FAS Newsletter

Federation of Astronomical Societies http://www.fedastro.org.uk

Remote Telescope Project

The FAS Council is exploring the idea of providing, for member societies, a high quality remote operation telescope. This will involve significant work in order to take the idea to a firm proposal and so there needs to be sufficient serious preliminary support from FAS member societies before we can justify the effort required to take the idea further.

The telescope would most likely be located at Astrocamp in southern Spain, where excellent observing conditions and the relatively high incidence of clear nights offer substantial advantages over those typically encountered in the UK.

The envisaged set-up would consist of a QSI 583 camera on a 250mm Ritchey-Chretien telescope mounted on a Paramount MX. A high quality, mid-sized refractor, with the same CCD and mount, would be another option. The emphasis would be on providing significant advantages in terms of observing conditions and instrumentation over those that most UK societies can access or afford.

Why are we considering this?

The FAS is always looking for ways to provide services and opportunities for its member societies that they cannot easily provide themselves.

Imaging has been the essential *modus operandi* in professional astronomy for decades and is now an intrinsic and rapidly growing part of amateur astronomy as well. Cost, inconvenience, lack of a suitable site

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Astrocamp—South Spain

FAS Convention & AGM

6th October - The Institute of Astronomy

The 2012 FAS Convention and AGM will be held on Saturday 6th October at Institute of Astronomy, Madingley Road, Cambridge.

The speakers are:

Professor Paul Hewett - 'Finding the Highest Redshift Quasars'
Professor Paul Murdin - 'Planetary Landscapes'
Robin Leadbeater - 'Epsilon Aurigae - A 21st century take on a 19th century engima'
Prof Carole Mundell - 'Big Bangs and Black Holes'
Mike Frost - 'The Accidental Death of an Anarchist - the story of the RGO'

There will also be trade stands, Member Society Displays and it is expected there will be a tour of the historic telescopes.

Admission price is £5.00 with tickets available on the door.

Doors open at 9am with the first lecture commencing at 9.50am

Newsletter reaches 100

Sharp eyed readers will have noted that this is the 100th edition of the FAS Newsletter, which has been informing and I hope, entertaining amateur astronomers for almost 30 years. Since this is the 100th issue we thought it might be nice to go back and have a look at issue #1.

The first FAS Newsletter was published in June 1984 and was edited by George Bolland. The highlights of this issue are a write up of a night out at the Temple Observatory by a member of Coventry and Warwickshire Astronomical Society. Oh and if you were wondering, as I was, the telescope is still used. There is the first ever ***News Round-Up***, a staple of the FAS Newsletter over the years and an article on how to make a star clock. I quite enjoyed seeing that the FAS subscription for the year was £7.50 - which would not be for a small society. Let's compare that to our medium society now of £44.50 (not including early payment) - its not that bad given we are looking back close to 3 decades.

The first news round up included items from: Aylesbury AS, Cleveland AS, Coventry & Warwickshire AS, Eastbourne AS, Huddersfield AS, Newchapel Observatories, Orwell AS, Sheffield AS, South West Herts AS, West of London AS, West Midlands AA. Out of 11, I think 4 aren't members and I'm not even sure that 3 of them still exist or probably now exist via a different name. Not bad going for some of our long time FAS members. I wonder if there is still the

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Issue 100 Summer 2012

Published by the Federation of Astronomical Societies ISSN 1361 - 4126

Presidents Spot

Greetings fellow amateur astronomers!

Hopefully this newsletter finds you well and taking advantage of the lengthening nights. Assuming it's not still raining where you are!

This newsletter provides an important channel of direct communication between the FAS Council and the amateur astronomers in the societies that make up the FAS. In the last newsletter I made another appeal to societies to communicate with the FAS, to let us know if there was anything you would like the FAS to consider doing for its member societies. Unfortunately we haven't had any response which is a bit disappointing. Anyway our desire for societies to communicate with the FAS Council remains ongoing and hailing frequencies are open!

Please make a note in your diary about the FAS Convention on Saturday, 6th October. Elsewhere in this newsletter you will find some details of the excellent programme of talks at the Convention, plus the trade stands that allow your cheque book to get up close and personal with some tempting astronomical equipment.

You will also find in this newsletter:

- An advert for a volunteer to carry out the post of Meetings Organiser for the FAS with effect from the next AGM. Please consider whether you would like to help out with this. Help and support would be given from the other Council members so don't be put off because you may never have done anything like it before.
- Some good news on the PLI subs for the next 3 years.

I would also ask anyone interested in volunteering to do some work on Council to let us know, whichever post you were interested in.

Well this is my last newsletter report to you as President. After 4 years in the post I will be standing down at the next AGM. I have thoroughly enjoyed my time in the job and it really has been a privilege to work with the other volunteers on the FAS Council. I sincerely thank them for all the support they have given me and I take satisfaction from the improvements that together we have made to the FAS.

One of the many things I have learnt from my time on the FAS Council is how much good work the Council volunteers do for astronomical societies and I would ask your society to state its appreciation for that from time to time. When was the last time your society committee expressed its thanks to the volunteers on the FAS Council for the work done on their behalf?

With your help reader, the FAS can continue and improve. However without society members like yourself being prepared to do a bit of voluntary work on the FAS Council the FAS will disappear to the detriment of societies. Don't assume someone else will volunteer but come forward and be counted!

My very best wishes to you,

Richard Sargent

Please Read This

Vacancy for

FAS Meetings Organiser

The FAS is appealing for nominations for someone to take on the post of Meetings Organiser with effect from the next AGM on 6th October 2012. The Meetings Organiser organises the Annual Convention of the FAS at a venue agreed by the FAS Council, including arranging for the speakers and the Traders for the event. With help from other Council Members the MO runs the annual convention on the day. The MO is a member of the FAS Council and would attend FAS Council meetings in London (3 meetings a year on Saturdays; travel expenses paid).

If you are interested in volunteering for this vacancy please contact the FAS Secretary via the contact link on the FAS website contacts page. You will need to confirm that the committee of the local astronomical society that you are a member of supports your application (and your society needs to be a member of the FAS). In carrying out this voluntary post you would be supported by the other members of the FAS Council and we are sure you would get great satisfaction from the post. The annual convention and AGM of the FAS is an essential part of the FAS work. Descriptions of the FAS Council posts can be found on the FAS website.

Important Announcement on the PLI Cost

The group Public Liability Insurance (PLI) cover is arranged by the FAS for societies who wish to pay for this optional item. At this year's renewal of cover the cost charged by the Insurance Company was £4,635.70 (an increase of 1.5% on the previous year). Divided between 171 participating societies (and not including a small FAS admin cost) this could have been a charge to each society of £27.11. However the FAS actually charged each society £20, and made up the shortfall from the reserve in the PLI fund.

Subject to there being no excessive increase in the premium charged by the Insurers, the FAS intends to keep the annual charge at £20 per participating society for the next 3 years. That will reduce the current PLI reserve fund from its current level of £8635.92 to an amount approximately equivalent to one year's premium, which is the target level set by the FAS for the minimum reserve. Thereafter the annual charge per society will return to whatever the total premium cost (plus FAS admin cost) divided by the number of participating societies equals, and without profit.

