New Zenith

The Monthly Magazine of the Vectis Astronomical Society

Vol 19 Issue 2 — March 2011

When Printed, this Newsletter costs VAS at least £1

Society News

Observing

The weather conditions on Thursday evenings since Christmas have been very dissappointing. This is particularly frustrating as we have had an influx of keen new members since then and the Stargazing Live event.

It may seem strange to newcomers but all seasoned astronomers know there is a law which states that 90% of all planned astronomy events (*that includes weeekly meetings*) will have cloudy skies!

There have been a few clear nights but unless you are ready to drop everything and get outside at a moment's notice you will miss things. I suggest the best way to approach this problem is to get yourself a pair of 10x50 binoculars and a comfortable folding chair; keep them near the back door and be ready to grab the odd hour outside whenever you see that elusive chink in the clouds.

I guess it's either that, or move to North Africa!

The camera installed at Niton records the night sky every day (*See "All Sky Camera" on page 9.*) and provides and archive showing that the Island is probably one of the better observing locations in the UK.

Here's hoping that the annual Isle of Wight Star Party will see the same 4 clear nights it was lucky enough to have in 2010 -- there are a lot of people with their fingers firmly crossed.

Try the binoculars, you have nothing to lose.....

For the next month or two, as an experiment, I'll sign off without the obligatory "Clear Skies".

Brian Curd
Observatory Director

VAS Website: www.wightastronomy.org

Submissions or letters to New Zenith are always welcome and should be sent to:

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Tel: **01983 864303** or email: **editor@wightastronomy.org**

Material for the next issue by the 6th of the month please.

VAS Registered Office

Castle Haven Cottage, Castle Haven Lane, Niton Undercliff, Isle of Wight, PO38 2ND

Registered Charity No 1046091

Observatory Diary

Monday, 19.30hrs	**Members Only**. Telescope and night sky training.
Thursday, 19.30hrs	**Members and Public**. Informal meeting and observing.

Contents this Month

Monthly Meeting Calendar 2011

Check the website for up to the minute information.

Travel for our monthly speakers is sponsored by:

WIGHTLINK
PART OF ISLAND LIFE

Date	Subject	Speaker
25 Feb	Major Moons of the Solar System	Michael Cull
25 Mar	TBA	TBA
29 Apr	Exoplanets from Hot Jupiters to Habitate Earth	Prof Don Pollacco
27 May	Planetary Nebulae	Owen Brazell
24 Jun	The Transit of Venus 2012	Robin Gorman
22 Jul	Pluto	Greg Smye-Rumsby
26 Aug	Astro-Image Processing	Dr Jon Whitehurst
23 Sep	Accretion Discs? TBC	James Fradgley
28 Oct	TBA	TBA
25 Nov	TBA	TBA

All details correct at time of publication.

Star Party 3rd - 7th March 2011

Don't forget, March is Star Party Month and you can attend on a daily basis (£4).

This event does not offer any formal instruction for beginners. However, many observers are happy to share their views with others, but do please ask first.

Visit *http://www.iowstarparty.org* for full details

New Members

A very warm welcome to our latest new members:

- David Mallard
- Thomas Jones
- Julie Jones

Quick Appeals

NZ by eMail

Printing and posting New Zenith each month is a major expense for the Society. If you have a broadband internet connection, would like to see each edition in colour and do your bit for the planet/VAS, please consider changing to an electronic copy.

