CANOPUS

The Astronomical Society of Southern Africa

Johannesburg Centre

Monthly Newsletter for November 2002

Contents:

The Sir Herbert Baker Library, 18a Gill Street, Observatory, Johannesburg
P.O.Box 93145, Yeoville, 2143

Editorial

Countdown to Eclipse 2002 is progressing and we have some articles and invitations to presentations in this month's issue. For those of you who have left it late, you may still be lucky in getting a place "out of" the Sun on the 4th of December. Just contact one of your friendly committee members to see where there might me a place for you.

Venus is still up there in the evening sky like a laser pointer, and the other major planets are starting to look pretty good in the mornings. Orion too looks good in the early mornings (when the clouds don't get in the way) and at the other end of the night, Delta Scorpii is still looking more like a Beta rather that a Delta as it shines in the Scorpion's Head. Have any of you out there made any measurements of Delta Scorpii lately? If so, pass them on to one of the Variable Star specialists such as **Brian Fraser**.

After an editorial boo-boo in the last (October) issue, **Eben van Zyl** continues to tell us of *Henrietta Swan Leavitt's* secrets. Read **Tim Cooper'**s ad for the ASSA 2002 Symposium on the inside back cover and there is also information on how to get your hands on some really good and (inexpensive) posters of Solar System objects with emphasis on our outer neighbour Mars.

Brian Fraser has once again supplied us with the monthly tables of all the astronomical events of interest - for November and December. We have also picked up a couple of interesting articles from the NASA email lists regarding the Rosetta Spacecraft as well as news of the largest Solar System object to have been discovered since Pluto was first seen back in the first half of the 20th century.

ECLIPSE chasers - Once again remember we have a solar eclipse on 4th December. If you would like to be there, contact a committee member, or Brian Fraser for further details on how to get to the area of interest. Time and accommodation is running out - so don't delay or you will miss this big event.

The Editor

chris@penberthy.co.za

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Notice of Monthly Meeting

The Monthly Meeting of the Johannesburg Centre of the Astronomical Society will be held in the Sir Herbert Baker Library, 18a Gill Street, Observatory, on Wednesday, 13th of November, 2002 at 20:00.

Consciousness Mapping

By: **Prof. Marilyn Lucas**

Telescope Making Classes

Would you like to make your own telescope?…or finish off a partially completed one? Well your opportunity has arrived (once again). Join the Telescope Making Class being held under the guidance of Brian, Evan and Chris. Contact Brian on (016) 366-0955 if you are interested. You may also subscribe to the email list server by sending an email to *assa_telescopemaking-request@list.to* with the word SUBSCRIBE in the body of the message. It will mail you back asking for confirmation - just follow the instructions.

To send email to all subscribers to the list, merely send a single message to *assa_telescopemaking@list.to* and the list server will distribute the message to everyone concerned.

Other ASSA Lists

	To Subscribe	**To send messages**
ASSA Jo'burg Centre:-	*assa_announce-request@list.to*	*assa_announce@list.to*

Public Viewing *(weather permitting)*

Public viewing nights are held *subject to suitable weather conditions* on the Friday nearest First Quarter, and are held at the Old Republic Observatory, 18a Gill Street, Observatory, Johannesburg. Starting time around 19:30. *See the ASSA event calendar for the proposed viewing dates.*

****** ECLIPSE APPETISER ******

Herbert Baker Hall at the OBSERVATORY
SATURDAY 16 NOVEMBER 14h00 to ~ 15h30

- General eclipse info – Eben van Zyl and Brian Fraser
- Eclipse photography – Kurt Buchmann
- Q&A for Tshipise and Fort Scorpio trips
- On sale: solar viewers, black polymer to make scope and camera filters

SNACKS AND DRINKS AVAILABLE

BRING YOUR PICS FROM LAST YEAR's ECLIPSE TO SHOW-OFF

Eclipse chasers, don't miss this !

All that glitters has a high refractive index.

