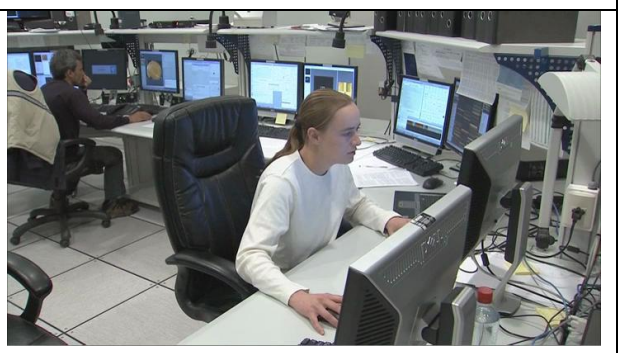
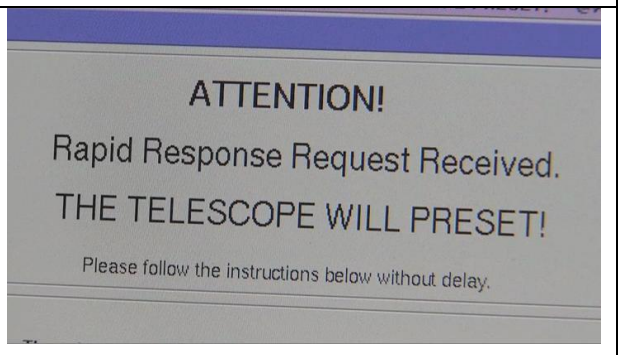
ESOcast Episode 25: Chasing Gamma Ray Bursts at Top Speed: The VLT's Rapid Response Mode.		
00:00 [Visuals start] [Narrator] 1. The control room of the ESO Very Large Telescope at Paranal. Here, astronomers observe the sky, using the advanced capabilities of this high-tech installation in the Chilean Atacama desert. With great expertise scientists and telescope operators master the VLT controls and make the difficult observations appear routine. But suddenly an alarm rings and calls for their undivided attention.		
00:42 ESOcast intro 2. This is the ESOcast! Cutting-edge science and life behind the scenes at ESO, the European Southern Observatory. Exploring the ultimate frontier with our host Dr J, a.k.a. Dr Joe Liske.		
01:00 [Dr J] 3. Hello and welcome to the ESOcast. In this episode we will learn more about the Very Large Telescope's so-called Rapid Response Mode. The point of this observing mode is to observe gamma ray bursts only a few short minutes after they are first spotted. Now because the optical afterglow of a gamma ray burst fades extremely rapidly, the observations must start as soon as possible after the initial discovery of the burst. And the VLT can deal with such time-critical observations better than any other telescope.		

01:31 [Narrator] 4. Gamma ray bursts are the most powerful explosions in the universe. Astronomers do not fully understand their origin, but they are thought to be caused by incredibly energetic events such as the collapse of massive stars. Gamma ray bursts are so energetic, that, for a brief instant, they outshine the rest of their entire galaxy. They produce more energy in a few seconds than the Sun will in its whole lifetime. After the flash of gamma-rays has ended, an optical afterglow can usually be detected for a few hours. Astronomers look at this to learn more about how and why gamma ray bursts occur. Because gamma ray bursts typically occur at a very large distance from Earth, their afterglow is faint. In addition, the afterglow fades very rapidly, so that within a few hours it can be up to 500 times fainter still. Hence, in order to learn more about the nature of a gamma ray burst and the influence of the explosion on its surroundings, the event must be observed as quickly as possible.		
02:39 [Dr J] 5. The VLT is perfectly equipped to obtain high-resolution observations of a Gamma Ray Burst. But before it can do so, such a burst must first be discovered. The Swift satellite chases gamma ray bursts with its wide-field Burst Alert Telescope. Once a burst has been discovered and verified, it is immediately reported to the VLT and other observatories.		
03:01 [Narrator] 6. An alarm at the VLT console indicates to the astronomers that the activation of the Rapid Response Mode has been requested. The scientists have to confirm that the VLT unit telescope can be moved safely, and within seconds all on-going observations are stopped. Then the system performs robotic observations without any human intervention, except for the alignment of the spectrograph slit. This automated procedure guarantees quick and accurate observations. In fact, the VLT allows astronomers to begin observations within only a few minutes of detection by Swift. With events as short-lived as these, this can mean the difference between making high		

quality observations and seeing nothing at all.		
03:56 [Dr J] 7. But the VLT at Paranal Observatory is not the only ESO installation which carries out gamma ray burst observations. At the La Silla observatory there are also telescopes that can observe these events. The 2.2-metre MPG/ESO telescope features the GROND instrument which takes images of the afterglow simultaneously in seven different colours,. And that gives astronomers further insights into the physics of gamma ray bursts. In addition, there are two smaller telescopes, the 60 cm REM and the 25 cm TAROT and these are also located at La Silla. These robotic telescopes are designed to react immediately when they receive an alert on a gamma ray burst, making it possible to start observing the burst within seconds.		
04:41 [Narrator] 8. Scientists agree that gamma ray bursts are associated with the formation of black holes, but until now the exact nature of the bursts remains enigmatic and more high-resolution spectroscopy data is needed. The VLT offers enormous light collecting power and high resolution. In addition it is equipped with a suite of high-tech instruments. It is the combination of the VLT's enormous observational potential with ultra fast response times, which provides data of superb quality to the scientists who study gamma ray bursts.		
05:22 [Dr J] The Rapid Response Mode at the VLT will be triggered many more times in the future, and ESO will continue to collect first class data on gamma ray bursts – data which will perhaps one day help to unravel the secrets of the most energetic explosions in the universe. This is Dr J signing off for the ESOcast. Join me again next time for another cosmic adventure		

05:44 [Outro]		ESOcast is produced by ESO, the European Southern Observatory. *ESO, the European Southern Observatory, is the pre-eminent intergovernmental science and technology organisation in astronomy designing, constructing and operating the world's most advanced ground-based telescopes.*

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