NOTICE

Crayford Manor House AS

Having celebrated our 50th Anniversary in 2011, the Crayford Manor House Astronomical Society is entering a new phase of operation in 2012, becoming independent from the Adult Education Centre and meeting at a new base – Sutton-at-Hone, Kent

This new beginning allows us to forge our own path, opens up flexible membership for existing and new members, and to undertake a wider range of activities.

We will continue to run a schedule of regular, high quality lectures provided by experts from the world of Astronomy, Science, Technology, History and Education. In addition, we will hold regular Society Nights, where we can discuss news, events and also share the results of our own research and observations.

Our new venue also allows us to conduct practical observing and coaching of beginners using binoculars, telescopes or webcams.

Annual membership now begins at £35, with Full Members entitled to attend all lectures, Society Nights and activities, for £125.

For information, please visit our website:

www.crayfordmanorastro.com

or e-mail us at secretary@crayfordmanorastro.com

Liverpool A S at NAM

In March, as part of amateur/professional co-operation network, members of the Liverpool Astronomical Society provided the opportunity for delegates to the UK-Germany National Astronomy Meeting (NAM) to view the Sun safely using Hydrogen-Alpha telescopes. This year was Manchester University turn to host the major meeting of astronomical minds.

The Society brought a ***Meade Coronado*** 40mm Personal Solar Telescope (PST) and newly purchased ***Meade SolarMax II*** 60mm telescope giving detailed views of the Sun which after weeks of inactivity has begun to reawaken. Prominences on the solar limb where seen, plus detailed views of forming filaments on the solar surface. One delegate who found some time to have a look, was Prof Fran Bagenal, from the Laboratory of Atmospheric & Space Physics, University of Colorado, USA. She is a principle scientist for the NASA's **Juno** mission to Jupiter, and the **New Horizons** spacecraft, on its way to distant Pluto. Prof Bagenal had given one of the NAM Public lectures on the subject of the Juno Mission the night before. A group of solar physicist indicated that they had never looked at the Sun using any kind of solar telescope, and had only viewed the Sun on computer screens. About 30-40 delegates found time between lectures and poster meetings to come outside on a sunny Manchester day!

- To look at our nearest star.

With thanks the Local Organising Committee for NAW, namely Dr Philippa Browning, Dr Tim O'Brien, and the staff from the University of Manchester Conference Office, and University Place visitor Centre.

(Continued from page 1)
and the myth that imaging is difficult mean that many amateurs never experience this exciting and powerful aspect of our hobby. The proposed facility should remove the barriers of cost, inconvenience and location by providing all necessary equipment, set-up and ready to go on a prime dark-sky site.

For beginners and inexperienced imagers, the system would need to be very simple to use. You would access the telescope online from your home computer. This should require a level of IT expertise no greater than, say, buying a book on Amazon or using email. For a single monochrome image, you need only type in your target object, select your filter and exposure time from a list and click a button. The system would do the rest.

Intermediate and advanced imagers would have access to a facility markedly better in terms of instrumentation, location and sky quality than they are likely to have at home. Though the telescope would be operated easily for basic imaging by beginners, it would also offer the full range of sequencing and capture options, including broadband and narrow-band filtration, that the more advanced users require.

Advice and guidance for all levels of experience would necessarily be provided.

Why Astrocamp?

Astrocamp is sited above 5,000 feet under very dark skies in an environmentally protected region. It enjoys on average 200 clear nights a year and seeing can be better than 1 arc sec. There is a 360 degree horizon and the latitude is advantageous for imaging, in that it brings more of the southern skies, not visible from the UK. Astrocamp is run by experts, many of whom are professional astronomers. Hosting includes shelter, power and internet connection and, crucially, on-going maintenance.

How much would it cost?

The initial set-up costs are envisaged to be around £18K - ***none of which would be sought from member societies***. The FAS would seek to fund the initial costs by sponsorship from grant-providing organisations. We would go ahead with seeking funding only if we received from FAS member societies enough firm interest to indicate that the idea would be viable and sustainable.

Hosting and maintenance charges at Astrocamp would cost FAS around £200 a month. Minor variation in this fee is to be expected as the specifics of our hosting requirements are finalised. We would share the monthly cost between those member societies who had signed up to the scheme.

Assuming 1200 imaging hours a year, if all 187 FAS member societies signed up, each could have 6.4 hours of telescope time for a total annual cost per participating society of just under £13. If 60 FAS member societies signed up, each could have 20 hours of telescope time for a total annual cost per participating society of £40. If only 30 societies signed up, we would need to charge each such society £80 for the year but for this, each of them would get 40 hours of telescope time. By way of comparison, time on a comparable commercially provided telescope would cost around £35 for a *single* hour. The FAS remote scope proposal would thus offer an enormous saving to FAS members, making a high quality imaging facility widely accessible and affordable to beginners and advanced users alike.

How would the scheme work?

The allocation of telescope time is a complex topic and something that will take considerable thought to get right. Our guiding principles will be to make the allocations as fair and equitable as possible.

The scheduling software means that observations can be made throughout the night without the user having to be in front of his PC.

Societies would have to book slots ahead of time and, subject to the arrangements we put in place to keep things fair, this would have to be on a first come first served basis.

It would be for signed-up societies to determine how their telescope time would be used and which of their members would access it.

The booking would be by society, but there is no reason why societies could not plan to use their time collaboratively on joint projects and, indeed, this could be a very constructive approach for you to consider.

What if the weather's bad or the equipment fails?

We could not, of course, guarantee good weather during booked timeslots. As a general rule, neither would we be able to compensate or reassign time lost due to bad weather.

With any imaging set-up, there is always the possibility of equipment glitches, though the quality of proposed equipment and the expert on-site maintenance should make this a rarity. We would build in arrangements to try and compensate for time lost to equipment problems but we could not guarantee to compensate.

Finally

It must be emphasised that the idea is still at an exploratory stage. Whether or not we progress past this first stage will depend on there being a sufficient level of firm interest from FAS member societies.

If this primary condition is met, we will go on to the next stage, which will be a detailed plan and consideration of the proposed scheme by the FAS Council to decide whether or not it is sufficiently viable to take further. If it is decided to proceed then the next stage would be to seek set-up funding.

A briefing note has been sent to all member societies asking for this outline proposal be given due consideration and to respond accordingly.

At this stage, we were seeking expressions of serious interest and any replies would not constitute a formal commitment.

If you have any questions or would like to offer any comments or suggestions, we'd be delighted to hear from you.

Interim news on the FAS Telescope survey

The FAST survey closed on 2nd July.

48 FAS member societies responded to confirm potential interest in joining the project. 12 societies replied saying that they were not interested. The FAS Council believes that 48 positive responses is enough to justify investigating the scheme further.

