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NEWSLETTER FOR APRIL 2004



A giant star factory in neighbouring galaxy NGC 6822

APRIL MEETINGS

The next meeting of the Pretoria Centre will take place at Christian Brothers College, Pretoria Road, Silverton, Pretoria, as follows:

Date : Wednesday 28 April at 19h15
Chairperson : Neville Young
Beginner's Corner : "The Oort Cloud and Kuiper Belt" by Ad Sparrius
What's Up : Tim Cooper

+++++BREAK (Library open)+++++

Main Topic "Eyepiece Design" by Chris Stewart

The meeting will be followed by tea/coffee and biscuits as usual.

The next social/practical evening will be held on Friday 23 April at the Pretoria Centre Observatory, also situated at CBC. You can arrive anytime from 18h30 onwards.

REPORT ON MONTHLY MEETING: 24 MARCH 2004

The March meeting started with a number of notices:

The Nylsvlei camp will take place on the weekend of 21 May. Please make arrangements with Wayne Mitchell, tel 012 719 9065 or 072 465 7739.

The observing evening with the optometrist will now be held on 13 May at the Loretta Convent in Queenswood. Members were urged to assist by bringing their telescopes along.

The ASSA Handbook is still available at a price of R40.

There was a change to the agenda with What's Up to be presented by Wayne Mitchell.

Neville Young presented Beginners Corner in a presentation called "A case for a Flat Earth". Luckily he did not hand out application forms for the "Flat Earth Society" but he did present a very enlightening view on the surface roughness of the earth. The height of mountains and continents on earth are almost non-existent if the scale of the earth is taken into account. Neville presented some home grown data in graphs with varying vertical scales and clearly demonstrated the fact that compared to the scale of the earth's circumference, the altitude of the South African highveld and even Mount Everest is almost negligible.

Wayne Mitchell did What's Up and he covered a number of astronomical events that will be worthwhile to observe in the next month. He also used some of his own photographs to show the location of some of the objects. Great photo's Wayne !

The main talk was presented by Michael Poll and it was titled "Long Period Variable Stars". His talk covered the definition and classification of variable stars, the stellar spectra, various types and light curves. He challenged us to find R Carinae and S Carinae on a photograph of the Carina constellation. He also covered the American Association of Variable Star Observers (AAVSO) that coordinates variable star observations made largely by amateur astronomers.

Michael then informed the meeting that Janet Mattei, Director of the AAVSO, passed away on 22 March 2004 after a long battle with Leukemia. We knew her well and will miss her.

Theo Pistorius

OBSERVING EVENING REPORT : MARCH 19TH 2004

Another hazy evening, but there were a few things to view, although the fainter objects were seen with some difficulty. A lot of the current interest is in the northern sky, with Orion, Canis Major, Gemini, Cancer and Leo well placed. The Orion Nebula and the Trapezium were observed, together with Sigma Orionis. The slight green tint of the nebula was seen in the Centre 12" reflector. In Gemini was Saturn and in Leo, Jupiter.

Jupiter provided most of the interest for the evening. Early on only two of the four Galilean moons were visible. Although the Handbook indicated that one moon - Callisto - was in occultation by Jupiter, we could not figure out where the fourth one was, because there was no mention of another occultation, or a transit or an eclipse. All became clear later on when what was thought to be one moon separated into two - Io and Europa had been so close together that we could not separate them.

The re-appearance of Callisto was observed through 12" reflector ("quite spectacular--I thought something was wrong with the eyepiece when Jupiter suddenly grew a bright pimple on the limb" - Johan) but Callisto disappeared again shortly thereafter when it was eclipsed by Jupiter's shadow. The Great Red Spot on Jupiter was also visible. The Cassini division in Saturn's rings, and the shadow of the planet on the rings were clearly visible and some bands on the planet were seen.

Omega Centauri was up, but due to the high magnification of the 12" and the hazy sky it was not well seen, but there were still many stellar pinpoints visible. The last target for the evening was the Jewel Box, which was as spectacular as usual.

Wayne and Johan remained after the rest had left, to devise a way of attaching Wayne's camera to the prime focus of the 12", and also to check the tracking, which seems fine. Watch this space as there will definitely be some long exposures tried in the near future.

Johan Smit & Michael Poll

RED DWARF STARS

Stars of spectral type M are cool red stars. Surface temperatures of these stars range from about 3 900°K for M 0 stars down to about 2 600° Kelvin for M 8 stars. Some of the M giants may have temperatures as low as 1 500°Kelvin.

