

Tasmania's new telescope

Tasmania is one of the best places to search for earthlike planets because of the solar system's, and therefore Earth's position on the rim of our own galaxy – the Milky Way. More than 10 times as many stars are visible from the Southern Hemisphere because the view from this hemisphere is towards the myriad stars of the galactic centre.

As well as the advantage of our southern latitude, our longitude, too, is significant. Placed as we are, approximately equidistant between South America to the east and South Africa to the west, we are in darkness when these continents are in daylight. Many astronomical studies require continuous monitoring of a star's light over several days and weeks

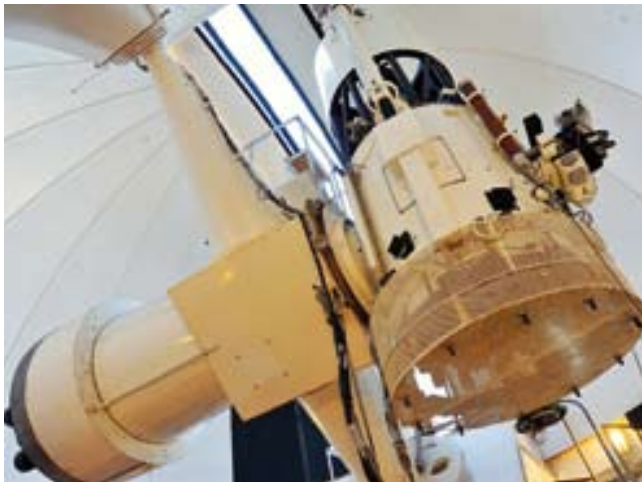
without the interruptions caused by the day-night cycle. For this type of work, observatories at different longitudes team up to follow the same star's light for many nights. (The Internet is used to send data to a central processing facility in Paris, enabling results from a worldwide network to be combined.)

When a new earthlike planet is discovered,
it may be discovered from Tasmania.

This new 'Earth' will not be in our solar system;
it will be orbiting another star, not our Sun

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PHOTOGRAPHS: Courtesy of the School of Mathematics and Physics, UTAS
and Shevill Mathers



ABOVE
One-metre telescope,
Mt Canopus Observatory

RIGHT
Twelve-inch telescope,
Southern Cross Observatory

OPPOSITE
Mt Canopus Observatory

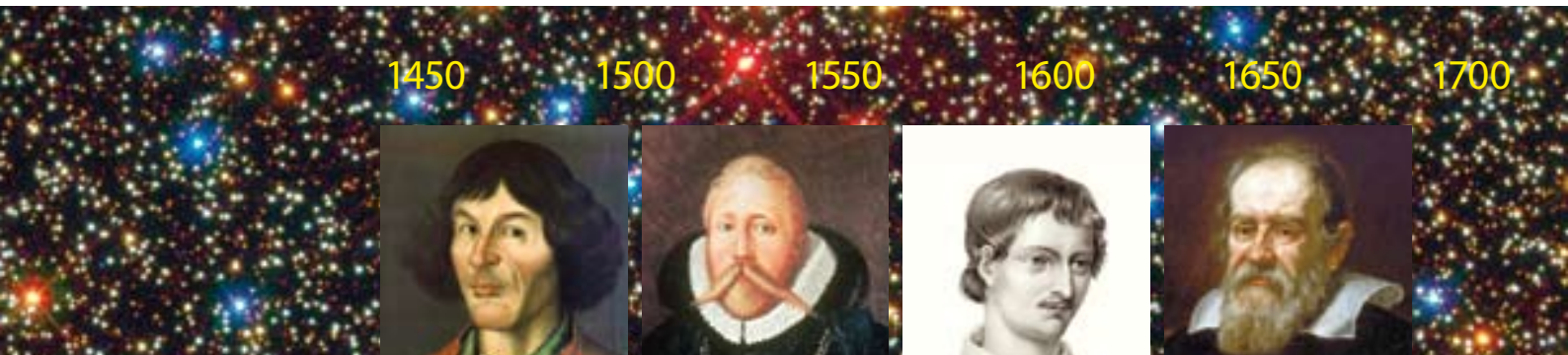
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Artist's impression of an
exoplanet



As technology has developed, more and more stars have been found to have planets. If a star has an orbiting planet, an effect called micro-lensing can enable this planet to be detected. (As famously predicted by Albert Einstein, the planet's gravity can cause a small deviation in the direction of the light beam, i.e. the planet's gravity acts as a 'lens'.)

Next year a new telescope will begin to search the Tasmanian sky for stars with planets, the ultimate goal being to locate one that resembles Earth. Distinguished astronomers from throughout the world will visit the state to take advantage of Tasmania's unique geographical position. An advanced guard of French scientists has already joined forces with UTAS astronomers.