Many thanks to all those societies and their representatives for replying, positively or negatively, to the survey. Thanks also to the many of you who sent comments, questions or suggestions. These were often very informative and will help shape the scheme should it finally go ahead.

The 48 societies who responded positively were wide-ranging in size (12 members to 180) and pretty much nationwide in geographical distribution. Within the positive responses, there was a gradation of tone from lively enthusiasm to cautious approval. Where there was caution, this was almost always because, understandably, the society wanted to see how things would work out for them in terms of cost and allocation, once more was known about the overall level of interest.

Now that we have a clearer indication of potential interest among societies, we can start work on the practicalities and come up with some firmer figures. This will include evaluating some of the alternative systems societies have suggested. Within this, we may want to consult with further on different options, for example around instrumentation, funding arrangements and time-allocations. When firm figures are available and you have had time to reflect on them, we'll ask you again whether you would be prepared to commit for three years.

As you'll appreciate, there is still a long way to go and there are obstacles to surmount, if the project is to become reality. Not least among these will be the quest for sponsorship. We'll be embarking on this shortly, alongside our work on the key practicalities and operational detail.

The FAS Council will continue to review the progress of the project, stage by stage, and keep member societies informed of developments as they occur.

Meanwhile, if you have any further questions or comments, please send them to John Evans on - fast@fedastro.org.uk

Shropshire AS looking for the Transit from The Wrekin

Mandy Bailey reports:

Sadly, our recent good fortune with the weather didn't stay with us for our ***Transit of Venus*** event on 6th June. However, it could have been much worse.

Leading up to the day I had a constant eye on weather forecasts as well as the very grey rain-filled skies; a week before the event the forecast was torrential rain for the morning of the Transit and I feared we might have to cancel our planned expedition to climb **The Wrekin** (1,335 feet) before dawn, set up telescopes and wait for the Sun to rise in the hope of seeing Venus pass in front of the Sun during the last hour of its historic Transit; an event which will not happen again for 105 years! The tension mounted as the day got nearer, more people became aware of the event thanks to TV, radio and newspaper coverage. Our little expedition caught the attention of the local media with a piece in the ***Shropshire Star*** and an interview on ***Radio Shropshire***. Then the national papers got hold of the story of some intrepid explorers in Shropshire climbing a rather large hill before dawn in the hope of seeing the Transit of Venus and we got rather a nice mention in ***The Independent*** newspaper. This resulted in a fair bit of interest and thankfully the day before the event the forecast suddenly started to improve a bit - well, at least rain wasn't forecast for a change.

So at 03:50 on June 6th a group of us met up at the base of The Wrekin and proceeded to drag telescopes up to the summit; it was dark, cold, and windy and when we neared the top we entered a cloud! That soon cleared and we were left standing on the top of The Wrekin setting the telescopes up by the trig points where we had a clear view over to the Eastern horizon and the thick clouds on that horizon.

Thanks to the media coverage there were a number of non-members who had braved the early morning and cloudy conditions to join us and all in all we numbered about 30. Sadly the clouds remained thick on the Eastern horizon (typically it was lovely and clear on the Western horizon) with the Sun teasing us during the last ten minutes of the Transit when it seemed to be trying hard to break through the cloud.

Sadly though, it only cleared the cloud once the Transit was over; despite giving it our best shot we didn't see the Transit of Venus. Yes, we were disappointed but despite being up there freezing in the wind and staring bleakly at thick clouds we all had a good time, and spirits were high.

Intrepid adventurers at the top of The Wrekin - Photo: David Smith

After all, we were making history - our expedition had been noted in the UK and was also listed on the website of the ***Royal Astronomical Society*** (RAS) where it will form part of the archives of the RAS. Just as we had looked back over the exploits of previous expeditions to observe the Transit of Venus, so in 105 years time, people will look back at our expedition and wonder what sort of insane creatures we were to get up so early in such bad weather and then climb The Wrekin to try to get the best possible view we could.

I am sure they will also wonder at the antiquated methods by which we were communicating with friends across the UK and world in our anticipation and excitement, wondering who had and had not seen the Transit - mobile phones and laptops, Twitter and Facebook, such wonderful old fashioned and inefficient methods of communicating which, in 105 years time, I am sure they will be! However to us they were a lifeline, and in a way we felt we were part of something big and involved in history in the making. We had messages from fellow amateurs, professional astronomers, freelance journalists, European Space Agency journalists and TV presenters, all hoping our early morning climb would reward us with a glimpse of the Transit. **Dr Lucie Green**, who was in Svalbad in the Arctic Circle and had, the night before, co-presented the BBC ***Horizon*** programme on the Transit of Venus, sent us this message; (reproduced by her kind permission):

?Lucie Green _@Dr_Lucie

@mandybailey2: Very impressed by your commitment! Fingers crossed!

Later Lucie emailed:

Hi Mandy!

So sorry to hear that the clouds didn't clear but great to hear you kept your spirits up! I was so impressed by your efforts. You have to try! It was lovely for me to hear about what you were all doing.

Keep up the great work!

Lucie xx

Yes, we kept our spirits up and that was in part helped by tweets from Lucie and others remarking on our efforts. Although we didn't see the Transit of Venus 2012 we were a part of it and we were all glad we had given it a go.

Proof that Shropshire AS made it to the top and were fully prepared

However there was one Shropshire AS member who did get to see the Transit—see the report of Grant Privett on page 8.

Courtesy: Hermes

BOOK REVIEW

Grating Spectroscopes and How to Use Them *by Ken M Harrison*

Published by Springer ISBN 978-1-4614-1396-7 167p £31.99

In some ways this book could be considered a prequel to Ken's earlier book 'Astronomical Spectroscopy for Amateurs' which was reviewed in these pages in Issue 96 - Spring 2011. Ken is also the designer of the L200 Spectroscope which are produced in kit form.

This book concentrates on the less costly and, some say, 'simpler' form of taking spectra - using a filter-like device called a transmission grating. However, whilst the gratings are less expensive, spectra acquisition and data processing requires the same dedication to achieving repeatable results as with Spectroscopes costing several thousands of pounds.

The transmission grating looks much the same as most 1 1/4inch filters which screw into the front of an eyepiece/camera fitting and is mounted in a similar way.

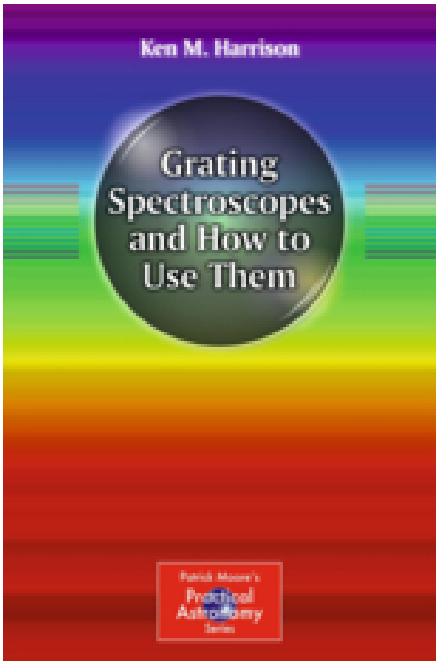
One thing I particularly liked was a two-page 'Quick Start Guide', which simply sets out what equipment you require and then a list of basic methods depending upon the type of camera you use. I found this particularly useful during reading about the more technical aspects, to refer to this Guide, to help to put it all into context.

