SPACEWATCH

the newsletter of the Abingdon Astronomical Society

9th January 2012

Prof. Ian Morison (FRAS)
(Gresham College)
'To Infinity and Beyond!'

May I take this opportunity to wish you all a Happy New Year. I hope you all had a good Christmas and that Santa brought all those new eyepieces, night sky simulation software and dew heaters that you were hoping for. Take advantage of the long nights at this time of year. It won't be long before you're waiting for it to become dark before you start your observing. Mind you, we haven't had many clear nights recently, so that must mean that we're due to get many more!

THE NIGHT SKY THIS MONTH

by Bob Dryden

Mercury: This is one of those rare occasions when Mercury is all but out of sight for the month. It is presently coming towards the end of a morning apparition and it may just be visible for a day or so before it disappears into the Suns glare. On the 9th January the planet rises ~1 hour before the Sun but only just reaches a height of 5°. It will be fairly bright though at magnitude -0.4 so a scan with binoculars may reveal it. However, by 15th January Mercury rises just 30 minutes before the Sun and will probably be impossible to find. Mercury passes though superior conjunction with the Sun on 7th February. Reappearance in the evening sky will not happen until later in the month.

Venus: Now setting nearly 3 hours after the Sun, Venus is very easy to find low in the south west. Shining at magnitude -4.0 means it is the brightest object in the sky apart from the Moon and the Sun. Elongation from the Sun continues to increase, going from 34° to 42° this session, but more importantly, Venus gains altitude as the weeks goes by. By mid-February the planet does not set until 4 hours after the Sun and is just over 30° above the horizon at sunset. The phase is around 75% so it looks like a gibbous Moon in your telescope. There are three dates to note regarding Venus. On 13th January Venus is ~1° south of Neptune. However, as Neptune is only 7th magnitude and will be quite low down, you may well need a small telescope to see it. The evening of 28th January brings a close encounter with the magnitude 4.2 star Phi Aquarius. The outstanding meeting though occurs on 10th February when Venus will be within ~18' of Uranus. You will be able to enclose two planets within the field of view of your telescope at the same time which doesn't happen that often.

Mars: Now approaching opposition (which occurs in early March) Mars is increasing in brightness, and becoming larger in your telescope. The planet reaches magnitude -0.9 by mid-February and then has an apparent diameter of 13″. At this size, in good seeing conditions, detail on the planets disc will be quite visible. Mars is moving amongst the stars on the Leo/Virgo border so in mid-January it rises ~22.00 UT. By mid-February this has become 19.30 UT which means the planet is becoming observable at a more sociable hour so make sure you turn your telescope in that direction.

Jupiter: High in the sky, shining at a very bright magnitude -2.5 in the constellation of Aries is Jupiter. Still a whopping 50° above the horizon at sunset in mid-February means that telescopic views should be excellent. Even steadily held binoculars will show you some of the four moons that orbit the planet.

Saturn: Definitely a morning object, Saturn is currently in Virgo. By mid-February it does appear above the horizon by ~23.30 UT but it will not gain enough height to give decent telescopic views until the early hours. And what views they are. The rings are well open at ~15° so any small telescope will show them to you, along with several of the planets moons. Saturn is magnitude +0.7, not too far from the first magnitude star Spica, so you will have no trouble finding it.

Uranus & Neptune: Neptune is falling towards the evening twilight now and will be gone by the end of January so this is your last chance to see it in the evening this year. Uranus is brighter (magnitude +5.7) and higher (30° at sunset mid-February) in Pisces so there is still time to track it down before it too moves into the twilight zone.

Asteroids: There are no bright asteroids on show at the moment so perhaps you could test your observational skills by tracking down two fainter ones.

15 Eunomia is crossing Taurus which makes it a nice evening target. Currently at magnitude +8.6, it fades to magnitude +9.5 by mid-February, so you will need a good finder chart and a small telescope to see it.

At magnitude +10.0 **5 Astraea** is presently fainter than Eunomia, but does brighten to magnitude +9.5 by February which will help slightly in finding it. Astraea is near the Leo/Virgo border, not far from Mars in fact which will help you locate the field of view you need.

Occultations: There is one occultation of a brighter star this session and that involve the magnitude +4.3 star Alpha Cancer. Alpha will reappear from behind the dark limb of the Moon at 06.05 UT on the morning of 11th January. The Moon will be ~25° high in the west at the time.

