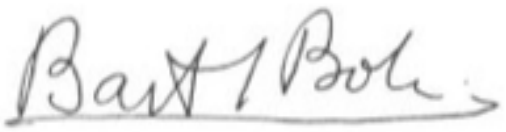
Bart Bok

The man who sold the Milky Way

Mike Bessell



Acknowledgements

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Bart J. Bok 1906 - 1983

- Bart and Priscilla Bok arrived in Australia on 3 March 1957 to take up the position as Director of the Mt Stromlo Observatory. Nine years later when he left to take up the Directorship of Steward Observatory in Arizona, he had personally moved optical astronomy to centre stage, not only at universities, but also with the general public. An indefatigable public lecturer and populist, Bart travelled Australia, including regional centres giving illustrated public talks on the wonders of his beautiful Milky Way. He endlessly lectured politicians to support astronomy and pushed Australia to become a leader in southern hemisphere astronomy. To locate the best optical observing site in SE Australia he initiated a site-testing program that resulted in Siding Spring mountain at Coonabarabran being established and eventually becoming the premier observatory site that it is. He realised the great benefits of combined optical and radio astronomy research and did all he could to encourage close cooperation between the well established radio astronomy community in Sydney and the growing optical community at Mt Stromlo Observatory in Canberra. He was the right person at the right time in the right place and left a legacy in Australia, and in particular at Siding Spring mountain that continues to grow and inspire.

Timeline

- Born in Hoorn Holland, schooled at The Hague graduating in 1924.
- 1924 - 1927 Sterrewacht Leiden undergraduate
- 1927 - 1929 Kapteyn Laboratory, Groningen postgraduate
- 1928 - IAU General Assembly in Leiden
- 1929 - marries Priscilla Fairfield in Boston
- 1929 - 1957 Harvard College Observatory
- 1957 - 1966 Mt Stromlo Observatory, Canberra
- 1966 - 1970 Steward Observatory Arizona
- 1975 - death of Priscilla Fairfield Bok
- 1977 - Bruce Medal, Selby Fellowship Australian Academy of Science
- 1983 - death of Bart Bok

Priscilla Fairfield Bok

Priscilla in 1928

Bart in 1934

Bart's marriage to Priscilla was undoubtedly the most important event of his life.

She was an established astronomer 10 years his senior when they met in 1928.

They were an inseparable and openly loving couple who achieved a rare symbiosis in life and work. He was boisterous and unrestrained. She was quiet, introspective and sensitive to others. Bart greatly valued her judgment and support.

Highlights of Harvard years

- PhD on “A study of the Eta Carina region” dealing with the physics of the emission nebulae.
- Nature paper 1934 on the stability of stellar clusters
- With Shapley showed there was a widespread clustering of faint galaxies contrary to Hubble’s view.
- Became a lively and conscientious lecturer.
- Assertive involvement with astro-politics
- Wrote “Distribution of stars in Space” 1937 great interest in spiral structure
- Refereed Grote Reber’s 1940 paper on radio waves from the Milky Way
- “Sky and Telescope” founded at Harvard 1941

Highlights of Harvard years

- Publication in 1941 of “The Milky Way” with Priscilla
- Helped setup Tonantzintla Observatory in Mexico 1941
- Studied and taught navigation to military personnel 1943
- Worked with UNESCO
- 1950 Boyden station South Africa installed Baker-Nunn camera; observed Carina and Magellanic Cloud
- 1951 radio 21 cm line of hydrogen discovered
- 1953 raised money for Aggasiz radio telescopes
- 1955 fall out with Harvard colleagues over support for Shapley and continuing interest in Milky Way research

The Mount Stromlo Years

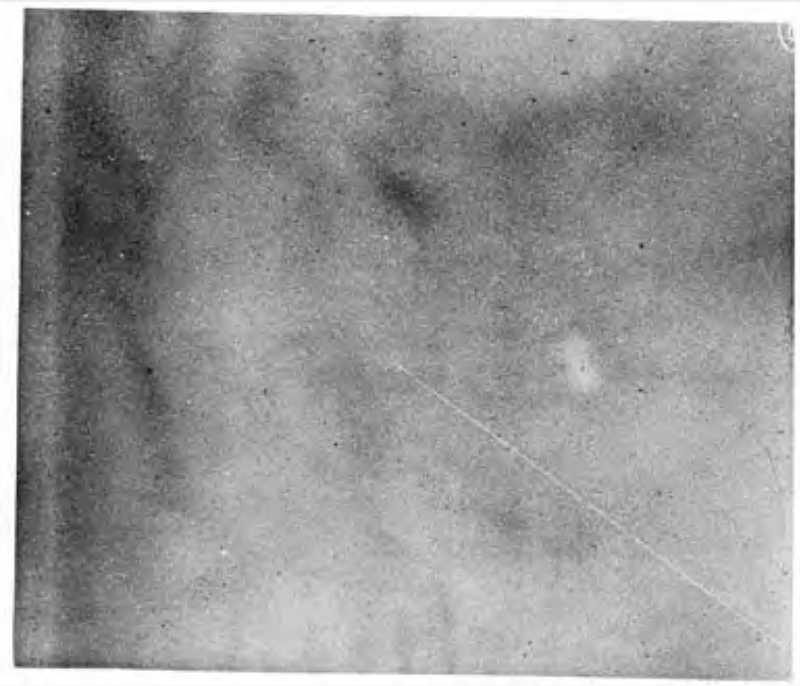
Bart and Priscilla at Stromlo. Circa 1960.

- Woolley left Australia at the end of 1955 and after 10 years of negotiations the Mount Stromlo Observatory was transferred to the ANU in 1957.
- Bok visited Mt Stromlo in 1956 for discussions with ANU and Stromlo staff on his plans for the future.
- Bok's appointment was strongly supported by Joe Pawsey head of CSIRO Radiophysics in Sydney.
- Upon arrival in 1957 the Boks set about making Mt Stromlo a Harvard in the South.