The book covers virtually all aspects of the spectrum from how to acquire the data, through the software processing stage and on to the interpretation. Much of this is fairly technical but is written is an easy to understand style - and it is also very readable, so don't be daunted.

Spectra can, of course, be taken by mounting the camera and grating onto a telescope where it is generally used in the same way as imaging, using some form of auto-guiding. However by obtaining suitable fittings the grating can be fitted to the front of a DSLR camera lens. This enables spectra to be taken with the camera simply mounted on an unguided camera tripod with surprisingly good results.

The processing of the acquired data, so vital to producing meaningful results, is thought by some to be a bit of a 'black art', specially by those in the foothills of the learning curve. However Ken's chapter on the software, much of it freeware by the way, is written in a clear and concise manner and should enable the absolute beginner - and those more experienced, to get to grips with this subject.

This book is worth having on your bookshelf even if you are unsure whether to try spectroscopy, because it covers the general subject of the spectrum, star classification, etc., in an easy to follow style.



Finally the grating spectroscope is a good lead in to the more demanding slit-type spectroscopes, with which the amateurs are able to contribute to the work of professional astronomers.

With its modest cost, the transmission grating is an excellent way to extend your astronomical activities - and this book will be a great help! - *and bear in mind about 85% of astro-discoveries, have been by spectroscopy!!*

Frank Johns

North West Group of Astronomical Societies - 3rd Imaging Workshop

Saturday, 21 April, saw 30 delegates from NWGAS, meeting for its 3rd astro-imaging workshop, hosted by Manchester Astronomical Society in the Octagon Room of the Godlee observatory, Sackville Building, University of Manchester. During the full day event, five speakers described how they used popular photo-processing software to get the best from their astronomical images. In all six local societies were represented.

Introduced by Kevin Kilburn (Manchester AS), Tom Hudson (Macclesfield AS) described his use of Registax and Photoshop to process his Hydrogen-alpha solar images taken through a modified Coronado PST. Veteran astro-imager, David Ratledge (Bolton AS) followed with a presentation using IRIS free download software to compile mosaic composite images of the Milky Way into accurately registered cartographic wide-field images and then demonstrated how IRIS was possibly the best free software to remove sky glow from light-polluted images taken from urban regions.

The afternoon session was chaired by Gerard Gilligan (Liverpool AS). Kevin Kilburn described the lunar surface colour project he is coordinating for the BAA Lunar Section. This otherwise by-passed topic is ideally suited to digital imaging in the study of lunar stratigraphy and possibly the underlying cause of Transient Lunar Phenomena by simply increasing colour saturation in Photoshop. Peter Franklin (Blackpool AS) followed with an in-depth discussion on multi-point registration of lunar video images using Registax 6.

Delegates & speakers at the NWGAS imaging workshop Image: Chris Lord, and Words Kevin Kilburn.

Steve Warbis (Macclesfield AS) rounded off the day with his method of 'grab and go' astro imaging of Messier objects with a telephoto lens and the very portable AstroTrak camera mounting. As a final, unscheduled topic, Tom Hudson briefly described the use of Autostakkerte2 freeware to make solar images.

Throughout each presentation, ongoing audience participation, questions and raised points of discussion added to an informal yet dynamic exchange of opinion and ideas from delegates who themselves were experience astro -imagers. This added immensely to the overall productivity of the meeting that ended, after more than six hours with suggestions of topics for another NWGAS imaging workshop next year.

PUBLIC OBSERVING ON WORTHING PROMENADE

The fine weather of the previous week went on into the weekend and about a dozen members and telescopes were on hand at Splash Point to show members of the public views of the late spring evening sky.

Before it got too dark a view of the fine thin crescent Venus was observed - "a baby's finger nail" as one members of the public described it.

The Moon at 6 days old was shining down and the well known "Wow" sound was heard as people saw a different than normal view of our nearest neighbour in space.

Many people who popped down got onto their mobile phones and told their friends that they had to come down and see what was going on and over the evening well over a hundred members of the public looked in and saw views of the sky they had never seen before. Not a bad turn out as we were up against the Eurovision Song Contest!!

The '*baby's finger nail*' view of Venus imaged by Brian Halls.

The evening began with Phil Trott pointing his telescope to an area above some buildings to show the crescent Venus.

Night to night at the time, the planet was approaching the Sun and the crescent getting thinner and thinner as Venus is getting closer to Earth and the Sun, until transiting on the 5th/6th of June. The crescent can be seen easily in a small telescope or even a pair of good binoculars. Below, Paul can be seen setting his Sky Watcher 120mm short focus telescope up to look at the Moon.

Several members had bought along these kind of instruments during the evening – fairly powerful yet portable and easy to operate – an ideal sort of telescope for this kind of event.

The Moon as always proved to be popular to look at and the principles of how the phases work and the cause of Earthshine were explained.

Above (from left to right): Jan, Chris, Phil and Steve are all looking for the faint planet Venus – Phil has the better eyesight as I never found it at all with my naked eye!

Mars proved to be just a tiny ochre coloured disk in most of the telescopes present but Saturn with its rings and atmospheric belts were a crowd pleaser.

The light evening meant of course that some deep sky objects were not visible but the many people who went away from this event did so with some astonishing views of the sky they may not have had before.

The '*baby's finger nail*' view of Venus the following evening (27th) imaged by Brian Halls. The cusps almost give the appearance of enclosing the full disk and the eye can be forgiven for being tricked into 'seeing' this optical illusion.

Image stacked from 1700 frames with Registax and then 'cleaned' up with the wavelets application. Seeing was not very good as Venus was low in the sky, with atmospheric turbulence.

Courtesy: Southern Astronomer (Worthing Astronomers)

OBITUARY

John Luvian-Wade

Died: 26th February 2012

John was a very keen knowledgeable Amateur Astronomer, owned his own telescopes and had the Brighton and Hove Astronomy Societies observatory in his back garden. He was a founder member of SAGAS and was involved in the start of the Federation of Astronomical Societies and was for years an Officer/ Committee of the BHAS which included liasing closely with the Astronomical Department of Sussex University.

He travelled extensively with close friends around the world always in the pursuit of anything to do with Astronomy and made many long standing friends in the Astronomical World.

John is in the middle of the picture

Peter Hingley

1951-2012

The Royal Astronomical Society and the FAS regrets to announce the death of Peter Hingley, the RAS Librarian at Burlington House.

Peter was a valued and committed member of the RAS staff with an extraordinary knowledge of historical astronomical documents and will be missed by all who knew him.