ASSA Jo'burg Centre - Calendar of Events

Month	Day/ Date	Event	Details
Nov	Fri 8	*Public viewing*	
	Mon 11	Committee Meeting 17:30	
	Wed 13	**Monthly Meeting**	"Consciousness Mapping" **Prof Marilyn Lucas**
Dec	Tue 3	*Possible* Star Party at Tshipese before	
	Wed 4	**Solar Eclipse 2002**	
	Mon 9	Committee meeting	
	Wed 11	**Year End Monthly Meeting** and Eclipse 2002 feedback	Informal get together and viewing
Jan 2003	Mon 6	Committee meeting	
	Wed 8	**Monthly Meeting**	A visit to Birr Observatory **Tony Hilton**
Feb	Mon 10	Committee meeting	
	Wed 12	**Monthly Meeting**	T.B.A.
Mar	Mon 10	Committee meeting	
	Wed 12	**Monthly Meeting**	T.B.A.

Reminders

2002	ASSA Symposium / hosted by Pretoria Centre/ At Aloe Ridge Hotel and Conference Centre LEONIDS Nov 19 **December 4, Solar Eclipse**
2003	Centenary of Flight **August: Mars opposition** **Mercury Transit**
2004	Centenary Sir Herbert Baker Library Building Johannesburg Centre to host 2004 ASSA Symposium **June 8, Venus Transit**

Thank-You

Many thanks to the members of the Telescope Making class who have donated R500 to the society.

Solar System Posters

There are some high-quality locally produced Astro-posters available for those of you who are interested. Cost is very reasonable and if you *are* interested, contact a committee member for more information.

They may be viewed online at:- *http://www.the-planet-mars.com/posters/mars-posters.html*

List of Posters:

- The Solar System
- The Planet Mars (2 different posters)
- Mars Features Dictionary
- Valles Marineris
- Mountains of Mars
- Map of Mars - Part 1
- Map of Mars - Part 2
- Large map of Mars (A1 paper size)

HOW DID HENRIETTA DO IT? (Part II)

With no Cepheids near enough to calculate their absolute magnitudes, based on the trigonometrical determination of their distances, indirect methods had to be used to determine the absolute magnitudes of the Cepheid variables**.** This was done by comparing the spectral types and classes of the Cepheids with those of stars of known distances and thus of known absolute magnitudes**.**

Another method was to compare the Cepheids with the members of clusters of known distances.

Harlow Shapley made the assumption that the parallaxes of nearby Cepheids could be determined on the basis that their average transverse velocities must be equal to their average radial velocities, with regard to the Sun as centre. The radial velocities could be readily measured. From the statistical values of the parallaxes the mean values of (m - M), the distance moduli, could be found and thus the distances D in parsecs could be calculated from the formula 5log D = (m - M) + 5**.** From the measured values of the apparent magnitudes m, the absolute magnitudes M could be calculated. These values of M were then ascribed to the Cepheids in the Small Magellanic Cloud, having the same periods as more nearby Cepheids. Shapley was assisted by M L Humason, E P Hubble and V M Slipher the foremost astronomers of the time, the 1920's, and eventually a scale of absolute magnitudes of the Cepheids, corresponding to the observed apparent magnitudes, was decided upon.

Using this scale, it was found that the Large Magellanic had a distance of about 170 000 light years and the Small Cloud, about 200 000 light years. This corroborated Henrietta Leavitt's supposition that the two Clouds were very far away.

Astronomers then had a mighty weapon for determining stellar distances greater than 100 parsecs (326 light years). In one leap measurable distances reached beyond 100 000 light years.

By measuring the periods and apparent magnitudes of Cepheid variables all over the Milky Way it became apparent that the Milky Way had a diameter of at least 50 000 light years, later found to be at least 100 000 light years. At more than 150 000 light years the Magellanic Clouds must therefore reside far beyond the fringes of the Milky Way Galaxy. Hence they had to be separate galaxies or clusters. This was the first indication that the Universe does not consist only of the Milky Way, but that the Milky Way is only one of the building blocks of the Universe. Besides the Magellanic Clouds, some of the nebulae seen in the sky could be stellar systems outside the Milky Way**.**

The 100-inch telescope on Mount Wilson succeeded in resolving individual stars in these nebulae and especially in M31, the Great Nebula in Andromeda, which thus had to be looked upon as being a galaxy rather than a nebula. By means of the Cepheid variables discovered in the Andromeda Galaxy by E P Hubble, it was found that the distance of M31 had to be at least 900 000 light years and that it had a distinct spiral pattern.

