The Spectrogram

Newsletter for the Society of Telescopy, Astronomy, and Radio

February 2015

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S*T*A*R
P.O. Box 863
Red Bank, NJ 07701
On the web at:
http://www.starastronomy.org

February Meeting

The next meeting of S*T*A*R will be held Thursday, February 5 at 8 p.m. At Monmouth Museum. The speaker will be STAR member Dave Britz, who will describe his visit to the mirror lab at the University of Arizona. The lab uses a rotating furnace to produce mirrors as large as 8.4 meters. The mirrors have focal ratios ranging from f/1.25 to f/1.14.

Calendar

February 5, 2015 – S*T*A*R meeting

February 25, 2015 - Mill Lake Star Party

March 5, 2015 – S*T*A*R meeting

January Meeting Minutes

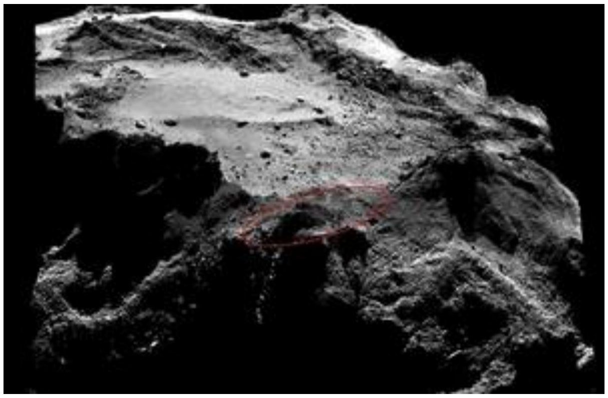
By Rob Nunn

The January meeting of STAR, the annual winter social event, was held January 9th. This year the meeting was hosted by president Kevin Gallagher and his wife at their home. The Gallaghers provided food and drinks, and asked club members to make contributions to the observatory fund in lieu of purchasing food.

With a good turnout, the event was fun for everyone. Members enjoyed delicious food, a nice view of comet Lovejoy from the front yard, and made a substantial contribution to the observatory fund.

Where is Rosetta's lander and when will it wake up?

Feb 02, 2015



OSIRIS two-image mosaic of 67P showing the current search area for Philae. From this distance of 12 miles (20 km) the lander would only be three pixels across. Credit: ESA/Rosetta/MPS for OSIRIS Team

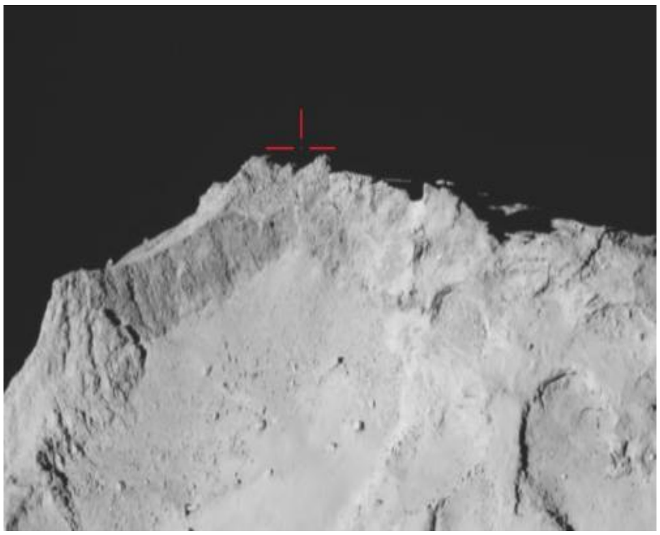
(Phys.org) Ever since Philae touched down on Comet 67P/Churyumov-Gerasimenko on 12 November the search has been on to identify it in images. While the CONSERT instrument has helped to narrow down a 350 x 30 m 'landing strip' on Comet 67P/C-G's smaller lobe, a dedicated search in OSIRIS images has so far not been able to confirm the little lander's final location. Philae's descent to the surface and first rebound were well-documented with the OSIRIS narrow-angle camera. The team also identified what they believe to be the lander in a wide-angle shot taken above the rim of the large depression – named Hatmehit – on the comet's small lobe. The image has been used to guide subsequent lander search efforts, and provides the basis for trajectory reconstructions. According to data recorded by Philae's ROMAP instrument, the lander may have grazed the surface so this image may have captured the result of that encounter.

