



The PRETORIA CENTRE

of the

Astronomical Society of Southern Africa

www.pretoria-astronomy.co.za

NEWSLETTER APRIL 2011

Next meeting

Venue: The auditorium behind the main building at Christian Brothers College (CBC), Mount Edmund, Pretoria Road, Silverton, Pretoria.

Date and time: Wednesday 27 April at 19h15.

Programme:

- **Beginner's Corner:** "Light pollution" by Johan Smit
- **What's Up:** by Pat Kühn
- 10 minute break — library will be open
- **Main talk: "Celestial music" by Frikkie le Roux**
- Socializing over tea/coffee and biscuits

The chairperson at the meeting will be Danie Barnardo.

Next observing evening: Friday 22 April at the Pretoria Centre Observatory, which is also situated at CBC. Turn left immediately after entering the main gate and follow the road. Arrive from sunset onwards.

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Last month's observing evening report - by Michael Poll

Cloud again, but a different format this month. Not a sky with clear patches, but a hazy layer through which we could peer at a few objects. About 15 or so people attended, with a few first time visitors, to whom we offer a retrospective welcome. There were three telescopes.

We were able to point out some of the brighter stars, including those of Orion together with Sirius and Canopus. We again had discussions about the visibility of satellites, and also about what we see as the apparent brightness of stars – we compared the distances of Rigel and Betelgeuse which to the eye appear at about equal brightness, although Rigel is further away than Beelgeuse.

The almost-full moon was in Leo, and there was some discussion about the full moon on March 19th occurring at perigee. This writer did not realize that there had been such a hoo-ha about this until he went home and read about it on line and saw it on TV. The full moon occurred more or less at the point in its orbit that is closest to earth (perigee), and would therefore appear “bigger” than usual. Well, a lot of on line comments were seen from people who had marvelled at how big the moon looked on March 19th. Talk about brainwashing? – people had been told that the moon would look extra big that night and, by golly, so it did! However there would have been little difference from February 19th, when the moon was 0.5% further away than on March 19th giving a difference in apparent size that would be totally indistinguishable to the naked eye, but nobody had been told to look at it on February 19th. Some sources, including Sky News said that, on March 19th, the moon would be “14% bigger”, but they did not say what the 14% was compared with. (In fact “14%” is the difference in apparent size of a full moon that occurs at apogee (furthest position from the Earth) compared with one at perigee). Can it be that, when full moon next occurs at apogee, that the media will tell people to go out and see how much *smaller* than usual the moon looks? Still, if it were not for events such as these, people might not go out and look at the sky at all.

Otherwise, we were able to look at some craters, notably the bright ones Tycho (85 km in diameter), and its ray system, and Aristarchus, the brightest spot on the moon and 40 km in diameter. We also noted Mare Crisium, which is 570 km across. Crisium is always near the limb of the moon from our viewpoint on Earth, and so appears as an oval, but if it could be viewed from above its true circular nature would be apparent.

At the end of the evening we at least wanted to have a look at Saturn before we left. At one time we said “there it is” and put the telescope on it, but no, it was a bright blue diamond - Spica, the brightest star in Virgo, which is to the south of Saturn ,i.e on the right when facing east. Later on we were rewarded – Saturn was seen through the cloud layer and was appropriately admired. The rings have opened up a little more than last year, and one moon was seen.

Summary of “What’s Up” to be presented on 27 April 2011- by Pat Kühn

Sun:

Rises at 06h31 at beginning and at 06h47 at the end of May.

Sets at 17h38 at beginning and at 17h23 at the end of May.

Moon:

New moon: 03 May

First Quarter: 10 May

Full Moon: 17 May

Last Quarter: 24 May

Best Observing Times: 1 to 7 May; and again from 26 to 31 May

Planets:

Mercury (mag 1.0) Morning sky object all month, brightens to -1.3 at month end.

Venus (mag -3.9) Morning object, visible 1.5 to 2.5 hours before sunrise.

Mars (mag 1.2) Morning object. Look for it about 1 hour before sunrise.

Jupiter (mag-2.1) Morning object rising as dawn begins in early May and 3hrs before sunrise by

month end.

Saturn (mag 0.4) A fine sight all evening until 04h00 at the beginning of May and setting around 02h00 at month end. It's rings were at a 9 degree angle during April and will close to 7 degrees in June..

Uranus (mag 5.9) Rises in Pisces around 03h00 on the 1st and will be visible from 01h00 at month end.

Neptune (mag 7.9) Visible in the Aquarius/Capricorn region from around 01h00 at the beginning of May and from 23h00 at month end.

Meteor Showers. Conditions are reasonably favourable for the following:

Alpha Scorpiids (Maximum on 03 May); Eta Aqaurids (Maximum on 05 May)

Constellations and Deep Sky: Orion and the summer constellations are being replaced by the winter constellations. The following are well placed in the evening sky:

Towards the East, the Scorpius region with Sagittarius appearing later in the month, with many deep sky objects (see p 98 of the Sky Guide).

