



Calar Alto Observatory

Visitor Guide



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FAQ & Visitor Information azimuthspain.com
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QUICK GUIDE TO CALAR ALTO

3.5-m Telescope

The largest telescope at the observatory.

Used for advanced astronomical research including exoplanets and distant galaxies.

2.2-m Telescope

A versatile research telescope used for many different scientific projects.

1.23-m Telescope

The telescope most frequently associated with public observing activities.

Schmidt Camera

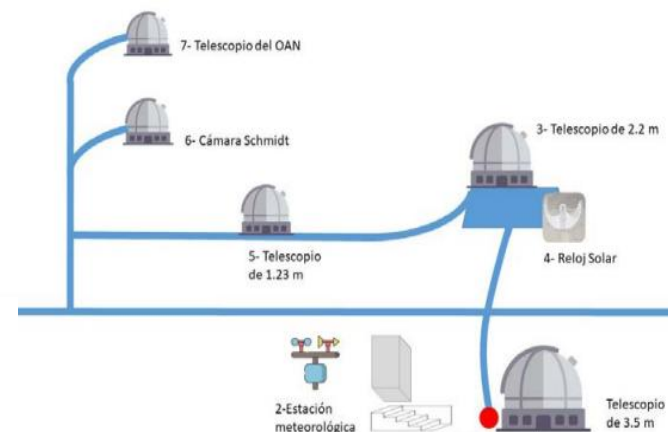
Designed to photograph large areas of the sky and monitor objects in Earth orbit.

1.5-m Telescope

Operated by the National Astronomical Observatory and used for scientific research.

Control Room

The operational centre of the observatory where astronomers monitor and control observations.





GLOSSARY: Many astronomy terms are very similar in English and Spanish. You may recognise more than you expect.

SIMILAR WORDS

English | **Spanish**

Observatory | **Observatorio**
Telescope | **Telescopio**
Instrument | **Instrumento**
Temperature | **Temperatura**
Altitude | **Altitud**
Astronomer | **Astrónomo**
Observation | **Observación**
Research | **Investigación**

Galaxy | **Galaxia**
Universe | **Universo**
Planet | **Planeta**
Exoplanet | **Exoplaneta**
Constellation | **Constelación**
Nebula | **Nebulosa**
Meteorite | **Meteorito**
Satellite | **Satélite**
Asteroid | **Asteroide**
Comet | **Cometa**
Tectonic Plates | **Placas tectónicas**
Habitable Zone | **Zona de habitabilidad**

OTHER USEFUL WORDS

English | **Spanish**

Dome | **Cúpula**
Mirror | **Espejo**
Researcher | **Investigador**
Weather Station | **Estación meteorológica**
Control Room | **Sala de control**
Space Debris | **Basura espacial**

Moon | **Luna**
Sun | **Sol**
Star | **Estrella**
Starlight | **Luz estelar**
Night Sky | **Cielo nocturno**
Black Hole | **Agujero negro**
Milky Way | **Vía Láctea**





INTRODUCTION

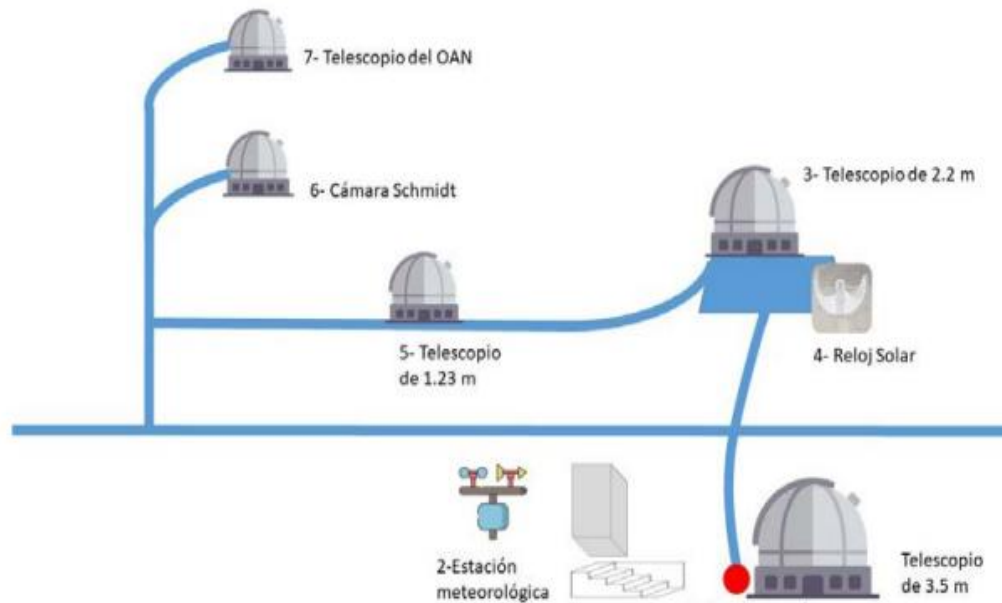
Welcome to Calar Alto Observatory!