Peter was particularly helpful to the FAS in any matter we needed to raise with him. He was also instrumental in enabling the FAS Council to meet at Burlington House on a regular basis.

A Century of Newsletters

(Continued from page 1)

same people on any of these committees? I wonder if Aylesbury now get more than their record of 35 people regularly? If Huddersfield still run photography competitions? If West of London still have their Geoff Smith observing contest trophy? I'd love to hear about any of these.

There is an advert from "Spaceprints" who would have sent you a catalogue if you sent a 16p stamp to them. I wonder how many people still have huge numbers of slides but never use them now? Digital projectors really did kill that off pretty fast.

Recently, copies of all of the printed newsletters that the FAS have in its archive went online. These can be found on the FAS website (www.fedastro.org.uk). Most of the back issues are available though there are a few missing.

If anyone has copies of newsletters: #58, #43, #37, #35, #26, #25, #24, #23, #20 please do let us know (email webmaster@fedastro.org.uk) as we would love to have a complete archive.

In some respects its seems that not much has really changed with the world of amateur astronomy, we still run very similar meetings and probably are bemoaned by similar problems - never mind the weather.

The archive is there for you all to enjoy so if you find something in there that you think would be interesting to us all please just drop us an e-mail.

Federation of Astronomical Societies

June 1984

Letter

Facsimile of Page 1 Issue 1 of FAS Newsletter

The only Shropshire AS member to see the 2012 Transit?

Further to the SAS Transit Report on page 5*

Meanwhile, far-flung SAS Secret Agent **Grant Privett** had much better fortune:

"This image shows the end stages of the Transit of Venus captured in Fovant, Wiltshire. The dawn showed a few small breaks in the sky but it was over twenty minutes after sunrise before I saw the Sun.

I wasted a lot of time trying to webcam it and finally gave up and stuck with a simple exposure using a Baader filter and a bog standard Lumix DMC-FZ7 (not a DSLR). Killed the time listening to 3 larks ascending, very bucolic.

Managed to see this and the previous one in Zakynthos so am doubly lucky".

** Shropshire AS*

WORTHING ASTRONOMERS - a member profile

In our occasional series we look at a member and their equipment and interests. This time it is member James West - observing out of Chandlers Forge in Hampshire.

In the picture above James can be seen with his Celestron CGEM EdgeHD 925 f/10 SCT with Canon 40D DSLR camera attached. With this setup James has caught some amazing images such as the ISS (below) caught on June 19th, 2011.

How did he capture the image?

He explains: "*The technique was to point the telescope at a position the ISS was predicted to pass through. Set the camera on high burst rate (6.5 fps) JPEG at 1/1000 of a second exposure at ISO 1600.*

As the ISS enters the field of view of the finder, then set the burst going and stop when it leaves. There were roughly 3 shots with the ISS in the frame. This was almost overhead so about as big and detailed as it can probably get. Quite a bit of the structure such as the various modules, support trusses and solar panels is clearly visible.

The approach I use is to use Heavens Above (http://www.heavens-above.com/) or Calsky (http://calsky.org/) to find a star the ISS is going very close to and tracking on that (HA has stars to about mag 6, Calsky much fainter). As the ISS comes into the Finder I then start a high speed frame burst at 1/1000s and ISO 1600. This still only gets about 3 frames with the ISS in it at the Canon 40D frame rate of 6.5/sec. Now I have a GOTO scope I don't need to use a star but get coordinates from Calsky and go to that coordinate and wait. Clearly focussing and seeing are now the limiting factors in how good an image one can get. One technique may be to try stacking the three images to improve the sharpness."

"*This* [image above] *is a composite of three photographs of the ISS with the Shuttle Atlantis docked taken at prime focus of my Celestron CGEM EdgeHD 925 with a Celestron solar filter (never look at the sun directly without a filter). The exposure was 1/1000s at ISO 1600. Focus not quite sharp (focusing in bright sunlight is easier said than done). This was*

taken at lunchtime on 11th July 2011 from my garden in Chandlers Ford. The centreline was about a mile away.

I used Calsky *to get predictions of when solar transits would be visible from nearby. You need to keep checking as the predictions change as they get closer to the actual time and times may be slightly different or positions of transit visibility can change (the track is very narrow so you may have to move at short notice).*

Set the telescope and camera up and track the sun. With a Canon 40D, the entire sun is not visible so you have to know where it will cross the sun if it is not central. A DX (35mm) camera should be able to see the entire solar disk.

Use a GPS to show the exact time and a second or two before the predicted transit set the fast burst rate going and stop a second or two after predicted finish. That caught three shots of the ISS transiting which I then stacked with Photoshop.

I am actually quite surprised how often the ISS does transit the sun from any position, probably several times within 10-20 miles of anywhere every couple of months. Whether the sky is clear enough is another matter.

James also images planetary, lunar and deep sky objects as well and he also produces some beautiful wildlife images with his equipment. His work can be found on *Flickr*.

Taken from 'The Southern Astronomer' - newsletter of Worthing Astronomers

Multi-wavelength Observing The New Astronomy by Brian Finney

J Helioviewer - will give you a new toy to play with.

SDO (Solar Dynamics Observatory) downloads 150 million bits of data per second, 24 hours a day, 7 days a week i.e. equivalent to downloading 500,000 iTunes a day.

For your information and entertainment, after all it is your taxes that are paying for the SDO and its data downloads; ESA has produced a java software package that is freely available and allows you to see the solar images in detail and almost real -time.

The software, J Helioviewer, accesses SDO and SOHO current and archive data in the full range of wavelengths observed; see the data as images or video and zoom in to see the detail.

Download the free software: http://jhelioviewer.org/ and be ready for the 2013-14 Solar Maximum.

There is a two minute tutorial to help you get started;

Enjoy

Amateur Telescope Making By Brendan Martin & Dave Thomson at Liverpool AS

The primary observations to be undertaken with this new telescope will be Supernovae searches to support the Wide field camera and the 20 inch Telescope and Observatory. Automated observing runs will normally be done late at night and through to the early hours of the morning. The telescope will cover areas of sky the Wide field camera and the 20 inch Telescope and Observatory will not cover in the same night.

The telescope will also be used for 'public outreach' and 'education'. The telescope will be accessed remotely during Sidewalk events, or from the Pex Hill observatory. Control over the telescope and CCD camera will be displayed using a PC projector. Access to the telescope will be via REMOTE control Via VNC using wireless broadband (if a local connection is not available).

The 16 inch F4 Primary is home made from 25mm Schott Borofloat. The blank disc was supplied by J.B.Treasure in Liverpool who do a very good service.

Two of the optics are in the process of being made. One for the 16 inch F4 Run off roof, and one for Ian Baker's Observatory to replace his Orion 12 inch F4.

16 inch F4 Optical design

The optical configuration chosen is a folded design to keep the instrument compact with low wind loading to operate in the open air. See sketch below.

The secondary is 122mm in diameter with the baffle 130mm in diameter.