Student recruitment - public outreach

- Bok was keen to have a strong graduate program like the one at Harvard University so set about attracting students and gaining public and political support for his plans for continuing and expanding optical astronomy in Australia.
- Summer Vacation Scholarships
- Monthly visitor nights at Mt Stromlo
- High school, rotary, public lectures - particularly country area
- Meetings with Senators, House of Representatives members
- Meetings with Prime Minister Menzies
- Visits to State Universities and high schools
- Generous promoter of physics and astronomy elsewhere in Australia

Pictures from the Uppsala Schmidt



1957 the first Sputnik photograph that Bok showed the Parliament

Bok's image of Eta Carina that enthralled people at his lectures

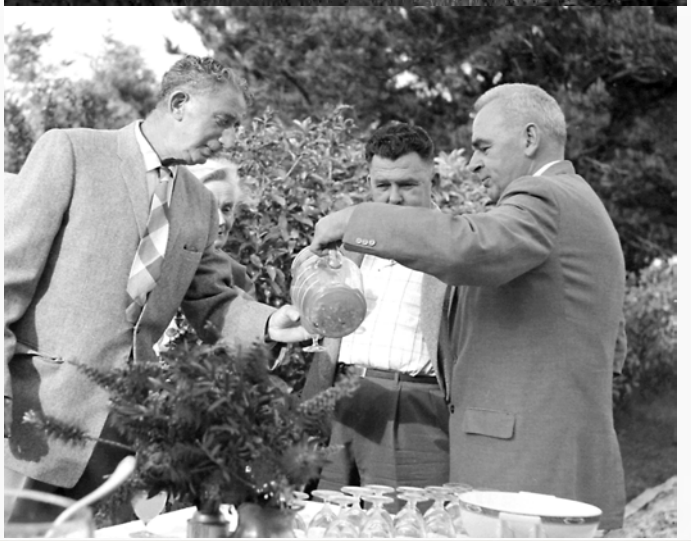
Mt Stromlo

1962 Summer Students Mt Stromlo

1961 Stromlo academic staff

Stromlo in the 60's

Christmas party at the Boks



Raising the profile of astronomy

Bok at ANU ceremony to award honorary degrees to Oort, Woolley and Ambartsumian.

Prime Minister Robert Menzies at opening of John Curtin School. Bok's meetings and relationship with Menzies pivotal in obtaining the AAT.

International and Australian conferences

IAU-URSI Symposium no 20 1963

Joint Stromlo-Radiophysics conference 1965

Bok was determined that the strong radio-astronomy community in Australia and the optical community should work collaboratively together and organised joint meetings as well as joint lecture series and supervision of PhD students.

Site testing

The rapid growth of Canberra threatened dark-sky research and Bok promoted a number of site surveys around Australia eventually settling on Siding Spring. Bok personally was in favour of Mt Bingar near Griffith but quickly came to love Coonabarabran and its clear, dark skies.

Mt Bingar

The first field station was at Mt Bingar, near Griffith.

Bok spent much time there doing photoelectric observations of southern star clusters and made friends with the local wine-growing families.

Siding Spring Observatory commences

The 40 inch and 16 inch telescopes were the first built at SSO.

The 40 inch housed a new Boller & Chivens telescope with wide-field photographic corrector for the f/8 secondary and photoelectric photometers for the f/18 secondary.

SSO the beginning

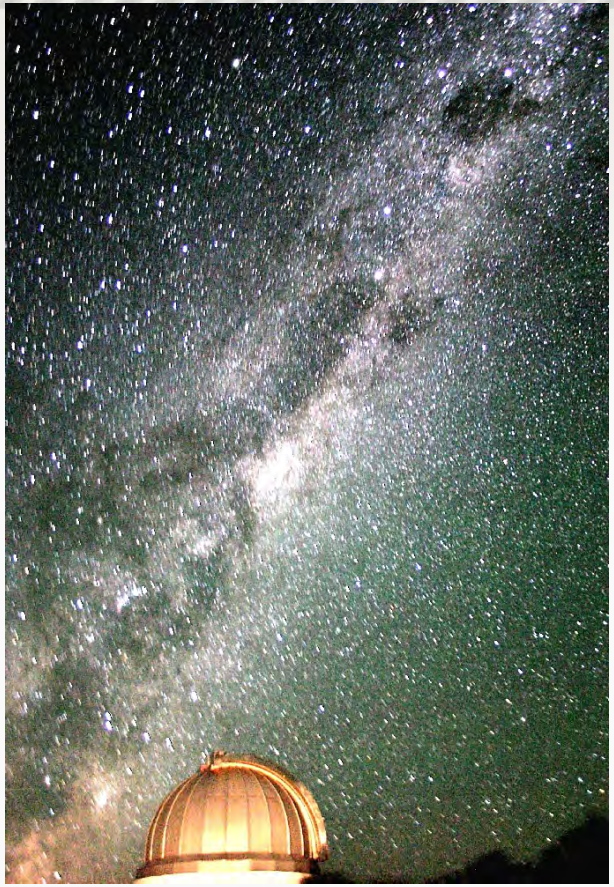
For the first few years before the lodge was built, observers lived in the 40 inch with its beautiful views to the north and east.

When Coona had a scheduled air service

In the early days Coonabarabran airport was well serviced by scheduled airlines.

The Boks with daughter Joyce, grand-daughter Jeanne and Harlow Shapley.

SSO night skies



Thank you for Coonabarabran's dark, awe inspiring skies!

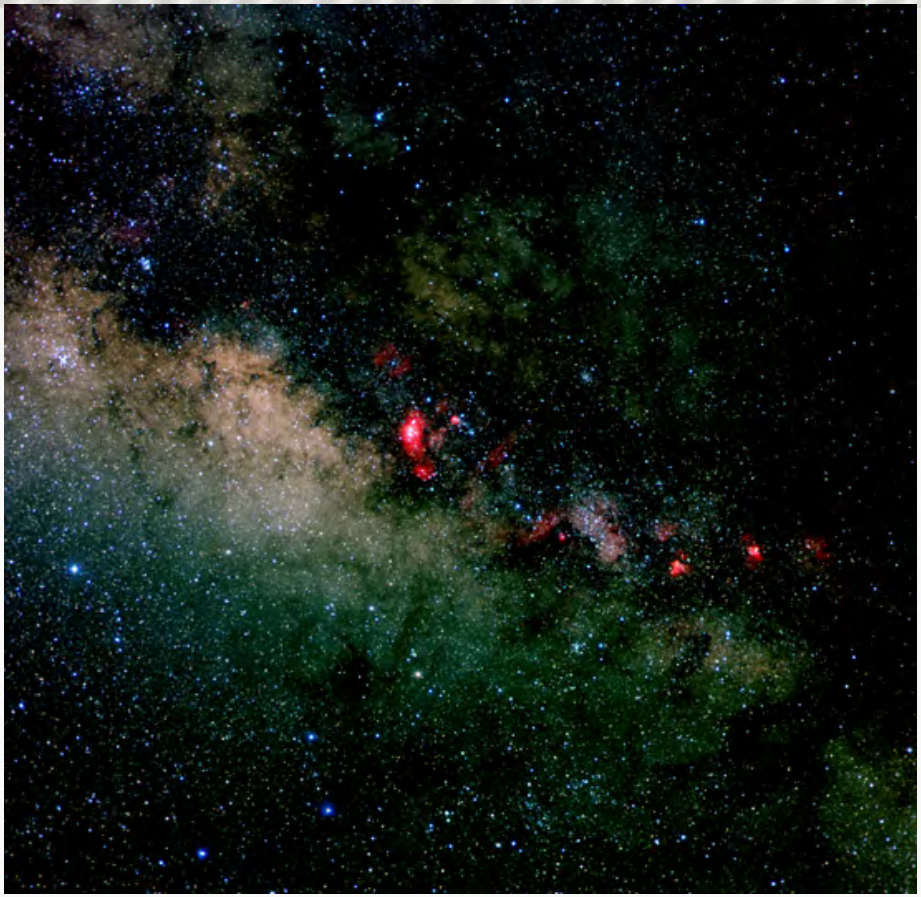
Other SSO attractions

SSO hosts many spectacular thunderstorms of a summer evening.

