

# Total Solar Eclipse Over La Silla

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On Tuesday 2 July 2019, in the late afternoon, a total solar eclipse took place over ESO's La Silla Observatory; totality lasted 1 minute and 52 seconds. For this very special event, ESO decided to open the doors of the observatory to the public, providing over one thousand visitors with a unique vantage point from which to witness this spectacular natural phenomenon.

The solar eclipse of 2 July 2019, whose path of totality included La Silla Observatory, provided a stunning culmination to the celebrations of the 50th anniversary of La Silla, ESO's first observatory, which was inaugurated on 25 March 1969. The thousands of visitors who came to La Silla for the eclipse were only a small fraction of the hundreds of thousands of people who travelled from all over the world to the narrow strip of land that would find itself under the shadow of the Moon for almost two minutes.

By 2011, ESO's education and Public Outreach Department had already received the first requests from the public to come to La Silla to witness the 2019 eclipse and/or to take pictures, videos and make precise measurements. An

outline of the eclipse project was drafted in 2013, and a project plan for a big public event was prepared and approved by the ESO Directors Team in June 2018, one year before the event.

The La Silla site provides a stunning setting, combining an astronomical observatory and a beautiful landscape; in addition, given the high likelihood of good observing conditions during the event, it became a desirable location to enjoy the eclipse. For that reason, ESO decided to open the observatory to as many visitors as the infrastructure and logistics would allow.

Figure 1. La Silla during the total solar eclipse, which resulted in almost two minutes of totality at 20:39 UT.

ESO/R. Lucchese



ESO/M. Zamani



**Figure 2.** The President of the Republic of Chile, Sebastián Piñera, pictured with Chilean high school students while visiting La Silla.

In addition to the general public, La Silla was honoured to welcome the President of the Republic of Chile, Sebastián Piñera and his wife, Cecilia Morel. They were accompanied by the Ministers of Science, Technology, Knowledge and Innovation, Andrés Couve, and of Education, Marcela Cubillos, as well as by the Undersecretaries of Foreign Affairs, Carolina Valdivia, and of Tourism, Mónica Zalaquett, along with other authorities from the Ministries of Science and Foreign Affairs and members of the National Congress. Although the President and the First Lady could not stay at La Silla for the eclipse, they had the opportunity of visiting the 3.6-metre telescope, where they were received by the Director General of ESO, the President of the ESO Council, and other members of the ESO management. After this visit, both the President of Chile and the ESO Director General gave speeches at a tent set up to host over 60 media representatives — both national and international — who had registered to provide live coverage of the event. They then moved to the VIP area, by the New Technology Telescope (NTT), where they met with diplomatic representatives of ESO Member States and Partners, and other distinguished guests.

As a symbol of the deep appreciation of ESO toward the local community which has hosted its first observatory for these

past 50 years, ESO had the pleasure of inviting a large group of students and senior citizens from the municipalities of La Higuera, La Serena, and Coquimbo to witness the eclipse from La Silla. The group, who had a special meeting with President Piñera and the First Lady, engaged in a lively conversation with them. In addition to the students from the Coquimbo Region, La Silla also hosted the sixteen winners of a contest organised by CONICYT, the National Council of Science and Technology of Chile, among children selected from schools across the country.

Most of the members of the ESO Science Outreach Network (ESON), ESO's network of outreach representatives in the Member States and beyond, were present at La Silla as well. For them, the eclipse was the highlight of a tour of the ESO facilities in Chile that included Paranal and the Atacama Large Millimeter/submillimeter Array (ALMA). Other members of this tour group included eight social media influencers selected from 300 participants in a #MeetESO social media competition<sup>1</sup> including the winner of the La Silla Total Eclipse Public Competition<sup>2</sup>.

A total solar eclipse offers a rare possibility to carry out scientific experiments targeting the physical properties of the lower solar corona, observation of which

is difficult even from space-based probes. La Silla hosted an array of scientific and outreach observations carried out by teams that used dedicated equipment to perform a variety of observations, described in Christensen et al. on p. 47. Notably, even the NTT was used to obtain spectroscopy of the solar corona, an observation that critically depended on perfect synchronisation — a miscalculation could have resulted in direct exposure to the radiation of the solar surface and severe damage to the telescope optics and instrument. The experience of the telescope operators ensured that this was expertly avoided (see Dennefeld et al., p. 54). Another notable experiment included the use of the Rapid Action Telescope for Transient Objects (TAROT) to reproduce the famous Eddington experiment during the historical eclipse of 1919, when the deflection of the light from stars near the line of sight of the Sun was used to verify the predictions of Einstein's general theory of relativity.