Comets: If you read the astronomy media, it would seem that there are two decent comets on view this session. However, in reality there will be just one.

Our old friend 2009 **P1 Garradd** continues to put in an appearance. Still around 7th magnitude, the comet finally starts to pick up speed as it moves amongst the stars of Hercules. Currently still just to the east of the Hercules Keystone asterism, by mid-February it has reached the border with Draco. It is now best viewed in the morning sky as Hercules is quite well up by sunrise.

The second comet that should have been easily visible is **P/Levy 2006 T1**. Predictions are it will be ~7th magnitude, crossing Pisces, Cetus, Eridanus, and Lepus in the evening sky. Unfortunately it is not happening. Comet Levy is very, very faint, and invisible in all but the very largest of amateur telescopes.

Algol: For those of you who would like to watch a star actually change its magnitude, Algol is the star for you as it visibly fades and increases in brightness again over a period of several hours. If you check the star every 30 minutes or so for a few hours either side of predicted minimum times you can see the changes. Times of minimum brightness are 20th January at 5.3UT, 23rd at 2.1UT, 25th at 22.9UT, 28th at 19.7UT, & 12th February at 3.8UT.

MOON PHASES:

Full: 9th Jan.; Last Qtr: 16th Jan.; New: 23rd Jan.; First Qtr: 31st Jan.; Full: 7th Feb.

LAST MEETING'S TALK

by Gwyneth Hueter

Last month's talk was our annual Stan Cocking Memorial Lecture, 'Solar Imaging'.

Nick Howes is a name familiar to you if you read "Astronomy Now" and he is a member of Wiltshire AS and involved in the ESA Space Science Faulkes Telescope Project.

If you missed his talk because you thought he would be going on about fancy filters and expensive telescopes, that was only a part of it, because his history of Solar observation brought up some intriguing facts:

The first recorded observation of a sunspot was in 1129 AD – not in China but by John of Worcester. Galileo did many drawings of sunspots and Stuart Clark, who gave us a talk on the history of solar observation a few years ago, wrote a fictional history based on fact, about Galileo and Kepler's work together. ('The Sky's Dark Labyrinth' and it is highly recommended, as is his 'The Sun Kings', which he plugged when he visited us that time).

But, overlooked by Stuart Clark but not Nick Howes, was the fact that William Herschel devised solar filters and based their densities on different thicknesses of claret. (Who else wished that he had gone into a bit more detail about that?)

In 1845 Louis Fizeau took the first picture of the Sun, complete with sunspot – a very good picture, even by today's standards.

Coming up to the present, Nick did not hesitate in reminding us that if we try to introduce solar observing to the general public, safety is all important, especially at a family event. You do not feel your eyeball boil if you look at the Sun through a telescope, binoculars or finderscope. And get rid of the finderscope!

He introduced us to the three ways of observing the Sun: [I notice that he is happy to mix Angstroms and nanometers – ten Angstroms = one nanometer]

1) White light – the cheapest, of course. Refractors are best for solar projection. Reflectors have too many bits inside that can burn, especially Schmidt-Cassegrains if their collimation is out by just a tiny bit. The Sun is still not very active (apparently there is a one in eight chance that we are entering another Maunder minimum) but you should be able to see granulation on the surface and coronal mass ejections (CME) on the limb. (He tells us a CME hit comet Elenin and that's why it's no more than a dust cloud now.) It is best to observe in the early morning and use green and continuum filters.

2) Hydrogen alpha is most popular because 'even on a boring day you'll see so much'. You can see prominences on the limb (visible as filaments if on the disc) and flares and spicules on the limb. To see these in visible light you have to wait for a solar eclipse. The H-alpha emission line is at 656.28 nm and the Coronado PST solar telescopes have filters with varying bandpasses. The best compromise is the 0.7 Angstrom filter but if you are not short of cash the 0.2 Angstrom is by far the best. (For 'cash', read '£8,000 to £9,000.') However, the Coronado scopes degrade after ten years because the filters consist of parallel plates of glass called an etalon, which uses the interferometer effect of light radiation to filter the light. The plates are so close together that they are very fragile. Beware – do not even consider dropping one! Solarscopes are of a higher quality and are available to larger sizes.