Exiled from Coonabarabran.

The Milky Way and spiral structure

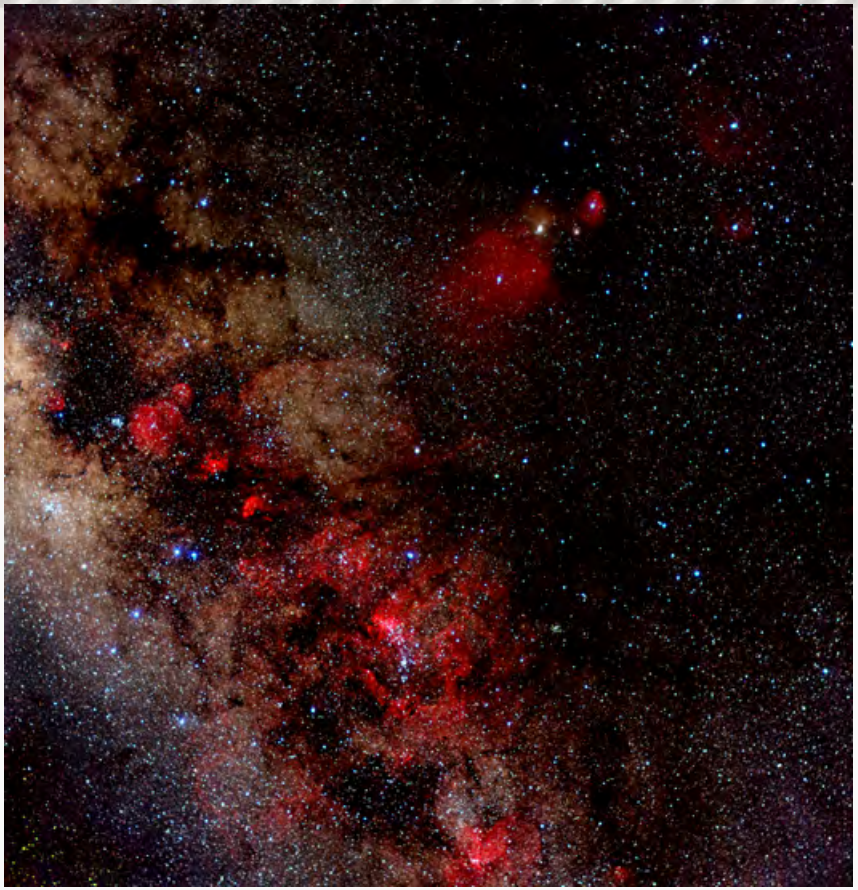
NGC 2997 a galaxy a little like our own



Sag-Oph region of the galaxy

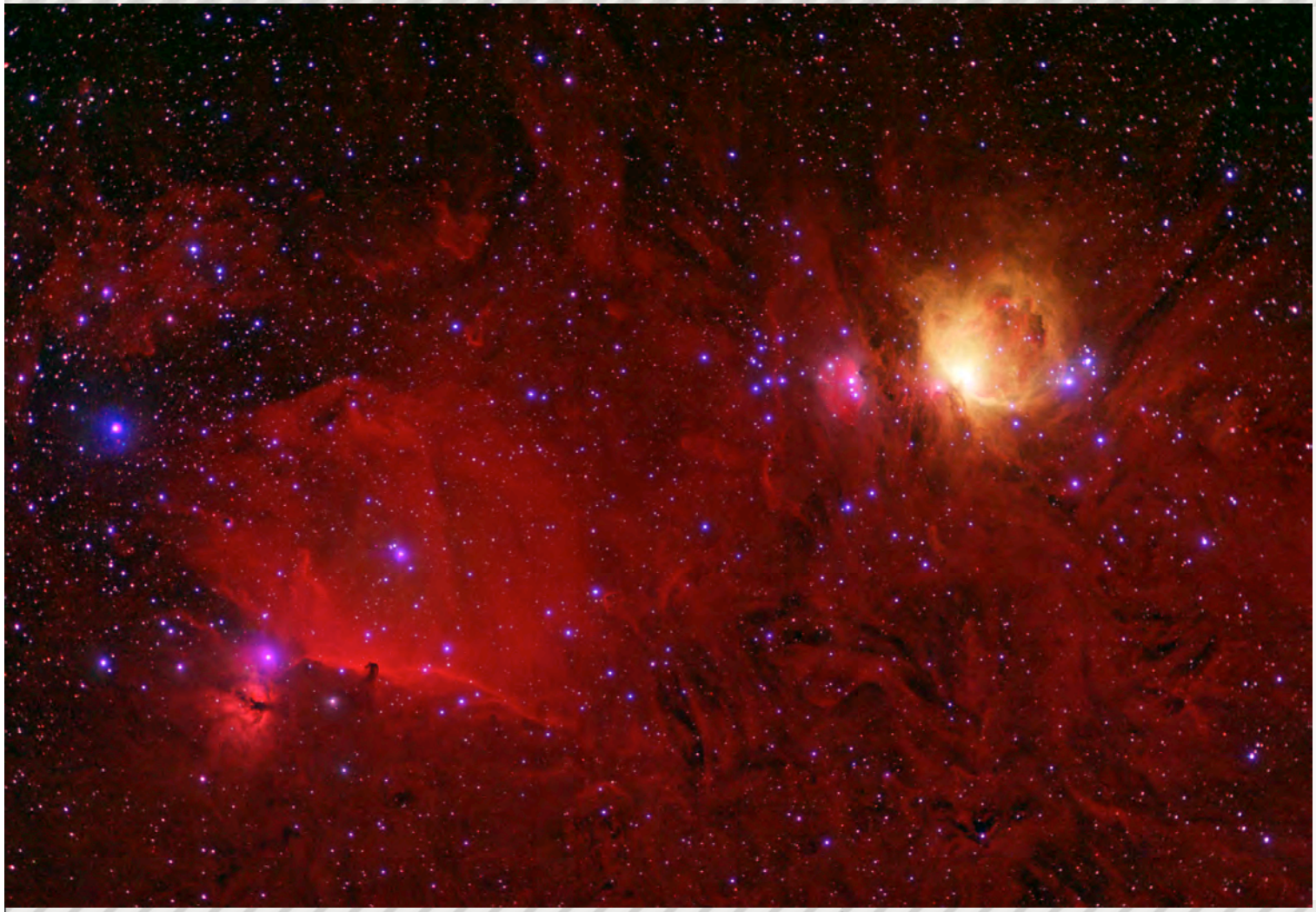
Southern Sky wonders

Eta Carina, Bok's favourite



Scorpius and the Milky Way

The Orion Nebula



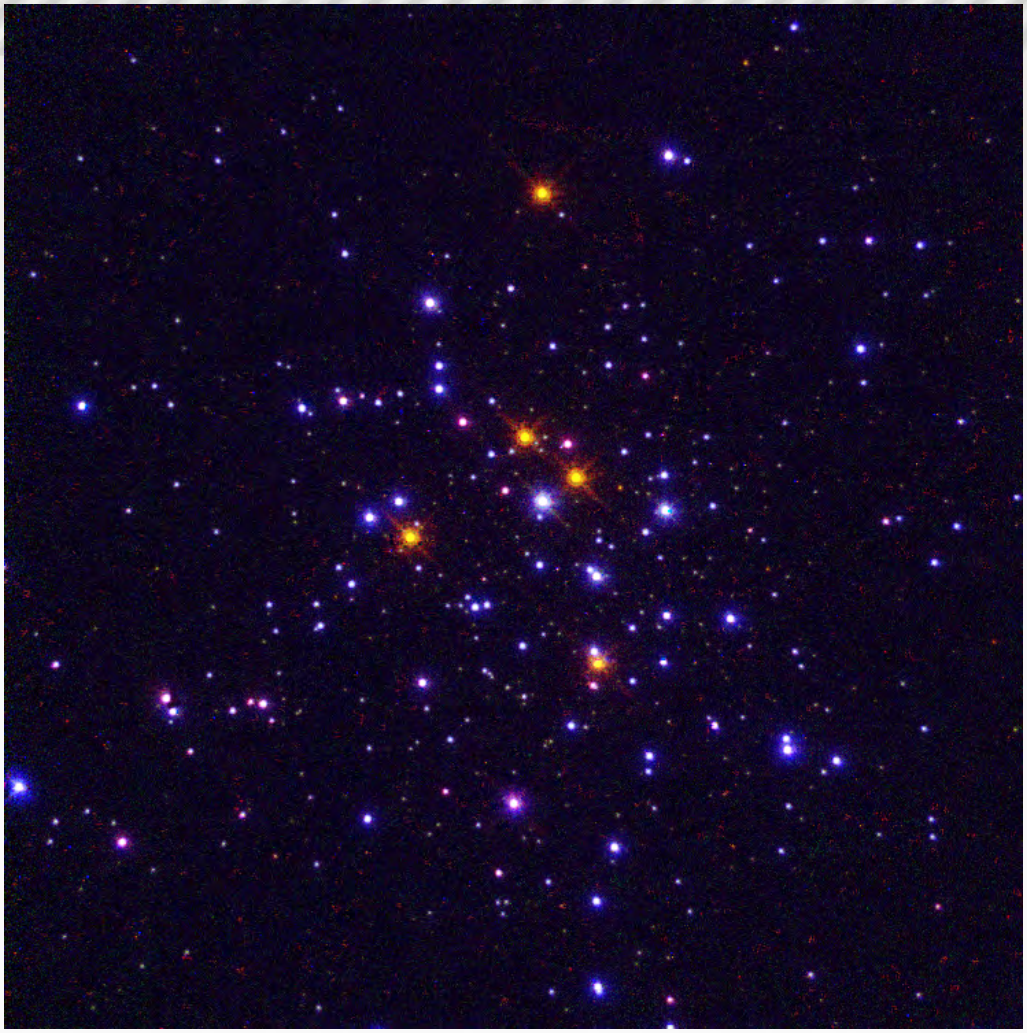
Orion, one of the most beautiful obects in the sky was off limits to MSO students because it was visible from the north.

The Magellanic Clouds

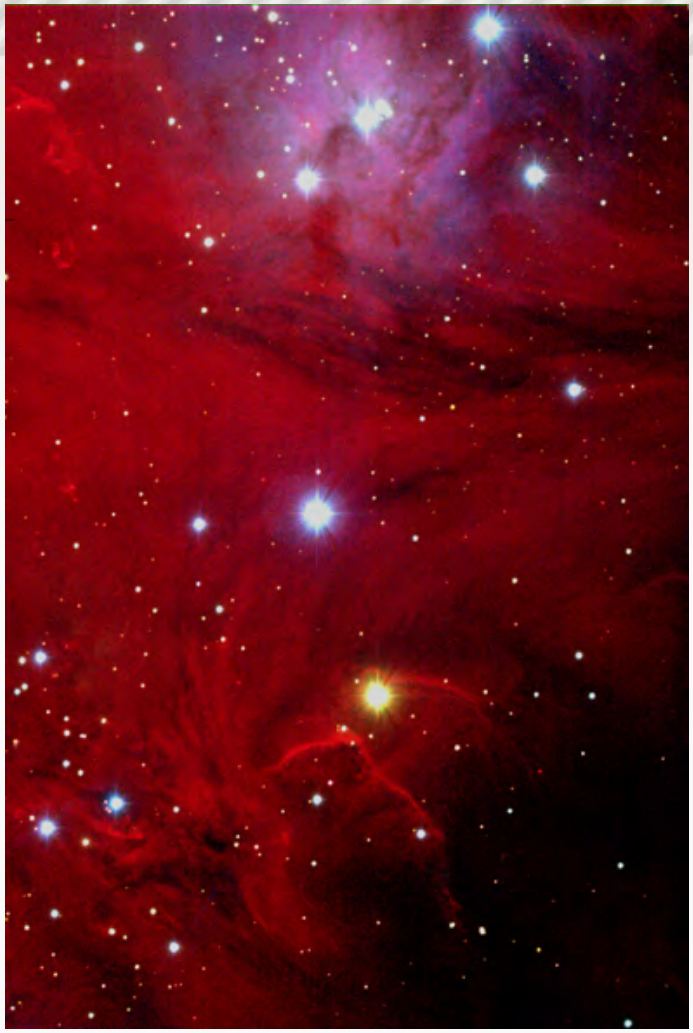
Star clusters

The Boks worked on the nature of the southern clusters like the Jewel Box (left) and NGC3603 (right) one of the youngest and most massive clusters in the Milky Way.

Star clusters



HST image of NGC2004 in the LMC.



NGC 2264, star forming region

The push for a large international telescope

Bart Bok was a very effective communicator with politicians and the public. He cultivated a relationship with the Prime Minister Robert Menzies as close as the PM ever allowed. He also had great support from Mark Oliphant at the ANU.

The earliest open nights were for invited guests, University Council, Members of Paliament, Government Departments, Diplomatic Corps and their families.

After the first Sputnik 1 picture was taken with Uppsala Schmidt at Stromlo, Bok was invited to talk to both Houses of Parliament about it. This contact was extremely successful, making friends of many parliamentarians and gaining him a reputation as a salesman for astronomy.

Bok made a series of ten widely seen 30 min TV programs on astronomy for the ABC, further increasing his fame and generating support for astronomy in Australia.

Bok pressed Menzies with the value of a large telescope at a good dark site, a proposal initiated by Woolley in 1953. As a result Menzies funded the site testing effort and advised Bok to submit a proposal for a large telescope to the newly formed Australian Academy of Science.

