SPACEWATCH
the newsletter of the Abingdon Astronomical Society

9th October 2006

Dr Danielle Bewsher
(Rutherford Appleton Laboratory)
'Living with a Star'

Tonight we'll hear about a star that is so close we can't fail to see its effects – the Sun. Sometimes we forget that all of the points of light we see as stars are suns in their own right, some far more powerful than the Sun. Many of these have planets, and perhaps on one of these planets a group of people are just sitting down to hear a lecture about their star…

THE NIGHT SKY THIS MONTH

by Bob Dryden

Saturn: This planet is on view in the morning sky in Leo. It rises at about 02.00 UT in mid-October but by mid-November it comes up at around 23.00 UT. At magnitude +0.5 it is not hard to find, fairly close to Regulus. The rings are visible in most small telescopes but they are starting to close now and their tilt angle is down to about 13 degrees. If you are not certain which 'star' is Saturn, the Moon is very close on 13th November.

Uranus + Neptune: Both these planets are still well placed in the evening sky, Uranus in Aquarius and Neptune in Capricornus. Uranus is mag. +5.7 and Neptune mag. +7.8 so both are visible in binoculars. As a guide, Uranus is very close to the 4th magnitude star Lambda Aquarius.

Mercury, Venus, Mars, Jupiter: All these major planets are out of sight this session as they are too close to the Sun.

Comets: Hopefully the highlight of the session will be comet 2006 M4 (Swan). I say 'hopefully' because comets are quite unpredictable and they sometimes do not perform as forecast and can be fainter, or even better, brighter than forecast.

Comet Swan is already close to naked-eye visibility and is easily visible in binoculars. So maybe it will be our bright comet of the year – only time will tell. It may develop a nice tail, or it may not, you will have to have a look to find out. The comet is crossing Canes Venatici until about 15th October, then Boötes until about 22nd October, Corona Borealis until about 27th October and then into Hercules. This obviously means that it will be in the evening sky, well placed, and probably bright, so this is your chance to see an easy comet at a sociable hour.

For real comet buffs there is a second comet about in Cetus, just below Aries. This is comet 4P/Faye which will be around 10th magnitude and so just a telescope object.

Meteors: There are two active showers this session.

The first, the **Orionids**, is active between 16th and 27th October and the night of maximum activity is the 20th. The hourly rate at maximum is 25 so in reality you can expect to see about half that an hour. The Moon is 28 days old on the 20th so will not be a problem. These meteors are associated with comet Halley, and are very swift, often with persistent trains.

The second shower is the **Taurids** which is active from 20th October to 30th November. November 3rd is when the maximum occurs but the Moon is bright that night hindering observations. This does not really matter with this particular shower as it is so long lasting and there are only 10 an hour at best. The reason this shower is worth looking for is because the meteors are very often slow moving and bright which makes them easy to see.

Asteroids: The only brighter asteroid on view at the moment is 7 Iris in the constellation of Aries, just to the west of Pleiades. It is easy to see in binoculars as it brightens from magnitude 7.7 to 6.8, which is the brightest it is going to get.

Occultations: If you have a clear eastern horizon, it may be possible to see one of the stars of the Pleiades reappearing from behind the Moon on the evening of 6th November. At magnitude 3.8 it will be easy to see in a small telescope, and possibly even in binoculars if the sky is clear low down on the night. The star will reappear at about 17.15 UT while the Moon is just 5 degrees above the horizon

Algol: Convenient minima of the variable star, Algol, occur on Oct 17 at 01.6UT, 19 Oct 22.4UT, 22 Oct 19.2UT, 6 Nov 3.3UT, 9 Nov 0.1UT, 11 Nov 20.9UT. These fades are easy to see with the

naked eye and the whole eclipse takes about 10 hours so do not expect to see the whole thing in one go.

Transit: On November 8th/9th there is a transit of Mercury across the Sun. Unfortunately, it is only visible from the other side of the globe so perhaps our members 'down under', Paul and Deborah, might let us know what it was like? This will be the last transit of Mercury until 2016 – a shame we cannot see it!

MOON PHASES:

Full: 7th Oct.; Last Qtr: 14th Oct.; New: 22nd Oct.; First Qtr: 29th Oct.; Full: 5th Nov.; Last Qtr: 12th Nov

STAGGERING DISTANCE

by Dr Tony Phillips

Tonight*, when the sun sets and the twilight fades to black, go outside and look southwest. There's mighty Jupiter, gleaming brightly. It looks so nearby, yet Jupiter is 830 million km away. Light from the sun takes 43 minutes to reach the giant planet, and for Earth's fastest spaceship, New Horizons, it's a trip of 13 months.

