The keynote Speaker is Prof. John Storey from the University of NSW talking about astronomy on the Antarctic Plateau. A place that offers some unique opportunities for science but it is a harsh place to live during the winter when the sky is dark.

Interest in Antarctic astronomy has blossomed over the past few years, particularly with the opening of Concordia Station in 2005 by France and Italy, the construction of Kunlun Station by China, and the decision by Japan to re-open Dome Fuji.

These new stations, all on the high Antarctic plateau, join the US Amundsen-Scott station as potentially outstanding sites for astronomical research. The Antarctic plateau is of course intensely cold and extremely dry, characteristics that are good for infrared and submillimetre astronomy but not so good for humans.

In this talk Professor Storey will describe recent successes in Antarctica, and the ambitious plans for future facilities.

There will be a door prize of a hamper. The draw will be made using your ticket.

An 8" ASTRONZ Dobsonian telescope will be auctioned starting with a reserve of just $1.00. A potential bargain for a lucky bidder.

Instructions for last minute registration can be found inside.
Dr Melanie Johnston-Hollitt spoke to the society at the October meeting about her research on the Horologium supercluster of galaxies, an area of the sky that is of particular interest to us because they are part of the southern constellations. Melanie has particular expertise in radio astronomy and she is the chairperson of the New Zealand Square Kilometre Array Research and Development Consortium (SKARD). Her research into the Horologium supercluster takes a multi wavelength approach using visual observations and x-ray data available from satellite observatories as well as radio frequency observations.

When the large scale structure of the Universe is examined mass density clumps in the form of slender filament like structures joined at nodes are observed. In the nodes reside galaxy clusters that typically consist of a giant elliptical central galaxy and anywhere from tens to hundreds of partner galaxies.

As with most astronomical phenomena multi wavelength observations are necessary to understand all aspects of the properties of these clusters. There is for instance insufficient mass observed in optical observations to explain how the clusters remain gravitationally bound!

One additional source of mass is seen in X-ray observations that reveal the presence of an extremely hot ionized gas plasma pervading the cluster. When accounted for this additional mass still falls far short of that required to keep the cluster gravitationally bound, leading to the hypothesis that Dark Matter constituting some 85 to 90% of the total mass of the cluster must be present.

Galaxy clusters are dynamic objects that have continuously evolved over time. Radio observations, mostly of Synchrotron emission (caused by the motion of highly energetic charged particles moving in magnetic fields) have proved to be particularly useful for tracing this evolution. Shockwaves, attributed to galaxy mergers, are observed moving through the inter-cluster plasma and are believed to be responsible for a number of different phenomena. The spectacular jets ejected by AGN (Active Galactic Nuclei) are readily seen in radio observations. It is believed that these jets can be switched off by the stripping of gas that occurs during mergers. The bursts of star formation observed in some galaxies are also attributed to these shockwaves. The study of the relative distributions of AGN and Star Forming regions in a cluster make a useful tool for tracing the passage of these shockwaves and gives vital clues as to the cluster's history and evolution. Other phenomena that speak of the workings of clusters include the intriguingly named “Head Tail” galaxies. These are AGN whose jets are severely bent over by a strong wind of particles moving through the plasma medium.

At present Star Forming regions are best probed by extremely expensive X-ray telescopes aboard satellites outside the Earth’s atmosphere. Eagerly anticipated developments such as the proposed Square Kilometre Array (SKA) radio telescope will bring about an improvement in sensitivity of 100 times that currently available and hold out the exciting prospect that a fuller understanding of the details of cluster evolution will be available from, relatively inexpensive, ground based radio observations.

The Horologium Supercluster (also known as Horologium-Reticulum Supercluster) is a massive supercluster, about 550 million light-
years across and has a mass of $10^{17}$ solar masses. The nearest part of the supercluster is 700 million light-years ($z=0.063$) away from us but the far end of it is 1.2 billion light-years in the constellations Horologium and Eridanus. The Horologium supercluster has about 5,000 galaxy groups (30,000 giant galaxies and 300,000 dwarf galaxies). It includes the cluster Abell 3266.

The Society Monthly meeting on Monday, 9th November will feature Professor John Storey talking about radio telescopes around the world - where they are located, why they are in those locations and why they look the way they do.

Prof. Miller Goss will complement the presentations on Radio Astronomy with a special lecture on early Radio Astronomy in New Zealand. That will be on Monday, 16th November at 8:00pm. See details below.

Antarctica - what does it offer the astronomer?

Interest in Antarctic astronomy has blossomed over the past few years, particularly with the opening of Concordia Station in 2005 by France and Italy, the construction of Kunlun Station by China, and the decision by Japan to re-open Dome Fuji. These new stations, all on the high Antarctic plateau, join the US Amundsen-Scott station as potentially outstanding sites for astronomical research. The Antarctic plateau is of course intensely cold and extremely dry, characteristics that are good for infrared and submillimetre astronomy but not so good for humans. In this talk Professor Storey will describe recent successes in Antarctica, and the ambitious plans for future facilities.

AAS meeting, Monday 9 November, Radio telescopes around the world.

Since Karl Jansky's discovery in 1933 of electrical disturbances apparently of extraterrestrial origin, radio astronomy has made an ever-increasing contribution to our understanding of the cosmos. Radio telescopes come in a great variety of shapes and sizes, and have been built in some of the most exotic locations on earth. This talk will take you back in time and around the world to visit some of the world's great telescopes, describing why they look the way they do and what they have achieved. We will finish with a glimpse into the future, looking briefly at the new telescopes being built in Western Australia.

DR. MILLER GOSS, Monday 16th November


A little known fact is that major early discoveries in radio astronomy were made in New Zealand and Norfolk Island by RNZAF personnel during WWII. In September 2008, I gave a lecture at the Stardome on NZ radio astronomy summarizing my knowledge at that time. I described the observations of solar bursts in 1945 from radar stations at Norfolk Island, North Cape, Whangaroa, Maunganui Bluff and Piha. Finally I described the Australian Cosmic Noise Expedition of 1948 to NZ, observations from Pakiri Hill (Leigh) and Piha.

In the last year I have learned a lot about the experiences of Bolton and Stanley (from Sydney) at Piha and Pakiri Hill. I have been at both sites and have identified the exact sites of the location of the Australian radar sets that were used as passive radio astronomy receivers. The sea cliff interferometers were located at impressive, beautiful cliffs on the East and West coasts of the North Island.

The knowledge of the experiences at the Leigh site has increased tremendously as Sergei Gulyaev and I have found the Greenwood family from Leigh, the hosts for the Australians in the winter of 1948. The Greenwood family has a remarkable archive of the visit including a priceless original record of the sea cliff interferometer response to Taurus A; this record led to the identification of the radio source with the Crab Nebula, the remnants of the Supernova of 1054. This experiment is one of the major events of astronomical research in the 20th century and contributed to the revolution in science brought about as the new window to the universe was opened in the post war period.