When the 200-inch (5 metre) telescope on Mount Palomar came into use (1948), W Baade could find no trace of the very short period Cepheids, the RR Lyrae variables but all other classes of stars were found there. The RR Lyrae variables all have the same absolute magnitude of 0,8 and at a distance of 900 000 light years (= 900 000 ÷ 3,26 parsecs), their apparent magnitudes would be 23:

$$(\ 0{,}8 = m + 5 - 5\log(\frac{900000}{3{,}26})$$

$$\therefore m = 0{,}8 - 5 + 5\log(276074)$$

$$= -4{,}2 + 5 \text{ x } 5{,}44102$$

$$= -4{,}2 + 27{,}2$$

$$= 23 \ ).$$

The five-metre telescope could easily see to magnitude 24, more than 2 times dimmer but it could find no RR Lyrae variables. The Andromeda Galaxy thus had to be further than 900 000 light years. Besides, a distance of 900 000 light years does not agree with a distance of 2 million light years which had been indicated by the Supernova S Andromedae which had appeared in M31 in 1885. It was unthinkable that a huge galaxy such as M31 would contain all sorts of stars, but no RR Lyrae variables.

Baade concluded that there must be something wrong with the Cepheid scale of magnitudes and distances. He pointed out that the classical

Cepheids with periods from 2 to 30 days are F and G giants, whereas the very short period RR Lyrae variables were all of Type A and the Long Period variables are of spectral types M and K. These stars that were so very different thus had to have different absolute magnitude and distance scales.

For classical Cepheids of periods from 2 to 14 days, selected by A R Sandage and G A Tammann of Mount Palomar Observatory and having absolute magnitudes ranging from -2,5 to -4,7, the relationship between absolute magnitude M and periods P (in days) works out at

$$M = -1{,}48 - 2{,}7 \log P \pm 0{,}32.$$

Using this relationship the absolute magnitude of Delta Cephei, the prototype of the Cepheids, works out to M = -3,45 and its distance to 339 parsec or 1105 light years. In the catalogues Delta Cephei was classified as having a distance of 630 light years. In 1993 C Gatewood and his assistants at the Allegheny Observatory, using the Multichannel Astrometric Photometer in which two separate telescopes form separate images of the object and thus give a greater resolution, found that the distance of Delta Cephei is indeed 1100 light years.

Today the most accurate distances are 166 000 to 170 000 light years for the Large Magellanic Cloud; 200 000 to 205 000 light years for the Small Magellanic Cloud and 2 200 000 light years for the Great Galaxy in Andromeda.

Thus the work begun by Henrietta Swan Leavitt led Astronomers far, far into the depths of space. The brightest Cepheids have enabled astronomers to measure distances up to 13 million light years. By means of the redshift and Hubble's Law distances can be determined as far as 15 milliard light years (15 thousand million light years) - as far as the observable edge of the universe. At this distance the galaxies and quasars are receding with velocities approaching the speed of light so that they become invisible even in the most powerful telescopes.

The Period-Luminosity Law, first broached by Henrietta Leavitt was the spur which enabled astronomers to form an idea of the structure of the universe.

Jan Eben van Zyl

HUBBLE SPOTS AN ICY WORLD FAR BEYOND PLUTO

NASANews@hq.nasa.gov
RELEASE: 02-190

NASA's Hubble Space Telescope has measured the largest object in the solar system seen since the discovery of Pluto 72 years ago.

Approximately half the size of Pluto, the icy world 2002 LM60, dubbed "Quaoar" (pronounced kwa-whar) by its discoverers, is the farthest object in the solar system ever to be resolved by a telescope. It was initially detected by a ground-based telescope as simply a dot of light, until astronomers aimed Hubble's powerful telescope at it.

