

# ESO Calendar 2018

European Southern Observatory



## Cover

The 4 Laser Guide Star Facility



Four lasers seem to blend into a single beam as they shine out from Yepun, one of the four Unit Telescopes of ESO's Very Large Telescope (VLT) at the Paranal Observatory. Produced by the 4 Laser Guide Star Facility, these beams are the most powerful laser guide stars ever used in astronomy, creating artificial stars high up in the atmosphere for telescope calibration. This long-exposure image also captures bright star trails, which trace out perfect concentric circles in the sky as the Earth spins on its axis.

Credit: ESO/F. Kamphues

## January

The Milky Way's tidy galactic neighbour

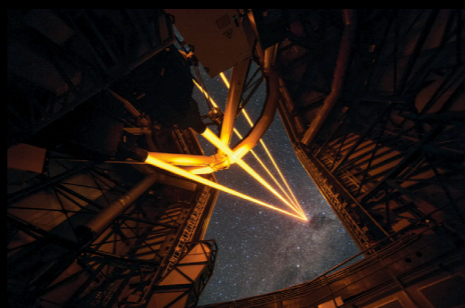


While most galaxies are chock-full of dust, this dwarf galaxy — snapped with the OmegaCAM camera on ESO's VLT Survey Telescope in Chile — is a veritable clean freak. IC 1613 contains very little interstellar dust, which allows astronomers to explore its contents with great clarity and precision. By studying stars that have variable brightness within IC 1613, astronomers have determined that it lies only 2.3 million light-years away and is part of the Local Group: a collection of more than 50 galaxies that includes our home galaxy, the Milky Way.

Credit: ESO. Acknowledgement: VST/OmegaCAM Local Group Survey

## February

Lasers shine at Paranal



In this eye-catching image, the most powerful laser guide star system in the world sees first light at ESO's Paranal Observatory. The 4 Laser Guide Star Facility uses four 22-watt laser beams to cause sodium atoms in the upper atmosphere to glow, making them appear just like real stars in the majestic Chilean skies. These artificial stars allow the adaptive optics systems to compensate for the blurring caused by the Earth's atmosphere, so the telescope can capture sharper images.

Credit: ESO/F. Kamphues

## March

The Prawn Nebula



This glowing shroud of gas makes up the huge stellar nursery IC 4628, approximately 6000 light-years away in the tail of the constellation of Scorpius. This image of IC 4628 — also nicknamed the Prawn Nebula — was taken using the VLT Survey Telescope at ESO's Paranal Observatory in Chile. Newborn stars burn brightly nearby, exposing the gas clouds to UV light and producing a colourful glow.

Credit: ESO. Acknowledgement: Martin Pugh

## April

Sunset over La Silla



ESO's La Silla Observatory looks down over the stunning sunset in Chile's Atacama Desert. At 2400 metres above sea level and far from the light pollution of human civilisation, the site is host to one of the most spectacular dark skies in the world, and thus provides the perfect view for ESO's telescopes. Fog hovers over the valleys surrounding La Silla, while the setting Sun lights up the horizon in orange. Once the Sun disappears, the night sky will reveal impressive astronomical sights, just waiting to be observed.

Credit: ESO/B. Tafreshi (twanight.org)

## May

LDN 1768: A turbulent nursery



The dark patch snaking across this spectacular image in the constellation of Ophiuchus (The Serpent-bearer) is not an absence of stars, but rather a dense cloud of dust that blocks the light of the stars behind it. This particular dark cloud is known as LDN 1768. Despite their murky appearance, dark nebulae are of huge interest to astronomers because they are star formation regions, home to newborn stars that are still coalescing from clouds of gas and dust. Protostars are relatively cold and emit radiation at submillimetre wavelengths, and so can be studied by telescopes such as the Atacama Large Millimeter/submillimeter Array (ALMA) in Chile.

Credit: ESO

## June

Moonset over ALMA



The last light of sunset sinks below the horizon of Chile's Chajnantor plateau, silhouetting the Atacama Large Millimeter/submillimeter Array (ALMA). The giant array of individual antennas work as one to study the light from some of the coldest objects in the Universe, such as vast clouds in interstellar space or the first stars and galaxies that emerged from the "dark ages" of the Universe many billions of years ago. This image was taken during the ESO Ultra HD Expedition.

Credit: ESO/B. Tafreshi (twanight.org)

## July

The Orion Nebula star formation region



This spectacular image of the Orion Nebula star formation region was obtained from multiple exposures using the HAWK-I infrared camera on ESO's Very Large Telescope (VLT) in Chile. This deep, comprehensive view of the nebula reveals about ten times as many brown dwarfs — stars too small to undergo nuclear fusion — and isolated planetary-mass objects than previously known, providing exciting insight into Orion's star formation history.