In addition, I have made contact with the host family at Piha thanks to the assistance of Sandra Coney. I will show images of the two sites at Pakiri Hill and Piha. Also, I will describe new information I have about the Norfolk Island effect of 1945, the second recorded instance of the discovery of Type I solar bursts. I have pictures of the current status of the Norfolk Island site provided by my friend, Susan Brian, who lives on Norfolk Island.
# Calendar and Events

## NOVEMBER PROGRAMME

<table>
<thead>
<tr>
<th>Day</th>
<th>Time</th>
<th>Event</th>
</tr>
</thead>
</table>
| Tue 3 | 8:00pm | A Sidewalk Astronomer  
*Note this replaces Practical Astronomy*
| Fri 6 | 7:30pm | Night Eyes  
Young Astronomers |
| Sat 7 | 6:00pm | Burbidge Dinner  
Speaker Prof John Storey  
“Antarctica, what does it offer?” |
| Mon 9 | 8:00pm | Society Meeting  
with Prof John Storey. see notice |
| Mon 16 | 8:00pm | History of Radio Astronomy in NZ with Prof Miller Goss |
| Wed 18 | 7:30pm | Council Meeting |
| Mon 23 | 8:00pm | Introduction to Astronomy |

## DECEMBER PROGRAMME

<table>
<thead>
<tr>
<th>Day</th>
<th>Time</th>
<th>Event</th>
</tr>
</thead>
</table>
| Fri 4 | 7:30 pm | Night Eyes  
Young Astronomers |
| Mon 7 | 8:00 pm | Practical Astronomy  
The Summer Sky and Mars  
with Melanie Pohl |
| Mon 14 | 8:00 pm | Society Meeting  
Alien Life with Richard Hall |
| Mon 21 | 8:00 pm | Introduction to Astronomy  
Note that this has moved from the 4th Monday |

### NIGHT EYES & YOUNG ASTRONOMERS

**NOVEMBER MEETING**

Friday 6th November, 7:30pm at the Observatory

The Young Astronomers Group is for older children. Night Eyes is for the younger group. At present they are combined due to numbers.

Parents, friends and other Society members are also very welcome to attend. For further information please contact Margaret Arthur on 579 7428 Email: marthur@aggs.school.nz

### SPECIAL LECTURE

**Monday 16th November at 8:00pm**

Professor Miller Goss, NRAO (New Mexico, USA)


A special talk about the history of radio astronomy in New Zealand With Prof. Miller Goss. New Zealand has a proud history of radio astronomy. This promises to be a very interesting complement to the rest of the program of speakers. See page 3 for more details

### WELCOME TO NEW MEMBERS

Peter Harrison (ordinary)  
Miilina Ristic (family)  
Holger Mueller (student)  
Jason Brown (ordinary)  
Roger Barraud (ordinary)  
Jane Lin (junior)  
Joel Schiff (ordinary)  
Roger Huddleston (country)
Tiritiri Matangi Island Evening

By Gavin Logan

The only clear evening of the society’s visits to Tiritiri Matangi Island to provide public telescope viewing was on 26th September. I joined seven other members from the society for the ferry trip.

The ferry trip was calm and pleasant from Downtown Auckland to Gulf Harbour but between there and the island I felt like the boat was taking Rock ‘n’ Roll lessons.

Conservation Department Volunteer looking through an 8 inch Schmidt-Cassegrain telescope.

Upon arrival Conservation Department Volunteers took us for a night-time walk around the island while our telescopes were transported to the lighthouse shop on top of the island. During the walk we saw some small Penguins, one Tuatara but unfortunately not the elusive night-time Kiwi the island is noted for.

We then set up four telescopes by the lighthouse which is situated on the top of the island. For one and a half hours people, most of the time forming queues, were treated to telescopic views of the first quarter Moon, Jupiter and some of the brighter deep sky objects.

It was a very successful evening.

Members of the public queuing to view through the 8 inch Schmidt-Cassegrain and John White’s 80mm refractor (back). William Miao standing alongside is supervising viewing with the 8 inch telescope. Blair Woolley setting up his refractor (left).

Galilean Nights comes to Parnell

By Gavin Logan

To celebrate 400 years since Galileo pointed his telescope to the skies members of the society’s Orion Group treated Parnell’s labour weekend evening cafe and restaurant goers and other people passing by to telescopic views of the Crescent Moon and Jupiter with its four moons.

Three telescopes were set up in a prominent position in Heard Park on the corner of Parnell Road and Ruskin Street on Friday evening and two on Saturday night.

Additional events were also held at West City and The Viaduct on Friday and Saturday evenings.

The events were a great success with more than 1800 members of the public viewing the Moon and Jupiter through a variety of telescopes.

Members of the public queuing to view through the 8 inch Schmidt-Cassegrain and John White’s 80mm refractor (back). William Miao standing alongside is supervising viewing with the 8 inch telescope. Blair Woolley setting up his refractor (left).
Scientists will measure the spectra of a thousand galaxies and quasars.

From Astronomy.com

The most ambitious attempt yet to trace the history of the universe has seen “first light.” The Baryon Oscillation Spectroscopic Survey (BOSS), a part of the Sloan Digital Sky Survey III (SDSS-III), took its first astronomical data September 14-15 after years of preparations.

That night, astronomers used the Sloan Foundation 2.5-metre telescope at Apache Point Observatory in New Mexico to measure the spectra of a thousand galaxies and quasars, thus starting a quest to eventually collect spectra for 1.4 million galaxies and 160,000 quasars by 2014.

“The data from BOSS will be the best obtained on the large-scale structure of the universe,” said David Schlegel, principal investigator of BOSS at the U.S. Department of Energy’s Lawrence Berkeley National Laboratory. BOSS uses the same telescope as the original Sloan Digital Sky Survey, but equipped with new spectrographs to measure the spectra.

“The new spectrographs are more efficient in infrared light,” said Natalie Roe, the instrument scientist for BOSS at the Berkeley Lab. “The light emitted by distant galaxies arrives at Earth as infrared light, so these improved spectrographs are able to look much farther back in time.”

The ability to look farther back in time is important in allowing BOSS to take advantage of a feature in the universe called “baryon oscillations.” Baryon oscillations began when pressure waves travelled through the early universe. “Like sound waves passing through air, the waves push some of the matter closer together as they travel,” said Nikhil Padmanabhan, a BOSS researcher. “In the early universe, these waves were moving at half the speed of light, but when the universe was only a few hundred thousand years old, the universe cooled enough to halt the waves, leaving a signature 500 million light-years in length.”

“We can see these frozen waves in the distribution of galaxies today,” said Daniel Eisenstein, director of the SDSS-III at the University of Arizona. “By measuring the length of the baryon oscillations, we can determine how dark energy has affected the expansion history of the universe. That in turn helps us figure out what dark energy could be.”

“Studying baryon oscillations is an exciting method for measuring dark energy in a way that’s complementary to techniques in supernova cosmology,” said Kyle Dawson at the University of Utah, who is leading the commissioning of BOSS.

“BOSS’ galaxy measurements will be a revolutionary dataset that will provide rich insights into the universe,” said Martin White, BOSS’ survey scientist at the Berkeley Lab. BOSS’ first data were taken after many nights of clouds and rain. The first data came from a region of sky in the constellation Aquarius. “Looks like I’m in for a very hectic but extremely exciting first month on the job,” said Nic Ross who has just joined the Berkeley Lab.

The BOSS spectrographs will work with more than two thousand large metal plates that are placed at the focal plane of the telescope. These plates are drilled with the precise locations of nearly two million objects across the northern sky. Optical fibers plugged into a thousand tiny holes in each of these “plug plates” carry the light from each observed galaxy or quasar to BOSS’ new spectrographs.

Using these plug plates for the first light image should have been easy, but it didn’t quite turn out to be simple. After we flipped the plus and minus signs in the program, everything worked perfectly.

The first public data release from SDSS-III is planned for December 2010 under the watchful eye of Mike Blanton at the New York University. “Making high-quality astronomical data available to all on the Web continues to revolutionize astronomical science and education by taking advantage of the talents of not just our team, but of all astronomers and also the general public.”