Overhead Corvus and Virgo provide ample opportunity for Galaxy hunting.

In the Northern regions are Bootes and Leo.

In the Southern part of the sky, the southern constellations are prominent with a host of deep sky favorites (see p 96 of the Sky Guide).

Special Events:

7 May – Mercury at greatest elongation West (26 degrees)

All month – In the morning sky before sunrise Mercury, Venus, Mars and Jupiter form attractive close groupings in Pisces and later in the month in Aries. Especially impressive on May 30th, they form a straight line, with an 8% moon alongside.

Resources:

<http://www.skyandtelescope.com/observing/ataglance>

<http://spaceweather.com/>

<http://www.heavens-above.com/>

<http://skymaps.com/>

<http://spaceweather.com/>

<http://www.sao.ac.za/public-info/sun-moon-stars/>

Sky Guide Africa South 2011

Hanny's Voorwerp

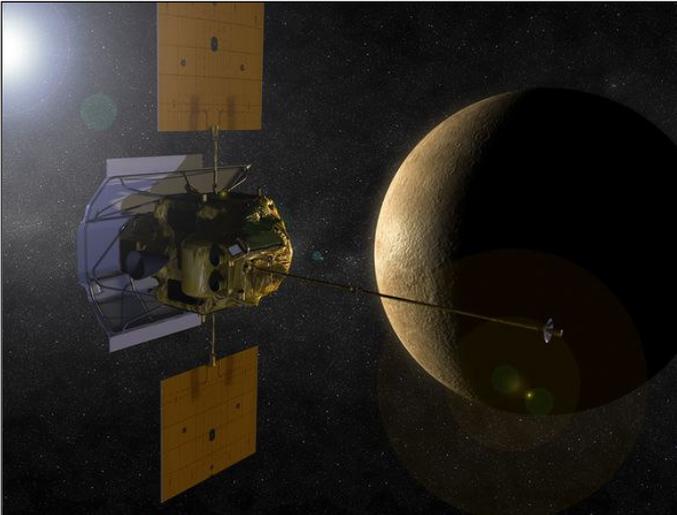
Hanny's Voorwerp—a glowing, green blob in space—is unexpectedly giving birth to stars, a new Hubble Space Telescope picture has revealed. Although it's the size of our Milky Way galaxy, Hanny's Voorwerp is not itself a galaxy, but a cloud of gas near the spiral galaxy IC 2497, which lies about 650 million light-years from Earth. The new Hubble picture—the sharpest yet taken of the brilliant cloud—shows that gas in a small region of Hanny's Voorwerp is collapsing and forming stars, the youngest of which are just a couple of million years old.

The new Hubble picture on the left shows the Hanny's Voorwerp gas cloud and galaxy IC 2497.

<http://news.nationalgeographic.com/news/2011/01/110110-glowing-green-blob-hannys-voorwerp-science-space-american-picture/>



NASA probe successfully orbiting Mercury - a first



NASA made history as the MESSENGER spacecraft became the first spacecraft to orbit the tiny planet Mercury. Launched in 2004, the **ME**rcury **S**urface, **S**pace **EN**vironment, **GE**ochemistry and **R**anging mission marks the first time a craft has gone near Mercury since 1975, when NASA's Mariner 10 probe conducted flybys.

For the past 6½ years MESSENGER has been maneuvering itself into an orbital path via gravity assists, using the tugs from flybys of Earth, Venus, and Mercury itself to speed up and alter course.

The image is an artist's impression of the spacecraft in orbit around Mercury.

<http://news.nationalgeographic.com/news/2011/03/110317-nasa-mercury-messenger-first-orbit-insertion-space-science/>



ESA's Mercury mapper feels the heat

Key components of the ESA-led Mercury mapper BepiColombo have been tested in a specially upgraded European space simulator. ESA's Large Space Simulator is now the most powerful in the world and the only facility capable of reproducing Mercury's hellish environment for a full-scale spacecraft.

The Mercury Magnetospheric Orbiter (MMO) has survived a simulated voyage to the innermost planet. The octagonal spacecraft, which is Japan's contribution to BepiColombo, and its

ESA sunshield withstood temperatures higher than 350°C.

This is a taste of things to come for the spacecraft. BepiColombo will encounter fully ten times the radiation power received by a satellite in orbit around Earth

The image shows the spacecraft being tested in the Large Space Simulator.

http://www.esa.int/esaSC/SEMNBC6SXIG_index_0.html

Meade LX200GPS 8" telescope and accessories for sale

Meade LX200GPS 8" Schmidt-Cassegrain Telescope

Super Plossel 26 & 40 mm eyepieces

Meade 2x Tele Negative Barlow Lens (New R599)

Meade Plossel 12 mm Illuminated Reticle eyepiece (wireless) (New R1,299)

Meade Deep Sky Imager PRO CCD Camera with RGB and IR filters (New R5,000)

RS232 to USB converter

Meade Lunar Planetary Imager (LPI)

Portable rechargeable battery pack (12v/220v)

Autostar

Autostar II

Pelican 1660 Hardcase (New R6000)

As new and recently serviced and calibrated by Lynx Optics. New GPS unit.

