by using gravitational lensing techniques, which is the bending of star light caused by the presence of dark matter in the Universe.	11”	*Gravitational lensing* *View of galaxies*
02:01 The map was created by using this technique, and analysing the distorted shapes of half a million distant galaxies. Such subtle distortions were then used to reconstruct the mass distribution along Hubble’s line of sight.	14”	*Weak gravitational lensing effect. Note how the shape of the “galaxy” changes from round to elliptical*
02:15 Stretching half-way back in time to the beginning of the Universe, the map reveals a network of dark matter filaments, collapsing under the relentless pull of gravity and growing clumpier over time.	13”	*Structure growth – dark matter*
02:28 The map shows how normal matter, including stars and galaxies, assemble and clump on top of the densest concentrations of dark matter.	10” 15”	*Visible light (from XMM-Newton X-ray obs.) compared with dark matter*
02:38 The 3-dimensional map is a historical achievement in its own right since it enables astronomers to better understand how galaxies formed and grew and has at the same time accurately confirmed current theories of how such structures come into being.	17”	*Formation of galaxies (simulation from Frank Summers, STScI).*
02:53 This result from the Hubble COSMOS survey has given us unprecedented information about the distribution of Dark Matter. Future improvements may lead to insight into what Dark Matter actually is. For instance the exotic particles that some scientists suggested many years ago.		*Hubble in orbit around Earth*
03:11 END		

Shotlist

TIMECODE	DESCRIPTION
	A-ROLL
00:00:00	Stars and galaxies
00:00:12	Earth with city-lights
00:00:21	Zoom on COSMOS survey
00:00:39	Hubble in outer space
00:00:50	Rotation of COSMOS and 3D
00:01:13	3D dark matter
00:01:29	Moon-COSMOS size comparison
00:01:50	Gravitational lensing phenomena: shape of “galaxy” changes from round to elliptical
00:01:58	View of galaxies
00:02:01	Weak gravitational lensing effect
00:02:15	Structure growth – dark matter
00:02:28	X-ray - visible light comparison
00:02:46	Galaxy formation (simulation from Frank Summers STScI)
00:02:53	Hubble in orbit around Earth
00:03:11	**END A-ROLL**
	B-ROLL
00:03:16	A-roll animations and footage unedited
00:09:56	**END B-ROLL**