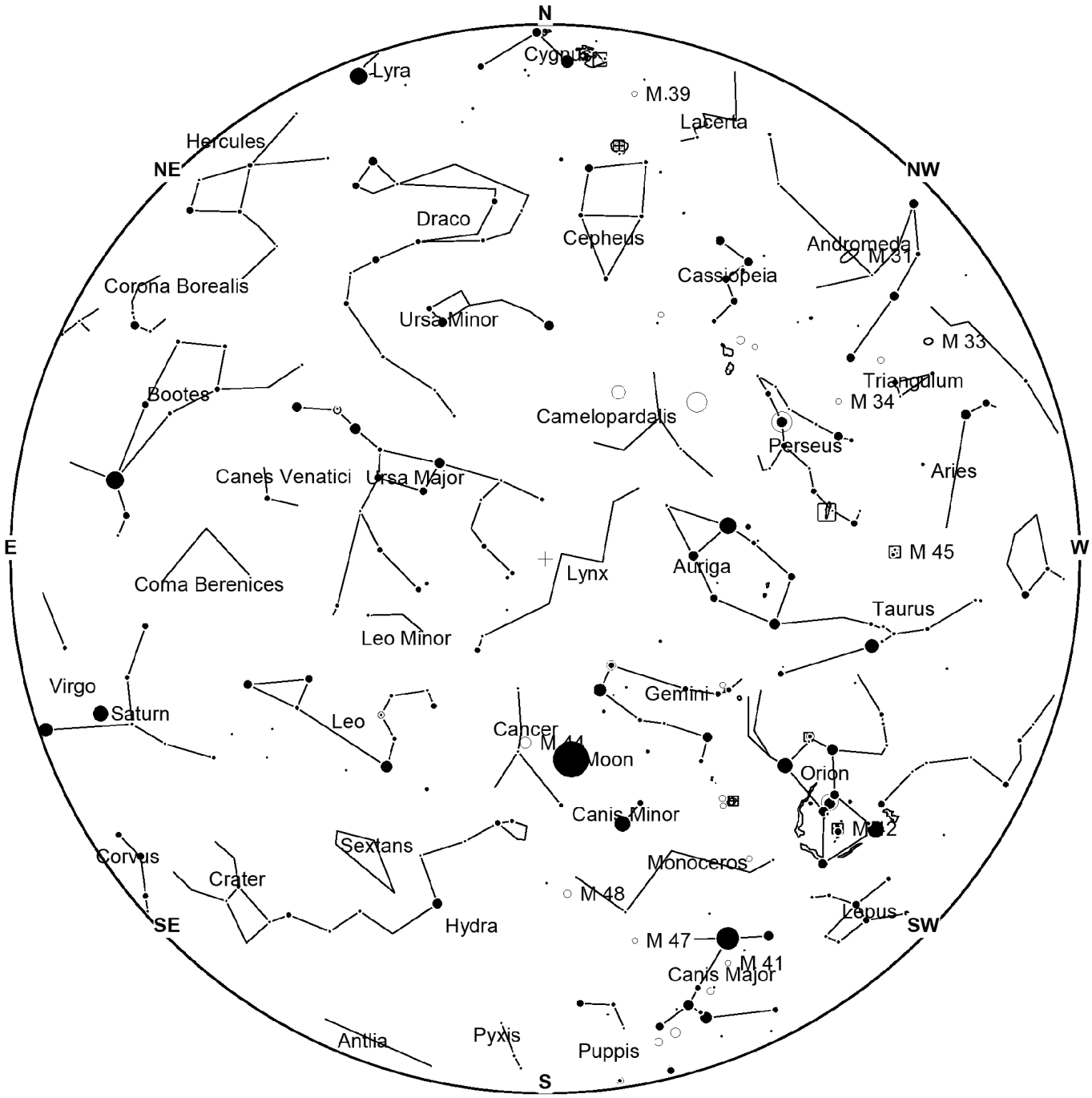
Contact me at editor@wightastronomy.org and I'll do the rest.

Observatory Work Party

Spring is approaching and that's the ideal time for some observatory maintenance!

Several areas could do with a coat of paint, particularly the outside of the dome and the corriders. Any volunteers would be welcomed to help over a couple of weekends (probably Sundays) inlate April/early May. Dates will be confirmed soon.

This Month's Sky Map



View from Newchurch Isle of Wight UK - 2100hrs - 15 March 2011

Messier 37 (NGC 2099) is the richest open cluster in the constellation Auriga. It was discovered by Hodierna before 1654. Messier 37 is the brightest of the three open clusters in Auriga. M37 was missed by Le Gentil when he rediscovered M36 and M38 in 1749. Messier independently rediscovered M37 in September of 1764 but all three clusters were recorded by Hodierna before 1654.

M37 is roughly 300 million years old and contains over 500 stars with roughly 150 stars brighter than magnitude 12.5. M37 also contains at least a dozen red giants. Its distance is between 3,600 to 4,700 light years and the apparent diameter of 24' corresponds to a linear extension of about 20 to 25 light years.

This Month's Night Sky

Moon Phases

New	1st Qtr	Full	Last Qtr
4th	12th	19th	26th

The vernal equinox is on the 20th at 23:21 when the sun crosses the equator on its path back towards the northern hemisphere.

Planets

Mercury

This spring time apparition of Mercury promises to be a good show, and just to help Jupiter is close by to act as a sign post to this elusive little world as it pops up over the western horizon this month. Mercury's brightness varies quite considerably during the apparition. When showing an almost full phase it can get quite bright and would be easily seen if the sky were darker. Compare the brightness of Mercury to the magnitude -2 Jupiter when nearby. As the planet starts to show a crescent phase the brightness drops dramatically and it becomes a challenging object against the bright sunset sky.

