welcome to NASA's L minus 1 webcast

previewing the final space shuttle mission to the Hubble Space Telescope

I'm Damon Talley of NASA's Digital Learning Network here at Kennedy Space Center in Florida the Hubble Space Telescope has opened our eyes to the universe in stunning and magnificent ways Hubble has unique advantage over the observatory is built on the highest peaks on earth it doesn't have to look through the atmosphere that means it sees galaxies planets and the birth of stars just as they happened with no
Distortion atlantis and its crew of seven plan to take that view of space and make it even better coming up we'll show you how the sts-125 astronauts are going upgrade the telescope later we'll examine imagery in art and culture Plus dr mario livio of the Space Telescope Science Institute will answer some questions about Hubble and its impact on science around the world but first we begin with correspondent Rebecca Sprague with a closer look at this amazing telescope hi Rebecca hi Damon as you mentioned there certainly is more than
meets the eye when it comes to Hubble

we're here at the Hubble exhibit at the Kennedy Space Center Visitor Complex, we thought it would be the best place to talk about NASA's Hubble Space Telescope.

The display is a stunning showcase of the telescope's discoveries and accomplishments, now almost 20 years after Hubble first began to unlock the secrets of the universe. Seven astronauts are ready again to fly high above Earth and add years to the life of the most successful telescope ever built after launching from NASA's Kennedy Space Center.
Center space shuttle Discovery released

00:02:02,789 --> 00:02:07,859
Hubble into orbit in 1990 from its perch

00:02:06,000 --> 00:02:09,899
high above Earth Hubble can collect

00:02:07,859 --> 00:02:12,598
light that has not been distorted by the

00:02:09,899 --> 00:02:14,520
atmosphere that means clearer images of

00:02:12,598 --> 00:02:16,500
events that happen billions of years ago

00:02:14,520 --> 00:02:19,020
such as the formation of the earliest

00:02:16,500 --> 00:02:21,300
galaxies and unlike other observatories

00:02:19,020 --> 00:02:24,270
in space Hubble was built to be repaired

00:02:21,300 --> 00:02:26,069
by astronauts in fact much of the work

00:02:24,270 --> 00:02:27,959
astronauts performed on Hubble would not

00:02:26,068 --> 00:02:29,729
have been possible if designers had not

00:02:27,959 --> 00:02:31,830
built the telescope with modules that

00:02:29,729 --> 00:02:34,049
could be replaced relatively easily by

00:02:31,830 --> 00:02:36,730
astronauts working in weightlessness and
wearing bulky gloves and space suits

the concept was put to the test when

astronauts first flew to the Hubble

Space Telescope in 1993 essentially

adding a set of glasses to the telescope

they cleared up the observatories

blurred vision with a high-tech

instrument that compensated for a flawed

main mirror since then three other crews

brought more instruments and upgraded

equipment to the telescope each mission

extended its life or added to its

extraordinary vision now it's sts-125 s

turn to upgrade the observatory as you
may recall Atlantis was ready to fly this mission in october two thousand eight it was poised on the launch pad when a critical module already in the Hubble gave out the unit does several important tasks including storing the data Hubble records and then transmitting it to earth when Hubble was switched to a backup control unit in space engineers on earth readied a spare unit to replace it after extensive testing the unit was shipped to Kennedy recently where technicians packed it for loading into the shuttle the astronauts
meanwhile adapted their plans and added