R25,000 for everything.

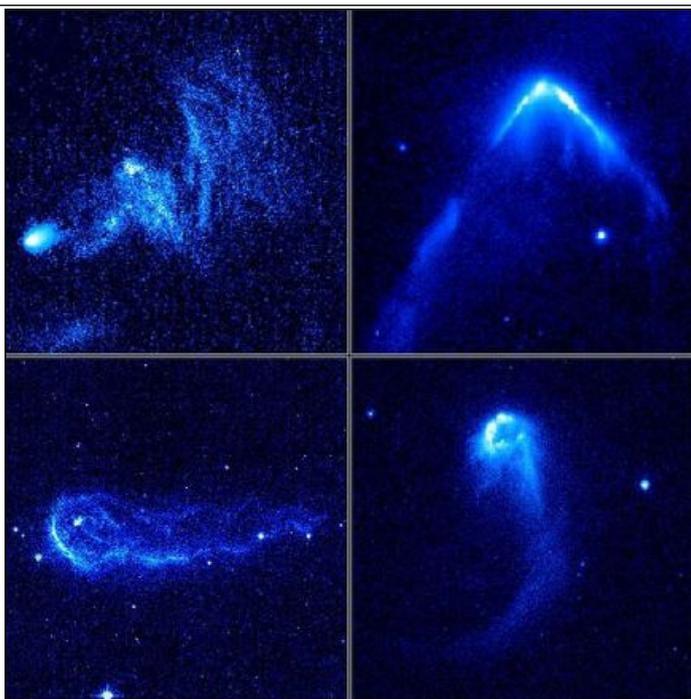
Contact: Fanie Kroukamp. Cell: 082 335 9052. E-mail: Fanie.Kroukamp@implats.co.za

Runaway stars

A runaway star is one which is moving through space with an abnormally high velocity relative to the surrounding interstellar medium. The proper motion of a runaway star often points exactly away from a stellar association, whose member it therefore once must have been before it was hurled out.

Two possible mechanisms may give rise to a runaway star:

1. In the first scenario, a close encounter between two binary systems may result in the disruption of both systems, with some of the stars being ejected at high velocities.
2. In the second scenario, a supernova explosion in a multiple star system can result in the remaining components moving away at high speed.



While both mechanisms are theoretically possible, astronomers generally favour the supernova hypothesis as more likely in practice. One example of a related set of runaway stars is the case of AE Aurigae, 53 Arietis and Mu Columbae, all of which are moving away from each other at velocities of over 100 km/s (for comparison, the Sun moves through the galaxy at about 20 km/s faster than the local average). Tracing their motions back, their paths intersect near to the Orion Nebula about 2 million years ago. Barnard's Loop is believed to be the remnant of the supernova that launched the other stars. Another example is the X-ray object Vela X-1, where photo digital techniques reveal the presence of a typical supersonic bow shock hyperbola.

In the image above, four runaway stars are seen ploughing through regions of dense interstellar gas and creating bright bow waves and trailing tails of glowing gas. The stars in these NASA Hubble Space Telescope images are among 14 young runaway stars spotted by the Advanced Camera for Surveys between October 2005 and July 2006.

http://en.wikipedia.org/wiki/Stellar_kinematics

AE Aurigae is the bright star below and left of centre in this evocative portrait of IC 405, also known as the Flaming Star Nebula. Embedded in the cosmic cloud, the hot, variable O-type star energizes the glow of hydrogen along convoluted filaments of atomic gas, its blue starlight scattered by interstellar dust. But AE Aurigae wasn't formed in the nebula it illuminates. Retracing the star's motion through space, astronomers conclude that AE Aurigae was probably born in the Orion Nebula. Close gravitational encounters with other stars ejected it from the region, along



with another O star, Mu Columbae, over two million years ago. The runaway stars have drifted in opposite directions ever since, separating at about 200 kilometers per second.

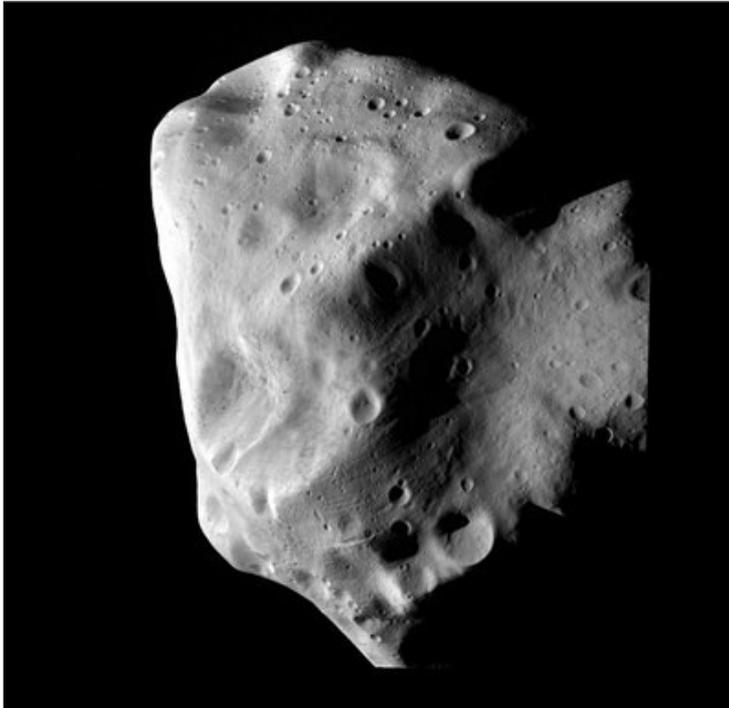
<http://apod.nasa.gov/apod/ap110311.html>