Date	Time	Mercury			Jupiter	
		Az	El	Mag	Az	El
7 Mar	18:30	264	2	-1.3	258	13
12 Mar	18:30	265	7.5	-1.1	261	11
17 Mar	18:40	268	10.6	-0.8	267	7.5
22 Mar	18:50	271	12	-0.1	272	4
27 Mar	18:55	275	11.5	0.8	276	1.3
1 Apr	19:00	280	8	2.3		

Venus

Venus is not giving up its position as Morning star just yet. It continues to be visible low in the east before sunrise but getting lower all the time; at the end of the month it is only 8 degrees above the horizon at sunrise.

Mars

Mars remains on the other side of the sun from us and is unobservable.

Jupiter

As the sky darkens Jupiter will be visible shinning brightly low in the southwest until it sets a short time later. It is not well placed for observation but makes up by being a well placed pointer towards the planet Mercury. By the end of the month it becomes too close to sun for observation.

Saturn

Saturn is now approaching opposition and is well placed for observation for most of the night. It is conspicuous in the southern sky during the early hours of the morning. There are few other bright stars nearby, only Arcturus and Spica. Compare the bright blue of Spica with the distinctly yellow looking Saturn.

Uranus & Neptune

Uranus has just passed through conjunction and remains just a few degrees from the sun. Neptune is moving away from the sun but remains too low down for observation. On the 27th Neptune and Venus are about a half a moon diameter apart, but the 12 magnitudes difference in brightness means that Neptune will be too dim to be seen.

Occultations

On the 11th at 23:08 the 4th magnitude star Upsilon Tauri disappears behind the first quarter moon.

On the 13th at 21:11 the 3rd magnitude star, Propus, eta Geminorium disappears behind the first quarter moon and reappears against the sunlight face at 22:15.

Deep Sky objects

M35 Open Cluster RA 6h 9m Dec 24° 20' mag 5.5

A large bright cluster in which Lord Ross counted three hundred stars. Some of the brighter members form a V shape pointing almost to the centre of the cluster and snaking up the other side is a long curved chain like a very shallow S. A little to the south west in the same low power telescopic field is NGC2158, a small triangular shaped cluster.

M36 Open Cluster RA 5h 37m Dec 34° 10' mag 6.5

This is a young cluster of bright blue stars their light dimmed by its 4100 light year journey across the winter Milky Way. While it is easy to find this cluster is not very impressive.

M37 Open Cluster RA 5h 52m Dec 32° 32' mag 6.0

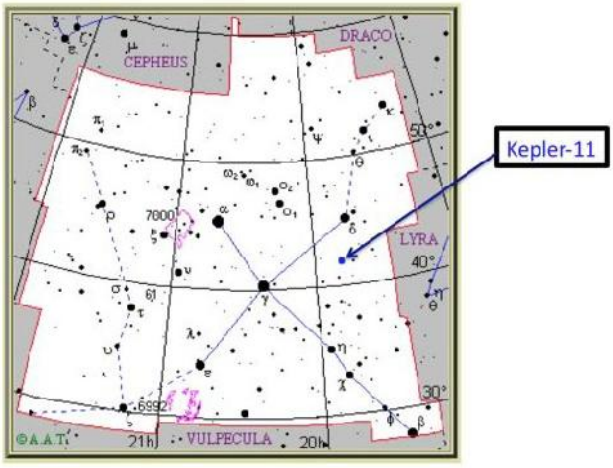
The most impressive of the Auriga clusters it is the brightest and most colourful. Particularly striking is the magnitude 9 red star at its heart. Careful observation reveals dark dust lanes through the centre of the cluster.

M38 Open Cluster RA 5h 29m Dec 35° 52' mag 7.0

This is a good binocular object when viewed under dark skies. Through a telescope with patience the Greek letter Pi shape mentioned in Burnham's atlas can be discerned.

Peter Burgess

NASA Finds Earth-size Planet Candidates in the Habitable Zone



Is our Milky Way galaxy home to other planets the size of Earth? Are Earth-sized planets common or rare? NASA scientists seeking answers to those questions recently revealed their discovery.

"We went from zero to 68 Earth-sized planet candidates and zero to 54 candidates in the habitable zone - a region where liquid water could exist on a planet's surface. Some candidates could even have moons with liquid water," said William Borucki of NASA's Ames Research Center, Moffett Field, Calif., and the Kepler Mission's science principal investigator. "Five of the planetary candidates are both near Earth-size and orbit in the habitable zone of their parent stars."