That's nothing.

Not far to the left of Jupiter is Pluto. Oh, you won't be able to see it. Tiny Pluto is almost 5 billion km away. Sunlight takes more than 4 hours to get there, and New Horizons 9 years. From Pluto, the sun is merely the brightest star in a cold, jet-black sky.

That's nothing.

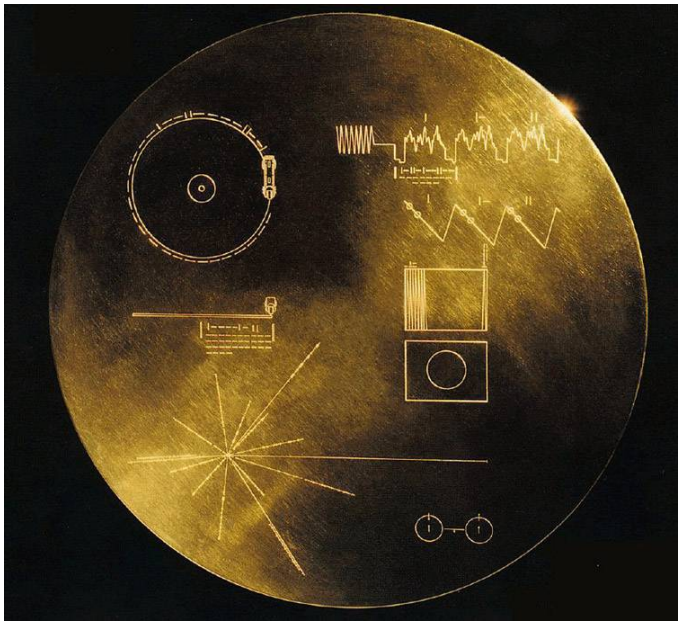
A smidgen to the right of Pluto, among the stars of the constellation Ophiuchus, is Voyager 1. Launched from Florida 29 years ago, the spacecraft is a staggering 15 billion km away. It has traveled beyond all the known planets, beyond the warmth of the sun, almost beyond the edge of the solar system itself.

Now that's something.

"On August 15, 2006, Voyager 1 reached the 100 AU mark—in other words, it is 100 times farther from the Sun than Earth," says Ed Stone, Voyager project scientist and the former director of NASA's Jet Propulsion Laboratory. "This is an important milestone in our exploration of the Solar System. No other spacecraft has gone so far."

At 100 AU (astronomical units), Voyager 1 is in a strange realm called "the heliosheath."

As Stone explains, our entire solar system—planets and all—sits inside a giant bubble of gas called the heliosphere. The sun is responsible; it blows the bubble by means of the solar wind. Voyager 1 has traveled all the way from the bubble's heart to its outer edge, a gassy membrane dividing the solar system from interstellar space. This "membrane" is the heliosheath.



In case it is ever found by intelligent beings elsewhere in the galaxy, Voyager carries a recording of images and sounds of Earth and its inhabitants. The diagrams on the cover of the recording symbolize Earth's location in the galaxy and how to play the record.

Before Voyager 1 reached its present location, researchers had calculated what the heliosheath might be like. "Many of our predictions were wrong," says Stone. In situ, Voyager 1 has encountered unexpected magnetic anomalies and a surprising increase in low-energy cosmic rays, among other things. It's all very strange—"and we're not even out of the Solar System yet."

To report new developments, Voyager radios Earth almost every day. At the speed of light, the messages take 14 hours to arrive. Says Stone, "it's worth the wait."

Keep up with the Voyager mission at voyager.jpl.nasa.gov. To learn the language of Voyager's messages, kids (of all ages) can check out spaceplace.nasa.gov/en/kids/vgr_fact1.shtml .

This article was provided by the Jet Propulsion Laboratory, California Institute of Technology, under a contract with the National Aeronautics and Space Administration.

A PUBLIC OBSERVATORY

by former AAS member Deborah Hambly in New Zealand

Last October, the 14" Newtonian equatorially mounted telescope that I acquired from the Northland Astronomical Society where it had been built with mastery and expertise arrived at my house in Baylys Beach. Little did I realise that it would take a year for my observatory to be built and the scope to be brought into action.

