The first public space telescope

In June 2014, Astrofactorium GmbH (Institute for Astronomy and Space Technology, Munich, Germany) announced *Project Public Telescope*—a project to make astronomical observations from space available to international participants, from amateur astronomers to members of the public. One of the project's directors, CHRISTIAN WIEDERER, outlines this remarkable enterprise.

THE main objective of *Project Public Telescope* is to make astronomical observations available to a wider international audience, not just the select few. Everyone can access the Public Telescope, from amateur astronomers, educational institutions and scientists through to members of the public, all from the comfort of their home over the web. The Public Space Telescope is currently being designed in Germany and is planned to be operational in four years' time.

Advantages of a Space Telescope

The Public Space Telescope offers many advantages over conventional terrestrial telescopes:

Due to the lack of atmosphere in space there is no air pollution or turbulence to degrade the image. This results in far clearer and sharper images.

Increasingly widespread air and light pollution on Earth has no influence on the Public Space Telescope's observations.

The Public Space Telescope operates independently of the user's location and local conditions, such as cloud or time of day. This results in a daily usage time of 24 hours for the entire starry sky of both the northern and southern hemisphere.

Without the filtering effect of Earth's atmosphere, the space telescope can also view in ultraviolet light in addition to visible light—something not possible from Earth's surface.

The Public Space Telescope will allow observation of phenomena such as star bursts and supernovas or the exploration of massive black holes, perhaps leading to new insights into our Solar System.

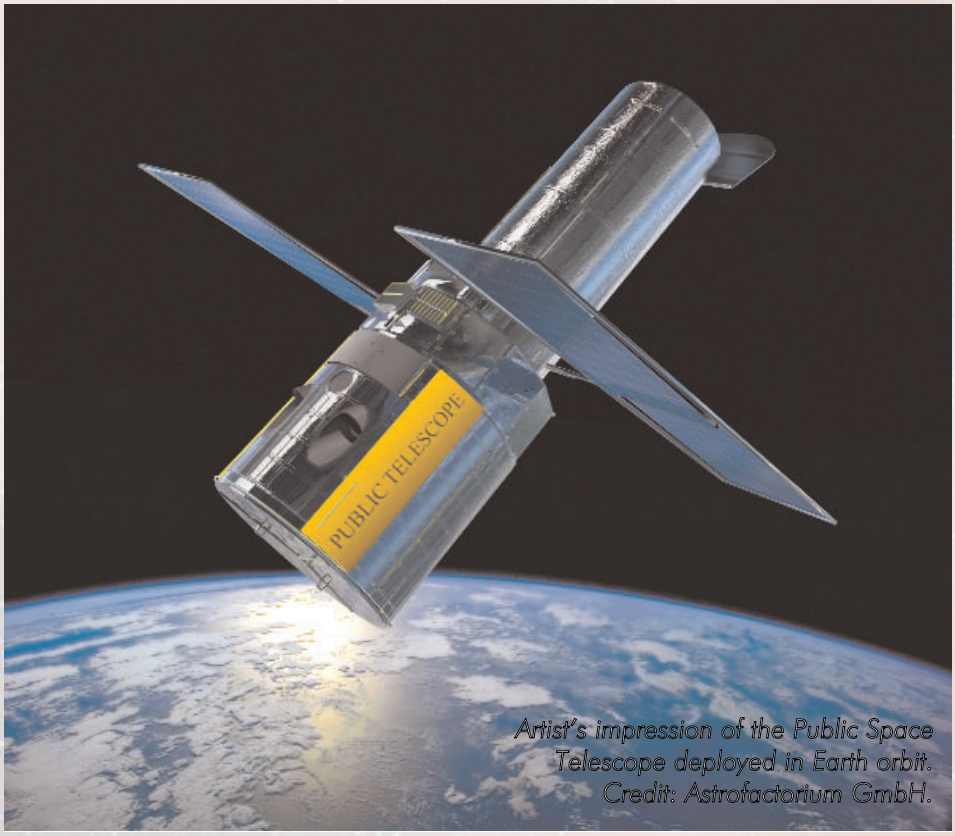
Ease of use and operation

Home users will be able to take photographs of specified objects such as planets, stars or galaxies through a simple and easy to use website. The process of accessing these objects is greatly simplified, meaning the only prerequisite is a working Internet connection. Indeed, the telescope will also be accessible on mobile devices or tablets through an easily available app. The heavens will be yours to explore.