Follow-up imaging campaigns of the comet have not been successful in locating the lander. The campaigns specifically targeted the times that the lander would be illuminated and when Rosetta had the correct orbital position to be able to image it. However, the cameras were looking into long cast shadows from Rosetta's terminator orbit, perpendicular to the Sun direction, which does not provide the optimum conditions for detecting the lander.

It is also important to note that Rosetta's trajectory immediately following Philae's touchdown allowed for good viewing conditions at the original landing site. Now that Rosetta has moved to a different orbit, and is further away from the comet, the chances of observing the lander are less.

The image above is an example of the images being used to search for the lander; it is a slightly cropped 2 x 2 mosaic taken by the OSIRIS narrow-angle camera on 13 December 2014 from a distance of about 20 km to the centre of the comet. For the 20 km imaging run 18 sets of two images were taken – one each with orange and blue filters to take advantage of the reflection of the lander solar panels, which differ compared to the cometary environment. The images were taken in the 2 x 2 rasters to ensure good surface coverage. The lander, about 1 metre across – the size of a household washing machine – would measure only about three pixels across in these images.

Although Rosetta is flying to within 6 km of the comet's surface on 14 February, the planned trajectory foresees the closest approach on the lower part of the larger comet lobe (although the trajectory also takes Rosetta over the first touchdown point). This trajectory is planned such that the Sun will be directly behind the spacecraft, allowing the acquisition of shadow-free images. The close flyby will also allow the suite of science instruments on the orbiter to take spectra of the surface with unprecedented resolution and to directly sample the very innermost regions of the cometary coma in order to learn more about how the comet's characteristic coma and tail develop.



OSIRIS wide-angle view from Nov. 12, 2014 that may show Philae above the flat region called Hatmehit. Credit: ESA/Rosetta/MPS for OSIRIS Team MPS/UPD/LAM/IAA/SSO/INTA/UPM/DASP/IDA.

When will Philae wake up?

For those of you who followed the wake-up of Rosetta, you will know that it is not simply a case of switch on and get back to the science right away. The same goes for Philae.

At the original landing site, Philae was expected to receive around 6.5 hours of illumination per 12.4 hour comet day, with temperatures becoming too high by March 2015 to enable continued operations. Now, at its new location, the illumination is just 1.3 hours.

In fact, even by May, the Sun inclination will be such that it will be directly overhead of the predicted landing zone, although the lander's orientation is such that it won't be able to make full use of the maximum illumination on offer.

As for the process of wake up, and assuming Philae survived the low temperatures in its new residence, the earliest that the lander team expect it to be warm enough to boot up is in late March. But it will likely be May or June before there is enough solar illumination to use its transmitter, and to re-establish a communications link with Rosetta – the lander needs about 17 Watts to wake up and say "hello". Furthermore, the orbiter also has to be commanded to listen for Philae's "I'm awake" signal, and be in a good position relative to the landing site to pick up the signal – although it can be up to 200 km away from the comet. It will be longer still before the battery is fully charged and Philae is ready to do science again, but that means there is a chance it will have a ringside seat for perihelion.

But even if Philae doesn't wake up, it's important to remember that it already completed its first science sequence on the comet, unexpectedly providing information from multiple locations on 67P/C-G. Meanwhile Rosetta will continue to follow the comet on its orbit around the Sun and as it heads back towards the outer Solar System.

With funding from the UK Space Agency and the Science and Technology Facilities Council (STFC), Rosetta is a mission with significant UK involvement from industry and science.

One of the main challenges for all the companies designing instruments for Rosetta has been to ensure the components remain intact for ten years, while the spacecraft makes its way to the comet, and then work perfectly when it gets there. Not an easy task!

Image: XMM-Newton and Hubble view of Jupiter's ghost

Feb 02, 2015

Credit: ESA/XMM-Newton & Y.-H. Chu/R.A. Gruendl/M.A. Guerrero/N. Ruiz (X-ray); NASA/ESA Hubble Space Telescope & A. Hajian/B. Balick (optical)

(Phys.org) Names of astronomical objects are often ambiguous, especially when the historical designation of a certain class of celestial body preceded their physical understanding and was based on their appearance in the sky.

A notoriously abstruse case of nomenclature is that of planetary nebulas, the picturesque remains of low- and intermediate-mass stars. In contrast to what happens to their more massive counterparts, stars with masses from 0.8 to 8 times that of the Sun do not end their life exploding as powerful supernovas but peacefully puff up, releasing their outer layers in the surrounding space and creating beautifully shaped clouds in the process.