Quaoar is about 4 billion miles away from Earth, well over a billion miles farther away than Pluto. Unlike Pluto, its orbit around the Sun is circular, even more so than most of the planetary-class bodies in the solar system.

Although smaller than Pluto, Quaoar is greater in volume than all the asteroids combined (though probably only one-third the mass of the asteroid belt, because it's icy rather than rocky). Quaoar's composition is theorized to be largely ices mixed with rock, not unlike the makeup of a comet, though 100 million times greater in volume.

This finding yields important new insights into the origin and dynamics of the planets, and the mysterious population of bodies dwelling in the solar system's final frontier: the elusive, icy Kuiper Belt beyond Neptune.

Michael Brown and Chadwick Trujillo of the California Institute of Technology, Pasadena, Calif. are reporting the findings today at the 34th annual meeting of the Division for Planetary Sciences of the American Astronomical Society in Birmingham, Ala.

Earlier this year, Trujillo and Brown used the Palomar Oschin Schmidt telescope to discover Quaoar as an 18.5-magnitude object creeping across the summer constellation Ophiuchus (it's

less than 1/100,000 the brightness of the faintest star seen by the human eye). Brown had to do follow-up observations using Hubble's new Advanced Camera for Surveys on July 5 and August 1, 2002, to measure the object's true angular size of 40 milliarcseconds, corresponding to a diameter of about 800 miles (1300 kilometers). Only Hubble has the sharpness needed to actually resolve the disk of the distant world, leading to the first-ever direct measurement of the true size of a Kuiper Belt Object (KBO).

Like Pluto, Quaoar dwells in the Kuiper Belt, an icy debris field of comet-like bodies extending 7 billion miles beyond Neptune's orbit. Over the past decade more than 500 icy bodies have been found in the Kuiper Belt. With a few exceptions all have been significantly smaller than Pluto.

Previous record holders are a KBO called Varuna, and an object called 2002 AW197, each approximately 540 miles across (900 kilometers). Unlike dimensions derived from Hubble's direct observations, these diameters are deduced from measuring the objects' temperatures and calculating a size based on assumptions about the KBOs' reflectivity, so the uncertainty in true size is much greater.

This latest large KBO is too new to have been officially named by the International Astronomical Union. Trujillo and Brown have proposed naming it after a creation god of the Native American Tongva tribe, the original inhabitants of the Los Angeles basin. According to legend, Quaoar "came down from heaven; and, after reducing chaos to order, laid out the world on the back of seven giants. He then created the lower animals, and then mankind."

Quaoar's "icy dwarf" cousin, Pluto, was discovered in 1930 in the course of a 15-year search for trans-Neptunian planets. It wasn't realized until much later that Pluto actually was the largest of the known Kuiper Belt objects. The Kuiper Belt wasn't theorized until 1950, after comet orbits provided telltale evidence of a vast nesting ground for comets just beyond Neptune. The first recognized Kuiper Belt objects were not discovered until the early 1990s. This new object is by far the "biggest fish" astronomers have snagged in KBO surveys. Brown predicts, within a few years, even larger KBOs will be found, and Hubble will be invaluable for follow-up observations to pin down sizes.

Electronic images, illustrations, animation, and additional information are available at:-

http://oposite.stsci.edu/pubinfo/pr/2002/17

Comet Orbiter Shipped to South American Launch Site

MEDIA RELATIONS OFFICE
JET PROPULSION LABORATORY
CALIFORNIA INSTITUTE OF TECHNOLOGY
NATIONAL AERONAUTICS AND SPACE ADMINISTRATION
PASADENA, CALIF. 91109 TELEPHONE (818) 354-5011
http://www.jpl.nasa.gov

Twenty instruments on the European Space Agency's comet-chasing Rosetta spacecraft, including three from NASA, are in final tests for launch early next year.