Credit: ESO/H. Drass et al.

## August

A kaleidoscope of colour above the VLT



Splashes of colour paint the night sky above ESO's Paranal Observatory in Chile, illuminating the barren desert landscape below. Billions of bright stars, glowing nebulae, and dark filaments of dust create the giant arch of the Milky Way, which frames the Very Large Telescope (VLT) sitting on the peak of Cerro Paranal. This image was taken from the site of one of ESO's newest telescopes, the Visible and Infrared Survey Telescope for Astronomy (VISTA).

Credit: P. Horálek/ESO

## September

Edgewise perspective of NGC 1055



The spiral galaxy NGC 1055 poses in sharp profile in this very clear image captured by ESO's Very Large Telescope (VLT) in Chile. Seen edge-on, this huge galaxy is estimated to be 15 percent bigger than the Milky Way and is located approximately 54 million light-years away in the constellation of Cetus (The Whale/Sea Monster). Spiral galaxies seen at different orientations from Earth offer astronomers unique ways to learn about galactic structure and history.

Credit: ESO

## October

Artist's rendering of the Extremely Large Telescope



The Extremely Large Telescope (ELT) is situated on Cerro Armazones in the Chilean desert, near ESO's Paranal Observatory. Currently under construction, the ELT's 39-metre diameter mirror will be the world's biggest eye on the sky, allowing the detailed study of exoplanets, the first objects in the Universe, supermassive black holes, and the nature and distribution of dark matter and dark energy. Here, an artist's rendering shows how the telescope's laser guide system will look in action when it begins observing in 2024.

Credit: ESO/L. Calçada

## November

VISTA views Messier 78



This richly detailed view of the star formation region Messier 78, just 1600 light-years away in the constellation of Orion (The Hunter), was taken with the VISTA infrared survey telescope at ESO's Paranal Observatory in Chile. As well as the blue regions of reflected light from the hot young stars, the image also shows streams of dark dust and the red jets emerging from stars in the process of formation.

Credit: ESO

## December

Spinning black hole swallows a star



This artist's impression depicts a rapidly spinning supermassive black hole surrounded by an accretion disc. This thin disc of rotating material consists of the leftovers of a Sun-like star that was ripped apart by the tidal forces of the black hole. In the process, the star was "spaghettified", while shocks in the colliding debris as well as heat generated in the accretion disc led to a brilliant burst of light which resembled a supernova explosion. Known as a tidal disruption event, this has only ever been observed about 10 times.

Credit: ESO, ESA/Hubble, M. Kornmesser

## ESO

European Southern Observatory



ESO is the foremost intergovernmental astronomy organisation in Europe and the world's most productive ground-based astronomical observatory by far. It is supported by 16 countries: Austria, Belgium, Brazil, the Czech Republic, Denmark, France, Finland, Germany, Italy, the Netherlands, Poland, Portugal, Spain, Sweden, Switzerland and the United Kingdom, along with the host country of Chile. ESO carries out an ambitious programme focused on the design, construction and operation of powerful ground-based observing facilities enabling astronomers to make important scientific discoveries. ESO also plays a leading role in promoting and organising cooperation in astronomical research. ESO operates three unique world-class observing sites in Chile: La Silla, Paranal and Chajnantor. At Paranal, ESO operates the Very Large Telescope, the world's most advanced optical astronomical observatory and two survey telescopes. VISTA works in the infrared and is the world's largest survey telescope and the VLT Survey Telescope is the largest telescope designed to exclusively survey the skies in visible light. ESO is a major partner in the revolutionary astronomical telescope ALMA, the largest astronomical project in existence. ESO is currently building the 39-metre Extremely Large Telescope, the ELT, which will become "the world's biggest eye on the sky".

Moon phases are indicated in Universal Time.

Produced by the ESO education and Public Outreach Department.

