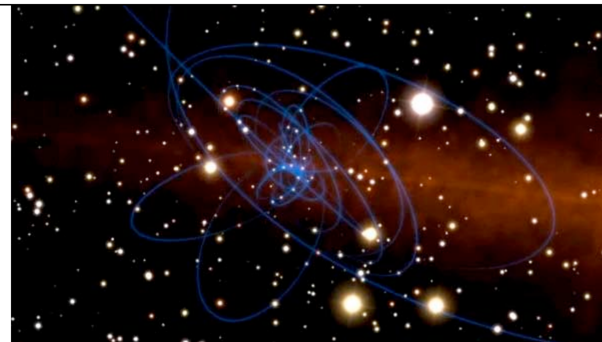
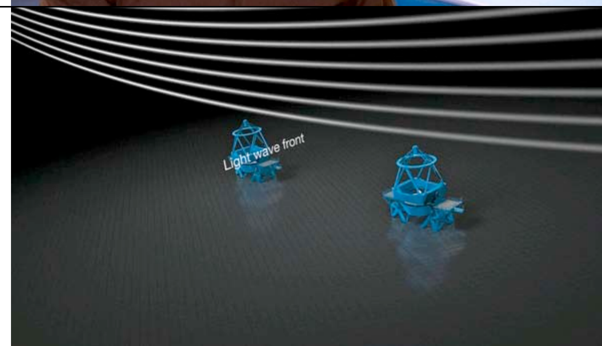
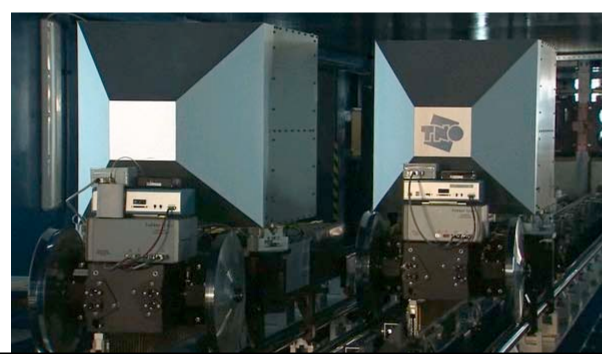
ESOcast Episode 13: A sharper view of the Universe with the VLT Interferometer		
1. 00:05 **[Visuals start]** **[Narrator]** Imagine looking up at the night sky and seeing details on the surface of a star millions and millions of kilometres away. Imagine having eyesight so keen that you could check out the surroundings of a black hole. Using ESO's Very Large Telescope Interferometer at Paranal, astronomers are now making these fantasies a reality.		
2. 00:32 **ESOcast intro** This is the ESOcast! Cutting-edge science and life behind the scenes of ESO, the European Southern Observatory. Exploring the ultimate frontier with our host Dr J, a.k.a. Dr Joe Liske.		
3. 00:49 **[Dr J]** Hello and welcome to another episode of the ESOcast. This time we'll take a closer look at a fascinating, special observing technique that gets used at ESO's Very Large Telescope, or VLT for short. This technique is called interferometry. It lets you combine the light collected by two or even more telescopes in such a way as to make the individual telescopes act as if they were part of a single, virtual telescope that is much bigger than the ones that you started with.		
4. 01:20 **[Narrator]** Each of the four VLT Unit Telescopes has a primary mirror with a diameter of 8.2 metres. Such big mirrors are necessary because they collect more light and provide sharper images. Under ideal conditions and with the appropriate technology, the individual VLT Unit Telescope can see details of objects in space that are equivalent to viewing a tennis ball on the International Space Station from the Earth. This corresponds to a distance of about 350 kilometres.		

5. 01:52 **[Dr J]** Now this may sound like a really impressive number, but astronomers figured out that they could do even better. Because frontline research requires studying the heavens in ever-increasing detail, new ways were sought to increase the VLT's already eagle-eyed vision even further.		
6. 02:10 **[Narrator]** And this is where interferometry comes in. Interferometry combines the light received by two or more telescopes that are simultaneously observing the same object. This allows astronomers to pick out details as sharply as if observing with a single telescope whose mirror has a diameter equivalent to the largest distance between the telescopes.		
7. 02:34 **[Narrator]** The VLT design always had the use of interferometry very much in mind. The four 8.2-metre Unit Telescopes of the VLT were built in a roughly trapezoidal configuration that can generate a virtual telescope mirror of up to 140 metres across. In addition, four, movable, 1.8-metre Auxiliary Telescopes can be combined in a configuration with an equivalent diameter of up to 200 metres. This gives images up to 25 times sharper than those from a single VLT Unit Telescope.		
8. 03:12 **[Dr J]** Combining the light collected by different telescopes is a major technical challenge and it requires incredible precision. The light beams from each telescope have to pass underground through a complex system of mirrors and delay lines before they can be combined at the common focus.		
9. 03:30 **[Narrator]** Delay lines are an integral part of the VLT Interferometer's complicated optical system. They ensure that the light beams arrive simultaneously at the common focus. To achieve this, several movable carriages loaded with ultra-smooth mirrors constantly adjust the light beams with extreme precision. The light paths must be kept equal to distances less than 1/1000 of a millimetre over a distance of one hundred metres. Without this kind of accuracy the light cannot be analysed properly by the observatory's instruments.		

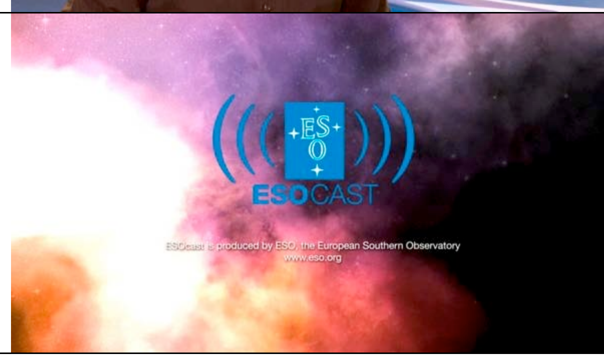
10. 04:06
[Dr J]
The VLT Interferometer really is a masterpiece of technology. In order for it to be functional every night, all of its many high-tech components must interact with flawless precision. Only then can astronomers benefit from the enormous observational power of this fantastic instrument.

11. 04:25
[Narrator]
The VLT interferometer provides astronomers with the ability to study celestial objects in unprecedented detail. It is possible to study the surfaces of distant stars, to determine the shape of asteroids or even capture the surroundings of black holes. The VLT interferometer has produced one of the sharpest images ever obtained of a star. The breathtaking sharpness of this image is the equivalent to seeing the head of a screw on the International Space Station from the ground.

12. 04:58
[Dr J]
These are really great examples of the superbly sharp vision that can be achieved with the VLT Interferometer. In the future, this instrument will continue to be a valuable tool for astronomers studying the Universe in unsurpassed detail.

This is Dr J signing off for the ESOcast. Join me again next time for another cosmic adventure.

13. 05:20
[Outro]



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