Aside from the special guests mentioned above, over 700 people travelled to La Silla. Around a tenth of these visitors came from Chile, with the rest travelling from abroad — mostly Europe and North America. An area with a wonderful view of the eclipse was prepared for the public and was equipped with a large tent with seats, where snacks and beverages



**Figure 3.** Some of the 1000 visitors to La Silla are seen here observing the eclipse from an area near the Swedish–ESO Submillimetre Telescope (SEST), during the performance by Steve Rothery and friends.

S. Lowery



were served. Polyclinic services were installed at the former control building of the Swedish–ESO Submillimetre Telescope (SEST), and two ambulances fully equipped to provide first aid were positioned along the public viewing area. Information on the safe viewing of the eclipse had been given in advance to all those attending, and glasses with filters certified for solar viewing were distributed.

As part of the programme of activities offered for all the visitors, solar telescopes were set up for public observations before and during the partial phases of the eclipse. The visitor centre at La Silla offered a brand-new exhibition about ESO, including informative panels, the simulation of an old control room and a collection of astronomical instrumentation pieces rescued from the observatory over the course of its 50-year history, showing the evolution of detectors from photographic plates to CCDs. Two itinerant exhibitions were also installed for the occasion: the already very popular audio-visual show “ALMA sounds”, created from millimetre-submillimetre signals detected by ALMA; and paintings by Chilean artist Silvana Zúñiga that, using luminescent paint, illustrate concepts like light pollution and multi-wavelength astronomy. The visitor centre also hosted public talks given by ESO experts on popular astronomy topics. Finally, public tours to the NTT and the 3.6-metre telescope were organised. The area reserved for public viewing offered ample space to set up the equipment that many visitors brought

along, resulting in a truly impressive display of telescopes, cameras and a wide variety of imaging aids.

ESO made sure that the spectacle enjoyed at La Silla could be followed across the rest of the world, offering a live webcast that combined high-resolution images of the eclipsed Sun with views of the site from several vantage points, conveying the atmosphere at the observatory (see Figures 3 & 4). In addition, a team of expert photographers from ESO ensured that excellent images of high technical and artistic quality were obtained, a sample of which are shown in this article.

A special treat was a concert by British musician Steve Rothery (of Marillion fame) and his band, who performed against the impressive backdrop of the Swedish–ESO Submillimetre Telescope (SEST) antenna. The concert ended with the premiere of a new record by Steve Rothery and Riccardo Romano, a member of his

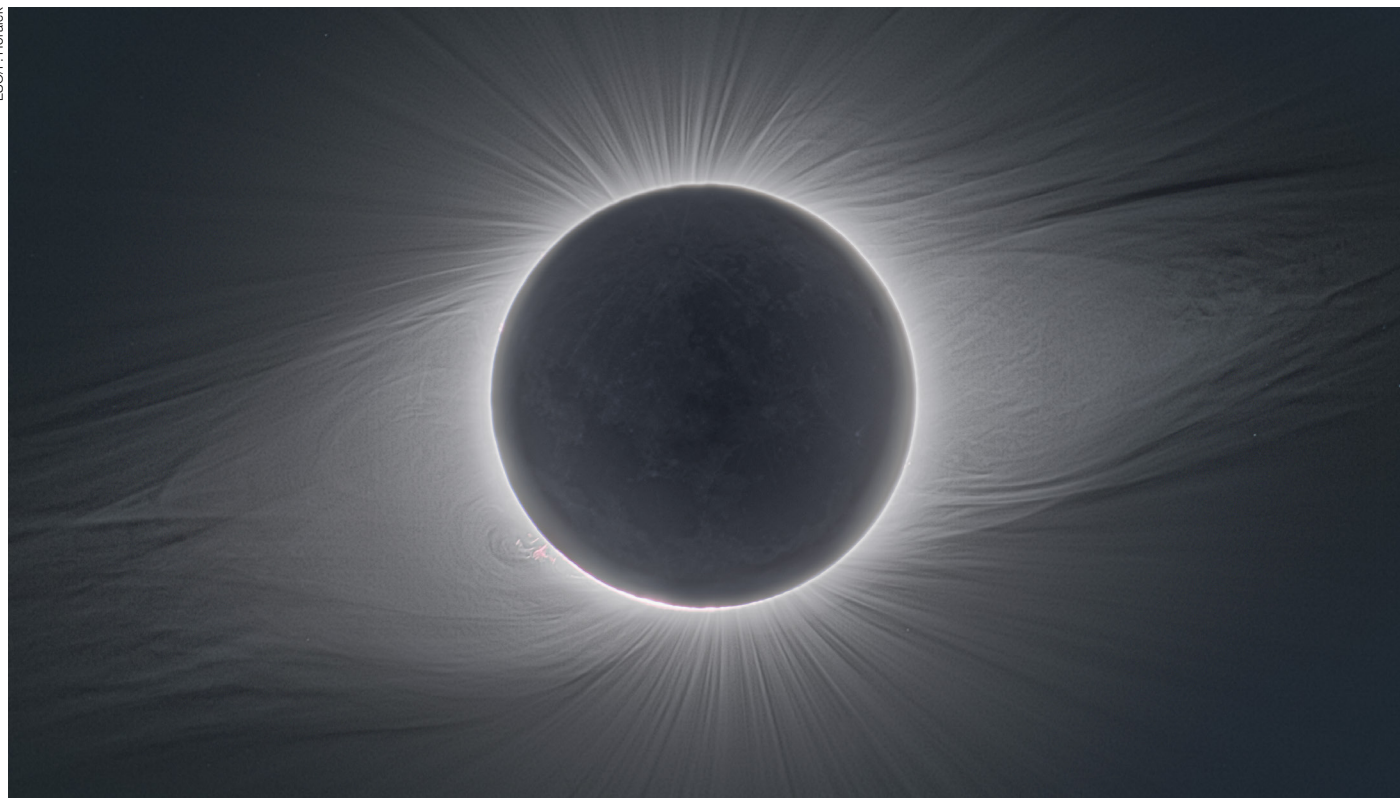
band, appropriately entitled “La Silla”. The performance was a collaboration with Rick Armstrong, who played bass guitar. It was an honour to host Rick Armstrong, the elder son of astronaut Neil Armstrong, particularly in the same month as the 50th anniversary of the first lunar landing.