Launch from the Kourou spaceport in French Guiana, on the northeastern coast of South America, is scheduled for a 19-day window beginning Jan. 13, 2003. Shipment to Kourou last month from the European Space Research and Technology Centre in Noordwijk, the Netherlands, followed more than 10 months of rigorous testing. "With the move from Europe to Kourou, we have now entered the most exciting phase of the Rosetta program so far -- the launch campaign," said Claude Berner, Rosetta's payload and assembly, integration and verification manager.

NASA is funding three research instruments and a key part of a fourth for the collaborative mission. NASA also provides one of the Rosetta's interdisciplinary scientists, Dr. Paul Weissman, of NASA's Jet Propulsion Laboratory, Pasadena, Calif., and operational support from JPL's Deep Space Network of ground-based antennas. "Rosetta is an ambitious mission with great international cooperation," said JPL's Dr. Claudia Alexander, project scientist for the U.S. role in the mission. "We're eager to get it launched."

Rosetta will fly for nearly nine years, passing by two asteroids, by Earth twice and by Mars before reaching its destination, comet Wirtanen, in November 2011. At that point, the comet will be about four times as far from the Sun as Earth is. Then, as Rosetta orbits Wirtanen at distances as close as one kilometer (0.6 mile), the orbiter's instruments will examine how the comet changes while it moves closer to the Sun during the following 20 months. Rosetta will also drop a lander onto the surface of Wirtanen's icy nucleus. The NASA instruments will examine Wirtanen from the orbiter. International teams of scientists expect to see dramatic changes as the comet approaches the Sun. Gases and dust escaping from the surface of a comet form a cloud-like "coma" around the nucleus and a tail pointing away from the Sun.

Rosetta carries more instruments than any other spacecraft in history. The orbiter's payload includes a camera to study surface details, a microscope to analyze dust grains coming off the nucleus, spectrometers to examine surface and coma materials in various wavelengths, and an experiment to probe the comet's interior with radio waves.

With all instruments installed, the spacecraft was put through its paces during testing at the European Space Research and Technology Centre. It was placed in a large vacuum chamber while the instruments were tested in heat and cold simulating the extremes the spacecraft will experience when it is closest to the Sun and when it will be almost as distant as Jupiter. Vibration and acoustic tests demonstrated that the whole spacecraft can survive a launch environment. Another set of tests checked whether any instruments cause electromagnetic interference with any others. Verification of many essential functions included commanding the spacecraft from the European Space Operations Centre in Germany, just as it will be in orbit. At Kourou, each instrument will again be tested by itself and with the other instruments before engineers can finally declare everything "green" for launch.

JPL supplied the Microwave Instrument for Rosetta Orbiter, the first of its type for any interplanetary mission. This instrument can reveal the abundances of selected gases, their temperatures, the speed at which they're coming off the nucleus, and the temperature of the nucleus. Scientists will use it to monitor changes in how vapors are released from the nucleus as the coma and tail grow. They will be studying water, carbon monoxide, ammonia and methanol gases, four of the most abundant gases from comets. JPL's Dr. Samuel Gulkis is principal investigator.

The Southwest Research Institute, based in San Antonio, Texas, supplied two NASA instruments for Rosetta. One is named Alice. It is the first in a new generation of miniaturized ultraviolet spectrometers and is capable of analyzing the composition both of gases released by the comet and of the comet's surface. One goal of scientists using it will be to learn about the temperatures at which the comet formed and evolved by determining its abundances of noble gases, such as helium, neon and argon. Principal investigator for the ultraviolet instrument is Dr. Alan Stern of the institute's Space Studies Department in Boulder, Colo.

Dr. James Burch, of the institute's Instrumentation and Space Research Division, San Antonio, is principal investigator for Rosetta's Ion and Electron Spectrometer. This device will measure the environment of charged particles surrounding comet Wirtanen. It will also study the interaction between that environment and the solar wind of charged particles speeding outward from the Sun.

Key electronics for a fourth instrument, the Rosetta Orbiter Spectrometer for Ion and Neutral Analysis, have been supplied by the Lockheed Martin Advanced Technology Center, Palo Alto, Calif. This instrument will examine gases surrounding the comet.