# 2018

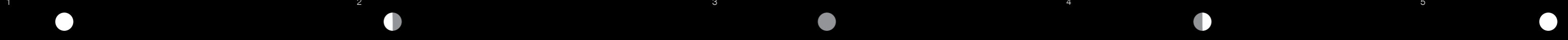


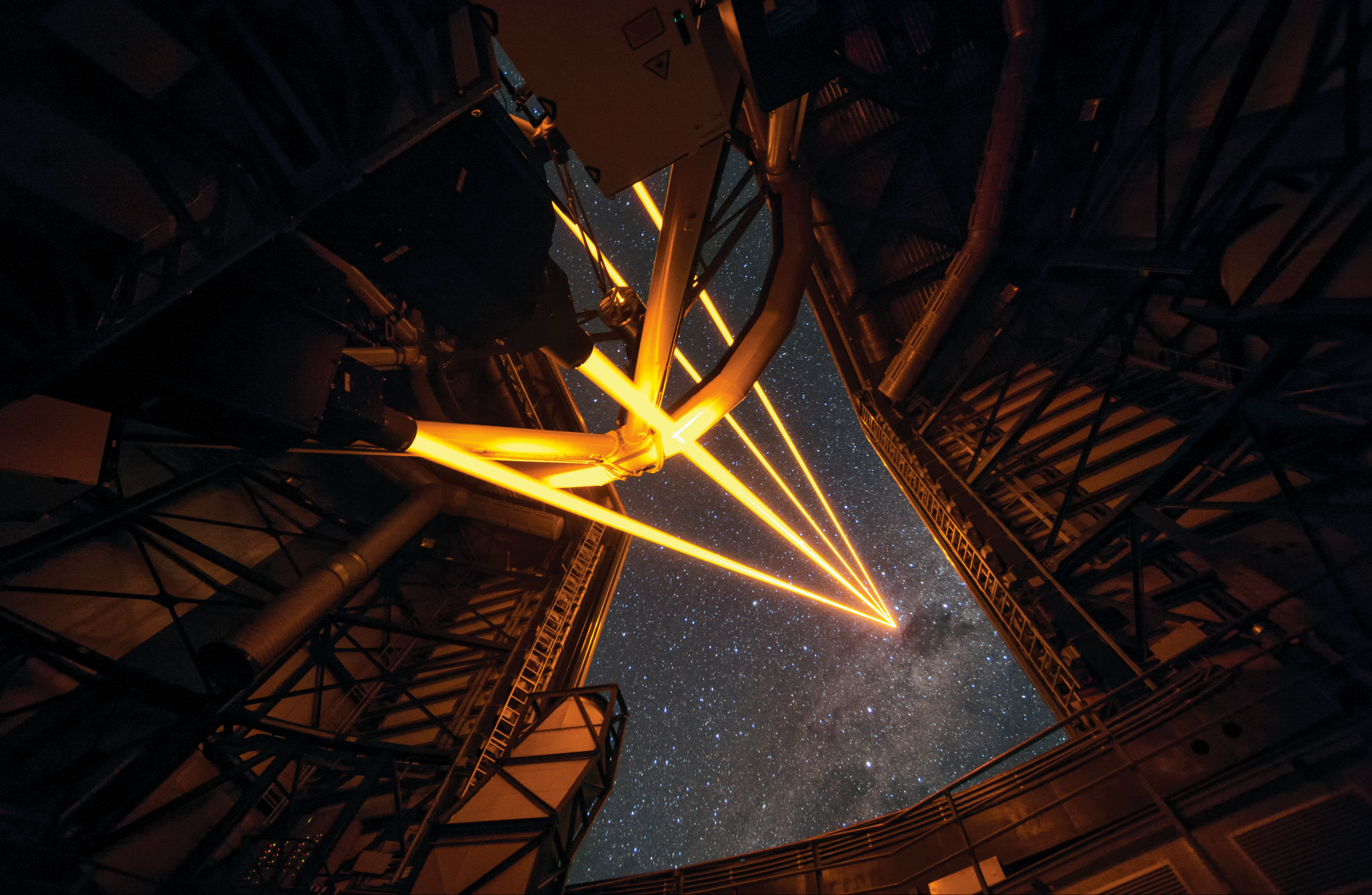


The Milky Way's tidy galactic neighbour

# January 2018

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Lasers shine at Paranal

# February 2018

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The Prawn Nebula

# March 2018

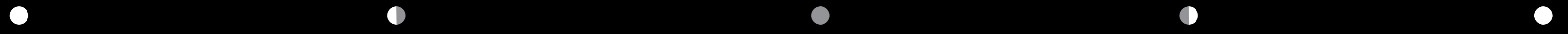
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Sunset over La Silla