Despite the expectation of the cold temperatures typical in July at La Silla, and the non-negligible probability of adverse meteorological conditions, the weather on the eclipse day was especially compliant, adding to the special character of the event. The sky remained clear and cloud-free for the whole day, temperatures were mild and virtually no wind blew, making the outdoors experience even more pleasant and memorable.

**Figure 4.** The moment worth waiting for: totality. With the Sun only 14 degrees above the horizon, day turns into twilight. The VIP platform at the NTT is seen on the right.

ESO/M. Zamani





**Figure 5.** A composite photo with exposures of varying duration showing filamentary details in the solar corona.

As the partial eclipse phase started and progressed during the early afternoon, an atmosphere of mounting excitement built up in anticipation of the extraordinary moments to come. People witnessed the progress of the covering of the solar disc with dedicated protective glasses at the beginning, but as totality approached, the changes in illumination of the surrounding landscape became increasingly obvious, giving the scene an unreal appearance. The blue of the sky became deeper and deeper while a band of intense orange — often seen in the middle of twilight — encompassed the entire horizon. At the same time, a noticeable drop in the temperature was felt as the solar irradiation decreased.

Finally, the shadow of the Moon reached La Silla. In a matter of seconds, the sliver of the uncovered solar disc thinned until disappearing as the sky quickly darkened, stars became visible, and the solar corona shone in stark contrast with the surrounding sky and the black disc of the

Moon completely covering the disc of the Sun. The corona appeared bright and compact, typical of the period near minimal solar activity, and, through the telescopes, a protuberance could be seen toward the northwest of the solar disc. Most of those witnessing the phenomenon reacted emotionally, with abundant exclamations of wonder, hugs and tears. As the first Bailey's beads appeared, signalling the end of the total eclipse phase, the 1 minute and 52 seconds of totality seemed to many way too short.

The deep impressions left by totality almost turned the last partial eclipse phase — during which the solar disc progressively reappeared from behind the Moon — into an anti-climax, despite the beautiful show put on by the partially eclipsed Sun advancing toward the horizon until the end of the eclipse near sunset. Further impressions of the event can be seen online<sup>2</sup>.

#### Acknowledgements

The authors feel privileged to have witnessed this once-in-a-lifetime experience at La Silla, as the next total solar eclipse visible from there will be in 2231<sup>a</sup>.

Contemplating one of the most majestic celestial phenomena was enhanced spectacularly by excellent meteorological conditions and the wonderful landscape of ESO's first observatory. While those particular factors were beyond ESO's control, the success of the experience for visitors on that day required planning, coordination and organisation and the effort of colleagues across ESO. The authors would particularly like to thank the staff in the Department of Communication, La Silla Logistics and operations, IT support, ESO's Representation in Chile, La Silla Paranal Safety, and everybody else who worked hard in the preparation and execution of a unique event in ESO's history.

#### Links

<sup>1</sup> #MeetESO social media competition: <https://www.eso.org/public/announcements/ann18088/>

<sup>2</sup> The La Silla total eclipse public competition: <https://www.eso.org/public/norway/announcements/ann18091/>

<sup>3</sup> ESO press release for the total solar eclipse: <https://www.eso.org/public/news/eso1912/>

#### Notes

<sup>a</sup> This is the only total solar eclipse that will be visible from an ESO observatory for more than 212 years, when La Silla will be close to the north of the path of totality during the total solar eclipse of 28 August 2231. An annular eclipse will be visible from La Silla next century, on 9 January 2187.