---

The Annual Burbidge Dinner

Remember that the Burbidge Dinner is on Saturday, November 7th at the Novotel, Ellerslie. Support this great event - get your tickets!

The keynote Speaker is Prof. John Storey from the University of NSW talking about astronomy on the Antarctic Plateau. Antarctica offers some unique opportunities for science but it is a harsh place to live in during the winter when the sky is dark.

There will be a door prize of a gift hamper. The draw will be made using your ticket number. An 8” ASTRONZ Dobsonian telescope will be auctioned starting with a reserve of just $1.00 - A potential bargain for the top bidder.

The prize winners for the Harry Williams Astrophotography Competition and the Beaumont Prize for the best original journal article by a Society member will be announced.

Purchasing Tickets

Please contact Andrew Buckingham 09 473 5877 or 027 246 2446 or by email: treasurer@astronomy.org.nz

Payment can be made by Internet Banking (Direct Credit) or deposit at any ASB branch, Account No.: 12-3061-0321397-00

Please use your member number or name as the reference.

Credit Cards: Visa or Mastercard payment can be made though our secure website at https://www.astronomy.org.nz/BurbidgeDinner.aspx or by phone on 09 473 5877.

Payment by Cheque: Make out to ‘Auckland Astronomical Society’ and post to PO Box 24187, Royal Oak, Auckland 1345.

Or give it to Andrew on the night.
Strange Shapes Seen In Milky Way’s Tiny Neighbor

From SPACE.com

A stunning new image of one of the Milky Way’s nearest galactic neighbors, Barnard’s Galaxy, reveals rich star formation and curiously-shaped nebulas.

At the relatively close distance of about 1.6 million light-years, Barnard’s Galaxy is a member of the Local Group, an archipelago of galaxies that includes our home, the Milky Way.

The galaxy, also known as NGC 6822, was discovered by the American astronomer Edward Emerson Barnard in 1884.

The new image, taken by one of the telescopes at the European Southern Observatory in La Silla, Chile, shows Barnard’s Galaxy beneath a sea of foreground stars in the direction of the constellation of Sagittarius (the Archer).

Barnard’s Galaxy is a dwarf galaxy that lacks the spiral arms of its neighbors, the Milky Way, Andromeda and the Triangulum galaxies. Barnard’s Galaxy is also much smaller than some of its Local Group neighbors, with about 10 million stars — a far cry from the Milky Way’s estimated 400 billion.

Reddish nebulas in the new image reveal regions of active star formation, where young, hot stars heat up nearby gas clouds.

Prominent in the upper left of the image is a striking bubble-shaped nebula. At the nebula’s center, a clutch of massive, scorching stars send waves of matter smashing into the surrounding interstellar material, generating a glowing structure that appears ring-like from our perspective. Other similar ripples of heated matter thrown out by feisty young stars are dotted across Barnard’s Galaxy.

Irregular dwarf galaxies like Barnard’s Galaxy get their random, blob-like forms from close encounters with or “digestion” by other galaxies. When two galaxies collide, their gravitational interaction can warp the shapes of the galaxies.

At a distance of 1.6 million light years away, NGC 6822 is literally right around the corner. This galaxy is a dwarf with a mere 10 million stellar members in its ranks. Note the “bubble” of gas in the top right corner. This bubble was probably caused by stars that formed from their natal gas cloud. Upon their birth, the extra gas in the cloud was expelled into space, pushed out by the energetic stellar winds of the baby stars. Since this galaxy (especially on the outskirts) does not have much in the way of internal motions, the bubble of gas continues to expand without anything disrupting it. (For those with good eyes... there are actually a few other bubbles in this image as well).

High in the north western spring sky, Barnard’s Galaxy (RA/Dec 19h 44m 56.6s/-14° 47’21”) is a challenging object for the amateur astronomer. With a low magnification eyepiece, dark skies and patience it can be observed in even a small telescope.
A dusty red planet and an icy moon of Jupiter may hold the best hopes for scientists trying to track down extraterrestrial life, at least in this solar system.

Mars and Europa each hold the promise of liquid water and possibly life. Mars has a history that suggests water once flowed in rivers and lakes, and it may still harbor liquid water deep underground. The more distant Europa could hide a churning ocean filled with life forms beneath its icy surface, as the moon gets gravitationally squeezed by Jupiter.

Future space missions have targeted both destinations to send new robotic explorers. But the red planet represents a much closer and better known target for space explorers.

“We're much farther down the road with Mars than Europa,” said Jack Farmer, an astrobiologist at the University of Arizona.

Mars invites a deeper look
Liquid water probably once filled the valleys and basins on Mars, but now the planet’s surface resembles a barren, dusty badland. Any living organisms that may have existed must have gone extinct or underground.

“View is that habitable environments on Mars are likely to only be found in the deeper subsurface where we might have a hydrosphere,” Farmer told SPACE.com. “Liquid water is unstable at the surface of Mars today.”

Some ice water or snowfall could temporarily become liquid at the surface, such as when NASA’s Phoenix Mars Lander possibly found some liquefied globules clinging to its struts. Still, that would hardly last long enough under freezing or vaporizing conditions to sustain life.

Microbial life that could eke out an existence also seems unlikely to survive the cosmic radiation that scours the surface of Mars. But astrobiologists remain excited about possibly finding signs of past life on the surface, where minerals that only form in water may have preserved certain remains.

“A lot of these kinds of mineralogical targets are water indicators, and we know where a lot of these deposits are now,” Farmer said. He noted that sulfate minerals do a decent job of preserving organic compounds produced by organisms on Earth, and sometimes even microfossils. Silica and other clay minerals have also turned up during searches by the Mars rovers and orbiters.

Upcoming missions to Mars could perhaps even tap into any liquid reservoirs hidden deeper below and search for existing life, if they have the right equipment.

Europa’s ocean: fact or fiction?
A more challenging target for astrobiologists sits farther out in the solar system, where the icy moon Europa beckons with hints of a salty ocean beneath its crusty exterior.

“Europa’s a very appealing target for astrobiology, and particularly from the standpoint of what life forms might be working in a sub-surface ocean,” Farmer noted. “The challenge with Europa is that we don’t know for sure if there’s a sub-surface ocean.”

Some studies have suggested that Europa holds an ocean up to three times deeper than Earth’s oceans. But other models have suggested that no such ocean exists, and that perhaps the moon only harbors pockets of ice-brine slush. The debate largely depends on how much heat Europa can generate from tidal flexing, when Jupiter squeezes the moon with its gravitational pull.

Still, Farmer suggested that life could perhaps exist even within a “snowball slush” mixture between the solid ice chunks. Such slush appears to have erupted onto the moon’s surface at times due to icy volcanic eruptions. And any material that came up might have carried signs of life with it — although living organisms would perish quickly due to the harsh radiation bombardment at the moon’s surface.

“If you drop down a ways below the depth where radiation is affecting surface materials, you might be able to access biosignatures frozen out in the ice there,” Farmer said.
A recent study suggested that Europa may hold hundreds of times more oxygen than scientists had previously imagined. That has lent to the sense of optimism about prospects for life on the slush ball.

Send in the robots

Still other worlds may beckon just as strongly as Mars or Europa, such as Saturn’s icy moon Enceladus. Yet the race to find extraterrestrial life may ultimately come down to where humans decide to send the robots.

Planned missions or mission proposals exist for the robotic exploration of both Mars and Europa. NASA’s Mars Science Laboratory (MSL) is slated to put an SUV-sized rover down on the red planet after launching in late 2011, and has an onboard organic chemistry lab that can do a general assessment of surface conditions. That would represent a “baby step for an actual life detection mission,” Farmer said.