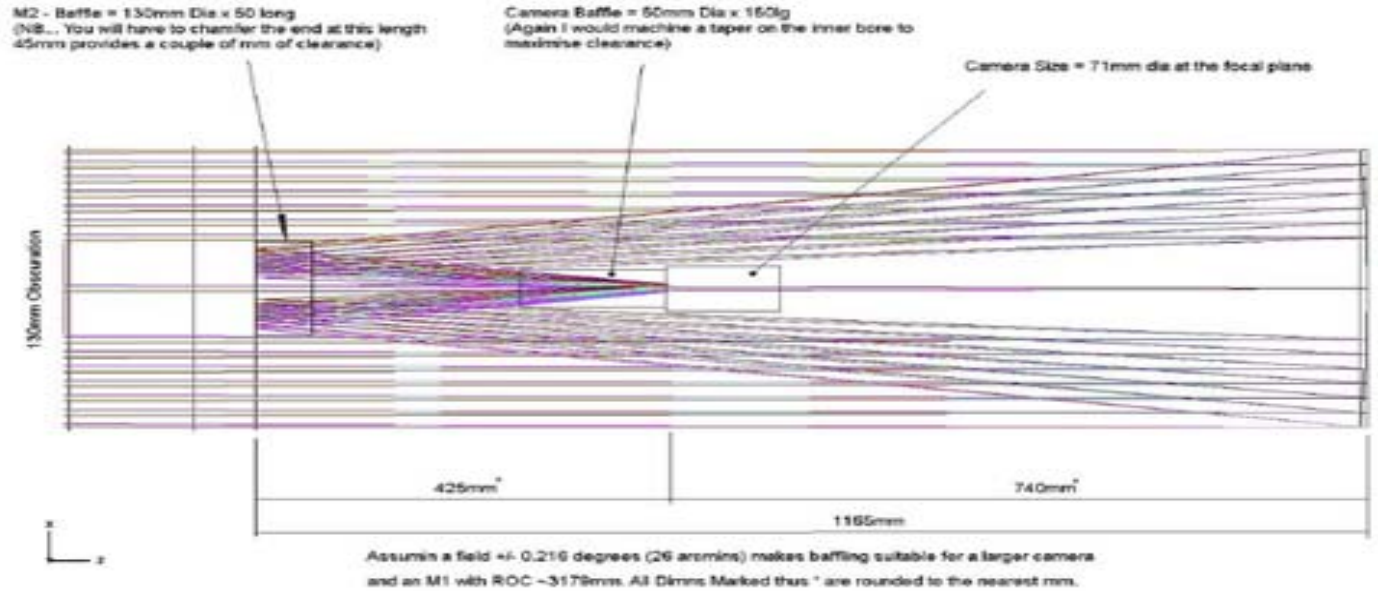
The 18 point mirror support

The camera is placed near the middle of the tube and is mounted in a bespoke focuser.

The Tube Assembly

The tube has been made from plywood and aluminium for ease of manufacture, cost and weight. Only 4 of the upper trusses are installed in the image above.

Image following is from May 2011 after completion of the rebuild of the Meade RCX400 mount.



(Continued from page 10)

The mount is on the concrete wedge that will be used for the folded 16 inch F4 telescope to be mounted in it's own run-off roof observatory.

The primary CCD for the 16 inch F4 will be a spare Starlight Xpress SXV M7 that I have.

The camera is mounted in the centre spider along with a bespoke focus mechanism. Limits for in and out travel are fitted. The focuser will be ASCOM compliant.

The focuser is driven from a motor gearbox pair that has a very high gear ratio. At 9V one rotation is approximately 2 seconds. There is no backlash worth worrying about, and no axial slop either.

The mechanism is mounted in a black drain pipe tube that can be removed for inspection and alignment of the optics.

A larger camera can be installed by a new interface section if required up to the diameter of the drain pipe, but this set up will give similar field area to the 20 inch Telescope and Observatory.

Observatory Construction

Construction of the slab that the 16 inch F4 Run-off Roof Observatory will sit on. This was constructed August 2011.

Making the foundation slab for the mount was done in a number of stages. The primary slab was (600 x 600 cast slab of concrete was done first. The rest of the slab is made of 600 x 600 mm patio flags bedded into concrete. Total size is 2400 x 2400 mm.

We had to excavate existing cable ducts and re-route cabling from the Dome and the Wide field camera Run-off roof as well. The Weather station will be re-located into the new observatory. The old shed is to be demolished.

The construction of the walls of the observatory were started in August 2011. They are similar to the existing Run-off Roof Observatory Construction in that they are a wooden frame

covered with white Foamex.

The walls were constructed in the garage before assembly onto the foundations.

The primary construction was completed late September 2011.

Images of the Observatory April 2012.

For more visit:

http://datscope.wikispaces.com/16+inch+F4+Run-off+Roof+Observatory

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Taken from LAS News Circular

Orientation of Far-Off Multiplanet System Has Orientation Very Similar to Our Own Solar System

ScienceDaily (July 26, 2012)

Our solar system exhibits a remarkably orderly configuration: The eight planets orbit the sun much like runners on a track, circling in their respective lanes and always keeping within the same sprawling plane. In contrast, most exoplanets discovered in recent years -- particularly the giants known as "hot Jupiters" -- inhabit far more eccentric orbits.

Now researchers at MIT, the University of California at Santa Cruz and other institutions have detected the first exoplanetary system, 10,000 light years away, with regularly aligned orbits similar to those in our solar system. At the centre of this faraway system is Kepler-30, a star as bright and massive as the sun. After analysing data from NASA's Kepler space telescope, the MIT scientists and their colleagues discovered that the star -- much like the sun -- rotates around a vertical axis and its three planets have orbits that are all in the same plane.

"In our solar system, the trajectory of the planets is parallel to the rotation of the sun, which shows they probably formed from a spinning disc," says Roberto Sanchis-Ojeda, a physics graduate student at MIT who led the research effort. "In this system, we show that the same thing happens."

Their findings, published July 25 in the journal *Nature*, may help explain the origins of certain far-flung systems while shedding light on our own planetary neighbourhood.

"It's telling me that the solar system isn't some fluke," says Josh Winn, an associate professor of physics at MIT and a co-author on the paper. "The fact that the sun's rotation is lined up with the planets' orbits, that's probably not some freak coincidence."

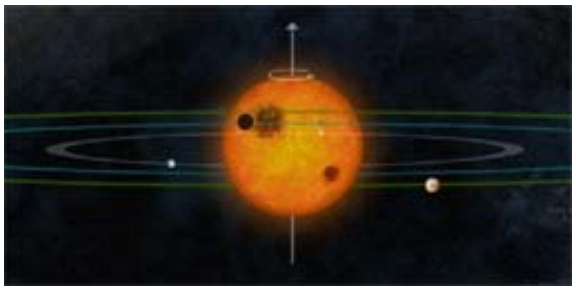
Setting the record straight on orbital tilts

Winn says the team's discovery may back a recent theory of how hot Jupiters form. These giant bodies are named for their extremely close proximity to their white-hot stars, completing an orbit in mere hours or days. Hot Jupiters' orbits are typically off-kilter, and scientists have thought that such misalignments might be a clue to their origins: Their orbits may have been knocked askew in the very early, volatile period of a planetary system's formation, when several giant planets may have come close enough to scatter some planets out of the system while bringing others closer to their stars.