The first problem-solving exercise involved the dome shutters. The reconditioned dome had arrived in immaculate packing, and I didn't think there was any point in unwrapping the shutters early. Unfortunately, after the dome had been lifted by crane more than 9 feet off the ground, it was discovered that there was no attachment or opening mechanisms whatsoever. Worse, since this was a hand-made dome, (one of the builders going on to make "Sirius" domes in Australia), there were no parts available for purchase! With a little bit of trial and error, a pulley system was rigged at the zenith of the dome, and the shutter bases now roll smoothly on wheels.

Once the shutters were securely on the dome, the telescope was installed and I was eager to get my first view. The telescope turned with ease in every direction. Sadly the dome did not! I found that pushing the weight of a 3.6 metre diameter dome (while at the top of a moveable staircase) was giving me more resistance training than my earlier pursuits in the UK on the flying trapeze! Fortunately there was rumoured to be an old motor still at the observatory that could be paired with the dome. Another member found part of the motor and was of great assistance in drafting plans for the missing pieces, and designing a two-part pulley system for equal distribution of movement force.

Finally I could use the telescope and observatory, and now all that was required was electricity to drive the telescope and operate the dome's motor. The electricians got a little carried away and, in addition to installing a phone connection to the dome, (with the added benefit of internet access) they produced an Ethernet too as they seemed intent on the possibilities of operating the GOTO functionality of my 8"SCT from inside the house. The installation of lighting and dimmer switches that could be alternated white or red allows the lighting level to be easily varied and mean I can now work in the dome on cloudy nights. When the halogen uplighters are set to reflect off the steel dome track they produce rainbow hues which creates a discrete yet colourful observatory both inside and out. Finally, I have planted bunches of red flower "star" lights around the perimeter of the observatory for outside observing sessions.

To protect the Mathis Worm Wheel and equatorial drive system, a box was built around it with one side made out of clear Perspex to put the entire system on view. A flat screen TV and VCR were mounted on top of the box and extend to the lip of the dome. I received a Zonta International Scholarship and used the funds towards video occultation equipment, which includes a GPS system. A Meade DSI Pro CCD camera was awarded on loan from the Royal Astronomical Society of New Zealand for variable star monitoring. All of this equipment is mounted next to the TV in the work corner of the dome. Another corner is filled with warm fleeces when hot days are followed by less warm evenings and patrons start to shiver. This also adds a little extra protection for the 8" SCT which is stored in the corner when not in use. I have inflated a globe of the world onto which visitors stick a star to show their country of origin and which can also be used for practical demonstrations of eclipses, seasons and our place in the solar system.

Inside the observatory door, accessible for both outdoor and indoor work, I have clipboards ready with satellite prediction times, Great Red Spot and Jovian satellite eclipse details, monthly observing targets, 'Lunar 100' targets, etc. The wooden beams of the observatory are used for atlases, binoculars, eyepieces and filters. With accessories all in their labelled place, stocks of planispheres, postcards, and NZ astrophotographs ready on the 'gift shop' wall, and posters on the remaining wall space, I am nearly ready for a formal "First light".

A real bonus was the recent installation of a computer on the telescope so that I can "Push To" objects and use the scope to find fainter objects quickly for public demonstrations. This very evening, an astronomer friend has just finished the final tweaking of the installation of this device and the digital encoders are producing wonderful results. It is a marvellous programme that allows you to set the limiting magnitude, choose the type of object(s), then select the constellation or section of the sky and it will then scroll through all the possibilities. This comes in very handy in the dome and saves time rotating back and forth to different parts of the sky.

There are still a number of 'tidying up' items which I have on my seemingly never-ending 'To Do' list. Next week I will have a competition at school for an artistic design on the two- metre 16-point compass rose which will decorate the floor to demonstrate Maori & Polynesian navigation techniques with a tie to the local shipping routes and associated historical shipwrecks, the remnants of which are a highlight here on the beach at low tide. I would like to mount photographic pictures of the 28 phases of the moon around the base of the circumference of the inner dome, but have yet to find a complete set with high enough resolution to print each at A4 size, so the search continues. I'm still looking for astronomical inspiration as to what I can illustrate with the 6" high band of beautifully curved wood that runs around the dome at head level to cradle the dome track. I would like to paint constellations on the inside of the dome, but I'm afraid this may be a long-term project. This has really been a journey, and although it isn't over yet, I feel that there is definitely starlight at the end of the telescope for a smooth running publicly accessible observatory.

FURTHER DISCUSSION

The Society's web site is www.abingdonastro.org.uk
Our webmaster, Andrew Ramsey, is always on the look-out for members' photographs to put on there. Don't forget you can read back copies of SpaceWatch on the web site too.

DATES FOR YOUR DIARY

23rd – 25th Oct 8pm. Observing evening at Frilford Heath Golf Driving Range.