M stars fall into two groups - the red giants and the red dwarfs. Henry Norris Russell, of the Hertzsprung- Russell diagram, noted this in 1914 when he saw that there was a big gulf between the M giants and M dwarfs. Even the faintest giants are intrinsically more than six magnitudes brighter than the brightest dwarfs and no red dwarf is visible to the naked eye. To be visible with the naked eye, an M 0 dwarf would have to be within 13 light years of us, and an M 8 dwarf would have to be less than half a light year away.

The reason why the red dwarfs shine so feebly is that they have a very low mass. At the most they have about half the mass of the sun. Low mass means that they have so little gravitational energy pressing inwards that their interiors do not get very hot, and the thermonuclear reaction that converts hydrogen into helium proceeds very slowly. At the lower limit, a star less than 0.08 times the mass of the sun, cannot fuse hydrogen at all, and this represents the end of the main sequence. The faintest known main sequence star is Van Biesbroeck 10 (VB 10), which is at visual magnitude 17, even though it is only 20 light years away. If it were situated at the orbit of Jupiter, would only appear one tenth as bright as the full moon.

A further consequence of low mass is that the dwarf stars burn their fuel supply very slowly, and therefore have very long lifetimes, which can be measured in billions of years. Because of their longevity, red dwarfs comprise 80% of all stars and make up half the stellar mass of our galaxy. As a small sample to illustrate how common they are, 9 of the 13 stars closest to the sun are red dwarfs. (The 13 stars are dispersed amongst 10 stellar systems).

Proxima Centauri, the third component of the Alpha Centauri system, and the closest star to the sun is an 11th magnitude red dwarf, spectral type M5. Its mass is estimated to be 8% of the Sun's mass, and its diameter 14% that of the sun, making it about one and a half times the diameter of Jupiter. It emits only 1/10 000th of the light of the sun.

The next four nearest stars to the sun, after the Alpha Centauri trio, are all red dwarfs:

- Barnard's star 5.9 light years, magnitude 9.5. In Ophiuchus
- Wolf 359 7.78 light years, magnitude 13.5 In Leo
- Teegarden's star about 8 light years magnitude 15.4 In Aries
- Lalande 21185 8.31 light years magnitude 7.5 In Ursa Major

The next nearest stars to the Sun after these are Sirius A and B at 8.6 light years, and after the Sirius pair are four more red dwarfs.

The brightest red dwarf in the sky is Lacaille 8760 at magnitude 6.7, situated in the constellation of Microscopium. (There is a finder chart in reference 3). This star is entry number 8760 in the catalogue compiled at the Cape between 1751 and 1753 by Nicolas-Louis de la Caille (1713 - 1762).

Lacaille's full catalogue was not published until 1847. In 1875 German astronomer Carlos Moesta, working in Chile, noticed that the star number 8760 had a high proper motion, indicating that it was nearby the sun. Data from the Hipparcos satellite gives a distance of 12.9 light years. Lacaille 8760 is of spectral type M 0, which is at the hotter end of spectral type M. The star has a mass of about 60% of the sun, and emits about 1/36th of the light of the sun. Because of the low mass and slow burning, it is estimated that Lacaille 8760 will continue shining for 70 billion years after the sun ends its time on the main sequence.

The second brightest red dwarf is Lacaille 9352 in Pisces Austrinus. It is at magnitude 7.34 and is 10.7 light years away. The third brightest is Lalande 21185 (see list above).

Many young red dwarfs give off large flares, lasting a few minutes, that outshine the rest of the star. M dwarfs that vary in this manner are called flare stars, or UV Ceti type stars after the prototype in Cetus. Proxima Centauri is one of this type. These unpredictable energy outbursts can be seen because of the low luminosity of the dwarfs. Young red dwarfs, like other young stars, spin quickly. The rapid rotation intensifies the magnetic field, creating star spots, analogous to sunspots. The dark spots create a characteristic light curve.

Principal References :

1. M stars : Supergiants to Dwarfs. James B Kaler. Sky & Telescope May 1986 p 450.
2. Sizing Up Proxima Centauri. MacRobert, Alan Sky & Telescope March 2003 p 22
3. The Brightest Red Dwarf. Croswell, Ken. Sky & Telescope July 2002 p 39
4. Guinness Book of Astronomy Facts & Feats. Patrick Moore. Guinness Superlatives 1979

Michael Poll

ASTRONOMICAL WEBSITE ADDRESSES

Space information: <http://www.spaceflightnow.com/news/index.html>

Hubble Space Telescope: <http://hubble.stsci.edu/>

Time-Lapse Movie Of Crab Nebula Pulsar Wind:

<http://www.chandra.harvard.edu/photo/2002/0052/movies.html>

(Article: Sky & Telescope, March 2003, p. 17)

AAVSO: www.aavso.org

CCD astronomy: www.ccd.com

Make a list on your PC of all the website addresses given in the monthly newsletters, so that you can browse on them whenever you want.