"We have found over twelve hundred candidate planets - that's more than all the people have found so far in history," said Borucki. "Now, these are candidates, but most of them, I'm convinced, will be confirmed as planets in the coming months and years."

The findings increase the number of planet candidates identified by Kepler to-date to 1,235. Of these, 68 are approximately Earth-size; 288 are super-Earth-size; 662 are Neptune-size; 165 are the size of Jupiter and 19 are larger than Jupiter. Of the 54 new planet candidates found in the habitable zone, five are near Earth-sized. The remaining 49 habitable zone candidates range from super-Earth size -- up to twice the size of Earth -- to larger than Jupiter. The findings are based on the results of observations conducted May 12 to Sept. 17, 2009 of more than 156,000 stars in Kepler's field of view, which covers approximately 1/400 of the sky.

"The fact that we've found so many planet candidates in such a tiny fraction of the sky suggests there are countless planets orbiting stars like our sun in our galaxy," said Borucki. "Kepler can find only a small fraction of the planets around the stars it looks at because the orbits aren't aligned properly. If you account for those two factors, our results indicate there must be millions of planets orbiting the stars that surround our sun."

Among the stars with planetary candidates, 170 show evidence of multiple planetary candidates, including one, Kepler-11, that scientists have been able to confirm that has no fewer than six planets.

Kepler, a space telescope, looks for planet signatures by measuring tiny decreases in the brightness of stars caused by planets crossing in front of them - this is known as a transit.

Since transits of planets in the habitable zone of sun-like stars occur about once a year and require three transits for verification, it is expected to take three years to locate and verify Earth-size planets orbiting sun-like stars.

"The first four months of data have given us an enormous amount of interesting information for the science community to explore and to find the planets among the candidates that we have found," said Borucki. "Keep in mind, in the future, we'll have even more data for small planets in and near the habitable zone for everyone to look at."

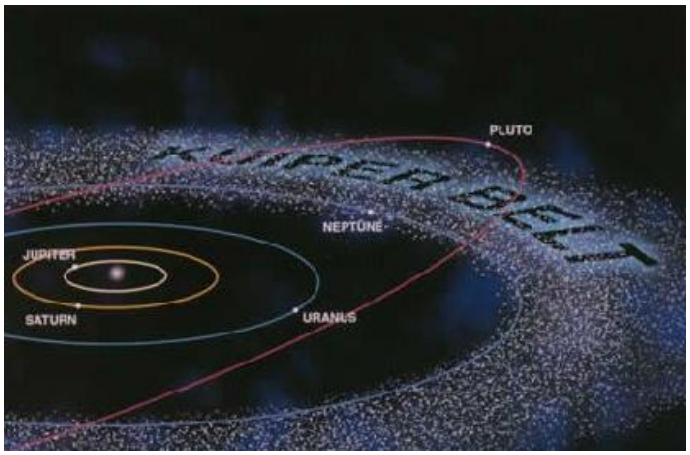
Kepler will continue conducting science operations until at least November 2012, searching for planets as small as Earth, including those that orbit stars in a warm habitable zone where liquid water could exist on the surface of the planet. Since transits of planets in the habitable zone of solar-like stars occur about once a year and require three transits for verification, it is expected to take three years to locate and verify Earth-size planets orbiting sun-like stars.

Borucki predicted that the search using the Kepler spacecraft's continuous and long-duration capability will significantly enhance scientists' ability to determine the distributions of planet size and orbital period in the future.

"In the coming years, Kepler's capabilities will allow us to find Earth-size planets in the habitable zone of other stars," Borucki said. "Future missions will be developed to study the composition of planetary atmospheres to determine if they are compatible with the presence of life. The design for these missions depends of Kepler finding whether Earth-size planets in the habitable zone are common or rare."

There's a lot more about the Kepler mission at:
www.nasa.gov/mission_pages/kepler/main/index.html

The Kuiper Belt



Note: One astronomical unit (AU) is the mean radius of the Earth's orbit around the Sun.

