CHILEAN ASTRONOMY:

A window to the Universe

SCIENCE CENTRE SINGAPORE

8 – 11 November, 2021

Embassy of Chile in Singapore

Government of Chile

SCIENCE CENTRE singapore

Chile, with its unique geographical and climate conditions, is the astronomical capital of the world and the base of 70% of the world's telescopes. Partnering with the Science Centre Singapore, we get the chance to learn about the mysteries of outer space through interaction with experts in the field, including representatives from astronomical societies and the biggest observatories of the world operating in Chile. The four-day program includes presentations on a number of fascinating astronomical topics, including star hunting, light pollution, inclusivity in astronomy, and also the streaming of related documentaries. As the event will be live-streamed, the Embassy of Chile along with the Science Centre Singapore would like to invite the general public to participate and discover, looking forward to open a new area of collaboration with ASEAN countries.

One of the four telescopes of the Paranal Observatory on the hill of the same name, operated by the European Southern Observatory. Taltal. © Max Donoso

For more information about the event, go to **for.edu.sg/chileanastronomy**

To join the live stream, go to **for.edu.sg/chileanlivestream**

You can join us and participate in this event in person, at the premises of the Science Centre Singapore (15 Science Centre Road, Singapore 609081)

Or remotely through the live stream: **for.edu.sg/chileanlivestream**

Day 1 (8 November)

6:00 - 6:10 pm SG time
7:00 - 7:10 am Chile time
10:00 – 10:10 am GMT

Welcoming remarks

6:10 - 6:30 pm SG time
7:10 - 7:30 am Chile time
10:10 - 10:30 am GMT

Presentation: "*The development of astronomy in Chile and the natural laboratory in the Chilean desert*"

6:30 - 7:20 pm SG time
7:30 - 8:20 am Chile time
10:30 - 11:20 am GMT

Documentary *Big Astronomy: People, Places, Discoveries*

7:20 - 7:40 pm SG time
8:20 - 8:40 am Chile time
11:20 - 11:40 am GMT

Q&A session with Dr. Shannon Schmoll, representing Big Astronomy Project

Day 2 (9 November)

4:00 - 4:50 pm SG time
5:00 - 5:50 am Chile time
8:00 - 8:50 am GMT

Documentary *The eyes of the World*

4:50 - 5:20 pm SG time
5:50 - 6:20 am Chile time
8:50 - 9:20 am GMT

Q&A session with Mrs Marie Courvasier, director of the documentary

7:00 - 8:00 pm SG time
8:00 - 9:00 am Chile time
11:00 am - 12:00 pm GMT
Presentation: "Astronomy and light pollution + Globe at Night Campaign"

8:00 - 8:20 pm SG time
9:00 - 9:20 am Chile time
12:00 - 12:20 pm GMT

Q&A session with Mr. Juan Seguel, Education & Engagement Specialist, NSFs NOIRLab

Day 3 (10 November)

Special Session with ALMA Observatory

6:00 - 6:30 pm SG time
7:00 - 7:30 am Chile time
10:00 - 10:30 am GMT

Documentary *ALMA: The Rebirth of a Giant*

6:30 - 8:00 pm SG time
7:30 - 9:00 am Chile time
10:30 am - 12:00 pm GMT

Discussion with the astronomers from ALMA. Q&A session

Day 4 (11 November)

6:00 - 7:00 pm SG time
7:00 - 8:00 am Chile time
10:00 - 11:00 am GMT

Roundtable: *"Women, inclusivity, and diversity in astronomy"*

7:00 - 7:40 pm SG time
8:00 - 8:40 am Chile time
11:00 – 11:40 am GMT

Q&A session with the panelists

Day 1 (8 November)

6:00 - 6:10 pm SG time
7:00 - 7:10 am Chile time
10:00 – 10:10 am GMT

Welcoming Remarks

Mrs. Carolina Valdivia Torres
Under-Secretary, Ministry of Foreign Affairs of Chile