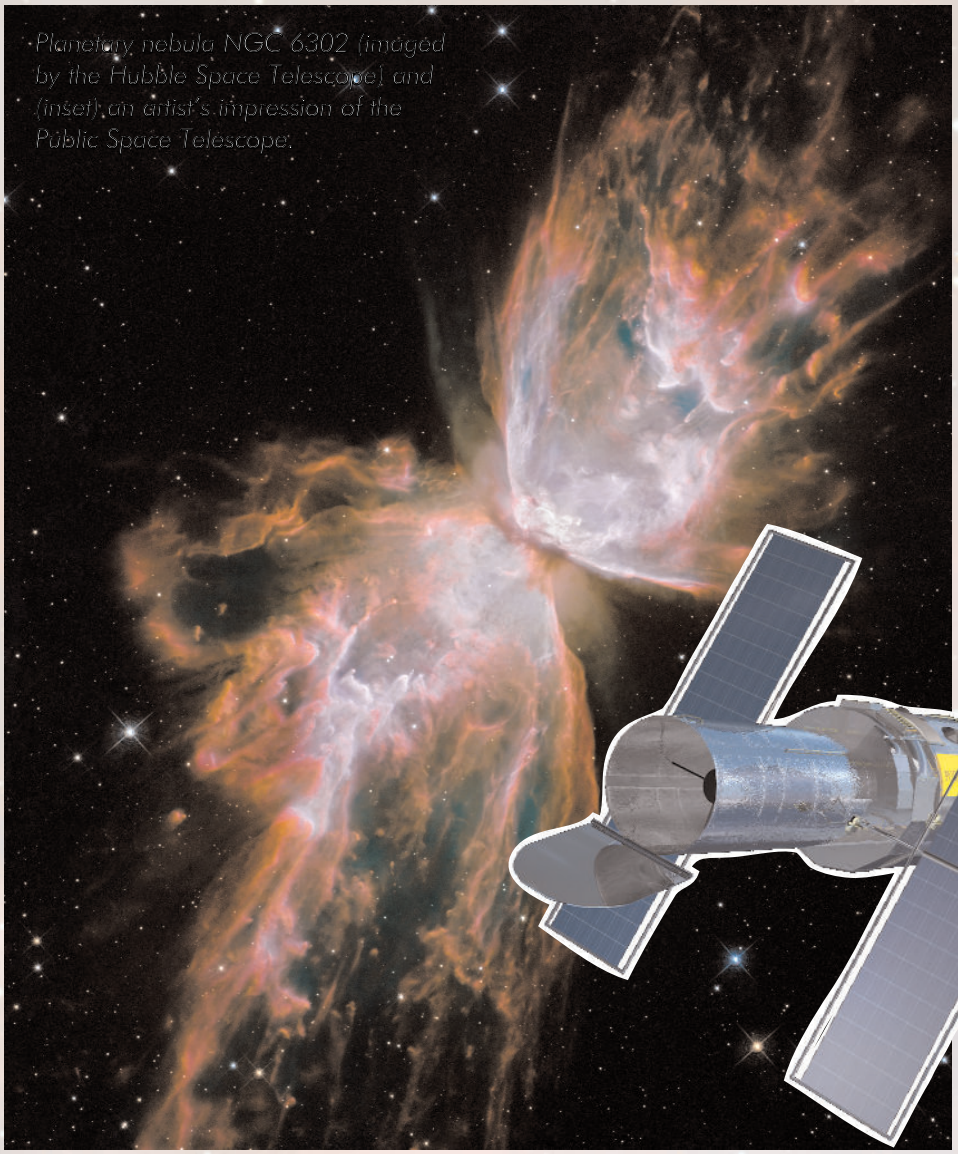
Opportunities for amateur astronomers

This is an unprecedented opportunity. At no time in history has such a high-powered tool been so easily available, not just for professionals but for amateurs and enthusiasts. The high-resolution capability of telescope offers new possibilities for the observation of small or distant objects. This will make it possible, for example, to study the evolution of the planets and their moons in our Solar System much more accurately. Another possibility is to analyze in far greater detail the distribution of cosmic impacts on Jupiter and Saturn, which may help further our notions of the distribution of asteroids and comets in the Solar System.

In addition, unresolved questions may also be addressed. The Public Space Telescope will offer amateur astronomers an extensive and fully customizable suite of functions and configurations; celestial co-ordinates can be directly input, different cameras selected, exposure time, colour filters chosen and much, much more.



Artist's impression of the Public Space Telescope deployed in Earth orbit. Credit: Astrofactorium GmbH.



Planetary nebula NGC 6302 (imaged by the Hubble Space Telescope) and (inset) an artist's impression of the Public Space Telescope.

Space Telescope for education

With the Public Telescope, students have the opportunity to access state-of-the-art space technology to pursue their own projects. Planets, galactic nebulae, galaxies, detailed sections of Earth or the Moon—all of this can be observed and discussed in real-time during the lessons. Lessons become much more tangible when discussions on star formation or supernovas can be analyzed and explored in practical lessons. In addition, students will be able to watch, in real-time, how other users (amateur astronomers or scientists) use the telescope.

Following this experience, interested students can also use the telescope independently. The Public Telescope team places great emphasis on the application of the telescope for educational purposes; therefore, educational institutions, schools and universities are encouraged to submit their own ideas, present a case and outline its goals before the telescope is put in space. Wherever possible the Public Telescope team will look to implement these features.