Tasmania has for many years made a significant contribution to optical astronomy. Since its establishment in 1980 both professional and amateur astronomers have used the Mt Canopus Observatory, near Mt Rumney in southern Tasmania.



Astronomical timeline

Nicolaus Copernicus (1473–1543) asserted that the Earth was not the centre of the universe. A heliocentric universe was a fantastic concept for the time. (This replaced the Ptolemaic theory that the universe was a closed space bounded by a spherical envelope beyond which there was nothing.)

Tycho Brahe (1546–1601) was a Danish nobleman known for his precise and comprehensive observations. The precision of these observations proved that celestial objects were not eternally unchanging, but evolving over time like terrestrial objects.

Giordano Bruno (1548–1600) was famous for his doctrine of pluralism without restraint: 'Innumerable suns exist; innumerable Earths revolve about these suns ... living beings inhabit these worlds.' Bruno was burned at the stake by the church for his views.

Galileo Galilei (1564–1642) discovered the four large moons of Jupiter – the 'Galilean moons' that he called the 'Medici stars'. A supporter of the Copernican heliocentric universe, he was famously found guilty of heresy by the Catholic Church.

Over the last 10 years, Mt Canopus has participated in the detection of at least 13 new planets. Of these new planets some are as large as Jupiter, and some are less than twice the size of the Earth. Most significantly, among them was the first cool rocky planet located in a system similar to our own solar system.

Thirty years have elapsed since the Mt Canopus Observatory was established. Though it has given sterling service, the observatory is now compromised by the light pollution from increasing residential and commercial development in the Cambridge area. Consequently, a new telescope with a suitable location is required.

From 2005 to 2007 UTAS astronomers John Greenhill and Andrew Cole, aided by physicist Mike Emery, undertook site testing and compilation of satellite records of cloud cover to ascertain an appropriate location. Bisdee Tier, in the southern Midlands, was made available by the owner of the site, Rodney Jones.

Construction has already begun on the new installation, with many tradespeople and



Amateur astronomers have collaborated with the university ever since the Mt Canopus Observatory was established. The Astronomical Society of Tasmania holds open nights several times a year, offering lectures on astronomical subjects and opportunities to look at the night skies. This tradition will be continued as soon as the new observatory is ready.

Astronomical Society of Tasmania
www.ast.n3.net

1750 1800 1850 1900 1950 2000 2050



Johannes Kepler (1571–1630) is now remembered for discovering the three laws of planetary motion that bear his name. (While Kepler was at work on his *Harmony of the World*, his mother was charged with witchcraft.)



Friedrich Bessel (1784–1846), using the technique of parallax, measured the distance from Earth to the star 61 Cygni to be about 10.4 light years – very close to the actual value of about 11.4 light years – thus establishing that the universe was very much larger than previously thought.



Edwin Powell Hubble (1889–1953) made some of the most important discoveries in modern astronomy. His measurement of the distance to the Andromeda nebula showed that there were galaxies beyond our own Milky Way.



Aleksander Wolszczan (1946–) announced (with Dale Frail) in 1992 the discovery of planets around the pulsar, PSR 1257+12. This discovery is generally considered to be the first definitive detection of an extrasolar planet (or exoplanet).

In 2005 data from Mt Canopus Observatory contributed to the discovery of the first cool rocky planet outside the solar system. In the following five years a further dozen exoplanets have been discovered.



The Tasmanian optical astronomers

Andrew Cole

was born in suburban New York and received a degree in astronomy and physics from Yale University. He earned a PhD in astronomy in 1999. He has used telescopes around the world and in space. To pursue his research, and is a world leader in the field of evolution of nearby galaxies. He has been a lecturer at UTAS since 2007.

Michael Emery

retired from UTAS in 1997 after 34 years teaching physics and working with the X-ray astronomy balloon group. Since then he has contributed to observatory instrument development and made a major contribution to site selection for the new observatory.

John Greenhill

was awarded a PhD in physics in 1967 and was a research fellow at Imperial College, London, before appointment to the academic staff at UTAS in 1972. He retired in 1998 and is continuing astronomical research as an honorary fellow in the School of Mathematics and Physics. Since retirement he has managed the Mt Canopus Observatory.

Shevill Mathers

has been an enthusiastic amateur astronomer all his life. He has his own Southern Cross Observatory in Cambridge and is an honorary research associate in the School of Mathematics and Physics. His immense practical knowledge and skills have been and are invaluable to Tasmanian astronomy.