Information is available about Rosetta at *http://sci.esa.int/rosetta* and about the microwave instrument at *http://mirowww.jpl.nasa.gov* . JPL, a division of the California Institute of Technology in Pasadena, manages the microwave instrument for NASA's Office of Space Science, Washington, D.C.

Ambition is a poor excuse for not having enough sense to be lazy.

Flyby of Annefrank asteroid to help Stardust prepare for primary mission

Vince Stricherz
University of Washington
vinces@u.washington.edu

It will be a moment tinged with history when the Stardust spacecraft makes an encounter with Asteroid 5535 Annefrank this weekend. The flyby will test many of the systems and procedures to be used when Stardust makes its encounter with comet Wild 2 in little more than a year.

"It turns out to be a tremendous plus because you end up having a full dress rehearsal more than a year ahead of the encounter," said Donald Brownlee, a University of Washington astronomy professor who is the mission's chief scientist. "It's a little like a dress rehearsal for a wedding - you expect things to be fine, but you practice just to make sure. If the unexpected does happen at the rehearsal, it's not a problem at the real ceremony."

Stardust, launched in February 1999, is designed to capture particles from Wild 2 and return them to Earth for analysis. The spacecraft already has collected grains of interstellar dust. It is the first U.S. sample-return mission since the last moon landing in 1972.

Brownlee described Annefrank as typical for asteroids found in the inner asteroid belt, just beyond the orbit of Mars. Stardust's main camera will capture images, but the asteroid's relatively small size (2½ miles across) and the spacecraft's distance (about 1,900 miles) mean the images won't be very detailed, he said. The closest approach to the asteroid will be at 8:50 p.m. PST (11:50 p.m. EST) on Friday.

"We're just fortunate to have a target there that we can approach at this time," he said.

Asteroid 5535 was discovered by prolific German asteroid hunter Karl Reinmuth in March 1942 but was not named Annefrank until long after World War II.

The discovery came barely three months before Frank, a Jewish teenager, joined her parents, her sister and four others hiding from the Nazis in Amsterdam, Holland. For two years the group remained in their hideaway, subsisting with help from a small circle of outsiders. Anne recorded their life and her thoughts in a diary that was to become one of the world's most famous books. The group was discovered in 1944 and sent to Nazi concentration camps. All except Anne's father perished. Otto Frank survived the war and returned to Amsterdam, where he published his daughter's diary.

Now Annefrank happens to be the asteroid that lies on the right course to help Stardust and its controllers at NASA's Jet Propulsion Laboratory in Pasadena, Calif., prepare for the tasks they face come Jan. 2, 2004.

On that day, Stardust will fly within 75 miles of Wild 2's main body, close enough to trap small particles from the coma, the gas-and-dust envelope surrounding the comet's nucleus. Stardust will be traveling at about 13,400 miles per hour and will capture comet particles traveling at the speed of a bullet fired from a rifle. The main camera, built for NASA's Voyager program, will transmit the closest-ever comet pictures back to Earth.

There are differences, however, between how the spacecraft will function during the Annefrank flyby and the comet encounter. For one thing, if it runs into serious problems during the asteroid encounter it will be able to go into "safe mode," where the spacecraft turns its solar power collectors toward the sun and essentially protects itself. But when it approaches Wild 2 (pronounced Vilt two), Stardust will be working without a net - the "safe mode" function will be turned off.

Brownlee said the Annefrank flyby is "a very good test," the kind that ideally every mission should have. Such tests are particularly important, he said, for low-cost missions such as those in the National Aeronautics and Space Administration's Discovery program, of which Stardust is a part.

"When we have the comet encounter, we want as few first-time events as possible," Brownlee said. "This fortunate opportunity at the asteroid increases our probability of success next year at the comet."

Besides the UW and JPL, the Stardust collaboration includes Lockheed Martin Astronautics.