# April 2018

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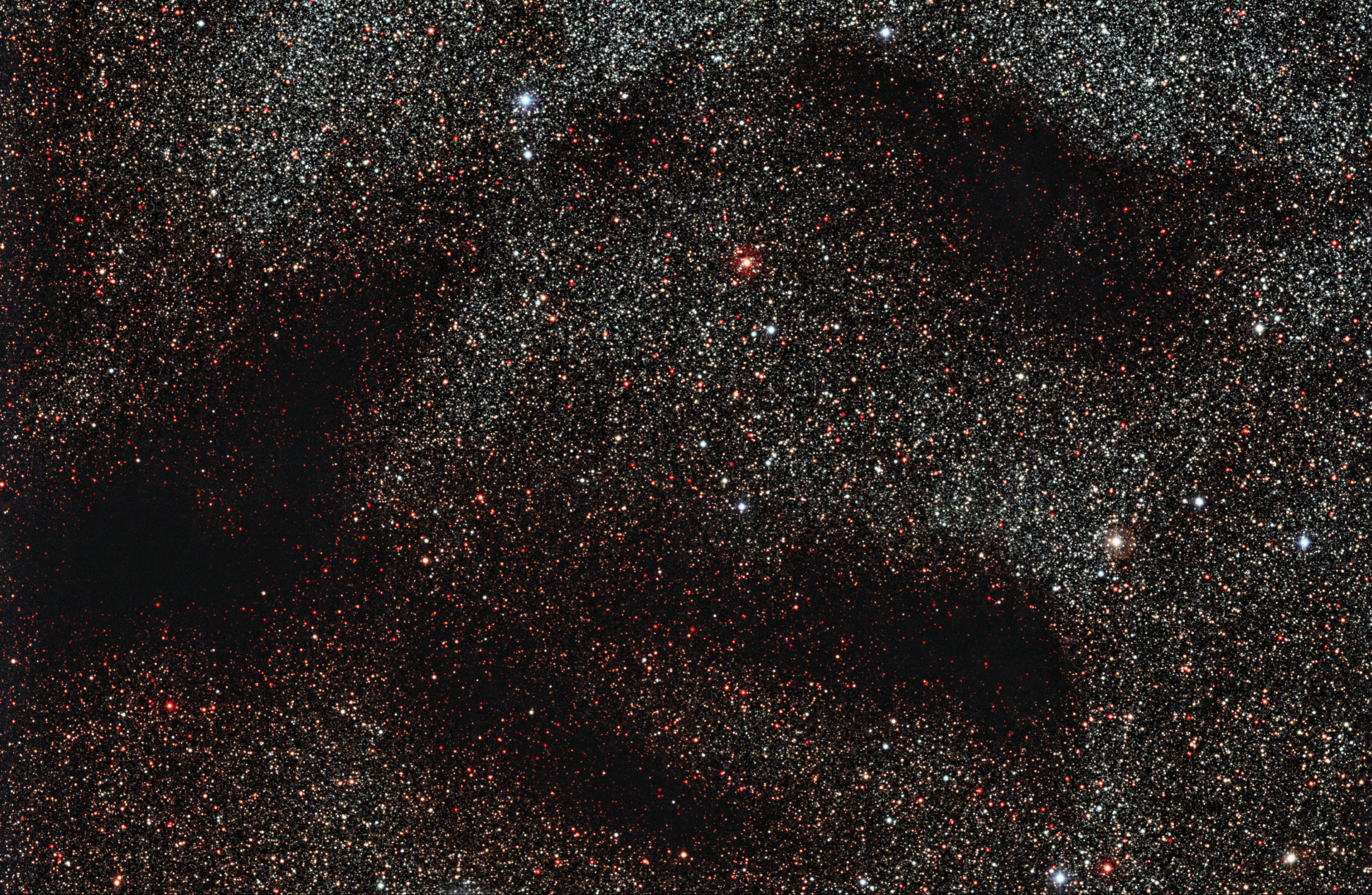
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LDN 1768: A turbulent nursery

May 2018

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June 2018

Moonset over ALMA





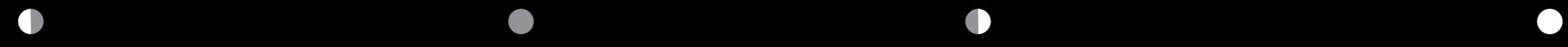


The Orion Nebula star formation region

# July 2018

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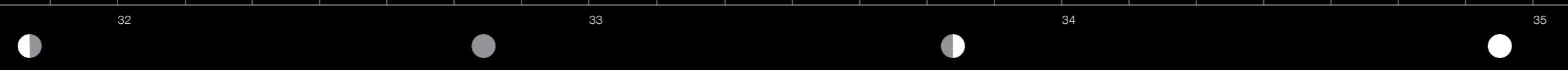




# August 2018

A kaleidoscope of colour above the VLT

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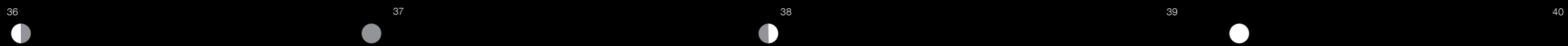