(continued on next page)

The star Zeta Ophiuchi, a hot blue supergiant with mass = 20 solar masses, is also a run-away star generating a bow shock as it moves through the interstellar medium.

<http://news.discovery.com/space/renegade-star-rips-through-space.html>

This information was sent in by Dr Hubrecht Ribbens, one of our members who has given several presentations at our monthly meetings and also one at the ASSA Symposium 2010. He remarks: *"A thought: in my previous contribution on chemical tagging, the siblings were leaving home peacefully. In this case, the family members are forcefully removed!"* His contribution on chemical tagging is on page 6 of the February 2011 newsletter.



Rosetta triumphs at asteroid Lutetia

Asteroid Lutetia has been revealed as a battered world of many craters. ESA's Rosetta mission has returned the first close-up images of the asteroid. The flyby was a spectacular success with Rosetta performing faultlessly.

The images show that Lutetia is heavily cratered, having suffered many impacts during its 4.5 billion years of existence. As Rosetta drew close, a giant bowl-shaped depression stretching across much of the asteroid rotated into view. The images confirm that Lutetia is an elongated body, with its longest side around 130 km.

The pictures come from Rosetta's OSIRIS instrument, which combines a wide angle and a narrow angle camera. At closest approach, details down to a scale of 60 m

can be seen over the entire surface of Lutetia. "We have seen a remnant of the Solar System's creation," says the OSIRIS principal investigator. The image shows Lutetia at closest approach.

http://www.esa.int/SPECIALS/Rosetta/SEM44DZOFBG_0.html



ESA remembers the night of the comet

Twenty-five years ago, ESA made its mark in deep space. A small spacecraft swept to within 600 km of Halley's comet. The Giotto probe was nearly destroyed by the encounter but what it saw changed our picture of comets forever. As debuts go, it doesn't get any better than Giotto. The spacecraft was ESA's first deep-space mission.

ESA's Rosetta spacecraft is en route to comet Churyumov-Gerasimenko, for arrival in 2014. It will study the comet and release a lander to analyze the surface material. Once at the comet, Rosetta will follow it for months. On the left is an artist's impression of Rosetta approaching the nucleus of the comet.

Where Giotto gave us the night of the comet, Rosetta promises the year of the comet.

http://www.esa.int/esaSC/SEMMA0YTVKG_index_0.html

SCOPEX 2011

This is a Telescope & Astronomy Exhibition.

When: Saturday, 7 May 2011.

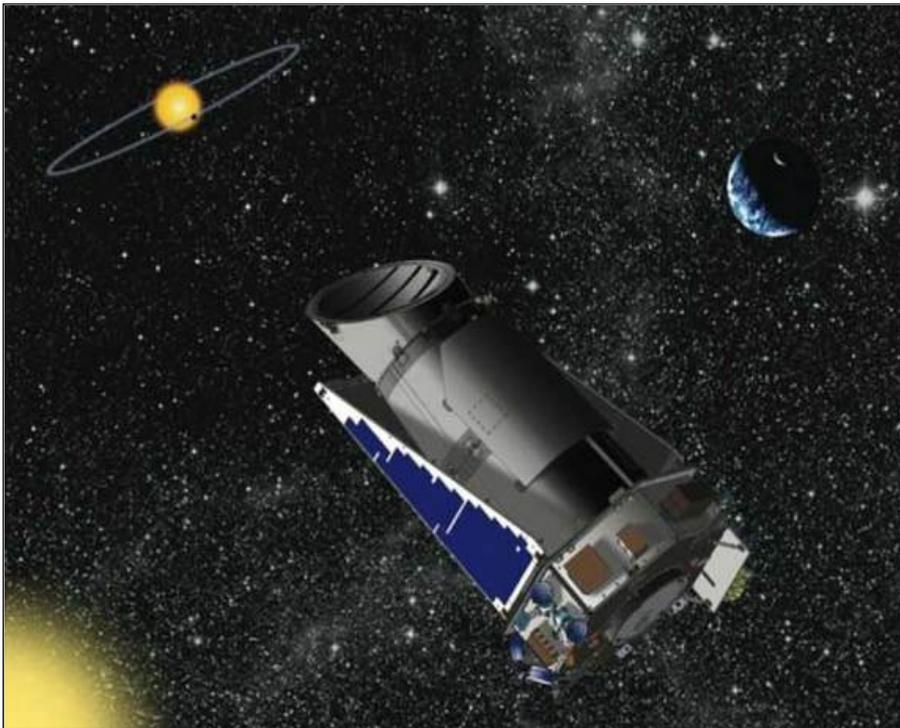
Where: SA National Military History Museum in Johannesburg (aka The War Museum. It is next to the Johannesburg Zoo).