The Europeans also continue to refine their ExoMars rover concept that could go a step farther and actually drill down into Martian regolith. A successful biosignature reading would likely lead to a mission to return Martian samples to Earth, where scientists could run definitive tests. Farmer sees this as a real possibility within the next decade.

Europa may ultimately lag behind Mars in the ongoing search for life, if only because it represents a greater unknown and poses steeper mission challenges. “If you were going to look for life on convecting snowball, you’re going to use a different kind of approach than if you were going to penetrate an ocean three times deeper than any on Earth,” Farmer pointed out. The extreme different views of Europa each require very different mission approaches.

A joint mission between NASA and the European Space Agency would likely first send an orbiter to better examine Europa, and perhaps figure out whether a subsurface ocean truly exists to warrant deep drilling. But that won’t likely launch until 2020 at the earliest. And besides, scientists may not yet have the technology to create a lander capable of surviving Europa’s harsh surface environment. “You would have to land on surface with no real atmosphere, freezing temperatures and high radiation, and survive there while you drill,” Farmer said. “We can’t do that yet.”

Black Holes or Black Stars

Quantum effects may prevent true black holes from forming and give rise instead to entities called black stars.

The four coauthors of this article include Professor Matt Visser from the Department of Mathematics at Victoria University of Wellington who many of you will remember gave such an excellent talk on aspects of cosmology and those ideas that we might be able to rely on to describe the cosmos.

The key concepts are:

Black holes are theoretical structures in space time predicted by the theory of general relativity. Nothing can escape a black hole’s gravity after passing inside its event horizon. Approximate quantum calculations predict that black holes slowly evaporate, albeit in a paradoxical way. Physicists are still seeking a full, consistent quantum theory of gravity to describe black holes.

Contrary to physicists’ conventional wisdom, a quantum effect called vacuum polarization may grow large enough to stop a hole forming and create a “black star” instead.

The 2009 Royal Society of New Zealand Distinguished Speaker

Professor Robert Kirshner
Clowes Professor of Science, Harvard University

Einstein’s Blunder Undone:
Exploding Stars and the Accelerating Cosmos

One of the great recent surprises in science is the extraordinary discovery by Kirshner and his colleagues that the expansion of the universe is accelerating under the influence of a mysterious dark energy. In a strange turn of events, the simplest form of the dark energy looks very much like a modern version of Einstein’s cosmological constant — a theory which Einstein proposed but then retracted and has been dubbed “Einstein’s greatest blunder”.

Wowed by Einstein’s blunder, and contradicted by the initial results of a competing research group, Kirshner and his team were reluctant to accept their own result. But, convinced by evidence built on their understanding of exploding stars, they announced their conclusion in February 1998 — the universe is speeding up! We live in an extravgant universe with a surprising number of essential ingredients: the real universe we measure is not the simplest one we could imagine.

Auckland

Date: Tuesday 10 November 2009, 7.30pm
Venue: Lecture Theatre 260-098, Owen G Glenn Building, Business School, 12 Grafton Road, The University of Auckland
(Enter Owen Glenn Building via main door off Grafton Road and follow the signs for the lecture)

Wellington

Date: Wednesday 11 November 2009, 6.00pm
Venue: Rutherford House Lecture Theatre 1, Pipitea Campus, Victoria University of Wellington
(Main entrance off Bunny Street)

Christchurch

Date: Thursday 12 November 2009, 7.30pm
Venue: College Hall (formerly Great Hall), The Arts Centre
cnr Worcester Blvd & Rolleston Ave

For more information email: speaker@royalsociety.org.nz telephone: 04 470 5781
Or visit www.royalsociety.org.nz/distinguisheds speaker

www.astromony.org.nz
NASA Space Telescope Discovers Largest Ring Around Saturn

Jet Propulsion Laboratory, Pasadena, Calif.

NASA's Spitzer Space Telescope has spotted a nearly invisible ring around Saturn -- the largest of the giant planet's many rings. The ring is so diffuse that it reflects little sunlight, or visible light that we see with our eyes. But its dusty particles shine with infrared light, or heat radiation, that Spitzer can see.

This artist's conception simulates an infrared view of the giant ring. Saturn appears as just a small dot from outside the band of ice and dust. The bulk of the ring material starts about six million kilometres (3.7 million miles) away from the planet and extends outward roughly another 12 million kilometres (7.4 million miles). The ring's diameter is equivalent to roughly 300 Saturns lined up side to side.

Image credit: NASA/JPL-Caltech/Keck

NASA's Spitzer Space Telescope has discovered an enormous ring around Saturn -- by far the largest of the giant planet's many rings.

The new belt lies at the far reaches of the Saturnian system, with an orbit tilted 27 degrees from the main ring plane. The bulk of its material starts about six million kilometres (3.7 million miles) away from the planet and extends outward roughly another 12 million kilometres (7.4 million miles). One of Saturn's farthest moons, Phoebe, circles within the newfound ring, and is likely the source of its material.

Saturn's newest halo is thick, too -- its vertical height is about 20 times the diameter of the planet. It would take about one billion Earths stacked together to fill the ring.

“This is one supersized ring,” said Anne Verbiscer, an astronomer at the University of Virginia, Charlottesville. “If you could see the ring, it would span the width of two full moons’ worth of sky, one on either side of Saturn.” Verbiscer; Douglas Hamilton of the University of Maryland, College Park; and Michael Skrutskie, of the University of Virginia, Charlottesville, are authors of a paper about the discovery to be published online tomorrow by the journal Nature.


The ring itself is tenuous, made up of a thin array of ice and dust particles. Spitzer's infrared eyes were able to spot the glow of the band's cool dust. The telescope, launched in 2003, is currently 107 million kilometres (66 million miles) from Earth in orbit around the Sun.

The discovery may help solve an age-old riddle of one of Saturn’s moons. Iapetus has a strange appearance -- one side is bright and the other is really dark, in a pattern that resembles the yin-yang symbol. The astronomer Giovanni Cassini first spotted the moon in 1671, and years later figured out it has a dark side, now named Cassini Regio in his honor. A stunning picture of Iapetus taken by NASA's Cassini spacecraft is online at http://photojournal.jpl.nasa.gov/catalog/PIA08384.

Saturn's newest addition could explain how Cassini Regio came to be. The ring is circling in the same direction as Phoebe, while Iapetus, the other rings and most of Saturn's moons are all going the opposite way. According to the scientists, some of the dark and dusty material from the outer ring moves inward toward Iapetus, slamming the icy moon like bugs on a windshield.

“Astronomers have long suspected that there is a connection between Saturn’s outer moon Phoebe and the dark material on Iapetus,” said Hamilton. “This new ring provides convincing evidence of that relationship.”

Verbiscer and her colleagues used Spitzer’s longer-wavelength infrared camera, called...
Scientists have long wondered why one hemisphere of Iapetus is so dark compared to the other hemisphere, and so dark compared to other surfaces in the Saturn system.

Scientists have long wondered why one hemisphere of Iapetus is so dark compared to the other hemisphere, and so dark compared to other surfaces in the Saturn system.

The multiband imaging photometer, to scan through a patch of sky far from Saturn and a bit inside Phoebe’s orbit. The astronomers had a hunch that Phoebe might be circling around in a belt of dust kicked up from its minor collisions with comets — a process similar to that around stars with dusty disks of planetary debris.