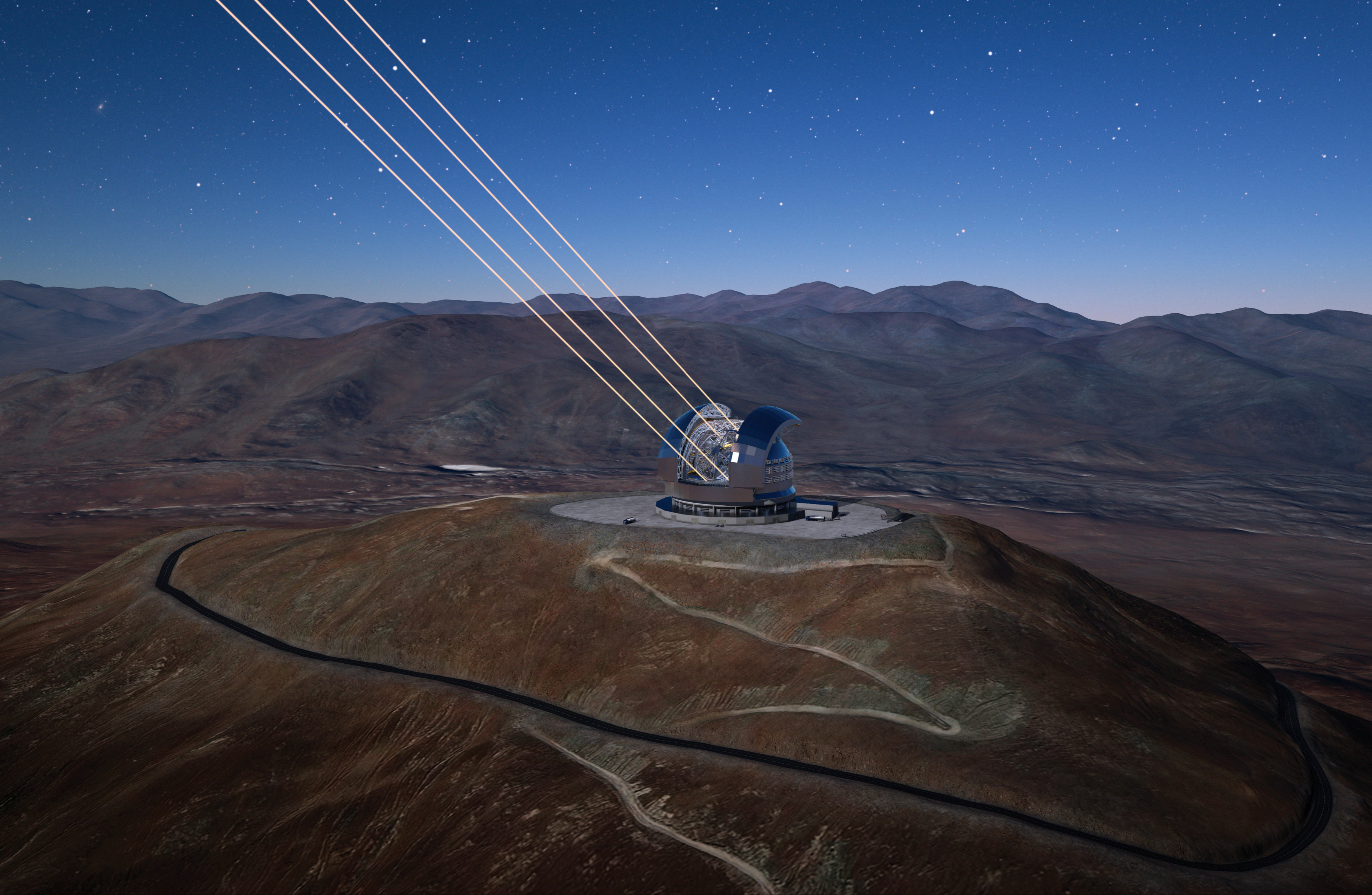


Edgewise perspective of NGC 1055

# September 2018

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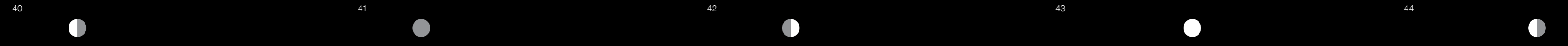




Artist's rendering of the Extremely Large Telescope

# October 2018

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November 2018

VISTA views Messier 78

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Spinning black hole swallows a star. Artist's impression

# December 2018

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