The push for a large international telescope

The Academy responded and suggested a delay of 2 to 3 years while they considered proposals for scientific collaborations in all areas of science, infuriating Bok.

By 1963 Menzies was showing a renewed interest in the proposal and submitted a bill to Parliament enabling the ANU to own land outside the ACT to undertake astronomical observations.

The bill attracted great support from both sides with great praise being expressed for the world leading Parkes radio-telescope that had been recently commissioned.

By June 1965 the Academy agreed to support the proposal for a 150 inch telescope and submitted a joint proposal with the Royal Society to the Australian and British Governments.

Bok was extremely disappointed with the delays with the telescope funding but before he left for Tucson in 1966 was consoled by Menzies: “These things take time”.

The AAT finally was approved in 1967 and at the telescope’s dedication in 1974, Fred Hoyle gave Bok full credit for having been the initiator of the whole project.

The Anglo Australian Telescope

1970 AAT pegged.

Construction under way mid1972.

Australia's prime optical astronomy site

Bok's vision for Siding Spring fulfilled.

AAT and UK Schmidt telescope (left)

AAT 3.9m telescope (right)

1966-1983

Bart and Priscilla returned to the USA in 1966 to head the Steward Observatory in Arizona.

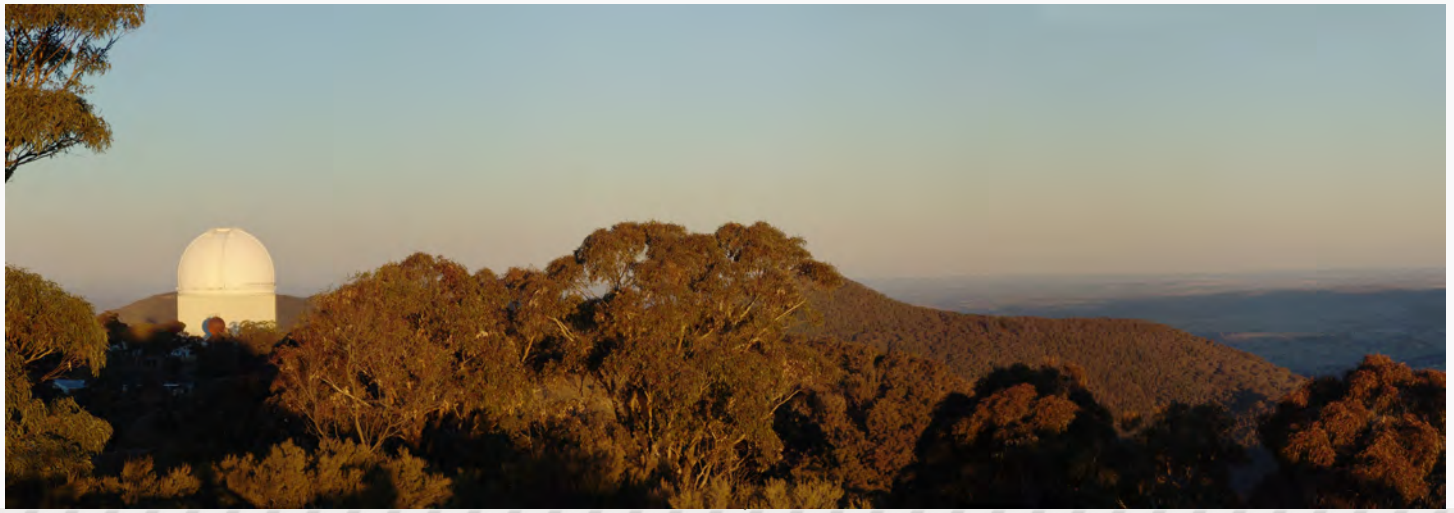
He was very instrumental in facilitating the construction of the 90 inch telescope at Kitt Peak.

Bok oversaw a doubling of the staff and growth in graduate student program until by 1970 it was ranked 5th in the USA.

Bart Bok resigned from directorship of Steward in 1970 but maintained an active involvement in research and astronomical politics until 1974 when he became Priscilla's full time carer. She died in November 1975.

He became involved in astronomy again in late 1976, travelled widely lecturing, observed in Chile, received several prestigious awards. He died suddenly in 1983 just before his scheduled departure for the IAU Symposium on the Magellanic Clouds in Germany.

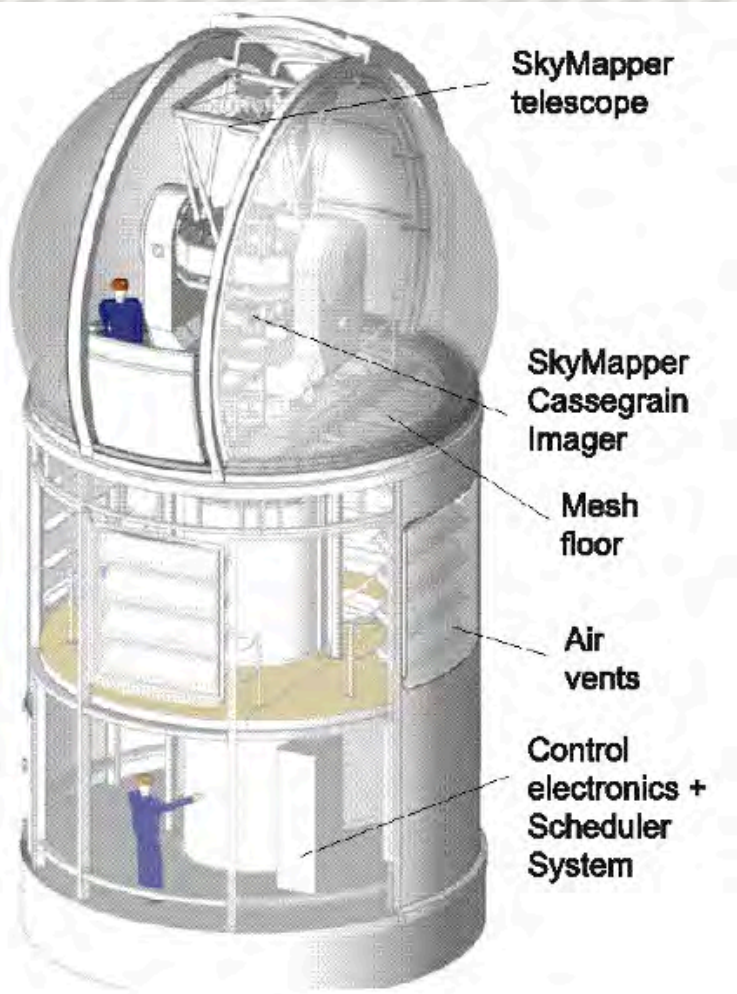
A clear night beckons



New telescopes for SSO

SSO hosts several new survey telescopes that will search the sky for supernovae, gravitational lensing and extra-solar planets.