Mr. Ignacio Concha
Ambassador of Chile to the Republic of Singapore

Assoc. Prof. Lim Tit Meng
Chief Executive, Science Centre Board

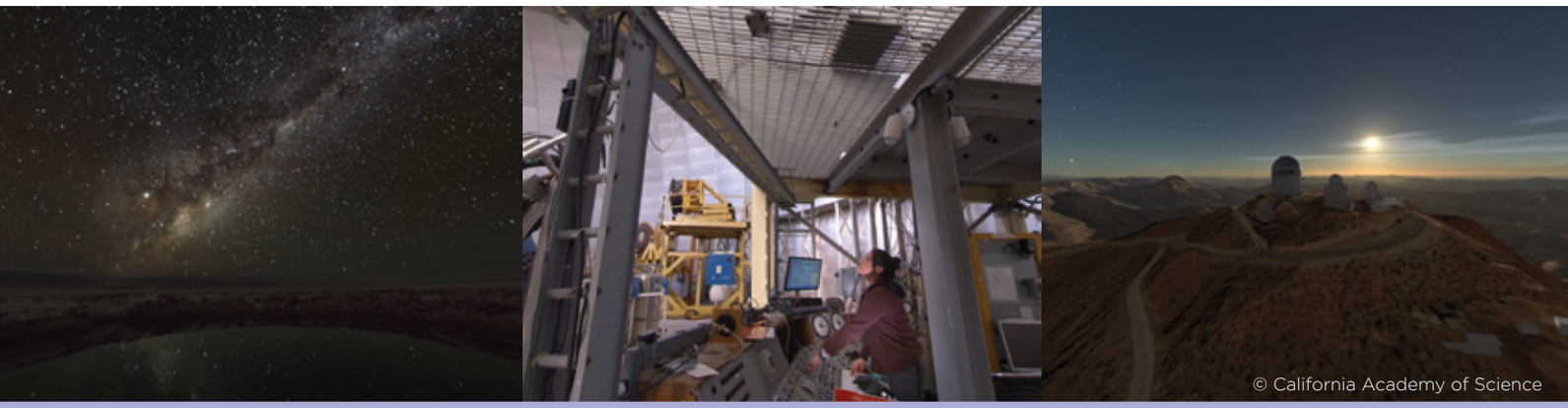
6:10 - 6:30 pm SG time
7:10 - 7:30 am Chile time
10:10 - 10:30 am GMT

Presentation: "The development of astronomy in Chile and the natural laboratory in the Chilean desert"

Dr. María Argudo-Fernández
President of the Chilean Astronomical Society (SOCHIAS)

6:30 - 7:20 pm SG time
7:30 - 8:20 am Chile time
10:30 - 11:20 am GMT

Documentary *Big Astronomy: People, Places, Discoveries*



big astronomy
people • places • discoveries

Big Astronomy is a multifaceted research and outreach project supported by several partners and funded by the National Science Foundation. It includes the award-winning planetarium show *Big Astronomy: People, Places, Discoveries*, which explores three observatories, ALMA, CTIO, Gemini, and the new Vera Rubin Observatory (formerly LSST), located in extreme environments and remote locations in Chile.

The film highlights the group of people with diverse backgrounds, talents, and skills needed to run a world-class observatory. Meet a few of these people as they share the wonder of the sky and the excitement of discovery and learn why Chile, with its beautiful mountain ranges and clear, cloudless skies create an ideal environment for studying the cosmos.