Sure enough, when the scientists took a first look at their Spitzer data, a band of dust jumped out.

The ring would be difficult to see with visible-light telescopes. Its particles are diffuse and may even extend beyond the bulk of the ring material all the way in to Saturn and all the way out to interplanetary space. The relatively small numbers of particles in the ring wouldn’t reflect much visible light, especially out at Saturn where sunlight is weak.

“The particles are so far apart that if you were to stand in the ring, you wouldn’t even know it,” said Verbiscer.

Spitzer was able to sense the glow of the cool dust, which is only about 80 Kelvin (minus 316 degrees Fahrenheit). Cool objects shine with infrared, or thermal radiation; for example, even a cup of ice cream is blazing with infrared light. “By focusing on the glow of the ring’s cool dust, Spitzer made it easy to find,” said Verbiscer.

These observations were made before Spitzer ran out of coolant in May and began its “warm” mission.

NASA’s Jet Propulsion Laboratory, Pasadena, Calif., manages the Spitzer Space Telescope mission for NASA’s Science Mission Directorate, Washington. Science operations are conducted at the Spitzer Science Center at the California Institute of Technology, also in Pasadena. Caltech manages JPL for NASA. The multiband imaging photometer for Spitzer was built by Ball Aerospace Corporation, Boulder, Colo., and the University of Arizona, Tucson. Its principal investigator is George Rieke of the University of Arizona.

For additional images relating to the ring discovery and more information about Spitzer, visit http://www.spitzer.caltech.edu/spitzer and http://www.nasa.gov/spitzer.

Royal Astronomical Society of New Zealand
IYA New Zealand 2009 Poster

The RASNZ IYA NZ 2009 poster is still available......A1 Full Colour. All posters packaged in poster tubes and sent by standard parcel post around New Zealand, 1 - 3 days delivery. If you require more than 20 posters please contact Jennie, (details below)

1 x Poster $7.00
Postage and Handling $9.00

2 x Posters $13.00
Postage and Handling $9.00

5 x Posters $31.00
Postage and Handling $9.00

20 x Posters $119.00
Postage and Handling $22.00

Please send an email to Jennie McCormick with your name, delivery address and the number of posters you require.

Once done, make payment to the Royal Astronomical Society of NZ using the details at http://www.rasnz.org.nz/Sales/Sales.html. If you live in Auckland and wish to save on postage by personally collecting them, please let me know.

Jennie McCormick – farmcoveobs@xtra.co.nz
RASNZ Treasurer - treasurer@rasnz.org.nz
I’m trying something new here: I’m going to give you a little bit of information and a teaser, and we’ll see -- in the comments section -- whether any of you can figure it out.

Imagine that you went outside, each and every day at the same time, and mapped the position of the Sun. What would you see? (Image Credit: Michael Stecker.)

Doing this -- taking a snapshot of the Sun at the same exact time from the same exact place on different days -- gives you what’s called an analemma. Now, on Earth, the top of the analemma happens during the Summer Solstice, the lowest point of the analemma happens during the Winter Solstice, and the “crossing” takes place twice a year: once on around April 15th and once (coming soon) about August 31st. Here’s an image I found on this site (http://www.csulb.edu/~rodrigue/geog140/lectures/earthsunbydate.html) that illustrates what happens throughout the year to the Sun’s position:

The figure-8 shape that we see happens on some of the other planets, but not on most of them. For example, if we did the same thing on Mars, taking a picture of the Sun at the same exact time every day for a year, we would get a teardrop shape instead of a figure-8:

In fact, if you made a list of what these shapes look like on all the terrestrial planets, here’s what you’d find:

1. Mercury: a single point (because a day on Mercury takes exactly two years!)
2. Venus: an ellipse
3. Earth: figure 8
4. Mars: teardrop
5. Jupiter: ellipse
6. Saturn: teardrop with a teeny-tiny loop at the end
7. Uranus: figure 8
8. Neptune: figure 8
9. Pluto: a very large figure 8

So of all the planets close to the Sun, only Earth sees a figure-8. My question for you is this: why does the Sun trace a figure-8 shaped analemma? If you want to go a little beyond that, I’ll ask you what the significance of April 15th and August 31st are, too.

The Question of Why: The Analemma
By Ethan Siegel, AAVSO Writers Bureau

Across:
3 Herschel, 5 Supergiant, 6 Sigma, 7 Young, 9 Irregular, 11 Harvard, 12 Dorado, 13 Cernan.

Down:
1 Troposphere, 2 Conrad, 3 Helix Nebula, 4 Horologium, 8 Gordon, 10 Guide.

Editor’s Note
1. The axis of rotation of the Earth is tilted at 23½° with respect to the plane of its orbit around the Sun.
2. The Earth’s orbit around the Sun is elliptical with the Sun at one focus.
3. The Earth’s orbit aligns perihelion and aphelion with the solstices whereas Mars’ orbit aligns them with the equinoxes. Consequently orbital eccentricity always dominates on Mars whereas both eccentricity and obliquity contribute to the Earth’s Analemma.

The combination of these three effects contributes to the shape or the analemma. Would any of our readers like to offer a full explanation?
Advantages of a Good Lightweight Refractor

By Gavin Logan

In the era where aperture rules and large Dobsonians are the fashion instrument of most amateur astronomers the advantages of a good lightweight refractor are often overlooked. As a stubbornly out of fashion person my telescope is a Sky-Watcher 100mm (4inch) Ed doublet refractor with a 900mm (f9) focal length. The inside lens of the telescope is made from FPL-53 low dispersion glass which largely solves the problem of chromatic aberration (false colour) that plagues many refractors. The optical tube weighs just over 3 kg and even when you add the 2 inch star diagonal and my 50mm right angle finderscope it still weighs less than 4 kg.

The scope is permanently collimated at the factory and never needs collimating again. It’s cool down time even on a cold night is faster than I can usually set it up and find the first object for viewing (10 minutes or less).

Its focal length is short enough to allow for good rich field views but long enough to give superb planetary views. For example, with a 40mm 2 inch eyepiece (22x magnification) I can get superb rich field views of large open clusters and the Milky Way. With a 6 mm eyepiece (150x magnification) I get superb and detailed views of the planets and the Moon.

I have two mounts which I can use for this telescope. One is an EQ5 Equatorial Mount which is extremely stable, looks impressive, has motorised tracking but is heavy and makes the scope less portable. The other is a simple Alt-azimuth Mount with aluminium tripod legs which is very light and easy to set up and still surprisingly stable with this light optical tube but does not provide for motorised tracking. However on this mount set up is quick and easy with its light weight meaning I can carry the telescope and mount in one piece.

How does the performance and price of this telescope compare with other types of telescopes? The heavily discounted price for the optical tube and carry case only was $1012. To put it on a simple alt-azimuth mount and buy the other accessories you will probably need to spend at least $400. Not a favourable equation when comparing it to the price of an undiscounted 200mm (8inch) Dobsonian at $800 which comes complete with accessories.

Having had three different 200mm reflectors in my possession for reasonable periods I have been able to compare the refractor’s performance to these. For watching the Moon or planets it’s a no contest. The refractor is vastly superior. It provides sharp, distortion free views that take you to the limit in visual detail of what Auckland’s wobbly atmosphere will allow. On the open clusters the refractor gives textbook images displaying vividly the different coloured stars as beautiful pinpoints of light on a black background. On the deep sky the difference in aperture does show and the 200mm reflectors do in most cases give brighter images but often not as pleasing to the eye.