16th Oct. 8pm. Beginners' Meeting in the Perry Room.

6th Nov. 8pm. Beginners' Meeting in the Perry Room.

13th Nov. 8pm. Stan Cocking Memorial Lecture by Dr Alan Chapman (Univ. Oxford): "Sir Robert Ball FRS, Astronomer and Populariser".

The editor of "SpaceWatch" is Andrew Ramsey, who would very much appreciate your stories & contributions. Please send any news, observations, photos, etc. to:

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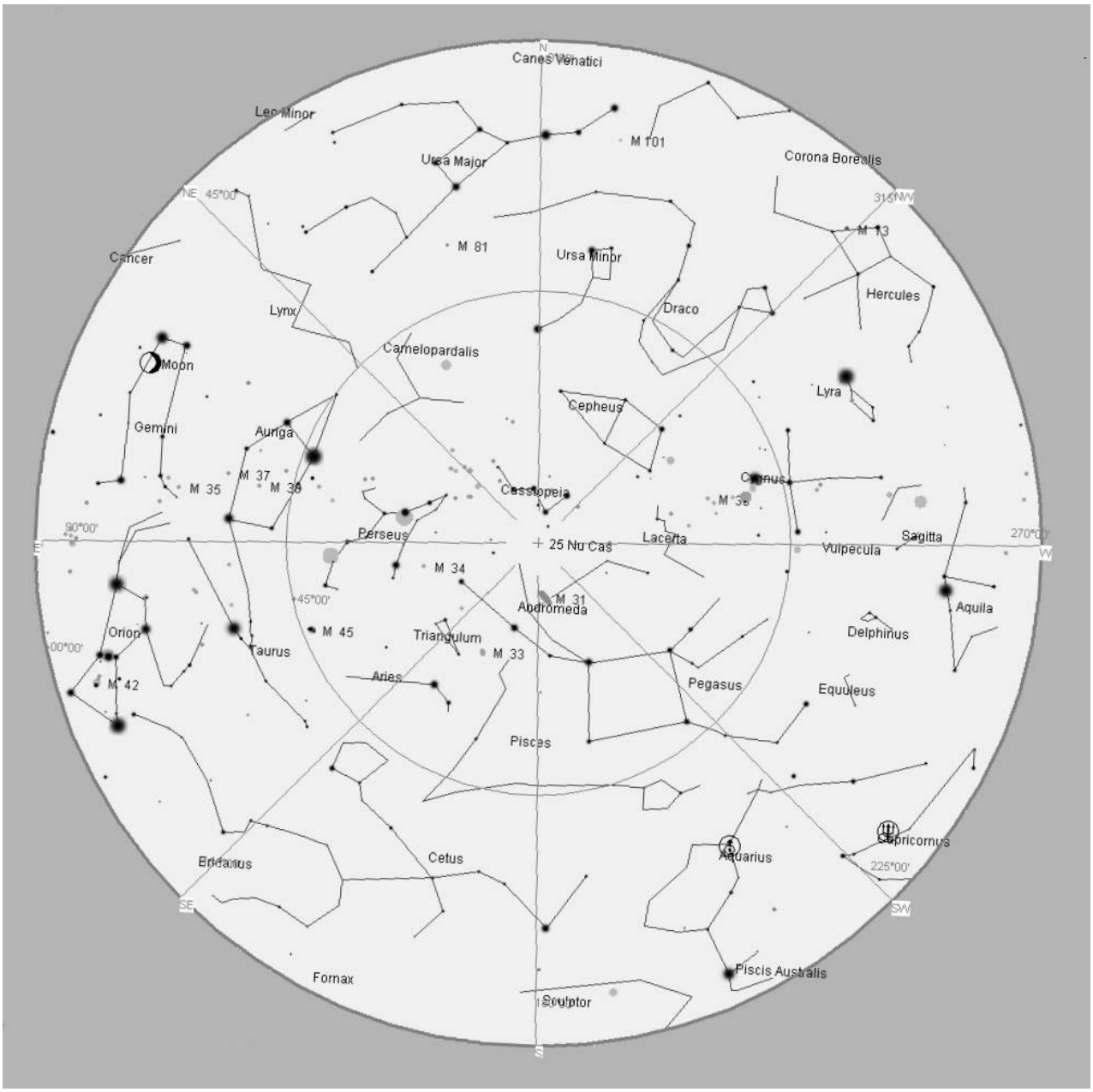
STAR CHART



Looking south at 11pm next Saturday (14th Oct.)