Time: 9am to 9pm (Star Party from 6pm).

Museum Entrance Fee: R22 adults, R11 senior citizens and children up to 18.

<http://www.sa-venues.com/events/gauteng/scopex/>

FEATURE OF THE MONTH: Kepler and HARPS-North



The search for planets outside our solar system continues to heat up. NASA's Kepler observatory has located more than 1200 planetary candidates. However, confirming them remains a challenge. The Kepler observatory determines the light curves of stars and looks for shallow periodic dips in the light curves, which occur when orbiting planets transit (i.e. cross in front of) the stars. In some circumstances, an eclipsing binary star can mimic the periodic dips.

Ground-based measurements are needed to verify an orbiting world by doing analyses of the spectra of the candidate stars. An eclipsing binary star

has two sets of periodically oscillating absorption lines, one set for each of the stars. A single star being orbited by a planet, has only one set of periodically oscillating absorption lines, with much smaller amplitude than those of an eclipsing binary star.

The Harvard-Smithsonian Centre for Astrophysics (CfA) continues to be a major player in the planet-hunting realm. CfA is part of an international collaboration building a new instrument called HARPS-North. (HARPS stands for **H**igh **A**ccuracy **R**adial Velocity **P**lanet **S**earcher.) This precision spectrograph is designed to detect the tiny radial-velocity signal induced by planets as small as Earth, if they orbit close to their star. It will complement Kepler by helping to confirm and characterize Kepler's planetary candidates. (There already exists a HARPS facility in the Southern Hemisphere. It is attached to the 3.6m telescope of ESO at La Silla in Chile. See the September 2010 newsletter, page 6.)

The image is an artist's depiction of the Kepler observatory in space, observing a star with a planet orbiting around it.

- <http://news.discovery.com/space/exoplanet-life-impossible-or-100-percent-what.html>
- <http://www.sciencecentric.com/news/11021403-new-instrument-will-help-confirm-kepler-planet-finds.html>
- The Kepler mission: <http://kepler.nasa.gov/>
- HARPS-North: <http://www.space.com/10860-kepler-harps-north-instrument.html>

Pretoria Centre of the ASSA at the Green Market

On Saturday evening 2nd April, Danie Barnardo, Percy Jacobs and Pat Kühn took their telescopes - which are not only beautiful to look through but also beautiful to look at - to the Green Market at the Botanical Gardens. Neville Young was also there with his Solar System



Model to explain why only Saturn was visible and why it could be seen rising in the East. Percy (leftmost standing person) and Danie (standing next to him) can be seen in this photograph.

Outreach event: call for volunteers

A regular outreach event will soon take place at Menlo Park Primary School. The Pretoria Centre of the ASSA has a close relationship with the science club at Menlo Park primary school. We sponsor a book prize for their top science learner and have visited them every year for the last few years. We have been invited again for a visit on the 11th of May 2011.

Johan Smit will do a short presentation to the learners at 17:30, after which we will join the learners and their parents for some star gazing on the sport field. This event is usually attended by at least 50 learners and their parents, so we need many volunteers and telescopes to assist with the star gazing

We are asking that our members bring along their telescopes for the viewing part of the evening. An evening like this at this school is always a pleasure and it is wonderful to meet some youngsters who are genuinely interested in science. Come and help us enrich some young minds. Even if you do not have a telescope and want to join us, you are most welcome to attend.

If you can assist with this event, please contact Johan Smit at:

tel: 011 790 4443

fax: 086 638 7385

cell: 072 806 2939

email: JohanS@firsttech.co.za

Karoo Star Party 2011

The Karoo National Star Party is now becoming a regular event!. The ASSA Pretoria Centre wants to hold its third Karoo National Star Party during the weekend of Friday 29 April to Monday 2 May 2011 about 20 km north of Britstown in the Karoo, right next to the N12 at the Kambro Padstal.