The SkyMapper Telescope



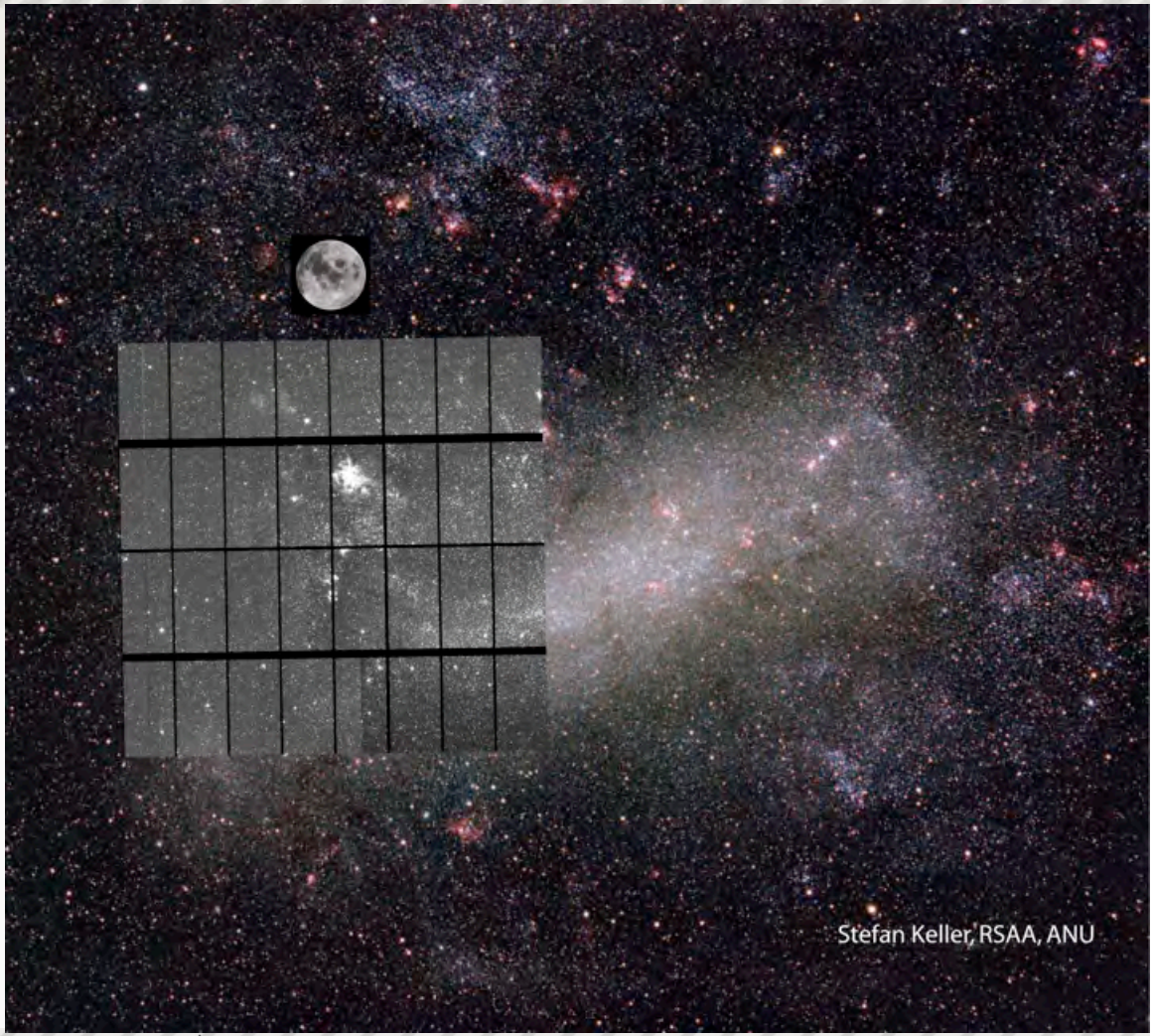
Project led by Nobel Laureate Brian Schmidt

- 1.35m telescope with a 5.7 sq. degree field of view
- Fully autonomous observing
- To conduct the Southern Sky Survey:
  - Five year
  - Multi-colour (6 filters)
  - Multi-epoch (6 exposures, each filter)
  - Hα filter also available

SkyMapper field of view

Some Scientific Programs

- What is the distribution of large Solar-System objects beyond Neptune?
- What is the history of the youngest stars in the Solar neighborhood?
- How far does the dark matter halo of our galaxy extend and what is its shape?
- Gravity and metallicity for on the order of 100 million stars ⇒ the assembly and chemical enrichment history of the bulge, thin/thick disk and halo?
- Extremely metal poor stars.
- Undiscovered members of the local group – Sculptor,Cen too…
- Accurate photometric calibration of the galaxy redshift surveys: 2dF/6dF.
- bright z>6 QSOs ⇒ probes of the ionization history of the Universe.
- Light curves of super-novae