Gerard Kuiper (1905-73) in 1950 imagined squashing Jupiter flat and spreading it around the Sun as a ring to simulate how it must have formed from a disk of gas and dust. But Jupiter contains a greater proportion of heavier elements than hydrogen and helium than the Sun, so extra gas must be added to bring the 'Jupiter ring' up to the solar composition. Squashing the Earth flat into a ring requires a lot more helium and hydrogen to be added, bringing this zone up to the solar composition too. Similar treatments to the other planets allows the hypothetical construction of the primordial nebula, having an area density falling smoothly from the middle, down to one kilogram per square centimetre at 1 AU radius, and to one gram per square centimetre at 100 AU radius. Kuiper suggested the pre-solar nebula didn't have an edge and was possibly not dense enough to make planets beyond Pluto. At a radius of 40 AU, small icy objects would exist, providing a source of the short-period volatile comets with periods less than 200 years in the ecliptic plane.

In the 1980s, computer simulations confirmed that short-period comets very likely originate in what became known as 'the Kuiper belt'. Previously it had been thought that a fraction of the long-period comets were steered by Jupiter into the ecliptic plane, becoming short-period comets, like Halley's comet, but computer simulations couldn't explain why such comets ended up predominantly prograde - orbiting the Sun in the same direction as the planets. These short-period comets needed a different parent source and Kenneth Edgeworth (1880-1972), who began work as an astronomer aged 59, expressed this idea in his papers of 1943 and 1951 (thesis p4). The first Kuiper belt object (KBO), about 200km across, was spotted in 1992 by David Jewitt and Jane Luu. By 2005, one thousand KBOs had been detected and the orbits of half of them (assumed to be Keplerian) determined, apparently reaching a peak density of orbital crowding at a radius of 45 AU.

At least one KBO, in addition to Pluto, is bigger than 1000km diameter but being so far from the Sun, the light which they reflect, already weakened by the inverse square law, is weakened again by the same factor as the light travels back to our planet. Looking at the data (thesis) it appears that the smallest radius for detailed observation is about 100km. (Sedna is another story, with perihelion much further out.) KBOs vary in colour from pale blue, through neutral, to deep red, but being magnitude 23 are difficult to study, requiring telescopes like the INT. About one-third of KBOs, tracked over several nights, fluctuate in brightness, attributed to spin and asphericity. Measurements require careful calibration, using Landolt standard stars to fix the magnitude scale, non-variable stars against which to perform differential photometry, making comparisons with background stars of similar brightness as KBOs to determine uncertainties (thesis p51). KBOs move a few arcseconds per hour. Many are either spherical or slow rotators, or approximate to triaxial ellipsoids of various axial ratios. One KBO, 230km long, takes 9 hours for one rotation, balancing centrifugal force against gravitation. A theory of spinning versus crushing - Chandrasekhar did work on spinning self-gravitating fluids - suggests the biggest KBOs are spherical rubble piles, whereas collisions amongst the smaller ones make smaller fragments and dust. Collisions between rubble piles with zero internal friction have been simulated by computer, using a 'coefficient of restitution of 0.8' (this seems rather elastic, rubble of this elasticity, tipped off the back of a lorry, would bounce higher than half-way back up!). Individually resolved KBOs are classified as follows:

Classical KBOs: in near circular orbits, they have not interacted much, they are the least evolved objects born in the primordial solar system, the redder ones near to the ecliptic plane are the most pristine.

An important family of classical KBOs are less red and have high inclinations, taking them out to plus and minus 25 AU from the ecliptic plane. They have interacted with Neptune so are not quite so pristine, the significance of the colours is not known. It is suggested that KBOs are redder than short period comets (thesis p13), so this means that comet surfaces have been modified somewhere along the transformation from KBO to comet status - or perhaps the less coloured ones on inclined orbits preferentially become comets.

Varuna, with radius 450km, is one of the few KBOs to have had its albedo measured directly from its optical and thermal radiation, giving 0.07 (the fraction of sunlight it reflects). Varuna, half as long again as its width, spins with a period of 6.3 hours, giving an optical magnitude variation of 0.42. From this it is deduced to be a rotationally deformed low density gravitationally-bound rubble pile with a density similar to water-ice and a spin that must have been acquired during its formation.

Quaoar has been resolved by the HST, has a radius of 630km and a spin period of 17.7 hours. Spectra of KBOs do not reveal much, but Quaoar contains water-ice, unusually in a crystalline form, whereas cosmic-rays should have converted the ice to an amorphous form. This means that Quaoar with a temperature normally near to 50K, has been mysteriously heated to 110K during the last ten million years.