Projects planned around the 2002 Solar Eclipse

(Information as at 30 October 2002 ; submitted to Marina Joubert, FEST)

NB: For a list of eclipse-related activities funded by DST & FEST – see *http://www.fest.org.za/eclipse_activities.html*

These projects are in addition to those funded by DST and FEST:

Prof Anthony Fairall; Dept of Astronomy, University of Cape Town

Tel: +27-21-650-2392; Email: *fairall@physci.uct.ac.za*

At the planetarium in Cape Town, we have for some time been running "Sky Tonight and Eclipse Preview" (an extension of our regular Sky Tonight show), a live presentation that features all the usual maps, pictures and warnings. We have a handout sheet that carries the basic information. At the time of the eclipse, we hope that some of the amateurs of the Cape Centre of the ASSA will set up telescopes outside the planetarium.

Kim Vosse; Marketing and Communications; The Shuttleworth Foundation
Tel: (021) 970 1210;
Email: *kim@tsf.org.za*

The Shuttleworth Foundation is involved via the Independent Newspapers.

There have already been six issues on the solar eclipse in the matric matters supplement of the Monday editions of Independent Newspapers. There will be another two as well as some main paper articles. (same project - more detail below).

Barbara McGorian; Education Manager; Independent Newspapers
Tel: (011) 633-2179 phone; Email: *bmc@star.co.za*

The Independent Newspaper group will be inserting 500 000 pairs of solar viewers into The Star, Pretoria News, Daily News and Cape Argus on the 29th November. We have run a series of educational articles in Matric matters and in all of the above newspapers and will continue to do so right up until the eclipse.

Dr. Michael Gaylard; Hartebeesthoek Radio Astronomy Observatory
Tel: +27-12-326-0742; Email: *mike@hartrao.ac.za*

In addition to what you already know about our project, our webpages on the eclipse are providing an online resource for educators and are specifically written for the southern ravell context. See:

http://www.hartrao.ac.za/other/eclipse2002/index.html

In addition, on the day of the eclipse various HartRAO staff will be acting as "eclipse experts" at various locations in the path of totality in Southern Africa, for local and international "eclipse chasers".

Derck Smits; Dept of Maths, Applied Maths & Astronomy; Unisa
Tel: 012 429-6345; Email: *dps@astro.unisa.ac.za*

I will be filming and photographing the eclipse in Musina and relaying it back to WorldOnLine who will display the images on their web servers. I did this from Lusaka with the previous eclipse on 21 June 2001 as a collaboration between Unisa, Cisco Systems and WorldOnLine. A paper based on our experiences last time is due to be published in Astrophysics & Space Science, vol 282 pg 1 – 8, 2002. The article is entitled "Observations of the 21 June 2001 Total Solar Eclipse"

The Musina Eclipse Festival : 29 November – 4 December

See *http://www.eclipseonline.co.za*

Waiting for information from the Johannesburg Planetarium? Others?

ASSA SYMPOSIUM 2002

The Fifth ASSA Symposium will be held from Friday November 29 to Sunday December 1 at the Aloe Ridge Hotel and Observatory, and is being organised by the Pretoria Centre of ASSA.

The Symposium will bring together professional and amateur astronomers to present and listen to papers on a wide range of topics. There will be papers on latest research, instrumentation, amateur observing, history, and an entire session devoted to the total eclipse of the sun which takes place on the morning of December 4 from northern South Africa, the first total eclipse of the sun visible from South Africa since 1940.

We are privileged to confirm Dr Janet Mattei will attend from the AAVSO.

Persons interested in presenting a paper at the Symposium, or attending the Symposium can contact the Chairman of the Organising Committee, Tim Cooper, at *tpcoope@mweb.co.za*, or on *011-967-2250*.

Registration forms will be sent out shortly and will also be available electronically.