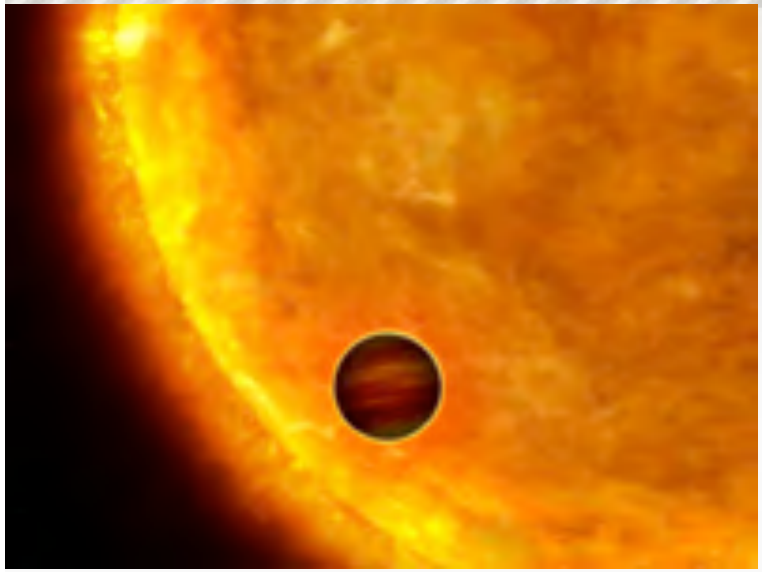


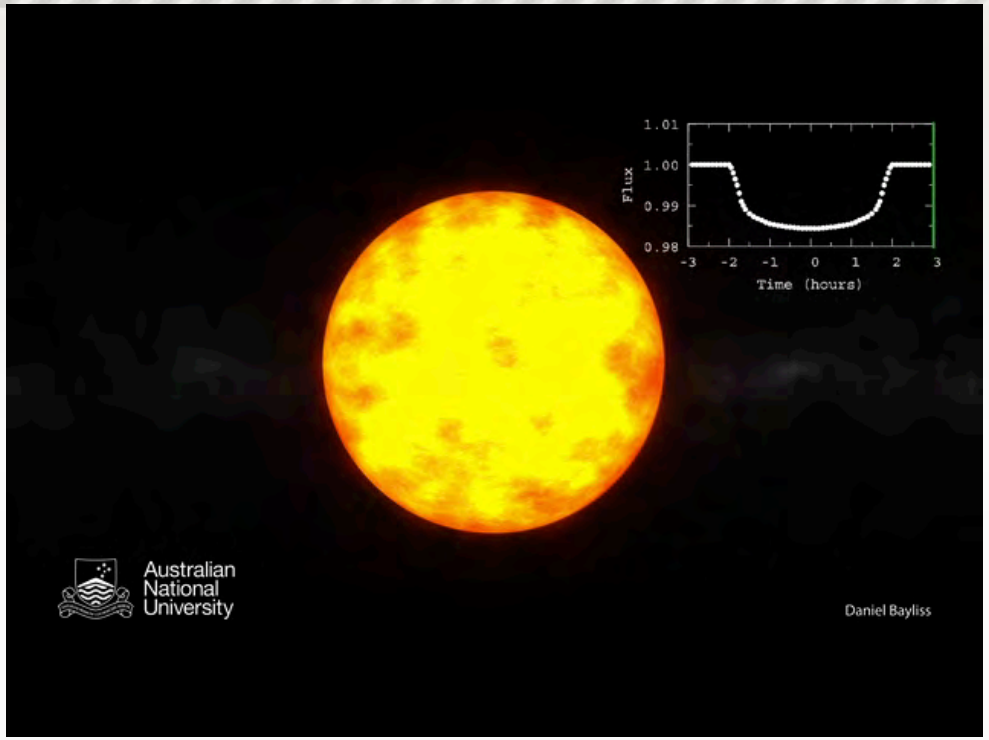
HAT-South Telescope

The HAT-South project is a collaboration between the Australia National University (ANU), the Harvard/Smithsonian Center for Astrophysics (CfA), and the Max Planck Institute for Astronomy (MPIA). Each site hosts two "TH4" units comprising four 0.18m Takahashi astrographs fitted with Apogee 4Kx4K CCDs. Each TH4 unit monitors 64 square degrees of sky at a time, so each site is capable of monitoring 128 square degrees of sky.

The HAT-South telescopes are located on three sites around the Southern Hemisphere: at Siding Spring Observatory (Australia), Las Campanas Observatory (Chile), and the Hess Site (Namibia). These locations allow fields to be monitored 24 hours per day, which greatly increase the rate at which planets can be discovered.

A search for hot Jupiters





HAT-South is a project to search for transiting extrasolar planets in the Southern Hemisphere. It uses a network of wide-field telescopes to monitor hundreds of thousands of bright stars, searching for the characteristic dip in light that occurs when a planet passes in front of its host star. With follow-up observations, the planets discovered in this project will be studied extensively to determine their density, temperature, and even atmospheric composition.

Solaris telescope

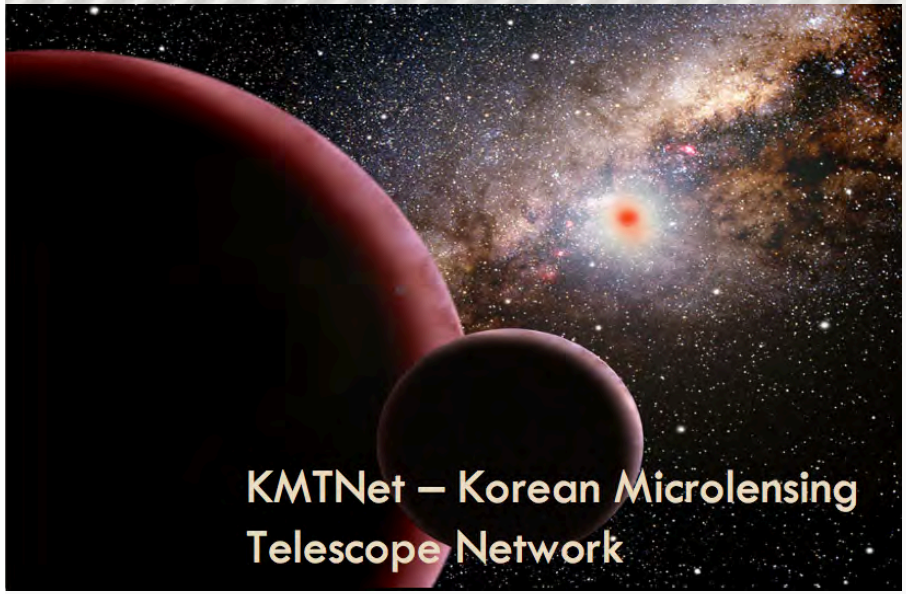
To detect circum-binary planets around a sample of up to 350 eclipsing binary stars using eclipse timing and precision radial velocities.

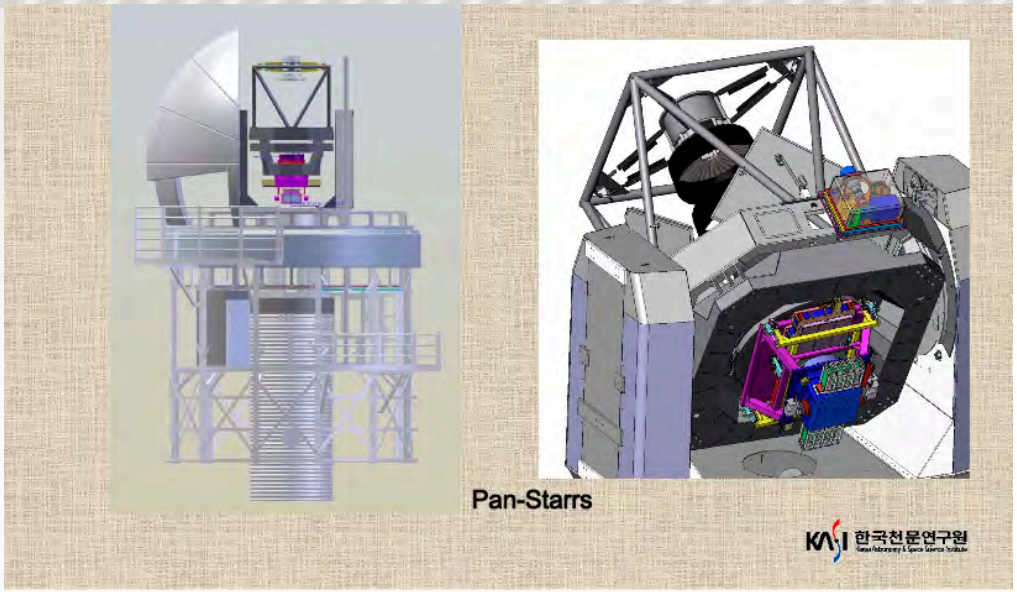
To characterize the binary stars with an unprecedented precision to test the stellar structure and evolution models.