Resonant KBOs: these waltz in gravitational dances with Neptune. 80 percent are 'plutinos', and 20 percent are 'twotinos'. Plutinos, like Pluto, go twice round the Sun to three circuits of Neptune, crossing orbits on the opposite side. Twotinos go once round the Sun to Neptune's twice, but four KBOs do three circuits to four of Neptune. Computer simulations suggest that over a period of ten million years, Neptune has migrated outwards by 8 AU, scattering many KBOs, pushing some into resonant orbits like chickens running from a fox. These KBOs get as close as 30 AU to the Sun, but differ from the short-lived Centaurs which have perihelia between Jupiter and Neptune, they need a regular restocking and the Kuiper belt appears to oblige. Two-thirds of Centaurs interacting with Jupiter get ejected into the Oort cloud, one third become short-period comets, a negligible fraction smash into Jupiter (thesis p11).

Scattered KBOs. Some KBOs are scattered, becoming short-period comets on elongated prograde orbits. This means that comets provide clues concerning the nature of their progenitor KBOs, such as having a low albedo and being made of water-ice. Dust of course, having a large surface area, is good at reflecting light, but the Kuiper Belt is hidden behind the Zodiacal Light. KBOs, with their temperatures of 50K, also radiate in the infrared at about 50 micron wavelength, which can be studied with the Spitzer Space Telescope. With all the various data, this has enabled estimates to be made of the size distribution of KBOs. Their total mass is presently believed to be between 0.1 and 0.01 Earth masses (much greater than the asteroid belt total mass). A formula suggests that about 1 KBO of magnitude 23 can be found per square degree, but being so dim, only the largest ones can be studied in detail.

Kuiper himself might not be too pleased with the modern data indicating such a low Kuiper belt mass, but it is evident that it was much more dense in the past, otherwise it's difficult to explain the formation of more than four percent KBOs as equi-balanced binaries, some of them are probably in contact. Although Pluto is a Kuiper belt object, it is odd in having a high albedo, thought to be caused by a very thin atmosphere condensing to make a highly reflective frost, a sugar-coated almond surface finish, bringing Pluto's brightness very generously up to magnitude 14, visible with a 25cm telescope.

To put the Kuiper belt mass into the picture, the belt is believed to contain many thousands of objects of 100km diameter, plus ten billion objects larger than 1km radius. So how could its total mass be so small? Since volume depends on the cube of the radius, then the Earth of radius 6000km could be divided into $(6000/100)^3$ = 60 x 60 x 60 =216,000 spheres of 100km radius, or into $(6000/1)^3$= 216 billion spheres of radius 1km, so the figures do tally, (but it's always worth checking!) Compared to the Asteroid belt, KBOs bigger than 200km have a mean spin period of 9.23 hours, rotating slower than main belt asteroids of the same size which have a mean period 6.48 hours. A bigger proportion of asteroids than KBOs have varying light curves. Many aspects of KBOs, such as their chemistry, albedos, eclipsing binaries, and perhaps a very large unresolved fraction, require much more work.

Why have my brother Richard and I become interested in the Kuiper Belt? - perhaps something to do with gravitation...

Sources

"The Kuiper Belt" M.E.Brown, *Physics Today* April 2004, pp49-54.

"The Shapes and Spins of Kuiper Belt Objects" P. Lacerda, *Thesis*, University of Leiden, 2005.

Dr. Guy Moore

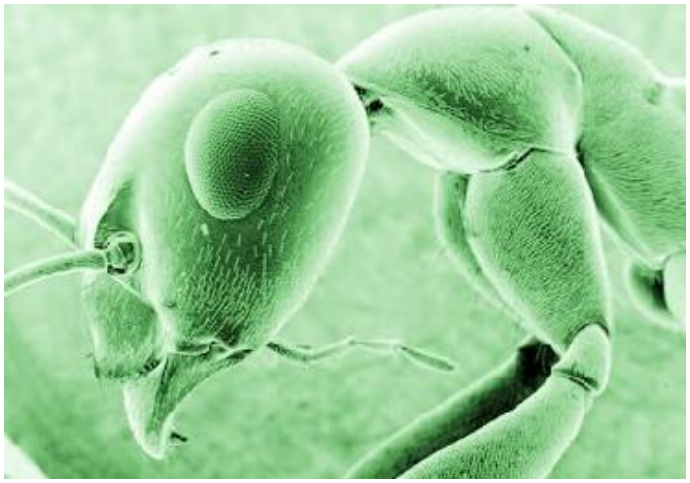
Planets in our Solar System

Monthly Meeting Short Report 28 January 2010 - Christina Brooks

This well-illustrated talk with many time-lapse computer image sequences, gave data on the Sun and the planets from Mercury to Pluto, covering gravitational strengths, temperatures, atmospheres, orbital periods, lengths of day, planetary cores, mountains, valleys, colours, atmospheric compositions, storms, magnetic fields and more, reaching the conclusion that the Earth is really the best place to be. A question concerned what science lies behind the prediction of a huge solar storm in 2013 - a colleague of the speaker discussed the current solar activity occurring on opposite sides of the Sun. If these active zones coalesce in two year's time, then a huge solar storm may put power systems, satellites and electronics into danger.