Although these stellar demises have nothing to do with planets, astronomers in the 18th century, who first noticed them, were baffled by their roundish appearance, and gave them the misleading name of planetary nebulas.

And just to make it more complicated, the planetary nebula shown in this image carries an even more peculiar name. Since it spans a disc on the sky roughly as large as that covered by the planet Jupiter, it received the curious moniker Jupiter's Ghost. Of course, this object is also known through its catalogue designations, the most recent of which, since the late 19th century, is NGC 3242.

The image reveals how mighty winds released by the dying star – the white dwarf star at the centre – are shaping the double-shell structure of the nebula. The blue glow filling the inner bubble represents X-ray emission from hot gas, heated up to over two million degrees by shocks in the fast stellar winds, gusting at about 2400 km/s against the ambient gas.

The green glow marks cooler concentrations of gas seen in optical light through the emission of oxygen, revealing the edge of the inner shell in contrast to the more diffuse gas making up the outer shell. The two flame-shaped features, visible in red to the upper right and lower left of the inner bubble, are pockets of even cooler gas, seen also in optical light through the emission of nitrogen.

Jupiter's Ghost lies some 3000 light-years away, and it is visible in the southern constellation Hydra, the water snake.

This image combines X-ray data collected in 2003 by ESA's XMM-Newton (blue) with optical observations from the NASA/ESA Hubble Space Telescope (green and red).

Are you a S*T*A*R Member?

S*T*A*R meets the first Thursday of each month, except July and August, at 8:00 p.m. at Monmouth Museum on the campus of Brookdale Community College in Lincroft, NJ. Meetings usually include a presentation of about one hour by a guest speaker, a break for refreshments and socializing, a description of interesting objects to view, and a discussion of club business.

Memberships:
( )Individual...$35
( ) Family...$45
( ) Student…$15

Name____________________________

Address__________________________

City_______________________State___Zip________

Phone___________________________

Email__________________________
Make checks payable to: STAR Astronomy Society, Inc. and mail to P.O. Box 863, Red Bank, NJ 07701

The club owns 8" f/8, and 13" f/4.5 Dobsonian telescopes which are available for use by members. To borrow a telescope, please contact the Vice President.

The officers of S*T*A*R are:
President Kevin Gallagher
Vice President Rob Nunn
Secretary Michelle Paci
Treasurer Arturo Cisneros
Member at Large Dave Britz

S*T*A*R members can join the Astronomical League (AL) for a small fee. Members receive the AL publication Reflector.

In the Eyepiece

Here is a list of objects for this month. This is reproduced from www.skyhound.com with the kind permission of its creator and author of SkyTools Greg Crinklaw.

Object(s)	Class	Con	RA	Dec	Mag
M48	Open Cluster	Hydra	08h13m46.1s	-05°47'08"	5.5
Castor	Multiple Star	Gemini	07h34m35.9s	+31°53'18"	1.6
Struve 1127	Multiple Star	Camelopardus	07h47m00.4s	+64°03'07"	6.8
M47	Open Cluster	Puppis	07h36m36.0s	-14°28'45"	4.3
M67	Open Cluster	Cancer	08h51m26.1s	+11°48'43"	7.4
M46 and NGC 2438	Open Cluster + Planetary Nebula	Puppis	07h41m47.8s	-14°48'06"	6.6
Eskimo/Clown Face	Planetary Nebula	Gemini	07h29m10.8s	+20°54'42"	9.9
NGC 2477	Open Cluster	Puppis	07h52m16.8s	-38°31'48"	5.7
NGC 2440	Planetary Nebula	Puppis	07h41m55.4s	-18°12'31"	10.8
Focus On Thor's Helmet	Diffuse Nebula	Canis Major	07h18m36.0s	-13°12'00"	10?
Gemini Nebula	Planetary Nebula	Gemini	07h25m34.7s	+29°29'26"	13.0
Hourglass	Planetary Nebula	Monoceros	07h09m22.5s	-00°48'24"	11.8
NGC 2419	Globular Cluster	Lynx	07h38m11.0s	+38°53'11"	11.0
The Integral Sign Galaxy	Galaxy	Camelopardus	07h11m22.6s	+71°50'10"	13.1
Abell 31	Planetary Nebula	Cancer	08h54m11.4s	+08°54'30"	12.2
The Medusa	Planetary Nebula	Gemini	07h28m59.2s	+13°15'16"	11.3
M 1-18	Planetary Nebula	Puppis	07h42m04.2s	-14°21'20"	14.0

Coordinates are epoch 2000.0