Winner in the category of Best Astronomy Education (Fulldome Film Festival, February 2020) and Best Science Film (Dome Fest West Film Festival, 2021)

Watch the trailer **here.**

7:20 - 7:40 pm SG time
8:20 - 8:40 am Chile time
11:20 - 11:40 am GMT

Q&A session with Dr. Shannon Schmoll, director of the Abrams Planetarium at Michigan State University, representing Big Astronomy Project

Day 2 (9 November)

4:00 - 4:50 pm SG time
5:00 - 5:50 am Chile time
8:00 - 8:50 am GMT

Documentary *The eyes of the World*

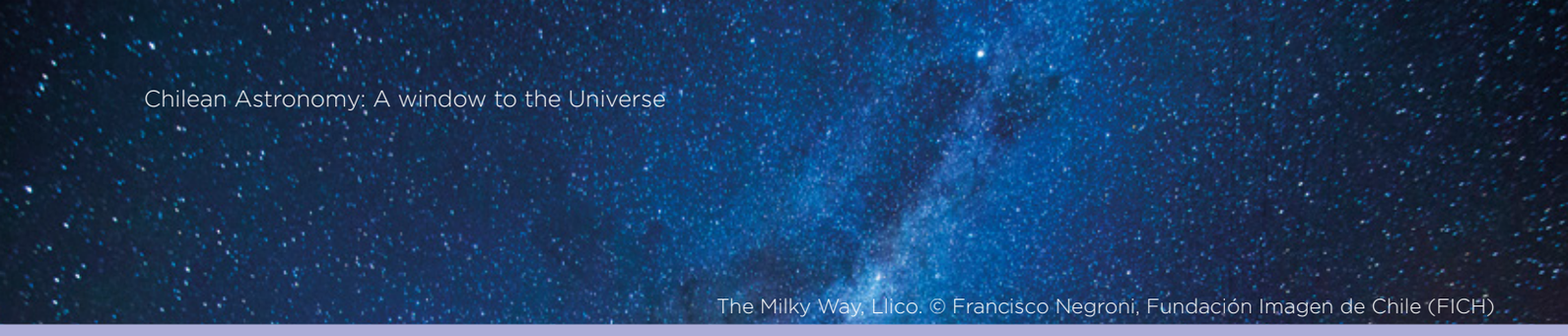


Filmed by French filmmaker Marie Courvasier, this documentary explains why Chile attracts so much astronomical interest, who is behind this scientific development and the implications these changes have for the country's science development.

Watch the trailer **here**.

4:50 - 5:20 pm SG time
5:50 - 6:20 am Chile time
8:50 - 9:20 am GMT

Q&A session with Mrs. Marie Courvasier, director of the documentary



The Milky Way, Llico. © Francisco Negroni, Fundación Imagen de Chile (FICH)

7:00 - 8:00 pm SG time
8:00 - 9:00 am Chile time
11:00 am - 12:00 pm GMT

Presentation: "Astronomy and light pollution + Globe at Night Campaign"

Mr. Juan Seguel
Education & Engagement Specialist,
NSFs NOIRLab

AURA Observatory in the framework of AURA NOIRLab.

Light pollution is excessive, misdirected, or obtrusive artificial (usually outdoor) light. Too much light pollution has consequences: it washes out starlight in the night sky, interferes with astronomical research, disrupts ecosystems, has adverse health effects and wastes energy. A little more than 100 years ago, you could walk outside at night even in a city and see the Milky Way galaxy arch across the night sky, but with more than half of the world's population now living in cities, 3 out of every 4 people have never experienced the wonderment of pristinely dark skies.

The Globe at Night program is an international citizen-science campaign to raise public awareness of the impact of light pollution by inviting citizen-scientists to measure their night sky brightness and submit their observations from a computer or smart phone. Light pollution threatens not only our "right to starlight", but can affect energy consumption, wildlife and health. More than 200,000 measurements have been contributed from people in 180 countries over the last 14 years, making Globe at Night the most successful light pollution awareness campaign to date.

We invite you to the Star Hunting experience from 27 October to 6 November, Globe at Night Campaign.

From 27 October - 6 November (during the moonless period), students are invited to participate in the Globe at Night Campaign to observe and record the constellation Pegasus in the night sky and comparing it to stellar charts. Through this activity, students from around the world are learning how the lights in their community contribute to light pollution. The contributions to the online database will document the visible night-time sky.