In theory a 200mm telescope should collect four times as much light as 100mm telescope and therefore, one would think, have four times brighter image. In practice this does not happen. At best the reflectors might be 20% to 40% brighter on some objects. The refractor seems to make the background sky look significantly darker thus making the object viewed appear relatively brighter. For resolving details in brighter objects the refractor is significantly better. NGC 104 - 47 Tucanae when viewed in the reflector is definitely brighter but the core is a ball of light. When viewed in the refractor the cluster is more resolved into pinpoint stars.

In April at the Waharau dark sky weekend I was viewing two 9th magnitude galaxies (M65 and M66 in Leo) through a 12inch Dobsonian. I decided to try the 4 inch refractor on them and was surprised to find that I could still see the shape of them and that although they were not as bright they were still easy to see.

It’s when observing the Moon that this telescope really excels. I regularly go hunting for craterlets that my moon atlas says you need a 300mm reflector for and I am always able to see them on nights of steadier seeing. Four of the craterlets inside Plato can be seen on most nights that the Moon is in the correct position for viewing this crater.
On choosing what size refractor to buy I considered several factors:

1. Quality Refractors larger than the 100 to 120mm range start to get very expensive and much heavier.

2. Refractors of 80mm of less, in my view, have too little light gathering power to provide satisfying viewing.

3. Short focal ratio refractors, even apochromatic ones, usually have problems for visual use and, in my view, are best avoided.

If you want large light gathering power for viewing faint objects or are on a budget, reflectors will always work out better.

The reason I have stayed with the 100mm refractor and not acquired a larger instrument is that the gain in brightness, for me, does not compensate for the weight and clumsiness of a larger reflector coupled with the inconvenience of waiting for it to cool down or its fussiness with regard to eyepieces. The ease of use of the refractor, combined with its sharp clear distortion free images and its ability to operate well in city conditions have made it an ideal telescope for me.

Filters can reveal hidden detail in many familiar deep sky objects. For the astro-photographer they are an invaluable aid.

Telescope Tips No. 5
Filters
By Ivan Vazey, Curator of Instruments

FILTERING OUT LIGHT
You can choose from a wide range of filters according to your viewing interests. Filters normally screw onto the base of your eyepieces. Some filters minimize the effects of light pollution. Known as LPR (Light pollution reduction) filters, they block the green and yellow wavelengths emitted by street lights, but transmit the red and blue-green colours of nebulas. Whilst these filters can improve views of star clusters and galaxies, they work best enhancing emission nebulas (ones that produce their own light)

LPR filters come in in several varieties. Broadband or Deep-sky filters transmit the widest range of colours, providing a modest enhancement of a range of deep-sky objects.

Narrowband or Nebula filters are much more effective on emission nebulas and are the best choice if you are planning on buying one filter only. Line filters such as Oxygen 111 and Hydrogen-beta filters transmit only a single colour, providing excellent results on a limited number of nebulas.
The new mother lode increases by about 30 percent the number of low-mass planets — those with a mass of less than 20 Earth masses — Udry says. He and his colleagues reported the findings on October 19 at a conference on extrasolar planets at the University of Porto in Portugal. Udry says his team expects to announce the discovery of another 30 or so extrasolar planets within the next six months.

“These low-mass planets are everywhere,” notes team member Stéphane Udry of Geneva Observatory in Sauverny, Switzerland. “Models are predicting them and we are finding them.”

The new mother lode increases by about 30 percent the number of low-mass planets — those with a mass of less than 20 Earth masses — Udry says. He and his colleagues reported the findings on October 19 at a conference on extrasolar planets at the University of Porto in Portugal. Udry says his team expects to announce the discovery of another 30 or so extrasolar planets within the next six months.

“All I can say is, “Wow. What a bonanza of planets,” says theorist Sara Seager of MIT, who is not a member of the discovery team.

The new roster of planets includes six planets classified as superEarths, so named because they have a mass five to 10 times that of Earth. Udry says his team identified several of the superEarths by scrutinizing the motion of stars already known to have heavier planets, rather than by blindly looking for low-mass planets.

“This proves that [superEarths] are very common. Even if you are not looking for them, you are finding them,” says Udry. SuperEarths — at least those in the short-period orbits that surveys have been able to detect — appear to be at least three times more common than giant, Jupiter-like planets, he adds.

That dovetails with the finding, reported last year by Udry and his colleagues using a smaller data set, that as many as 30 percent of all sunlike stars may harbor short-period superEarths (SN: 7/5/08, p. 7).

“That is important point,” says Udry. Rather, his team is trying to extract from the new numbers exactly how common superEarths and Earth-mass planets are, a task for which NASA’s Kepler mission, launched earlier this year, may provide the best results.

Udry adds that the data indicate that the general rules of planet formation, deduced by analyzing the much larger population of heavy, Jupiter-like planets, can be successfully applied to the lower-mass population.

Many of the low-mass planets in the new study orbit M dwarfs, low-mass stars that are the most common star type in the universe. Theoretical calculations predict that low-mass planets would be common around such stars. According to theory, these low-weight stars are thought to have a hard time making heavy planets because the disks of gas and dust these stars generated in their youth — the raw material for making planets — might not contain enough material.

But while the new discoveries do show low-mass stars as being relatively common, two of the new-found planets that also orbit M dwarfs are heavier than Jupiter — possibly challenging that planet formation theory, said study collaborator Nuno Santos of the University of Porto.

“It’s premature to say theory needs to be modified,” says Seager. “We need larger numbers of planetary cases we don’t expect.”

Three of the new-found planets, each several times heavier than Jupiter, orbit stars that have a low abundance of any element heavier than helium. Previous searches have indicated that such stars, which in astronomical parlance are labeled “metal-poor,” are much less likely to form heavy planets. The findings suggest that it may not be quite as difficult for metal-poor stars to produce these heavyweights as previously thought, says Udry.

To find the orbs, Udry and his colleagues examined the motion of some 2,000 nearby stars over the past five years. The team used the High Accuracy Radial Velocity Planet Searcher spectrometer on the European Southern Observatory’s 3.6-metre telescope at La Silla in Chile. A tiny wobble in a star’s motion indicates the tug of an unseen, orbiting planet. The HARPS instrument can detect variations in a star’s motion along the line of sight to Earth as small as 3.5 kilometres an hour, the pace of a person walking slowly.

These measurements provide only the minimum mass of an orbiting planet, not its actual mass. However, statistics suggest that with among such a large number of planets, many are likely to have a mass close to their minimum, Udry says.

Udry says his team will now examine the planetary systems with NASA’s Spitzer Space Telescope to see if any of these planets pass across the face of their parent stars, as observed from Earth. The minieclipses created by such passages reveal their size and, in conjunction with the wobble method, their exact mass.
The Evening Sky in November 2009

By Alan Gilmore

Jupiter is the first ‘star’ to appear, visible northwest of overhead soon after sunset. Binoculars and small telescopes will show Jupiter’s brightest moons above-right and below-left of the planet. Jupiter is around 750 million km away from us now. In late November and into December Mercury is near the southwest horizon at twilight. Around the 21st Mercury, white and much brighter, will pass to the right of Antares.

Canopus, in the southeast, is the second brightest star in the sky. It moves eastward and upward during the night as the stars appear to circle clockwise around the south celestial pole, Polaris. Canopus is 300 light years away. Seen up close it would be 13 000 times brighter than the Sun.

Sirius rises in the east around dusk. When low in the sky it is shining through a lot of air. Warm and cool cells in the air break its white light into colours, so Sirius twinkles like a diamond. It is the brightest star both because it is relatively close, nine light years away, and 23 times brighter than the Sun.