More value to science and research

With tools for monitoring ultraviolet light, the Public Telescope will provide an excellent complement to existing monitoring capacities for scientists. Using the Public Telescope scientists greatly enhance their capabilities to observe variable objects of different astronomical classes:

Novae, dwarf novae or supernovas.

Stars in their mass-loss episodes, hot and cool stars.

Active galactic nuclei, even analyzing their molecular chemistry.

Gas and dust production from comets.

These objects can be photographed over periods of hours to months and regular spectroscopic analysis can be done.

Technology

The Public Telescope will be equipped with an optically effective mirror with a diameter of 80 cm. Due to a special technology, the angular resolution will be in the optical spectrum of the theoretical limit of 0.15 arcseconds. Instruments for different spectral ranges, such as infrared (IR) and ultraviolet (UV) will also be included, allowing the recording of images, spectroscopy and photometry. Additional cameras will allow the transmission of images of Earth's surface.

"Every major invention for astronomy has rapidly spread among the many people interested in astronomy around the world," underlines Heiko Wilkens, founder and managing director of the project. "The realization of a space telescope for everyone is therefore only a question of 'when' and not 'whether' or 'why'. By using the Public Telescope—the first of its kind—a detailed view of the Universe is possible for all people. That's our vision. That's what we work for."

The planning and execution of *Project Public Telescope* is coordinated by an experienced team under the direction of the initiator Heiko Wilkens and Christian Wiederer. The project is also supported by renowned experts from science and technology, amongst others by ESA astronaut Gerhard Thiele, astrophysicists and university professors Dr. Hanns Ruder and Dr. Klaus Werner and the optics and telescope developer Harrie Rutten.

Comet ISON, imaged at Mt. Lemmon SkyCenter on 8 October 2013. Credit: Adam Block / Mount Lemmon SkyCenter / University of Arizona.