RIGHT
Artist's impression
of proposed
Bisdee Tier Optical
Observatory

OPPOSITE TOP
Sketch site plan of
proposed Bisdee
Tier Optical
Observatory


OPPOSITE BOTTOM
Artist's impression
of an earthlike
planet



contractors working on site development and new buildings, under the direction of the prime contractor, Fairbrothers (Hobart), and architects Philp Leighton (Launceston). The dome and telescope are being constructed in Canada and the US respectively and will be shipped to Tasmania when the building is ready later this year.

With a mirror diameter of 1.27 m the new telescope will provide 56% more collecting area than the Canopus telescope. When connected to the spectrograph, the mirror and its associated optics will allow light from the stars to be separated by wavelength, and therefore to determine what elements are present and in what concentrations. With these tools the Bisdee Tier Observatory will be capable of sophisticated astronomical research in a wide variety of fields, ranging from finding new planets to studying the oldest populations of stars.

By early 2011, the new observatory will be in operation. The first international visiting scientists will be a commissioning team from the Institut d'Astrophysique in Paris.

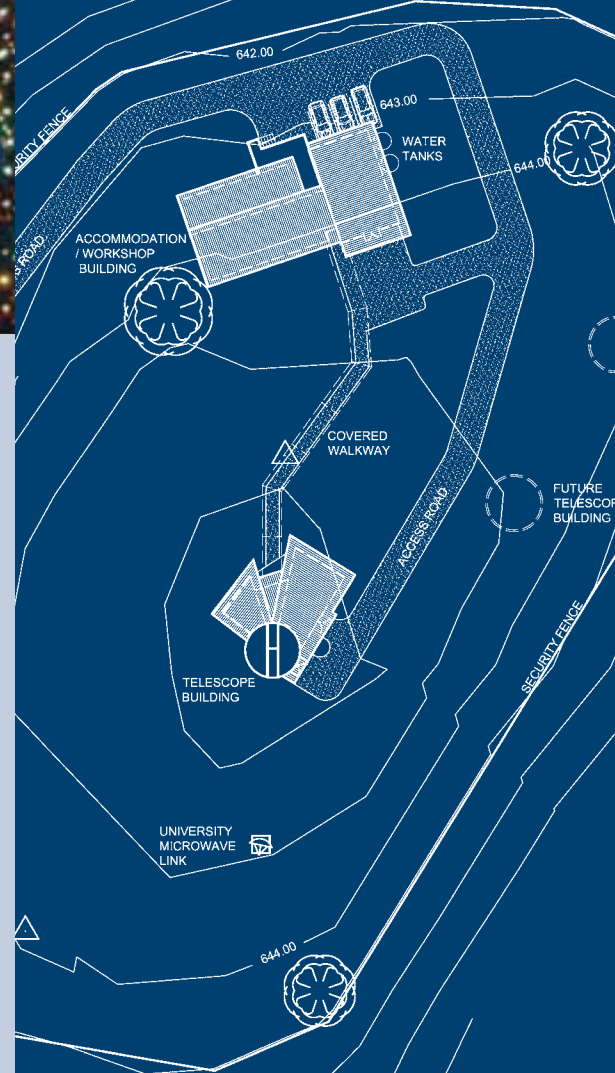
The new telescope will be a tremendous asset, giving young Tasmanians a world-class facility to use for their training and attracting fine young scientists from overseas. 



Tony Sprent graduated from the University of Queensland in 1971. He completed a PhD in physics at UTAS. During his studies he became involved in X-ray astronomy. He retired in 2004 but has continued his association with the School of Mathematics and Physics as a visiting fellow and is closely involved with the new Bisdee Tier Observatory.

Dave Warren graduated from UTAS with BSc (Hons). His postgraduate studies included cosmic ray and X-ray astronomy and medical research in physiology. In 2008 David was admitted to the degree of Doctor of Science Honoris Causa for his work in support of physics and mathematics at UTAS. He is active in management and finance for astronomy at UTAS.

Mike Waterworth is a graduate of UTAS, and has a PhD from Imperial College, University of London. Michael was a lecturer and then reader in physics at UTAS between 1967 and 1988. The optical components of the 1m Mt Canopus telescope were designed and completed by the optics group at UTAS led by him.



Can you help?

The Bisdee Tier Observatory is a community project. The generosity of so many people thus far has been heartwarming to everyone working on the project. This project depends very much on the support of benefactors. The telescope has been donated by a British supporter, and a camera, worth \$1 million, has been donated by the University of Warsaw, Poland. ANU has provided a \$1.6 million spectrograph. The project could not have been commenced without contributions from generous, enthusiastic Tasmanians who have given both their time and their money. To complete the observatory and begin operations an additional \$2 million will need to be raised.

If you would like to make a donation to the Optical Astronomy Observatory, contact the University of Tasmania Foundation on (03) 6226 1920 or donate on line at:

www.utas.edu.au/foundation/observatory-appeal