the control unit to their already

crowded to-do list for a closer look at

how the astronauts will make the

upgrades will send it back over to you

Damon thanks Rebecca it will take five

spacewalks each about six and a half

hours long to install new instruments

guides equipment and that control unit

during the 11-day flight this is how the

spacewalkers will upgrade Hubble during

the mission it will take about two days

for Atlantis to catch up the Hubble and

capture it using the shuttle's robotic
arm then working in teams of two one

00:04:10,659 --> 00:04:14,709
space Walker will stand on a platform at

00:04:12,549 --> 00:04:16,750
the end of the robotic arm he will hold

00:04:14,709 --> 00:04:18,579
the large instruments while an astronaut

00:04:16,750 --> 00:04:21,370
inside the shuttles Gavin moves him

00:04:18,579 --> 00:04:23,259
around the telescope into place there is

00:04:21,370 --> 00:04:25,509
little room for error especially with

00:04:23,259 --> 00:04:28,000
instruments as delicate as those of the

00:04:25,509 --> 00:04:30,009
public that's why the astronauts have

00:04:28,000 --> 00:04:32,470
practiced the exact procedures precisely

00:04:30,009 --> 00:04:34,899
since being assigned to the mission two

00:04:32,470 --> 00:04:36,760
years ago with the new instruments

00:04:34,899 --> 00:04:38,978
astronomers expect to see deeper into

00:04:36,759 --> 00:04:40,538
space than ever before they expect to

00:04:38,978 --> 00:04:42,490
look closer at the atmospheres of
planets outside our solar system and
maybe find more planets like them and
all the maintenance will keep Hubble going strong until at least 2014
Rebecca takes a closer look at what Hubble has given us already this is the Hubble Ultra Deep Field perhaps the most famous photograph the observatory has taken astronomers pointed Hubble's powerful lens at an area of seemingly empty space and found thousands and thousands of galaxies some as they were being formed more than 13 billion years ago in cosmic terms it's like a baby
picture of space in early 2008 Hubble recorded the first signs of methane on a planet outside our solar system. Methane plays a vital role in the chemical reactions that lead to the development of life. All those discoveries require a powerful lens and cameras, but they also require a spacecraft that will not move even slightly while floating in the vacuum of space. Here's Damon to show you how it works. Thanks Rebecca, everything from pointing itself at a tiny piece of space to turning its lens away from a blinding light of the Sun is controlled.
by a set of spinning wheels called gyroscopes with them public can turn itself in all directions and just as importantly hold still they work on the same principle as a bicycle wheel at rest the bicycle wheel is easy to move from side to side and it will fall over if held up from one side spinning the wheel generates rotational inertia and it becomes difficult to move it from side to side you can really feel the difference amazingly the wheel stays up when held from one side this is why you stay upright as long as
your bicycle or motorcycle is moving

00:06:25,129 --> 00:06:32,990
forward this is also why a spinning top

stays up to demonstrate how Hubble uses

the gyroscopic effect to turn itself in

space I'll stand on a reduced friction

surface now a much safer way to try this

at home is by sitting down on a swivel

chair Hubble uses electric power to spin

its gyros and to turn them from side to

side one must apply force to turn a

wheel on the side Newton's third law of

motion action reaction kicks in and

spins you around this is how Hubble can

turn itself and lock on objects in many

different directions using gyroscopes
sts-125 will provide Hubble with six brand-new gyroscopes although Hubble's are now for numerous first sts-125 will mark several laughs for the telescope and the space shuttle program right Rebecca that's right sts-125 marks the last time human eyes are scheduled to see the Hubble directly it will be the last time hands will touch it before it is released to orbit on its own for several more years after a distinguished career it will eventually be decommissioned and remain an orbit high above earth and out of the way of other
spacecraft here at Kennedy this mission marks the last time two orbiters are expected to be on the launch pad at the same time the silhouette of space shuttle Endeavour moved toward launch pad 39b recently as the Sun peered over the Atlantic Ocean with Atlantis already at launch pad 39a Endeavour completed the unusual scene of two space shuttles standing ready for launch NASA took the extra precaution of preparing two shuttles for flight at the same time since Atlantis will not be able to seek safety at the International Space
Station if something goes wrong during

the mission in that unlikely event

endeavour would be launched on a rescue

mission it's a breathtaking scene with a

serious purpose Damon Hubble's reach

extends well beyond science and

textbooks dr. Mario Livio of the Space

Telescope Science Institute said that

the cultural out

reach may turn out to be the Hubble's

most significant contribution on the

cultural arena Hubble is really quite

unique in that Hubble images have

crossed the boundary between science and
culture and penetrated into areas such

00:08:50,629 --> 00:08:55,850
as art literature and so on really it

00:08:53,600 --> 00:08:59,060
has become you know the symbol of

00:08:55,850 --> 00:09:01,250
science exploration there are scores of

00:08:59,059 --> 00:09:04,099
instances of Hubble's crossover from

00:09:01,250 --> 00:09:05,750
science to culture for example a picture

00:09:04,100 --> 00:09:07,670
of one of the Stardust stocks of the

00:09:05,750 --> 00:09:09,708
Eagle Nebula was printed as part of a

00:09:07,669 --> 00:09:12,539
series of stamps celebrating the

00:09:09,708 --> 00:09:14,869
telescope's achievements the influential

00:09:12,198 --> 00:09:17,539
rock band Pearl Jam used a Hubble photo

00:09:14,870 --> 00:09:20,299
of a planetary nebula as the album cover

00:09:17,539 --> 00:09:22,519
for binaural the telescope has been

00:09:20,299 --> 00:09:25,758
mentioned on notably unscientific shows

00:09:22,519 --> 00:09:27,769
including family guy and art museums are
exhibiting Hubble images with reverence

normally associated with Picasso Monet or Cezanne the exhibits hold up the universe not as a set of data points to be analyzed but as artwork to be appreciated and marveled upon it's just another way Hubble brought space down to earth that's it from here back to you

Damon thanks Rebecca the final mission in NASA's Hubble Space Telescope may be one of the most exciting that space shuttle astronauts have undertaken you can follow the launch of Atlantis as it happens on NASA TV or at www.NSF.gov
shuttle launch blog will be available along with updated photo and video galleries you can stay up-to-date throughout the mission at NASA's website I'll host a live webcast on the Digital Learning Network during the last hour of the countdown that's our show looking ahead to Atlantis this sts-125 servicing mission to the Hubble Space Telescope

thanks to Rebecca Sprague and dr. Mario Livio for helping us out and thanks to you for watching for NASA I'm Damon Talley.