For more information:
Global Night 2021
Activity Guide: Introduction 2021 Campaign Dates that use Pegasus: October 27 – Nov 6, 2021
Download the app and follow these 6 Simple Steps.

8:00 - 8:20 pm SG time
9:00 - 9:20 am Chile time
12:00 - 12:20 pm GMT

Q&A session with Mr. Juan Seguel

Day 3 (10 November)
Special Session with ALMA Observatory

6:00 - 6:30 pm SG time
7:00 - 7:30 am Chile time
10:00 - 10:30 am GMT

Documentary *ALMA: The Rebirth of a Giant*

The Atacama Large Millimeter/submillimeter Array (ALMA) -the largest astronomical project in existence- is a single telescope of revolutionary design, composed of 66 high precision antennas located on the Chajnantor Plateau, 5000-meter altitude in northern Chile. ALMA is an international partnership of the European Southern Observatory (ESO), the U.S. National Science Foundation (NSF) and the National Institutes of Natural Sciences (NINS) of Japan, together with NRC (Canada), MOST and ASIAA (Taiwan), and KASI (Republic of Korea), in cooperation with the Republic of Chile.

The global COVID-19 pandemic forced ALMA to halt its observations of the Universe and close its doors. This was an unprecedented technological and human challenge for which nobody was prepared. A camera accompanied the team responsible for taking care of the facilities in this empty camp. What was this experience like for its technicians, engineers, and astronomers? What happens when you stop 66 antennas located at 5,000 meters above sea level? What discoveries did we miss? What is the situation today? These are some of the questions that will be answered in the documentary, *ALMA: The Rebirth of a Giant.*

Watch the trailer **here.**

6:30 - 8:00 pm SG time
7:30 - 9:00 am Chile time
10:30 am - 12:00 pm GMT

Discussion with the astronomers from ALMA. Q&A session

Day 4 (11 November)

6:00 - 7:00 pm SG time
7:00 - 8:00 am Chile time
10:00 - 11:00 am GMT

Roundtable: "Women, inclusivity, and diversity in astronomy"

Chile is looking to promote STEM vocations among under-represented groups focused on girls and women, but also including indigenous communities, socially and economically disadvantaged students, migrants, and people with disabilities.

In this panel, Chilean leaders will share their own experiences in the STEM, in particular the initiatives to promote inclusivity, equity, and diversity in astronomy.

Did you know?

Chile has developed the "Gender Equality Policy for Science, Technology, Knowledge and Innovation".

According to the 2020 Gender Equality in Science, Technology, Knowledge and Innovation Report, only 28% of people engaged in careers related to science and engineering in Chile, were women. Furthermore, women's participation in the Information and Communications Technology (ICT) sector is only 5%. This public policy aims to remove the barriers that impede girls and women from taking part in science, technology, knowledge and innovation and to increase their participation in work related to research and development. The policy includes a "50/50 by 2030" action plan that will implement more than 30 steps, such as the creation of a scientific research program for boys and girls and funds to support institutional plans for universities to close their gender gaps in research.

For more information go to: www.minciencia.gob.cl/genero

Moderator:

Dr. Kiruthika Ramanathan
Deputy Director, School & Professional Development
& Technology Science Centre Board

Speakers:

Dr. Paulina Assmann
Regional Ministerial Secretary of Science of the South Central Macrozone (Chile)

Dr. Sonia Duffau
Outreach and Diversity Officer, AUI/NRAO Chile

Mrs. Pamela Paredes
Physics graduate and co-creator of the project Dedoscopio, a program that promotes making astronomy accessible to everyone

Mrs. Carla Fuentes
Telescope Operator and Technical Assistant at Las Campanas Observatory and co-creator of Dedoscopio

Mrs. Carol Rojas Diaz
Communications and Outreach Officer at Las Campanas Observatory