Tim Cooper

For Sale

ORION

4.5" Short-tube EQ Reflector
Focal length 1000mm

Comes with:
Tripod
Standard Setting Circles
2x 1.25" eyepieces(10mm & 25mm)
Moon Filter
Dust Covers
Assembly and Instruction booklet
(very informative for a beginner)

Cost: **R2500-00**

Contact: **Paul Ludick**
Email: *rhalda@hotmail.com*
Cell: 083-601-7952

Burnham's Astronomical Handbook

An Observer's Guide to the Universe
beyond the Solar System
(3 Volumes)

Cost: **R300-00**

Home Made 10" reflecting telescope
(± 2 metre tube)
Tripod with Equatorial Mount
12V Equatorial Drive
9mm, 20mm and 40mm Lenses

Cost: **R8000-00** *onco*

Contact: **Cathy Phillips**
Phone: (011) 646-5768

Asteroid 'Hit Northern Russia'

http://www.ananova.com/news/story/sm_684445.html
October 4, 2002

A large meteorite is thought to have smashed into a forest in a remote area of Russia. Residents in the town of Bodaibo, in the Irkutsk region of Siberia, saw a large luminous body fall from the sky.

They say the impact caused the ground to shake and made a sound like thunder.

To read the full story, point your internet browser to the following URL:

http://www.ananova.com/news/story/sm_684445.html

The Sky this Month

November 2002

dd hh		dd hh	
2 18	Mars 3.7 S of Moon	14 05	Mercury in superior conjn.
3 08	Mercury 6.6 N of Venus	16 13	Moon at apogee
4 01	Moon at perigee	19 04	Venus stationary
4 06	Venus 8.5 S of Moon	20 02	**FULL MOON** *Eclipse*
4 09	Uranus stationary	20 04	Mars 3.3 N of Spica
4 10	Mercury 2.1 S of Moon	22 12	Saturn 2.9 S of Moon
4 21	**NEW MOON**	25 10	Mercury 3.4 N of Antares
10 22	Neptune 4.6 N of Moon	26 07	Jupiter 4.4 S of Moon
11 21	**FIRST QUARTER**	27 16	**LAST QUARTER**
12 05	Uranus 4.6 N of Moon		

December 2002

dd hh		dd hh	
1 02	Mercury 11.2 S of Pluto	14 05	Moon at apogee
1 10	Mars 2.6 S of Moon	17 17	Saturn at opposition
1 14	Venus 2.1 S of Moon	19 15	Saturn 2.6 S of Moon
2 09	Moon at perigee	19 19	**FULL MOON**
4 08	**NEW MOON** *Eclipse*	22 01	Solstice
4 21	Jupiter stationary	23 12	Jupiter 4.2 S of Moon
5 04	Mercury 0.7 S of Moon…Occn.	25 16	Mercury greatest elong. E(18)
7 02	Venus greatest brilliancy	27 01	**LAST QUARTER**
8 08	Neptune 4.6 N of Moon	28 05	Mercury greatest brilliancy
9 14	Uranus 4.6 N of Moon	30 01	Mars 1.1 S of Moon…Occn.
9 16	Pluto in conj. with Sun	30 02	Moon at perigee
11 16	**FIRST QUARTER**	30 09	Venus 2.2 N of Moon

LOCAL TIMES of RISE and SET for the MAJOR PLANETS, 2002

Site Location:- Long. **+28.0** deg. Lat. **-26.0** deg. Local Time:- UT **+2.0** hrs.

Date	Sun		Mercury		Venus		Mars		Jupiter		Saturn	
	Rise	Set	Rise	Set	Rise	Set	Rise	Set	Rise	Set	Rise	Set
Nov 07	05.16	18.27	05.04	18.06	04.28	17.42	03.46	16.09	00.52	11.52	21.40	08.14
Nov 17	05.12	18.34	05.16	18.42	03.46	16.44	03.25	15.59	00.15	11.15	20.58	07.33
Nov 27	05.09	18.41	05.33	19.17	03.15	16.05	03.05	15.48	23.37	10.38	20.16	06.50
Dec 07	05.09	18.49	05.56	19.50	02.53	15.42	02.46	15.38	22.58	09.59	19.33	06.08
Dec 17	05.12	18.55	06.24	20.16	02.37	15.31	02.26	15.28	22.18	09.18	18.50	05.25
Dec 27	05.17	19.00	06.45	20.24	02.26	15.28	02.08	15.18	21.37	08.36	18.07	04.42
Jan 06	05.24	19.03	06.22	19.46	02.20	15.31	01.51	15.08	20.55	07.53	17.24	03.59