We invite you to explore one of Europe's most important astronomical observatories.

This self-guided tour will take you around the observatory complex, where you will discover the telescopes, scientific facilities and research carried out at Calar Alto.

Located at an altitude of over 2,100 metres in the Sierra de Los Filabres, Calar Alto Observatory is home to some of the largest optical telescopes in continental Europe. Astronomers from around the world use these instruments to study planets, stars, galaxies and many other fascinating objects in the Universe.

The numbered map shows the different stops included in this guide. You are currently at **Stop 1**, next to the observatory's largest dome.



Please remember that this is an active scientific facility. Vehicles may be moving around the site, and research activities may be taking place during your visit.

Follow all signs and instructions and take care when walking between locations.





01.

3.5 METRE TELESCOPE

You are now standing beside the largest telescope at Calar Alto Observatory.

The telescope has a primary mirror measuring **3.5 metres in diameter** and has been in operation since 1984. Equipped with a range of advanced scientific instruments, it is used for some of the observatory's most important research projects.

Today, a large proportion of its observing time is devoted to the search for exoplanets orbiting stars in our galactic neighbourhood.



Did you know?

Exoplanets are planets that orbit stars other than the Sun.

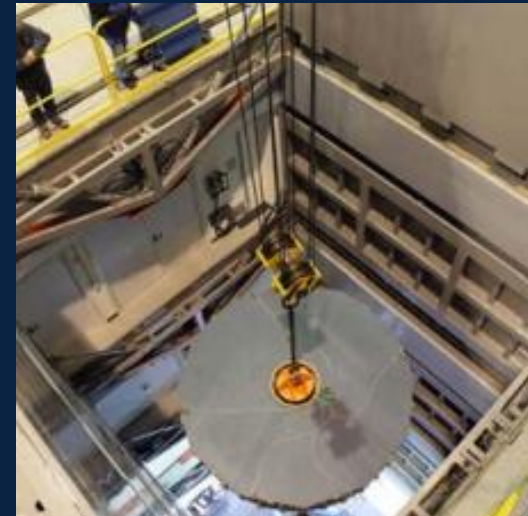
This telescope is capable of detecting Earth-mass planets located within the habitable zone, where conditions may allow the existence of liquid water.

It has also revealed, for example, that some Jupiter-like exoplanets, which are extremely hot and orbit very close to their stars, can lose part of their atmospheres as material is stripped away by the star itself.

Did you know?

The mirrors of large telescopes require regular maintenance to ensure they continue working correctly.

Once a year, the 3.5-metre telescope mirror is removed and placed inside a special aluminising chamber located on the main floor of the building.



There, the mirror is coated with a thin layer of aluminium, allowing it to reflect incoming light with maximum efficiency.

This process is highly complex and can take several days to complete.





02.

WEATHER STATION

You can now move to **Stop 2** on the route: **the Weather Station**, located at the top of a small flight of stairs beside the large white building near the 3.5-metre telescope dome.

At the top of the stairs, you will find a grey instrument mounted on a cylindrical concrete pillar. This device is a GPS station that measures the precise position of the site.

Weather conditions play a crucial role in astronomy. Clear skies, stable air and low humidity allow astronomers to obtain sharper images and more accurate scientific data.

The observatory is also connected to a wider network of meteorological stations that, among other things, can measure the movement of tectonic plates.

The weather station continuously monitors atmospheric conditions across the observatory.

Would you like to know the temperature and humidity at the observatory **right now**? You can visit the following webpage to find out:

<https://www.caha.es/es/servicios/meteorologia>

Data published on this page is collected by the instruments installed on the meteorological tower shown in the photograph. Information such as temperature, humidity, wind speed and precipitation is collected and used to support astronomical observations.



Punto 2

Did you know?

Astronomers pay close attention not only to clouds, but also to atmospheric turbulence. Even on a clear night, unstable air can make stars appear to twinkle and reduce image quality.