Left of Sirius in the late evening is the constellation of Orion, with ‘The Pot’ at its centre. Rigel, the bluish supergiant star, is directly above the line of three stars; Betelgeuse a red-giant star is straight below. Left again is a triangular group around Aldebaran making the upside down face of Taurus the bull. Still further left is the Pleiades or Matariki cluster, also called the Seven Sisters, Subaru and many other names. Six or seven stars are visible to the eye; dozens are seen in binoculars. The Pleiades cluster is 400 light years away and around 70 million years old.

Scorpius is low in the southwest with its tail pointed up toward the zenith. The tail is ‘the fish-hook of Maui’ in Maori star lore. Antares, the heart of the Scorpion, is a ‘red giant’ star cooler than the Sun. Antares is bigger than Earth’s orbit but it is mostly very thin gas around a hot dense core.

The Milky Way is low in the sky, visible around the horizon from the northwest, through south into the eastern sky. The broadest, brightest part is in Sagittarius. The Milky Way is our edgewise view of the galaxy, the pancake of billions of stars of which the Sun is just one. The thick hub of the galaxy, 30 000 light years away, is in Sagittarius. A scan along the Milky Way with binoculars will show many clusters of stars and a few glowing gas clouds.

Low in the south, Beta and Alpha Centauri, and Crux the Southern Cross. In some Maori lore the bright southern Milky Way makes the canoe of Maui with Crux being the canoe’s anchor hanging off the side. In this picture the Scorpion’s tail can be the canoe’s prow and the Clouds of Magellan are the sails.

The Clouds of Magellan, (LMC and SMC), high in the in the southern sky, are two small galaxies about 160 000 and 200 000 light years away, respectively. They are easily seen by eye on a dark moonless night. The larger cloud is about 1/20th the mass of the Milky Way galaxy, the smaller cloud 1/30th. That’s still many billions of stars in each. The globular star cluster 47 Tucanae appears near the SME but is ‘only’ 16 000 light years away. Globular clusters are spherical clouds of stars many billions of years old.

Very low in the north is the Andromeda Galaxy, easily seen in binoculars on a dark night and faintly visible to the eye. It appears as a spindle of light. It is similar in shape to our galaxy but a little bigger and nearly three million light years away.

Mars is a bright orange star in the morning sky. It rises in the northeast about 2 a.m. the beginning of the month; around 1 a.m. by the end. It is small in a telescope.

Notes by Alan Gilmore, University of Canterbury’s Mount John Observatory, P.O. Box 56, Lake Tekapo 7945, New Zealand. www.canterbury.ac.nz

Notes on the Planets in November 2009

MERCURY is at superior conjunction, on the far side of the Sun on November 5. This will mean it is too close to the Sun for observation most of the month. After conjunction, Mercury will become an evening object, setting shortly after the Sun. By the end of November, Mercury will set about 75 minutes after the Sun, so may be visible in the evening twilight. 40 minutes after sunset, the planet will be very low in a direction between southwest and west.

VENUS remains a morning object, rising about half an hour before the Sun all month. So it will be a very low object, only 4 or 5 degrees above the horizon by the time the Sun rises. Given a clear horizon, between east and southeast, the brilliance of the planet should make it visible.

Spica will be some 3.5° above Venus on the morning of November 4.

MARS continues to rise well after midnight throughout November, so remains a morning object. On the last morning of October, the planet will be on the western edge of the Praesepe (Beehive) star cluster (M44) in Cancer. It will cross the cluster over the next 3 nights to be on the eastern edge on November 3. Mars crosses just north of the centre of the cluster. For the rest of the month, Mars will move to the east across Cancer, to lie on the boundary between it and Leo on November 30. On the morning of November 10, the Moon at last quarter will be just over 7° to the upper right of Mars, the previous morning it will be a similar distance to the left of Mars, and then 61% lit.

JUPITER is now moving through the stars in a forward, that is easterly direction after being stationary in October. This will mean its distance from Neptune will again start to decrease, halving from 6° to 3° during the month.

Jupiter remains in Capricornus all month and starts the month close to the 4.3 magnitude star Cap, the two being just over 20 arcminutes apart on November 1. Jupiter moves steadily away from the star during November.

On November 23 the 36% lit Moon will be 6° from Jupiter, the two getting a little closer through the evening. The following evening the two are only slightly further apart, although the Moon will be on the other side of Jupiter, and now 45% lit. This time the two will move apart during the evening.

SATURN will start moving further up in the morning sky during November, rising 2 hours earlier at the end of the month compared to the beginning. By November 30, the planet will be nearly 20° up 45 minutes before sunrise, in a direction between northeast and east. The ring system is beginning to open as seen from the Earth, with the northern face now in view and lit by the Sun. Even though they are opening, the rings will still appear quite narrow for the next few months. Saturn is in Virgo at present moving to the east and a little over half way between Regulus in Leo and Spica the brightest star of Virgo.

On the morning of November 13, it will be joined by the crescent Moon, 19% lit. The Moon will be 6° above the planet.
Diary of Solar System Events
November 2009

By Brian Loader RASNZ

<table>
<thead>
<tr>
<th>DATE (NZDT)</th>
<th>DIARY OF SOLAR SYSTEM EVENTS IN NOVEMBER 2009 FOR NEW ZEALAND</th>
</tr>
</thead>
<tbody>
<tr>
<td>November 1 to 3</td>
<td>Mars crosses M44.</td>
</tr>
<tr>
<td>November 3</td>
<td>Full Moon at 8:14am NZDT (Nov 2, 19:14 UT).</td>
</tr>
<tr>
<td>November 4</td>
<td>Venus 3.6° below Spica, magnitude 1.6, very low to east at sunrise.</td>
</tr>
<tr>
<td>November 5</td>
<td>Mercury at superior conjunction.</td>
</tr>
<tr>
<td>November 6</td>
<td>Moon furthest north, resulting in the lowest southern hemisphere transit for the month.</td>
</tr>
<tr>
<td>November 7</td>
<td>Moon at perigee, its closest to the Earth for the Lunar month, 368912 km.</td>
</tr>
<tr>
<td>November 10</td>
<td>51% lit waning Moon 7° to right of Mars, early morning sky.</td>
</tr>
<tr>
<td>November 10</td>
<td>Moon at last quarter 4:56am NZDT (Nov 9, 15:56 UT).</td>
</tr>
<tr>
<td>November 11</td>
<td>39% lit waning Moon 3.2° to upper right of Regulus, magnitude 1.4, brightest star in Leo, morning sky.</td>
</tr>
<tr>
<td>November 13</td>
<td>19% lit waning Moon 6° above Saturn, morning sky, before sunrise.</td>
</tr>
<tr>
<td>November 15</td>
<td>5% lit crescent Moon 3.5° to right of Spica, magnitude 1.4, brightest star in Leo, low to east in dawn sky.</td>
</tr>
<tr>
<td>November 17</td>
<td>New Moon at 8:14am NZDT, (Nov 16, 19:17 UT).</td>
</tr>
<tr>
<td>November 18</td>
<td>2.4% lit crescent Moon 0° to upper right of Antares, magnitude 1.1, brightest star in Scorpius, low in sky following sunset.</td>
</tr>
<tr>
<td>November 19</td>
<td>Moon furthest south, resulting in the highest southern hemisphere transit for the month.</td>
</tr>
<tr>
<td>November 23</td>
<td>Moon at apogee, its greatest distance from the Earth for the Lunar month, 404734 km.</td>
</tr>
<tr>
<td>November 23</td>
<td>36% lit waxing Moon 6° from Jupiter evening sky, closest near midnight. Only slightly further apart the next night</td>
</tr>
<tr>
<td>November 30</td>
<td>65% lit waxing Moon 6° below Uranus evening sky, closest after midnight.</td>
</tr>
</tbody>
</table>

Cetus, a constellation for November

by Paul Rodmell, Southland Astronomical Society

This is an ancient constellation depicting a sea monster that threatened to devour Andromeda, before Perseus rescued her. Cetus is found in the sky basking on the shores of the constellation Eridanus, the River, and near Aquarius the Water Carrier. The constellation is large but faint and lies in a rather barren part of the sky.

