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Hubblecast Episode 42: Hubble's greatest hits FOR IMMEDIATE RELEASE 27 January 2011		
00:00 [John Grunsfeld] There's so many discoveries that Hubble has made. Some that we knew we would make such as measuring the speed of the expansion of the Universe, verifying the existence of black holes, and then there's some that were completely unexpected. In fact, my favourite I think is one that when Hubble was launched, we didn't know about any extrasolar planets. So my favourite Hubble discovery if you will, is the measurement of the atmosphere of a planet around a nearby star, that was made by the STIS instrument. I think it really boggles the mind, or stimulates the imagination to think that here on Earth with a telescope in orbit, we can actually spy on other planets in other solar systems.		
		
01:15 [Dr J] Hello and welcome to the Hubblecast. How do we know if a scientific discovery is really important, or somehow special? Well, when astronomers obtain a result, they usually write it up in an article for a scientific journal. And one way to know whether the result is important or not is to look at how often other astronomers refer to this article in their work. That's the simple answer anyway. But there's a human component too. Some results simply capture our imagination more than others, and that too is an important part of what makes a truly great discovery. In this episode, we're going to be talking to some leading astronomers who use the Hubble Space Telescope, and we're going to ask them about their favourite Hubble moments.		

02:00 [Bob O'Dell] My favourite Hubble discovery is of course one of my own! It was a surprise that should not have been a surprise. When we first looked at the Orion nebula, this region of nearby star formation, we found that we could actually see protoplanetary discs around many of the stars. Now, we should have expected to see this, we should have been looking for it, but we were looking for something else and found that. It was a wonderful feeling, to discover the protoplanetary disc. It was the closest thing to a 'eureka' moment that I have ever had in science. You look at the image and then suddenly everything comes together. You know exactly what you've seen. And you're seeing something that no-one else had ever seen before. It was wonderful.		
03:07 [Laura Ferrarese] I've done a lot of research with Hubble and in fact almost all my work has been done with or based on Hubble images. But perhaps my very favourite was this one galaxy that we observed very very early on. NGC 4261. And what we saw when we looked at this galaxy was that there is a very small disc of gas and dust at the centre and we could use the velocity of the gas in the disc to measure the mass of the central supermassive black hole. And that was one of the very first conclusive evidence for the presence of a black hole in a galaxy.		
03:39 [Sandy Faber] I think that my favourite Hubble discovery is based on aesthetics. And it's the imaging of these giant clusters of galaxies that show these beautiful gravitational lenses. The red cluster galaxies and the blue background galaxies. General relativity in action there, bending light and making images that are just stunning. I wish I had done that!		
04:07 [David Leckrone] Actually, early on we weren't even certain that Hubble was going to be able to see distant galaxies. When Hubble was first being designed the thought was that as you farther and farther back in time, farther and farther out in the Universe, galaxies would become just fainter, low surface brightness, just sort of faint, diffuse blobs, and you wouldn't be able to see them very well with Hubble. In fact, galaxies aren't just faint, diffuse blobs, they have a lot of structure, and a lot of regions within them that are bright because of stars being born right there. And so it has been not only possible with Hubble to directly detect very distant galaxies, but now we've actually seen objects that emitted their light when the Universe was only 7 or 800 million years old. And of course the Universe today is 13.7 billion years old. So we're looking back in the early nursery of our Universe, and seeing the toddler galaxies as they're just coming along and starting to grow.		

05:20 [Monica Tosi] I tend to favour the wonderful images that have allowed to obtain very tight and deep colour-magnitude diagrams, see how stars form and evolve in nearby galaxies.		
05:40 [John Mather] Oh, a favourite Hubble discovery? I think that the beautiful pictures of the dust clouds that are on everyone's desk are so amazingly beautiful that they say well can we have some more? And so as a scientist I look at that cloud and say that cloud's beautiful but is hiding what I know about. So inside that cloud are stars that have been born recently or stars maybe about to be born. And it tells us right away that we need to use infrared to see inside those clouds. So that's the sort of the thing that I think about the most from the Hubble.		
06:15 [Linda Smith] I did some work on a fantastic large star forming region called NGC 346, which has beautiful images of it. And being able to look at how young stars are born and how they influence their molecular clouds around them, and just to see the fantastic structure in the H II regions, is great, I mean I can, I just spend so much time looking at these images and I never tire of them, because you always learn something every time you look at them.		
06:47 [Dr J] So clearly Hubble has made a lot of fantastic observations of the Universe during its lifetime. And I for one find it hard to pick what my favourite Hubble moment is. So one of my favourite Hubble achievements were the images Hubble took of planet Fomalhaut b. These were the first images of an extrasolar planet that were taken in optical light. And by using multiple observations, Hubble actually allowed us to watch this planet move on its orbit around its parent star. So another great Hubble moment were the images that it took of the so-called Bullet Cluster. These are actually two colliding clusters of galaxies that demonstrate beautifully the existence of dark matter. And then of course the Hubble Space Telescope measured the so-called Hubble constant, which is the expansion speed of the Universe. Hubble did this more precisely than was ever done before – and of course this was one of the main reasons for building Hubble in the first place.		

07:49 [Dr J] This is Dr J signing off for the Hubblecast. Once again, the Universe has amazed us beyond our wildest imagination.		
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