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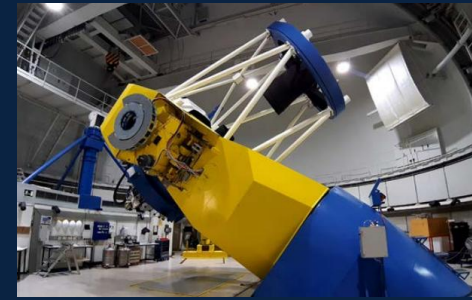
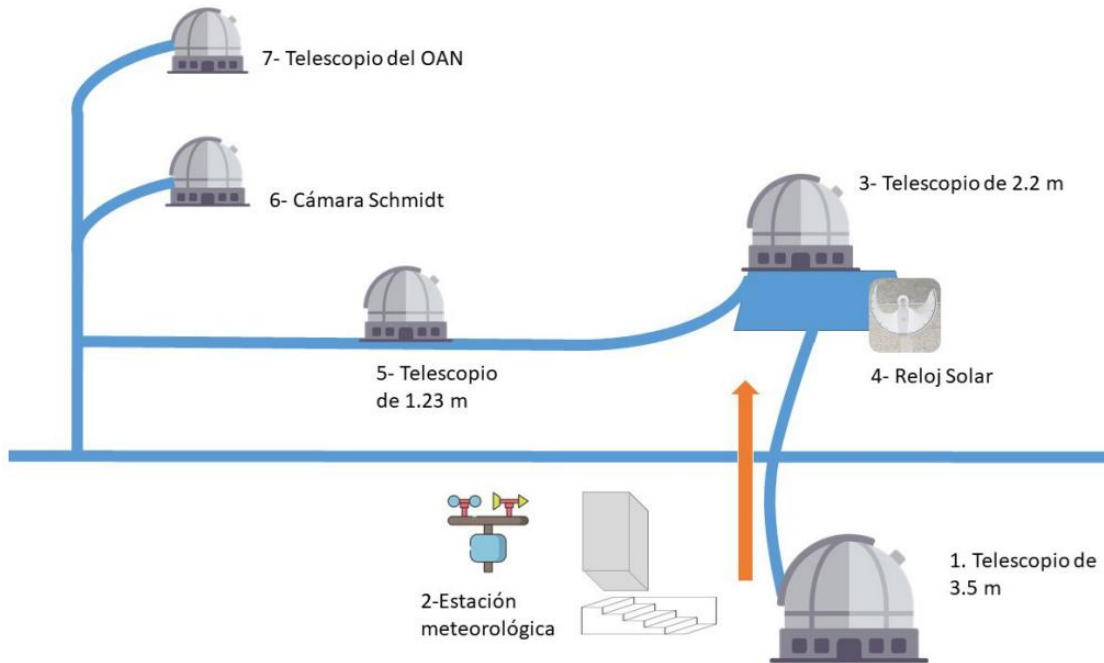


03.

2.2-METRE TELESCOPE

Now return to the large dome and continue along the road until you reach the **2.2-metre telescope**. Once there, you can read **Stop 3**.

You are now at the second-largest telescope at Calar Alto Observatory.



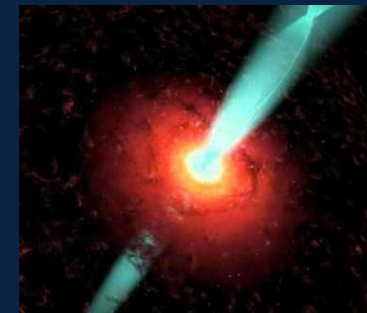
Installed in 1979, the 2.2-metre telescope is a highly versatile instrument that has supported a wide range of astronomical research projects over the years.

It is equipped with a wide variety of scientific instruments; its usual flexibility allows scientists to use different instruments depending on the observations being carried out.

One area of research involves active galaxies.

These galaxies contain supermassive black holes at their centres, which absorb large amounts of surrounding material.

As this material falls towards the black hole, it heats up and can sometimes emit more light and radiation than all the stars in the galaxy combined.



These are fascinating objects to study because extremely energetic physical processes take place in these regions of the Universe.





04. SUNDIAL

In the open area beside the 2.2-metre telescope you will find a sundial.

Take a moment to read the information displayed there and observe it carefully.

This is a very special instrument that was designed specifically for **the exact latitude and longitude** of Calar Alto Observatory.

The difference between the time shown by the sundial and the official time is less than one minute.



Activity

Observe the sundial and the instructions displayed on the nearby plaque.

1. One side of the Sun's shadow indicates the time. Which side is it? Remember that Spain changes between summer and winter time, which can create a one-hour difference that the sundial cannot take into account.

1. How are the hour numbers read? From right to left, or in the opposite direction?

The object that casts the shadow is called a gnomon.

The curved shape of the gnomon compensates for the fact that the apparent motion of the Sun changes slightly throughout the year.

This is due to two factors: the Earth's orbit around the Sun is elliptical, and the Earth's axis is tilted relative to its orbit.

These variations can produce differences of up to 15 minutes between solar time and clock time.

The curved shape of the gnomon helps correct for these effects so that the shadow indicates the time as accurately as possible.

The gnomon is aligned north-south, with the upper end pointing towards the north.

3. In the afternoon, will the shadow be projected to the right or to the left of the gnomon? Remember that the Sun sets in the west.





05.



1.23 METRE TELESCOPE

From the open area beside the 2.2-metre telescope you can see the remaining telescopes at the observatory.