Recently, scientists have identified a number of hot Jupiter systems, all of which have tilted orbits. But to really prove this "planetary scattering" theory, Winn says researchers have to identify a non-hot Jupiter system, one with planets circling farther from their star. If the system were aligned like our solar system, with no orbital tilt, it would provide evidence that only hot Jupiter systems are misaligned, formed as a result of planetary scattering.

Spotting sunspots in a far-off sun

In order to resolve the puzzle, Sanchis-Ojeda looked through data from the Kepler space telescope, an instrument that monitors 150,000 stars for signs of distant planets. He narrowed in on Kepler-30, a non-hot Jupiter system with three planets, all with much longer orbits than a typical hot Jupiter. To measure the alignment of the star, Sanchis-Ojeda tracked its sunspots, dark splotches on the surface of bright stars like the sun.



In this artist interpretation, the planet Kepler-30c is transiting one of the large starspots that frequently appear on the surface of its host star. The authors used these spot-crossing events to show that the orbits of the three planets (color lines) are aligned with the rotation of the star (curly white arrow). (Credit: Graphic by Cristina Sanchis Ojeda)

"These little black blotches march across the star as it rotates," Winn says. "If we could make an image, that'd be great, because you'd see exactly how the star is oriented just by tracking these spots."

But stars like Kepler-30 are extremely far away, so capturing an image of them is almost impossible: The only way to document such stars is by measuring the small amount of light they give off. So the team looked for ways to track sunspots using the light of these stars. Each time a planet transits -- or crosses in front of -- such a star, it blocks a bit of starlight, which astronomers see as a dip in light intensity. If a planet crosses a dark sunspot, the amount of light blocked decreases, creating a blip in the data dip.

"If you get a blip of a sunspot, then the next time the planet comes around, the same spot might have moved over here, and you'd see the blip not here but there," Winn says. "So the timing of these blips is what we use to determine the alignment of the star."

From the data blips, Sanchis-Ojeda concluded that Kepler-30 rotates along an axis perpendicular to the orbital plane of its largest planet. The researchers then determined the alignment of the planets' orbits by studying the gravitational effects of one planet on another. By measuring the timing variations of planets as they transit the star, the team derived their respective orbital configurations, and found that all three planets are aligned along the same plane. The overall planetary structure, Sanchis-Ojeda found, looks much like our solar system.

James Lloyd, an assistant professor of astronomy at Cornell University who was not involved in this research, says that studying planetary orbits may shed light on how life evolved in the universe -- since in order to have a stable climate suitable for life, a planet needs to be in a stable orbit. "In order to understand how common life is in the universe, ultimately we will need to understand how common stable planetary systems are," Lloyd says. "We may find clues in extra-solar planetary systems to help understand the puzzles of the solar system, and vice versa."

The findings from this first study of the alignment of a non-hot Jupiter system suggest that hot Jupiter systems may indeed form via planetary scattering. To know for sure, Winn says he and his colleagues plan to measure the orbits of other far-off solar systems.

"We've been hungry for one like this, where it's not exactly like the solar system, but at least it's more normal, where the planets and the star are aligned with each other," Winn says. "It's the first case where we can say that, besides the solar system."

Most Massive Stars Live as Vampires in Close Stellar Pairs

by Denise Chow, SPACE.com Staff Writer

Artist's impression of a vampire star and its victim.
CREDIT: ESO/L. Calçada/S.E. de Mink

A surprising number of massive stars in our Milky Way galaxy are part of close stellar duos, a new study finds, but most of these companion stars have turbulent relationships — with one "vampire star" sucking gas from the other, or the two stars violently merging to form a single star.

Astronomers using the European Southern Observatory's Very Large Telescope in Chile studied massive O-type stars, which are very hot and incredibly bright. These stars, which have surface temperatures of more than 54,000 degrees Fahrenheit (30,000 degrees Celsius) live short, violent lives, but they play key roles in the evolution of galaxies.

The researchers discovered that more than 70 percent of these massive stars have close companions, making up so-called binary systems in which two stars orbit each other.

Studying stellar behemoths

Type O stars drive galaxy evolution, but these stellar giants can also exhibit extreme behavior, garnering the nickname "vampire stars" for the way they suck matter from neighboring companions.

"These stars are absolute behemoths," study lead author Hugues Sana, of the University of Amsterdam in the Netherlands, said in a statement. "They have 15 or more times the mass of our sun and can be up to a million times brighter."

These massive stars typically end their lives in violent explosions, such as core-collapse supernovas or gamma-ray bursts, which are so luminous they can be observed throughout most of the universe.

For the new study, the astronomers analyzed the light coming from 71 O-type stars — a mix of single and binary stars — in six different star clusters, all located roughly 6,000 light-years away.

The researchers found that almost three-quarters of these stars have close companions. Most of these pairs are also close enough to interact with one another, with mass being transferred from one star to the other in a sort of stellar vampirism. About one-third of these binary systems are even expected to eventually merge to form a single star, the researchers said.

The results of the study indicate that massive stars with companions are more common than was once thought, and that these heavyweights in binary systems evolve differently than single stars — a fact that has implications for how scientists understand galaxy evolution.

"It makes a big difference for understanding the life of massive stars and how they impact the whole universe," said de Mink.

Big stars with a big impact

Type O stars make up less than 1 percent of the stars in the universe, but they have powerful effects on their surroundings. The winds and shocks from these stars can both trigger and halt star formation processes, the researchers said.

Over the course of their lives, culminating in the supernova explosions that signal their death, these massive stars also produce all the heavy elements in the universe. These elements enrich galaxies and are crucial for life.

But for massive stars in close binary systems, the interactions between the pair impact the evolution of both stars.

With vampire stars, the lower-mass star sucks fresh hydrogen from its companion, substantially increasing its mass and enabling it to live much longer than a single star of the same mass would, the researchers explained. The victim star, on the other hand, is left with an exposed core that mimics the appearance of a much younger star.

These factors could combine to give researchers misleading information about galaxies and the stars within them.