Ms. Tatiana López
Aerospace Engineering student and astronaut for the European Asclepios Mission

7:00 - 7:40 pm SG time
8:00 - 8:40 am Chile time
11:00 – 11:40 am GMT

Q&A session with the panelists

ALMA invited local children from Toconao and San Pedro to enjoy the magic of the solar eclipse in 2019 © ALMA (ESO / NAOJ / NRAO

PROVOCA is an AUI/NRAO initiative to promote STEM vocations among underrepresented groups, with a focus in Chile, but with messages that are universal in their appeal. Despite hosting many world-class NSF-funded observatories, Chile lags behind most OECD and Latin American countries in terms of female participation and retention in STEM careers. To address this challenge and broaden participation, PROVOCA was launched in 2018 to inspire girls and break down damaging gender stereotypes.

The Dedoscopio initiative aims to bring astronomy closer to people with visual disabilities and to stimulate their senses, especially touch, to represent the phenomena of the Universe. Therefore, they use different textures, sounds and contrast to represent the phases of eclipses, the sizes of planets and satellites such as the Moon, among other astronomical concepts.

ALMA includes the local community in many activities, like the visits to the facilities of the Base Camp, as well as those of the Llano de Chajnantor © Thais Mandiola - ALMA (ESO/NAOJ/NRAO)

3 reasons why Chile is the astronomical students' paradise

Its ideal sky conditions and state-of-the-art technology are among the reasons why both local and international students, and even renowned astronomers, are motivated to observe and study the skies in Chile.

Clean skies

"There is no other country with similar conditions. This is paradise in terms of astronomy. The Atacama Desert fulfills two aspects that are essential for observation: cloudless skies and very little atmosphere between the telescope and the stars. These are ideal conditions for observing the stars and galaxies," explained German astrophysicist Matthias Schreiber, professor at Universidad Técnica Federico Santa María and alternate director of the Millennium Nucleus for Planet Formation (NPF).

World-class technology

However, it's not only its clean skies that make Chile one of the best places for studying astronomy; the significant infrastructure installed here is also key. Schreiber points out that Chile has more than half of the best telescopes in the world and, what is more, there is also privileged access to make use of them. "Chile has 10% of the right to use and that is a huge advantage, considering that the rest of the world has to share the remaining 90%. This means that under- and post-graduate students can come and study with the best telescopes in the world".

Field of employment

In terms of employment, Schreiber says that the majority of PhD students that have studied under him go on to work in a permanent research position. "If you studied in Chile, the level is so good that you can easily compete with students from the U.S. or Europe. The work field is growing," he concludes.

These three elements have made Chile such an attractive place to study the skies that even a popular phrase has been coined: "Chile, the eyes of the world". For anyone looking to study astronomy, any related career or to pursue a PhD in the field, Chile has a long list of universities, including the Astrophysics Institute of Universidad Católica, and Learn Chile, a network of higher education institutions that includes the Universidad de La Serena, Universidad de Valparaíso, Pontificia Universidad Católica de Valparaíso, Universidad Metropolitana de Ciencias de la Educación, and Universidad Técnica Federico Santa María.

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Government of Chile

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In collaboration with

big astronomy
people · places · discoveries

ALMA

Carnegie Science
Las Campanas Observatory

AURA

Chile

Ministerio de Ciencia, Tecnología, Conocimiento e Innovación

SOCHIAS

Chilean Astronomy: A window to the Universe

Science Centre Singapore

www.science.edu.sg

Embassy of Chile in Singapore

chile.gob.cl/republica-de-singapur/en

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Andrés Borlone, Embassy of Chile in Singapore
Lim Meng Hwee, Science Educator, Science Centre Board

Design: Carola Osorio, Graphic Designer

Backing: Néstor Guerrero, Embassy of Chile in Singapore

Panoramic of antennas in Chajnantor, in the heights of the Andes Mountains