Dr. Guy Moore

NASA Invents New Technique For Finding Alien Life



Researchers from NASA's Jet Propulsion Laboratory in Pasadena, Calif., have come up with an idea to improve on an old standby of space exploration instruments and improve the odds of finding life, if any, on Mars.

By adding a laser and an ion funnel to a mass spectrometer, it is possible to analyze the elements from the Martian surface directly, without the complex handling samples usually need.

The mass spectrometer is used to identify molecules, their elements and their isotopes in samples ranging from rocks to proteins. It does so by looking at their mass-to-charge ratios. Ordinarily a sample has to be prepared because it will be vaporized and then ionized so the electrons and atomic nuclei can be separated.

The new version uses a two-step technique. First it shoots a laser at the sample's surface. This creates a plume of molecules and ions. To get the ions into the mass spectrometer, the new system uses an ion funnel. The ion funnel uses conductive, progressively smaller electrodes in the shape of a ring that attract the ions, effectively vacuuming them into the mass spectrometer.

"There are a lot of exciting discoveries about Mars that have yet to be made. This technique could make understanding the composition of rocks and soils on Mars -- possibly including evidence of life -- much easier," said Paul Johnson, the paper's lead author, in a statement.

Johnson got the idea after reading about the ion funnel technology for mass spectrometry developed by Keqi Tang and Dick Smith of the Department of Energy's Pacific Northwest National Laboratory. The two said the ion funnel wasn't originally intended for space, but they are glad to see it's a good fit with the Mars mass spectrometer. Johnson also got contributions from William Brinckerhoff and Robert Hodyss of NASA on the project.

NASA says mass spectrometry has been used to analyze Martian soil dating back to the Viking explorations of the 1970s. Back then, soil was scooped up, placed into a chamber and heated to make the sample a gas before it could be analyzed -- leaving a much greater chance for failure. With the modern adjustments, it could be all done instantaneously.

Mass spectrometry will be used again when the Mars Science Laboratory lifts off for the planet later this year. The improved system from Johnson and his colleagues is less likely to be used as it needs further work to be ready for space.

"Cutting rocks, picking them up and moving them around, all this adds complexity," Johnson said. "Complexity makes it more difficult to conduct experiments with a robotic rover. Plus, adding new tools so the instrument can do these extra tasks increase size, weight and power consumption. All this makes sending a mass spectrometer into space even more challenging."

The project was funded by NASA and experiments were done at the Jet Propulsion Laboratory, which is managed by the California Institute of Technology.

To contact the reporter responsible for this story
email: g.perna@IBTimes.com

Garlic Festival 2011

20th & 21st August

This is our major fund-raising event each year and we need volunteers to be marshalls.

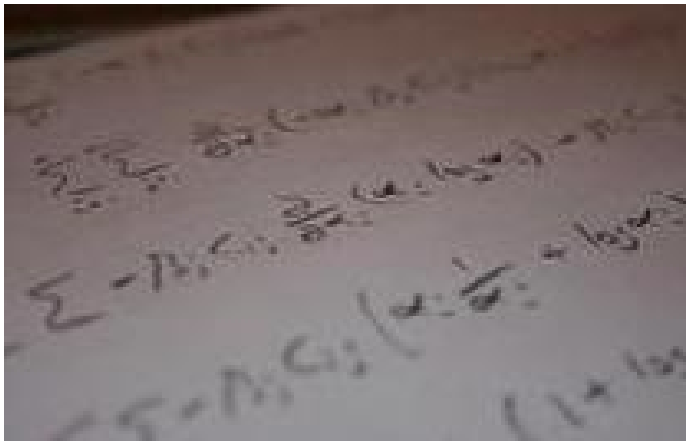
You will be:

Patrolling the site
Helping visitors
Controlling traffic
etc

If you can help on either day, please contact

Richard Flux
883062

Inaugural Meeting For Isle of Wight Mathematical Society



We are hoping to form an Isle of Wight Mathematical Society to encourage the enjoyment and study of mathematics; for persons of all ages and abilities to appreciation its beauty and elegance and enhance their understanding.