The Solaris project (Poland) will establish a global network of four 0.5-meter robotic telescopes (Australia, Africa, South America) to collect high precision, high cadence light curves of the binaries.

The advances in remote and robotic operation are made possible by the advent of high speed internet connectivity across Australia and around the world.

Korean Microlensing telescope



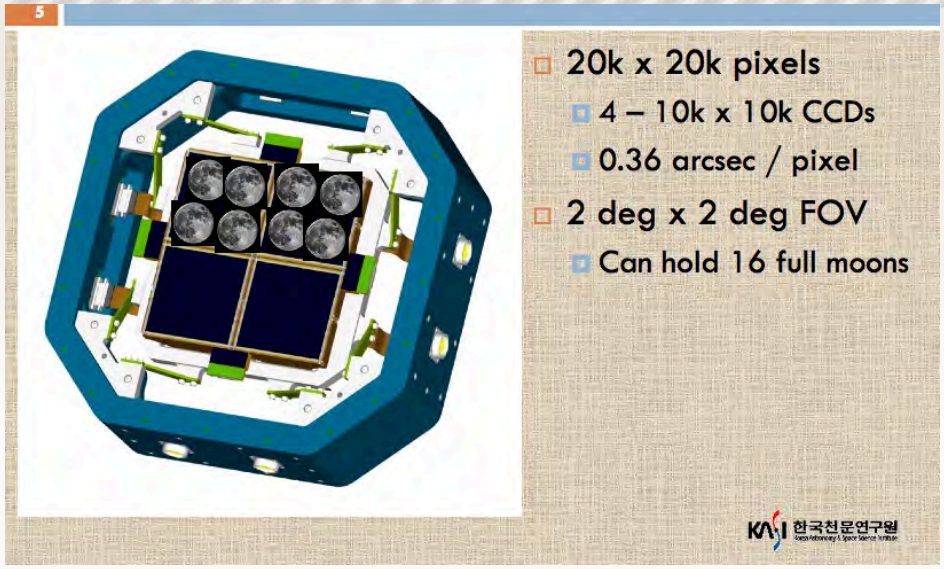


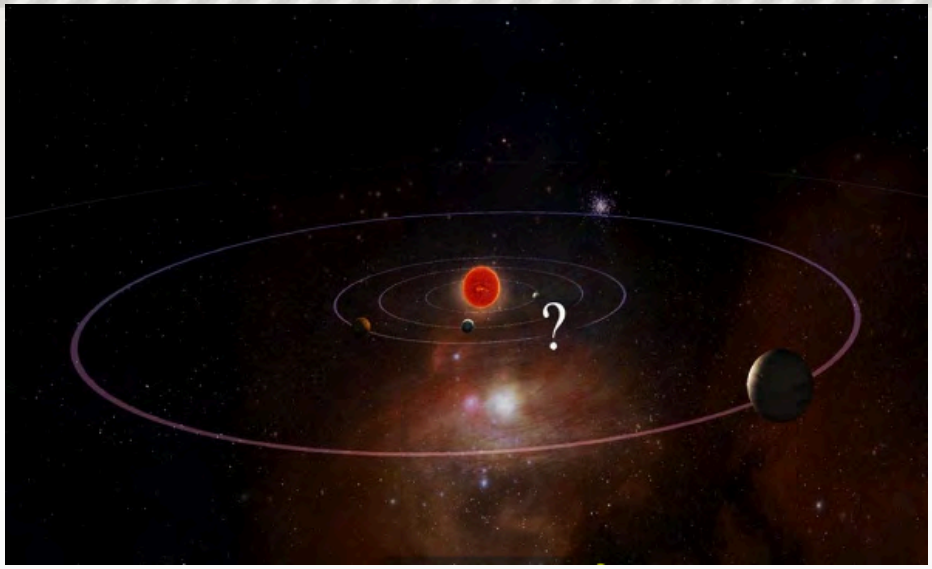
Aim of the project

Discover the first Earth-mass exoplanet. A huge number of exoplanets in wide mass range can be detected by microlensing.

A huge number of variable stars can be detected and studied (e.g. OGLE)

Korean Project to detect Earth size planets





Large Aperture : 1.6m diameter

Wide observing field : 4 degree x 4 degree
More frequent observation : 1 exposure /10 min

24-hour coverage : 3 telescopes in 3 continents
Australia, South Africa and Chile

No more Alert & Follow-up observations

Higher detection rate for microlensing events due to larger field & short interval observation

More sensitive to small and short anomalies in light curve due to low-mass planets

Existing and Prospective SSO telescopes

Current
Australian Astronomy Observatory - 3.9m, UK Schmidt
Australian National University- 2.3m, SkyMapper
HAT-South - 4 x 18cm - extra-solar planetary transits
Las Cumbres Obs Global Network - previously FAULKES - Universities and schools
University of Arizona - NEO survey
Korean Yonsei University - YSTARR
University of NSW - APT Baker-Nunn camera

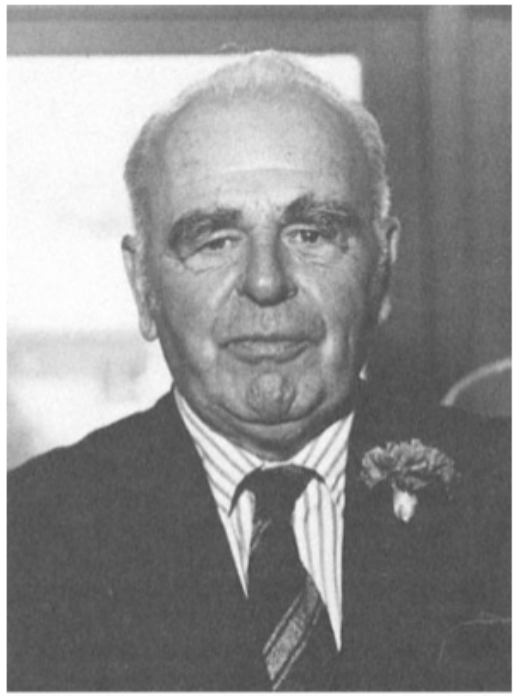
Underway
Nicolaus Copernicus Astronomical Centre - SOLARIS 0.5m
ITELESCOPE Net P/L - “rentascope”
University of North Carolina - PROMPT

Proposed
Korean Astronomy & Space Science Institute -1.6m, microlensing
Tzec Maun Foundation - student internet observing - 4”, 6”, 7”

Possible
SLOOH -

Astronomishes Institute Switzerland - satellite tracking
University of North Carolina - 24”

Bart J. Bok 1906 - 1983



Bart Bok was the right person, at the right time, in the right place and left a legacy in Australia, and in particular at Siding Spring Observatory, that continues to grow and inspire further generations through an understanding and appreciation of astronomy and scientific and technological enquiry.