<http://www.pretoria-astronomy.co.za/events.htm>

Workshop on observing

I (your newsletter editor) received an e-mail message from Kos Coronaios, the chairman of the Soutpansberg Astronomy Club. The following invitation was contained in it:

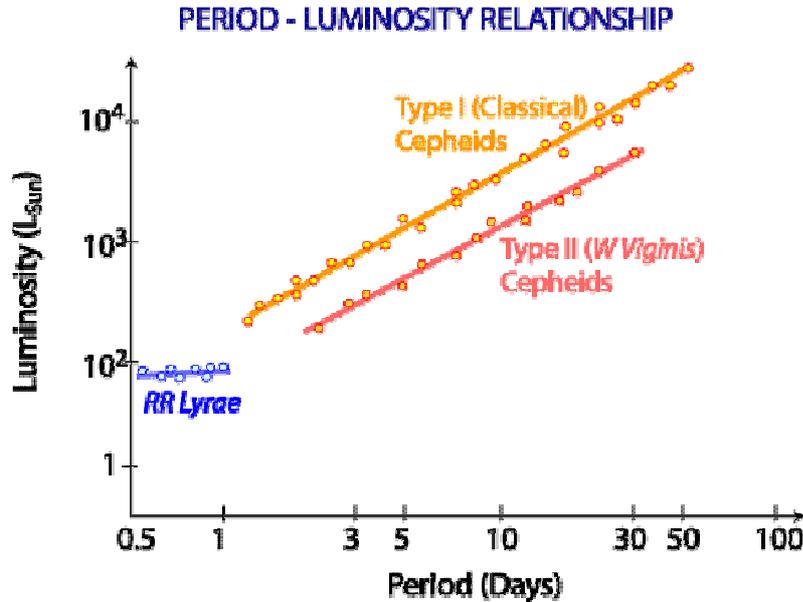
The Director of the Comet, Asteroid and Meteor Section of ASSA, Tim Cooper, would like to conduct a workshop in the region on all aspects of observing (not just comets and meteors) which will be held in May or June. Dates, venue and other details still to be finalized. Anyone with an interest in astronomy is welcome to attend the workshop and observers who are serious about contributing something scientific to astronomy must not miss this one!

If you are interested in attending the workshop, please contact me (Kos Coronaios) at 079 148 4934 or 015 516 3110 or elephantcastle@lantic.net so that we can get an idea of numbers to plan venue, dates, etc.

Basics: finding distance using the P-L relationship - by Pierre Lourens

The Period-Luminosity (P-L) relationship connects the period of regularly pulsating stars to their average luminosity. There are three types of stars for which there are such relationships:

- Type I (classical) Cepheids (which includes the prototype, Delta Cephei). These stars have chemical compositions like that of the Sun. (Roman numeral I for 1 is meant here.)
- Type II Cepheids. These stars are poor in “metals” (i.e., elements with atomic mass greater than that of helium). (Roman numeral II for 2 is meant here.)
- RR Lyrae stars. These stars are also poor in “metals”.



Since these stars have large luminosities, they are visible from Earth even if they are very far away. These relationships are used to find distances to star clusters and galaxies. **In principle**, it is done as follows. Consider the following formula for a star of one of the three types:

$$I = L / (4\pi d^2) \quad (1)$$

I is the mean (over time) intensity of light from the star, measured here on Earth.

L is the mean (over time) luminosity of the star.

d is the distance of the star from Earth.

If we measure the mean intensity **I** here on Earth and somehow know the value of the mean luminosity **L**, the only unknown in (1) is the distance **d**, which can then be calculated. It is in the determination of the value of **L** that the P - L relationship is used. The period **P** is found from the light curve for the star. **L** is then read off from the appropriate plot in the figure above.

In practice, however, astronomers do not use formula (1) and the plot above to determine the distance to the pulsating star, but instead use formula (2) below and a log-log plot. Formula (2) is derived from formula (1) and from the definition of the apparent magnitude **m** of a star in terms of **I**. Formula (2) is therefore nothing but formula (1) in disguise (**All logs are to base 10.**):

$$m - M = - 5 + 5 \log d \quad (2)$$

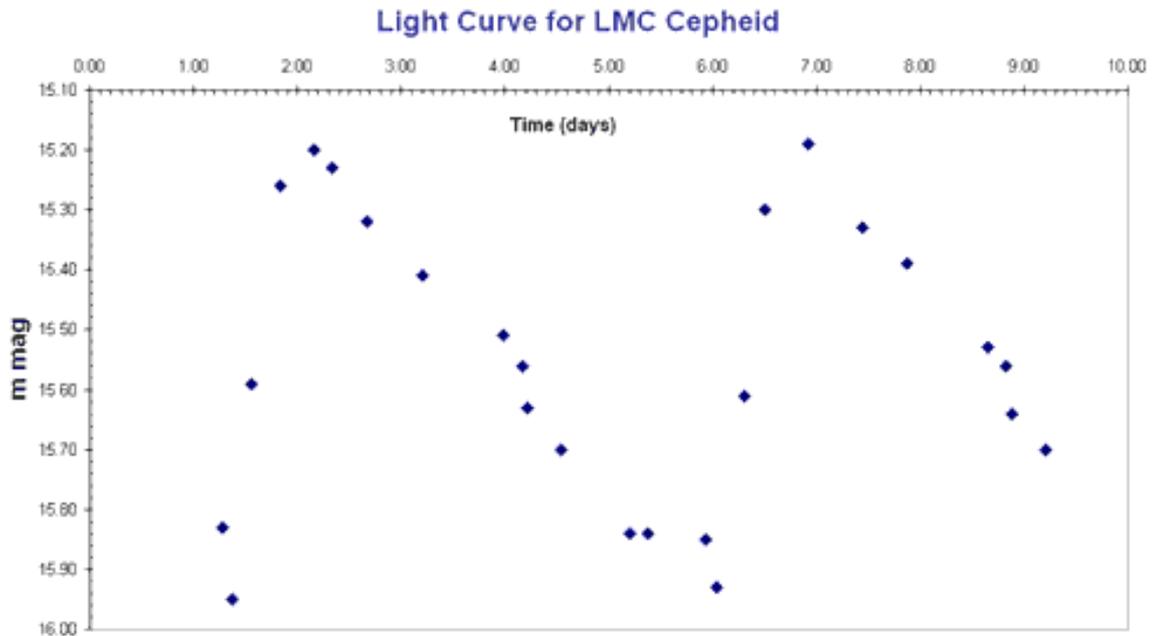
m is the mean apparent magnitude of the star. It is a measure of **I**.