As Galileo stated "the Universe, cannot be read until we have learnt the language and become familiar with the characters in which it is written. It is written in mathematical language and letters are triangles, circles and other geometrical figures; without which it is humanly impossible understand a single word, without these one is wondering about in a dark labyrinth." Mathematics is even more so today the driving force behind modern science.

It is appropriate that we should have the society at the home of Robert Hooke Society Exhibition, for it is reputed that he, whilst a student at Westminster School, read and learnt Euclid Books I - VI within two weeks.

The aim is that, the society will provide initially a forum for lectures, discussion, and debate. More importantly though it is hoped, that over time, it will become a centre for the study and practice of mathematics at all levels.

Come along, help us shape this aim and make it happen.

The inaugural meeting will be held in the classroom at Fort Victoria on Thursday 17th February starting at 7.30pm.

This meeting will set up the society and there will be a general discussion "One, two, three, infinity".

If you wish to come along please me on mail@paul-england.co.uk or call on 752194.

Paul England

All Sky Camera

Don't forget the All Sky Camera installed here on the Island in Niton.

The camera records pictures of the whole sky each night, pictures are then combined to make a video archive. Data from the camera is also analysed to provide sky quality information.

The cameras are SBIG AllSky-340 cameras, run by the University of Hertfordshire and situted at four locations in the UK. The first camera was set up at the university's observatory at Bayfordbury, Hertfordshire in October 2009. A further camera was added at Hemel Hempstead, Hertfordshire in July 2010, and two more near **Niton, Isle of Wight** and near Cromer, Norfolk in August 2010.

For more details visit:
http://star.herts.ac.uk/allsky/about.php?c=3

It's well worth a visit

THE BACK PAGE

LINKS, COMMENTS AND OBSERVATIONS

News and Events

Giant ring of black holes in Arp 147

The nine X-ray sources scattered around the ring are so bright that they must be black holes, with masses that are likely 10 to 20 times that of the Sun.

Just in time for Valentine's Day comes a new image of a ring — not of jewels, but of black holes. This composite image of Arp 147, a pair of interacting galaxies located about 430 million light-years from Earth, shows X-rays from the NASA's Chandra X-ray Observatory (pink) and optical data from the Hubble Space Telescope (red, green, blue) produced by the Space Telescope Science Institute (STScI) in Baltimore, Maryland.

Arp 147 contains the remnant of a spiral galaxy (right) that collided with the elliptical galaxy on the left. This collision has produced an expanding wave of star formation that shows up as a blue ring containing an abundance of massive young stars. These stars race through their evolution in a few million years or less and explode as supernovae, leaving behind neutron stars and black holes.

A fraction of the neutron stars and black holes will have companion stars and may become bright X-ray sources as they pull in matter from their companions. The nine X-ray sources scattered around the ring in Arp 147 are so bright that they must be black holes, with masses that are likely 10 to 20 times that of the Sun.

An X-ray source is also detected in the nucleus of the red galaxy on the left and may be powered by a poorly fed supermassive black hole. This source is not obvious in the composite image but is clearly visible in the X-ray image. Other objects unrelated to Arp 147 are also visible — a foreground star in the lower left of the image and a background quasar as the pink source above and to the left of the red galaxy.

Infrared observations with NASA's Spitzer Space Telescope and ultraviolet observations with NASA's Galaxy Evolution Explorer (GALEX) have allowed estimates of the rate of star formation in the ring. These estimates, combined with the use of models for the evolution of binary stars, have allowed the authors to conclude that the most intense star formation may have ended some 15 million years ago, in Earth's time frame.

By Chandra X-ray Center, Cambridge, Massachusetts
Published: February 10, 2011

Observatory

For your own safety, when visiting the VAS observatory, please bring a torch. Also, please make sure you close and lock the car park gate if you are the last to leave - if you need the combination to the lock, please contact a member of the committee.

Articles Needed

New Zenith welcomes letters, articles or pictures related to all aspects of astronomy. Contributions to the Editor at the email or postal address on the front page.

"In my opinion nothing occurs contrary to nature except the impossible, and that never occurs"

Galileo Galilei

Quotations

"At night astronomers agree"
Matthew Prior

"If I have ever made any valuable discoveries, it has been owing more to patient attention, than to any other talent"

"I can calculate the motion of heavenly bodies, but not the madness of people"

"No great discovery was ever made without a bold guess"
Sir Isaac Newton