Cetus contains some interesting stars, particularly ο Ceti and τ Ceti. UV Ceti, is a faint but famous prototype of a class of erratic variable variables known as flare stars. These are red dwarfs that undergo sudden increases in light output lasting a few minutes. The outbursts of the flare star component of UV Ceti take it from its normal 13th magnitude to as bright as 7th magnitude.

To find Cetus, look north between the Great Square of Pegasus and Aldebaran, about half way up from the horizon.
A new image from the Herschel Space Observatory shows off the observatory’s talents for seeing multiple wavelengths of light.

The infrared observatory, a European Space Agency mission with important participation from NASA, can use two science instruments simultaneously to see five different “colors” of infrared, which is light that we can’t see with our eyes.

The new composite picture features a dark and cool region of our Milky Way galaxy, where material is just beginning to be stirred together into new batches of stars. Much of this region would appear dark in visible-light views, but Herschel can see the very dim infrared glow of cold dust that is only slightly warmer than the coldest temperature theoretically attainable. Herschel’s view reveals that this star-forming region is even richer in cold and turbulent material than previously believed.

“Herschel’s infrared vision lets us sense the feeble heat from some of the coldest objects in the cosmos,” said Paul Goldsmith, the NASA project scientist for the mission at NASA’s Jet Propulsion Laboratory, Pasadena, Calif.

Herschel is still in what is called the performance verification phase, in which its instruments are being fine-tuned and checked out. Some routine science observations have begun.

The new image is a combination of data taken with Herschel’s photodetector array camera and spectrometer, and its spectral and photometric imaging receiver. By using these two instruments at the same time, Herschel won’t need to use as much of its stored liquid coolant, a limited resource expected to last about three-and-a-half years.

In the color-coded image, blue shows warmer dust and red, the coolest, with green representing temperatures in between. The coldest dust can be seen as thin filaments. It is here that stars are in the very earliest stages of their infancy, and can be seen lined up together like glittering beads of water on a blade of grass.

More images like this are expected in the future and will ultimately help astronomers map the “terra incognita,” or unknown land, of our Milky Way, as well as other galaxies that are farther away.

Herschel is a European Space Agency cornerstone mission, with science instruments provided by consortia of European institutes and with important participation by NASA. NASA’s Herschel Project Office is based at NASA’s Jet Propulsion Laboratory. JPL contributed mission-enabling technology for two of Herschel’s three science instruments. The NASA Herschel Science Center, part of the Infrared Processing and Analysis Center at the California Institute of Technology in Pasadena, supports the United States astronomical community. Caltech manages JPL for NASA.
The William Herschel Telescopes

AAS Journal Feature Article

William Herschel, who discovered Uranus, built a reflecting telescope in Slough, England, that was 40 feet in length, the largest of its day. It was constructed from 1785 to 1789 at a cost of 4,000 pounds, which was paid by King George III. It remained the largest telescope in the world for 50 years. On August 28, 1789, the first night of its operation, Herschel pointed it at Saturn and discovered one of its moons. He would go on to discover another Saturnian satellite as well as two of Uranus’s moons.

THE WILLIAM HERSCHEL TELESCOPE OR WHT

The project was finally given the go-ahead in 1981. That year was the 200th anniversary of the discovery of Uranus by William Herschel, and it was decided to name the telescope in his honour. The telescope is a member of the Isaac Newton Group of Telescopes.

Construction began in 1983, and the telescope was shipped to La Palma in 1985. It saw first light in 1987. The telescope has an altazimuth mount. The mirror is maintained so that its theoretical maximum resolution is less than 0.2 arcseconds. The typical seeing at La Palma is of the order of one arcsecond, so the telescope is limited by that.

Notable discoveries made using the WHT include that of a hot bubble of expanding gas at the centre of our galaxy, suggestive of the presence of a supermassive black hole; the first observation of the optical counterpart of a gamma-ray burst; and recently, the discovery of a Wolf-Rayet star with the fastest-known stellar wind.

THE HERSCHEL SPACE TELESCOPE

The European Space Agency’s Herschel Space Observatory (formerly called Far Infrared and Sub-millimetre Telescope or FIRST) has the largest single mirror ever built for a space telescope. At 3.5-metres in diameter the mirror will collect long-wavelength radiation from some of the coldest and most distant objects in the Universe. In addition, Herschel will be the only space observatory to cover a spectral range from the far infrared to sub-millimetre. The telescope will occupy a Lissajous orbit about the second Lagrange point of the Sun-Earth system (L2).

Objectives will be to Study the formation of galaxies in the early universe and their subsequent evolution, investigate the creation of stars and their interaction with the interstellar medium, observe the chemical composition of the atmospheres and surfaces of comets, planets and satellites and examine the molecular chemistry of the universe.

THE 2009 COUNCIL

President: Grant Christie 09 636 3437
Vice President: David Britten 09 846 3657
Treasurer & Membership: Andrew Buckingham 09 473 5877
Secretary: Bill Jamieson 09 528 9494
Curator of Instruments: Ivan Vazey 09 535 3987
Librarian: Tim Natusch 09 838 9938
Journal Editor: Clive Bolt 09 534 2946
Webmaster: Nick Moore 09 480 5648
Council: Jennie McCormick 09 576 9815
Council: Gavin Logan 09 534 4103

SOCIETY CONTACTS

Auckland Astronomical Society Inc,
PO Box 24187, Royal Oak,
Auckland 1345, New Zealand

Email: info@astronomy.org.nz
Journal: journal@astronomy.org.nz
Website: www.astronomy.org.nz

Membership enquiries: contact Andrew Buckingham at treasurer@astronomy.org.nz or by phone on 09 473 5877 or 027 246 2446
8” (200mm) Dobsonian Telescope

.................. $699.00

Direct Sale Only • Special Price for AAS Members - mention this ad
Limited stock at this price - only while stocks last
Payment by cash, direct credit, direct deposit only

www.astronomy.co.nz

email: sales@astronomy.co.nz • ph 027 246 2446

---

Great Telescopes...

...at a great price

Plossl Eyepieces • SuperView Eyepieces
Camera Projection Eyepieces • Barlow Lenses
Crayford Focusers • Diagonals • Adapters
Filters • Telescope Parts

High Grade Ritchey-Chretien Telescopes

Astrophotographers Dream Machine

• True Ritchey-Chretien Cassegrain type optics. Hyperbolic quartz primary and secondary mirrors with 99% reflectivity dielectric coatings.
• Carbon-fibre optical tubes - for outstanding thermal stability!
• Ideal for astrophotography - due to their virtually coma-free imaging!
• Flatter image compared to SCT and apochromatic/corrected SCT designs

www.astronomy.co.nz

ph: 027 246 2446 • email: sales@astronomy.co.nz
Astronomy NZ Ltd • PO Box 39496, Howick, Auckland 2145