M is the mean absolute magnitude of the star. It is a measure of **L**.

d is again the distance of the star from Earth, but must now be in parsecs.

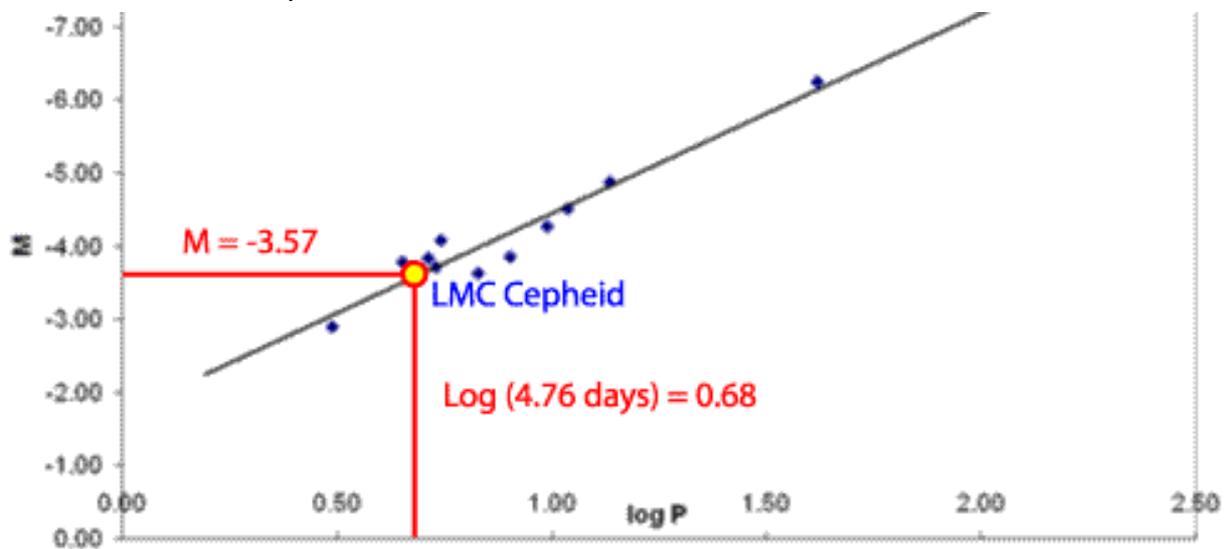
Instead of the plots above, they use plots of **M** (**= - (5/2)log L + a known constant**) versus **log P** for the three types of stars. These plots contain the same information as the plots above.

The method can be understood by working through the following example. Suppose we want to find the distance to the Large Magellanic Cloud (LMC). Consider a star that has been identified as a Cepheid of type I in the LMC. Photometric observations, be they naked-eye estimates, photographic plates, or photoelectric CCD images provide the apparent magnitude values for the Cepheid. Plotting apparent magnitude values from observations at different times results



in a light curve such as shown here. From the light curve, the mean apparent magnitude m of the star and its period P in days, are determined. In this example, $m = 15.56$ and $P = 4.76$ days.

Knowing P , we can now determine the mean absolute magnitude M , by using the plot of M versus $\log P$ for Cepheids of type I. The plot shown here is based on Cepheids of type I within the Milky Way and with known distance. $\log(4.76) = 0.68$. When the value of M for this value of $\log P$ is read off from the plot, a value of $M = -3.57$ is found.



Solve for d from (2). Obtain

$$d = 10^{(m - M + 5)/5} \quad (3)$$

Substitute the values of m and M in formula (3) and then calculate d . The result is:

$$d = 67\,000 \text{ parsecs} = 219\,000 \text{ light-years}$$

The distances between the stars in a cluster or galaxy are small in comparison with its distance from Earth. The distance d determined for the pulsating star in a cluster or galaxy is then also the distance to all the stars in the cluster or galaxy - to a good approximation.

Last month's meeting report – by Percy Jacobs

To our visitors who attended the evening, we encourage you to join our Society and take part in our activities and look forward to seeing you at our monthly meetings and monthly viewing evenings.

