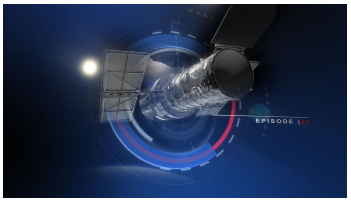
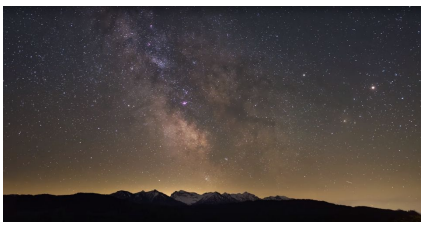
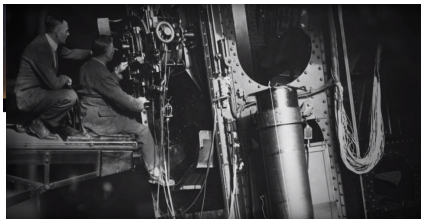
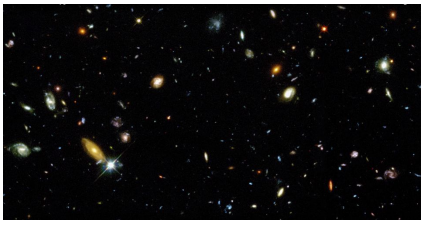
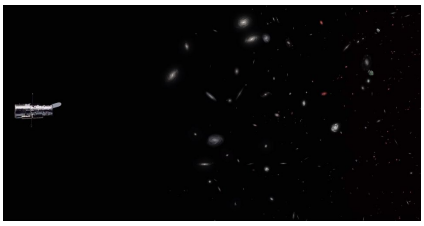
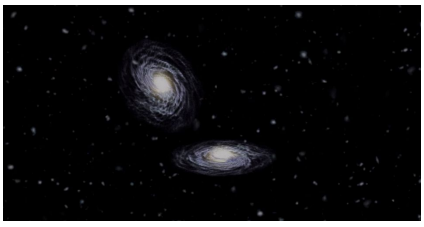
ESO, Karl-Schwarzschild-Str.2
D-85748 Garching bei München,
Germany
Telephone: +49 (0)89 3200 6855
Telefax: +49 (0)89 3200 6480
hubble@eso.org

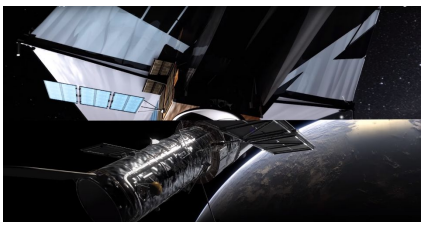
www.spacetelescope.org

Keywords: Galaxies, Deep Field

Hubblecast Episode 96: How many galaxies are there?	**Visual notes**
00:00 [Narrator] 1. The Milky Way galaxy is our cosmic home. But it is far from being the only galaxy in the Universe. To get a better understanding of the composition and evolution of our Universe, astronomers try to answer a deceptively simple question: How many galaxies are there in the Universe?	 
00:26 2. Intro	

00:44 [Narrator] 3. On a dark night, the Milky Way can be seen as a glowing band across the night sky. And for a long time it was thought that that the entire Universe consisted of our galaxy alone. This only changed in 1924. In that year Edwin Hubble identified variable stars in several spiral nebulae. He used these stars to calculate the distances to these nebulae. His observations proved that these stars were far too distant to belong to our Milky Way. They instead were members of other galaxies, far outside the Milky Way. Since then astronomers have tried to find out just how many galaxies there are in the observable Universe.	  
01:42 [Narrator] 4. A reliable first estimate could only be made after the Hubble Deep Field was observed in 1995. This was the first really deep look into the Universe and it revealed hundreds of galaxies that had never been seen before. Additional deep observations with Hubble and other instruments followed, detecting even fainter and more distant galaxies. From these observations astronomers determined that the Universe contained a total of 120 billion galaxies!	 
02:27 [Narrator] 5. These are only the galaxies within the so called observable Universe: This consists of all the objects, that can in principle be observed with telescopes like Hubble — those from which light has had time to reach us since the beginning of the Universe.	

Beyond this limit, known as the cosmological horizon, the Universe continues. Just how far it goes is yet an unanswered question.	
02:57 [Narrator] 6. Now astronomers have carried out a new analysis of published data from Hubble and other telescopes. They have concluded that the previous estimate of the number of galaxies within the observable Universe is at least ten times too low! They think that some 90% of the galaxies in the Universe are actually too faint and too far away to be observed by the current generation of telescopes. Astronomers can only infer their existence, based on models and calculations. The newly collected data has allowed astronomers to look back more than 13 billion years into the past, to the early days of the Universe. This lookback unveiled an early Universe in which the density of galaxies was also 10 times higher than today. Most of these galaxies were relatively small and faint, with masses similar to those of the satellite galaxies surrounding the Milky Way. These results are powerful evidence that galaxies evolved and grew via mergers throughout the Universe's history, dramatically reducing their total number over time.	   
04:30 [Narrator] 7. With 90% of the galaxies in our Universe yet to be observed, there is still much left to explore and to discover for Hubble — and the upcoming James Webb Space Telescope.	

Once again nature has surprised us beyond our wildest imagination.	

Ends 04:50