3) Calcium K and H filters are in the UV end of the visible spectrum at 393nm and 396nm respectively. Once you pass the age of around 35 your incipient cataracts will prevent you from seeing this far into the UV so these filters are really best for photography! You can get these filters to fit on the end of a normal telescope of up to 105mm aperture and their bandpasses also vary, so a 2.4 Angstrom is the best but a Baader 8 Angstrom will give you good views of Venus too.

DAWN TAKES A CLOSER LOOK

by Dr Marc Rayman

Dawn is the first space mission with an itinerary that includes orbiting two separate solar system destinations. It is also the only spacecraft ever to orbit an object in the main asteroid belt between Mars and Jupiter. The spacecraft accomplishes this feat using ion propulsion, a technology first proven in space on the highly successful Deep Space 1 mission, part of NASA's New Millennium program.

Launched in September 2007, Dawn arrived at protoplanet Vesta in July 2011. It will orbit and study Vesta until July 2012, when it will leave orbit for dwarf planet Ceres, also in the asteroid belt.

Dawn can maneuver to the orbit best suited for conducting each of its scientific observations. After months mapping this alien world from higher altitudes, Dawn spiraled closer to Vesta to attain a low altitude orbit, the better to study Vesta's composition and map its complicated gravity field.

Changing and refining Dawn's orbit of this massive, irregular, heterogeneous body is one of the most complicated parts of the mission. In addition, to meet all the scientific objectives, the orientation of this orbit needs to change.

These differing orientations are a crucial element of the strategy for gathering the most scientifically valuable data on Vesta. It generally requires a great deal of maneuvering to change the plane of a spacecraft's orbit. The ion propulsion system allows the probe to fly from one orbit to another without the penalty of carrying a massive supply of propellant. Indeed, one of the reasons that traveling from Earth to Vesta (and later Ceres) requires ion propulsion is the challenge of tilting the orbit around the sun.

Although the ion propulsion system accomplishes the majority of the orbit change, Dawn's navigators are enlisting Vesta itself. Some of the ion thrusting was designed in part to put the spacecraft in certain locations from which Vesta would twist its orbit toward the target angle for the low-altitude orbit. As Dawn rotates and the world underneath it revolves, the spacecraft feels a changing pull. There is always a tug downward, but because of Vesta's heterogeneous interior structure, sometimes there is also a slight force to one side or another. With their knowledge of the gravity field, the mission team plotted a course that took advantage of these variations to get a free ride.

The flight plan is a complex affair of carefully timed thrusting and coasting. Very far from home, the spacecraft is making excellent progress in its expedition at a fascinating world that, until a few months ago, had never seen a probe from Earth.

This full view of the giant asteroid Vesta was taken by NASA's Dawn spacecraft, as part of a rotation characterization sequence on July 24, 2011, at a distance of 5,200 kilometers (3,200 miles). Credit: NASA/JPL-Caltech/UCLA/MPS/DLR/IDA

Keep up with Dawn's progress by following the Chief Engineer's (yours truly's) journal at http://dawn.jpl.nasa.gov/mission/journal.asp. And check out the illustrated story in verse of "Professor Starr's Dream Trip: Or, how a little technology goes a long way," at http://spaceplace.nasa.gov/story-prof-starr.

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

FURTHER DISCUSSION

If you are not already on our internet mailing list, then why not log on to YahooGroups. The list is called 'abingdonas'. Members use the list to alert each other about celestial events and to chat about amateur astronomy. The list is quite active, with several messages most weeks. To read through previous messages click on: http://groups.yahoo.com/group/abingdonas/ .

To join the abingdonas list, please go to http://www.yahoogroups.com . You can also unsubscribe from the list here.

To post messages to the list, please send them to abingdonas@yahoogroups.com . Please note that you will need to sign up with a YahooID if you do not already have one. You can do this on the above page.

Further information about the mailing list can be found on the abingdonas webpage at : http://groups.yahoo.com/group/abingdonas/ .
Further discussion on astronomy and many other topics takes place at the Spread Eagle pub in Northcourt Road after the main meetings. You are most welcome to join us.

DATES FOR YOUR DIARY

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

23rd Jan. – 25th Jan. (FCN) 8pm Observing Evening at Frilford Heath. Ring Ian on the night to confirm on 07557 373401. *[FCN=first clear night]*

13th Feb. 8pm ***Speaker Meeting:*** Malcolm Coe (Univ. Southampton) 'Tides in the Magellanic Clouds'.