What's Up & Beginner's Corner was combined and presented my Michael Poll. Michael took us through the highlights of what's up in April and a little in May as per his summary in the March newsletter. Michael did highlight a few points:

Mercury will be seen at its best during months of April & May in the early morning.

On April 27th, Jupiter, Mars, Venus, Mercury, Uranus, in a straight line along the ecliptic early morning in the east

In May, these 5 planets, Jupiter, Mars, Venus, Mercury, Uranus, shall be in a grouping in the early morning in the east.

Constellations Leo, Virgo, Scorpius are starting to rise in the east.

Michael then went onto the topic of calculating the dates of Easter. (Any member who wants the few slides that Michael presented, in the form of a pdf file, must request it from me by e-mail. - Editor.)

Dr Hubrecht Ribbens, a member of the Pretoria ASSA Centre, our Main Speaker for the evening, went on to present "Space Science in South Africa". He covered the below topics in the presentation:

Historical overview of Space Science in South Africa

Current role players in this industry and their focus

Recent developments in space science

New Prospects

From the presentation, South Africa has had a very active history in global space science arena and is still considered a major player within the industry contributing towards space development locally and internationally.

Some History

Rich heritage of involvement in space science – 1820 permanent observatory in Cape Town and many others since.

Tracking satellites from early space age - late 1950's to 1970 to determine effects of upper atmosphere on their orbits.

In 1961, *NASA commissioned 40ft antenna at Hartbeesthoek* (and two others in Chile and Australia) to track and acquiring data .

Between 1964 – 1975, *CSIR supported numerous NASA lunar and interplanetary missions* from the tracking station at Hartebeesthoek , e.g. receiving data from scientific packages left on the Moon by Apollo astronauts.

In 1965, the tracking station at Hartebeesthoek received the *first images of Mars taken by the Mariner IV spacecraft*.

Last NASA mission was to support the Viking launches to Mars in October 1975.

In 1975, Hartebeesthoek was *converted to a radio astronomy facility* to receive data from various Earth observation satellites such as Meteosat, NOAA and Landsat.

In 1980, system was *modified to support space activities of French National Space Agency (CNES)*.

South Africa's initiated its *first space programme in the 1980s*. Objective: to develop Earth observation satellite (Greensat) and a *launcher at Arniston* – discontinued in 1994.

In 1999, University of Stellenbosch built 64kg Sunsat, launched by NASA as secondary payload to the larger Argos satellite – operated successfully for two years.

In 2005, Department of Science and Technology initiated its satellite programme. University of Stellenbosch appointed to manage programme – Sumbandila (means "Lead the way" in Venda). Launched on 17 September 2009 from Baikonur Cosmodrome.

Positioned in low Earth orbit (LEO) – purpose to take high resolution images for agricultural and environment management application. Currently still operational - CSIR does tracking.

CSIR SAC maintains an archive of images taken by the various satellites dating back to 1972. The archive is a national resource, providing applications long after satellites ceased to operate.

Current Role Players

Department of Science and Technology (DST)
 National Research Foundation – NRF
 South African Astronomical Observatory (SAAO)
 SALT and other telescopes (Sutherland)
 MeerKAT (*Pathfinder to the SKA*) (Carnarvon)
 Hartebeesthoek Radio Astronomy Observatory (HartRAO)
 Hermanus Magnetic Observatory (HMO)
 South African National Space Agency (SANSA)
 Department of Trade and Industries (DTI)
 South African Council for Space Affairs (SACSA)
 CSIR
 Satellite Application Centre (SAC)
 Council for GeoScience
 University of Stellenbosch & SUNSpace
 Universities - formal training and research e.g. UNISA, UCT, NWU, Rhodes, UWC, other
 Private sector – computing, ICT, electronics, Telkom, and other.

New Prospects

- “Office of Astronomy Development (IAU) and UNAWE”
 Agreement decision taken in May 2010 when IAU selected South Africa as host for the OAD. *South African bid beat stiff competition from field of 20 competing proposals.*
 OAD to be operated as a *partnership between the IAU and South Africa.*
 Dr Kevin Govender of SAAO will manage the OAD.
- Educational Astronomy Project Awarded Grant of 1.9 Million Euros
 EU granted 1.9 million Euros to support the *6-country educational programme Universe Awareness (UNAWE).*
Aimed at the implementation of Universe Awareness programmes in six countries over three years: Germany, Italy, the Netherlands, United Kingdom, South Africa and Spain.
- 62nd International Astronautical Congress - Cape Town 3-7 Oct 2011
 First time to be held in Africa
 Science and Exploration
 Applications and Operations
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- Square Kilometre Array (SKA)
 SKA will be 50 times more sensitive, and be able to survey the sky 10 000 times faster, than any imaging radio telescope array previously built.

South pole of Phobos

The south pole of Phobos, one of the two moons of Mars, as seen by spacecraft Express of ESA.
<http://apod.nasa.gov/apod/ap110124.html>



Telescope for sale

Celestron Skywatcher 130
 Contact Lynn Wilford 011 433 1870 or 072 436 6029

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Delphinus=Dolphin