Activity

1. What shape do all the domes have? Why do you think they are built this way?
2. Why do you think all the domes are painted white?

The 1.23-metre telescope was the first major telescope installed at Calar Alto Observatory, in 1975. It is mainly used for research into stellar physics, objects in the outer Solar System such as comets, asteroids and trans-Neptunian objects, and for the study of planets orbiting other stars.

Did you know...?

Unlike most professional telescopes, and only on special occasions, this telescope can be used by looking directly through the eyepiece with your own eyes.

It is the only professional telescope of this size in Europe that is regularly used for activities where visitors can observe astronomical objects directly through the telescope.

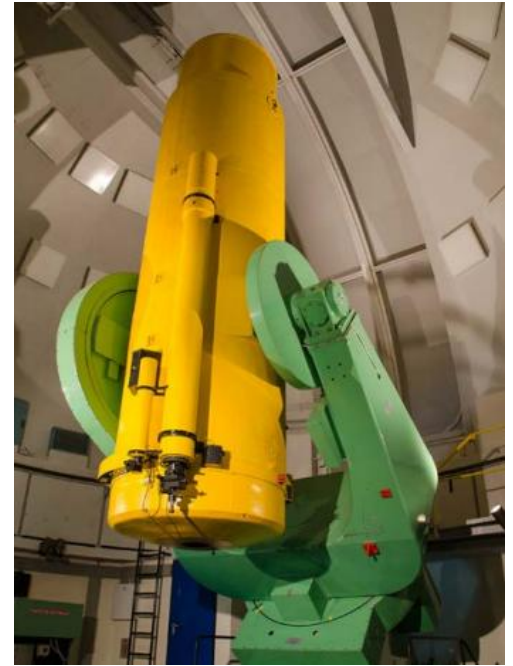




06.

SCHMIDT CAMERA

The Schmidt Camera is an **80 cm telescope** designed to take images of large areas of the sky. This telescope works in collaboration with the European Space Agency (ESA).



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Did you know...

that there is also rubbish in space?

There are many inactive satellites and fragments of old space missions orbiting the Earth.

These objects are known as space debris, and it is important to track their positions to ensure they do not pose a risk to operational satellites or future space missions. For this reason, the Schmidt Camera is used, in cooperation with the European Space Agency (ESA), to monitor and track these objects.



07.

1.5-METRE TELESCOPE

The dome visible in the distance houses a telescope with a **mirror diameter of 1.5 metres**.

Unlike the other telescopes at Calar Alto, this telescope does not belong to the Calar Alto Astronomical Centre. It is operated by the Spanish National Astronomical Observatory.

For this reason, it is often referred to as the "**Spanish Dome**".



Did you know...

You should always wear warm clothing when entering the telescope domes.

The temperature inside the domes is kept close to the expected night-time temperature. As the observatory is located at more than 2,000 metres above sea level, temperatures can approach 0°C during winter. This helps prevent air turbulence around the telescope, which would otherwise reduce the quality of astronomical observations.





07.

LABORATORIES AND CONTROL ROOM

The Control Room is the main working building of the observatory.

This is where astronomers and telescope operators work during observing runs and where the telescopes are controlled throughout the night.

The building also houses mechanical and electronics workshops, laboratories and an extensive scientific library.



Did you know...

The observatory buildings are connected by underground tunnels.

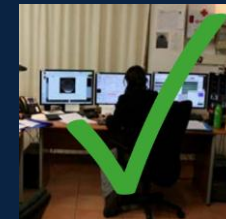


The extreme weather conditions that can occasionally occur in this high-mountain environment are the reason why a network of underground passageways links the different buildings across the site.

Did you know...

Modern astronomers do not normally observe by looking directly through telescopes.

Instead, the information collected by the telescopes is recorded and analysed using computers.



The human eye cannot accurately measure the brightness, colours or positions of astronomical objects.

For this reason, telescopes use specialised digital cameras known as CCD cameras, which provide precise scientific measurements and allow researchers around the world to compare their results.



ASESORÍA

FORMACIÓN

EDUCACIÓN

ASTROTURISMO

VISITAS GUIADAS

TURISMO CIENTÍFICO



Thank you for visiting Calar Alto Observatory.

We hope you have enjoyed discovering the telescopes, scientific facilities and research carried out at one of Europe's most important astronomical observatories.

You can find more information about the observatory in the [Frequently Asked Questions \(FAQ\)](#) section of our website. This information may help you prepare for your visit.

Remember that the observatory is open throughout the year for astronomical tourism activities, whether you are visiting individually or with family and friends.

Both daytime and night-time visits can be booked through our website:

www.azimuthspain.com/eventos

If you have any questions, please contact us at:

info@azimuthspain.com

Best wishes, and we hope to see you soon at Calar Alto.

The AZIMUTH Team



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