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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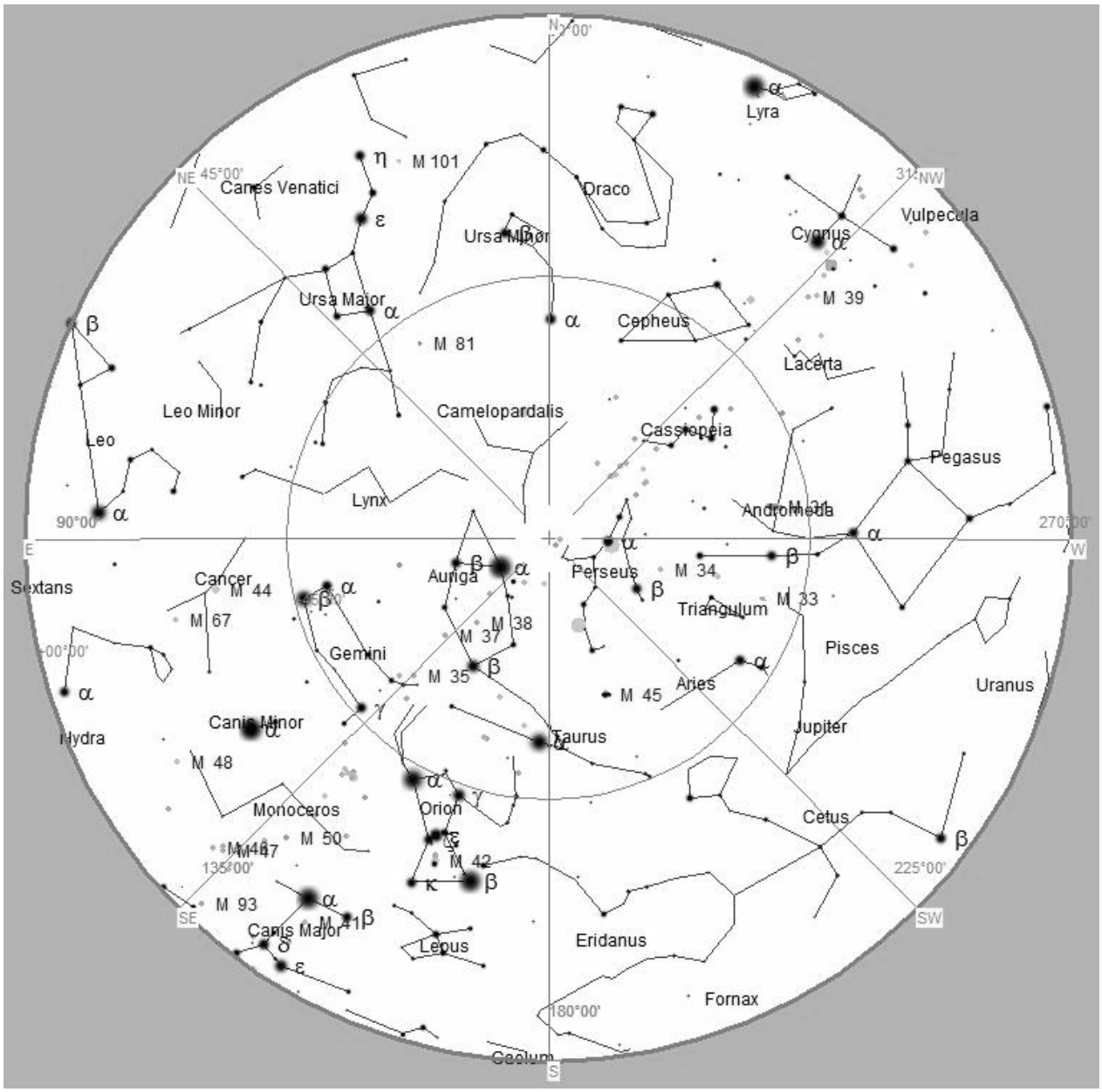
STAR CHART



The Night Sky at 9pm (GMT) next Saturday (14th Jan.)

Orion dominates the southern sky at this time of year. Follow Orion's belt upwards and to the right to find the Pleiades or "Seven Sisters", the other side of red Aldebaran, the eye of the bull, Taurus. Down and to the left of the belt is brilliant Sirius, the brightest star in the sky after the Sun. Up and to the left you will find the Twins in Gemini, Castor and Pollux. Almost overhead is Capella in Auriga, the charioteer.