Editor

ASTRONOMICAL EVENTS

Lunar eclipses

Lunar eclipses occur when the Moon passes into the shadow of the Earth. The Earth's shadow consists of two parts - the dark inner umbra and the lighter outer penumbra. During 2004, two total (umbral) lunar eclipses will be visible from South Africa: a favourable late-evening event occurs on 04 May and a rather unfavourable early-morning eclipse takes place on October 28.

On 04 May 2004 Moonrise is at 17:50, the Moon enters the umbral shadow at 20:48, totality starts at 21:52, mid-eclipse is at 22:30, totality ends at 23:08, and the Moon leaves the umbra at 00:12. During this eclipse, the Moon occults the star alpha Libra.

Saturn

Sky watchers can now enjoy Saturn at its finest. A similar opportunity won't come again for another 30 years. On Dec. 31 2003, Saturn was opposite the Sun in relation to Earth. That means from our planet, Saturn rose as the Sun set, reached its highest point in the southern sky at midnight and set as the Sun rose. Astronomers call this opposition.

Saturn takes 29.42 years to orbit the Sun. Its path is not quite circular, and it was just on July 26 2003 that Saturn reached its closest point to the Sun on that orbit, called perihelion. The near coincidence of perihelion and opposition dictated that on New Years Eve 2003, Saturn was closer to Earth than at any time since December 1973.

Saturn's rings are not always well tilted for viewing. Sometimes they are edge on, as seen from Earth, and unimpressive. Right now, Saturn's rings are tipped -- more than 25 degrees to our line of sight. This allows the planet to be seen in all its glory, and it also accentuates Saturn's brightness.

SETI@home

SETI@home has almost 5 million users. They use this software to search for ET. You can too! Use your home computer to help search for extraterrestrials!

How? The SETI@home screen saver is scientific analytical software. It performs mathematical operations on data you download from the SETI program.

SETI@home uses the largest telescope in the world, the Arecibo telescope in Puerto Rico, to continuously scan the sky for radio signals.

So far no signs of life. So if you want to help, maybe you can be the lucky one who finds ET!

UPDATE: New and Improved SETI@home will Form the Backbone of Distributed Computing Network.

BOINC - the "Berkeley Open Infrastructure for Network Computing" - is moving through its development phases, and a new version of SETI@home is being tested right along with it. BOINC will make it possible for researchers in areas as diverse as molecular biology, climatology, and astrophysics to tap into the enormous but under-utilized calculating power of personal computers world-wide.

The backbone of the new system will be a new and improved SETI@home, designed to fit the BOINC platform.

Download the latest free version of SETI@home software:

<http://setiathome.berkeley.edu>

From the INTERNET

JACK BENNETT AWARD : 2003 - 2004

Members of the Pretoria Centre of ASSA are invited to submit nominations for the Jack Bennett Award. The award is made annually to a member of the Centre, in memory of a founder member, Jack Bennett. The award is made to the Centre member who is considered have made the best contribution to the Centre, and / or to Astronomy during the year. Nominations should be made on this basis, and must be supported by a motivation.

The winner of the award is afforded the use of the Bennett telescope for one year. The telescope is a 5 inch, 20x refractor which was owned and used by Jack.

Please submit nominations to Michael Poll by May 31st 2004. The award will be presented at the Annual General Meeting on July 28th. Michael Poll

OBSERVING EVENING FOR OPTOMETRISTS – CHANGE OF DATE

The Centre has agreed to put on an observing evening for clients of Rodney Steadall (Optometrist) on Wednesday May 12th 2004. Arrangements are being made through Karin Steadall. Karin has written to say that, due to circumstances beyond her control, both the date and venue have had to be changed.

The evening will now take place on Thursday May 13th 2004, at the Loretta Convent in Queenswood. Guests are invited to have a picnic supper on the field from 5.30. At around 7 o'clock there will be a presentation of Guide dogs - about 10-15 minutes and then a 45 minute talk by Lance Kinnear who does an audio visual presentation on a large screen. After this the people will be invited to go onto the field and observe the stars and look through telescopes.

About 300 – 400 people are expected at this event. Members of the Centre (as many as possible!) are asked if they could bring telescopes for the evening.

Michael Poll

WEEKEND CAMP AT NYLSVLEY

The particulars were given in a hand-out at a previous club meeting. The hostel is already fully booked. However, there are still campsites available. Contact Wayne Mitchell if you still want to go.

Editor

REQUEST TO COMPANIES

Companies are requested to donate old digital projectors to the club when replacing them.

Editor

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