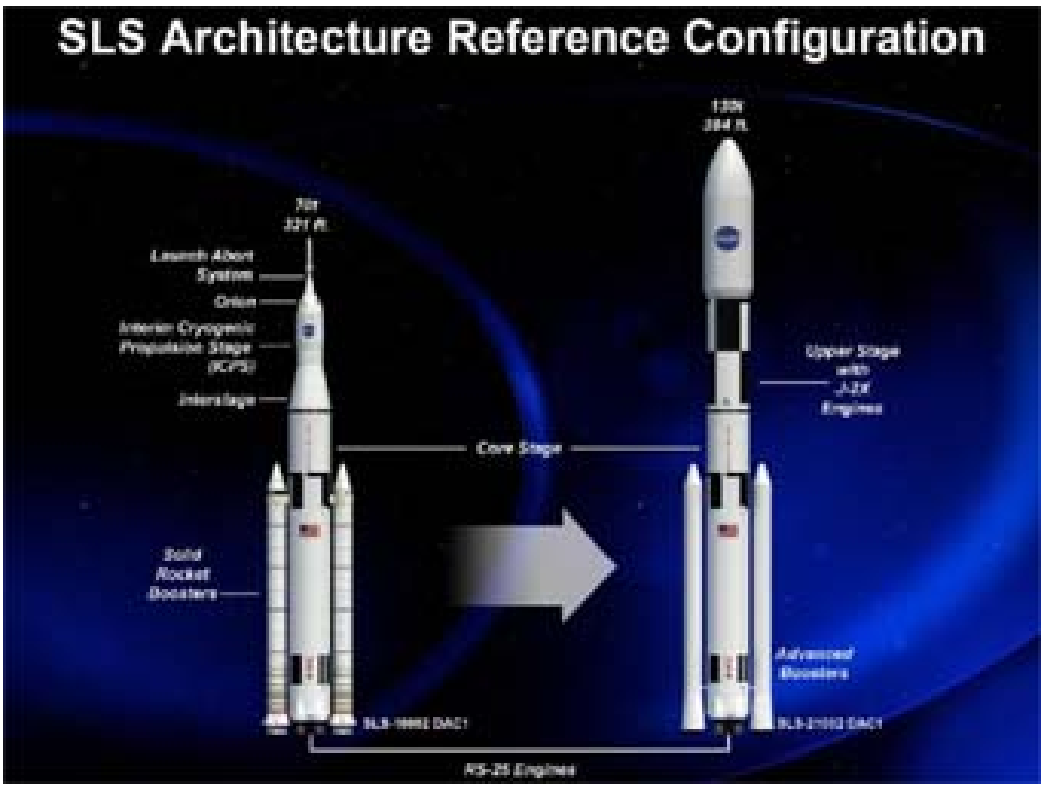
"The only information astronomers have on distant galaxies is from the light that reaches our telescopes," said Sana. "Without making assumptions about what is responsible for this light, we cannot draw conclusions about the galaxy, such as how massive or young it is. This study shows that the frequent assumption that most stars are single can lead to wrong conclusions."

The researchers report their findings in the July 27 issue of the journal Science.

Follow Denise Chow on: Twitter @denisechow or SPACE.com @Spacedotcom.

These spectacular panoramic views show parts of the Carina Nebula (left), the Eagle Nebula (center) and IC 2944 (right). These star-forming regions contain many hot young stars, including several bright O-type stars. The O stars that were included in a survey using ESO's Very Large Telescope are circled. Many of these stars were found to be close pairs, and such binaries often transfer mass from one star to the other. CREDIT: ESO

NASA's Space Launch System Passes Major Agency Review, Moves to Preliminary Design



An artist rendering of the various configurations of NASA's Space Launch System. (Credit: NASA)

The rocket that will launch humans farther into space than ever before passed a major NASA review July 25. The Space Launch System (SLS) Program completed a combined System Requirements Review and System Definition Review, which set requirements of the overall launch vehicle system. SLS now moves ahead to its preliminary design phase.

The SLS will launch NASA's Orion spacecraft and other payloads, and provide an entirely new capability for human exploration beyond low Earth orbit.

These NASA reviews set technical, performance, cost and schedule requirements to provide on-time development of the heavy-lift rocket. As part of the process, an independent review board composed of technical experts from across NASA evaluated SLS Program documents describing vehicle specifications, budget and schedule. The board confirmed SLS is ready to move from concept development to preliminary design.

"This new heavy-lift launch vehicle will make it possible for explorers to reach beyond our current limits, to nearby asteroids, Mars and its moons, and to destinations even farther across our solar system," said William Gerstenmaier, associate administrator for the Human Exploration and Operations Mission Directorate at NASA Headquarters in Washington. "The in-depth assessment confirmed the basic vehicle concepts of the SLS, allowing the team to move forward and start more detailed engineering design."

The reviews also confirmed the SLS system architecture and integration with the Orion spacecraft, managed by NASA's Johnson Space Center in Houston, and the Ground Systems Development and Operations Program, which manage the operations and launch facilities at NASA's Kennedy Space Center in Florida.

"This is a pivotal moment for this program and for NASA," said SLS Program Manager Todd May. "This has been a whirlwind experience from a design standpoint. Reaching this key development point in such a short period of time, while following the strict protocol and design standards set by NASA for human spaceflight is a testament to the team's commitment to delivering the nation's next heavy-lift launch vehicle."

SLS reached this major milestone less than 10 months after the program's inception. The combination of the two assessments represents a fundamentally different way of conducting NASA program reviews. The SLS team is streamlining processes to provide the nation with a safe, affordable and sustainable heavy-lift launch vehicle capability. The next major program milestone is preliminary design review, targeted for late next year.

The first test flight of NASA's Space Launch System, which will feature a configuration for a 70-metric-ton (77-ton) lift capacity, is scheduled for 2017. As SLS evolves, a three-stage launch vehicle configuration will provide a lift capability of 130 metric tons (143 tons) to enable missions beyond low Earth orbit and support deep space exploration.

NASA's Marshall Space Flight Center in Huntsville, Ala., manages the SLS program. Across the country NASA and its industry partners continue to make progress on SLS hardware that will be integrated into the final design. The RS-25 core stage and J-2X upper-stage rocket engine in development by Pratt & Whitney Rocketdyne of Canoga Park, Calif., for the future two-stage SLS, will be tested at NASA's Stennis Space Center in Mississippi. The prime contractor for the five-segment solid rocket boosters, ATK of Brigham City, Utah, has begun processing its first SLS boosters in preparation for an initial qualification test next year, ahead of their use for the first two exploration missions. The Boeing Co. in Huntsville is designing the SLS core stage, to be built at NASA's Michoud Assembly Facility in New Orleans and tested at Stennis before being shipped to Kennedy.

For more information about the Space Launch System, including the newest proposed rocket configurations, visit:http://www.nasa.gov/sls

ScienceDaily (July 25, 2012)

Beneath the Mask, Titan looks Surprisingly Smooth and Youthful

by JENNY WINDER Universe Today

Saturn's largest moon, Titan has long been hidden beneath the thick shroud of its methane and nitrogen-rich atmosphere. That all changed in 2004 when NASA's Cassini mission was able to penetrate the haze and sent back detailed radar images of the surface. These showed an icy terrain, carved over millions of years, by rivers similar to those found here on Earth. However, Titan's surface doesn't look as old and weather-beaten as it should. The rivers have caused surprisingly little erosion and there are fewer impact craters than would be expected. So what is the secret to Titan's youthful complexion?

Titan is around four billion years old, roughly the same age as the rest of the solar system. But the low number of impact craters put estimates of its surface at only between 100 million and one billion years old.

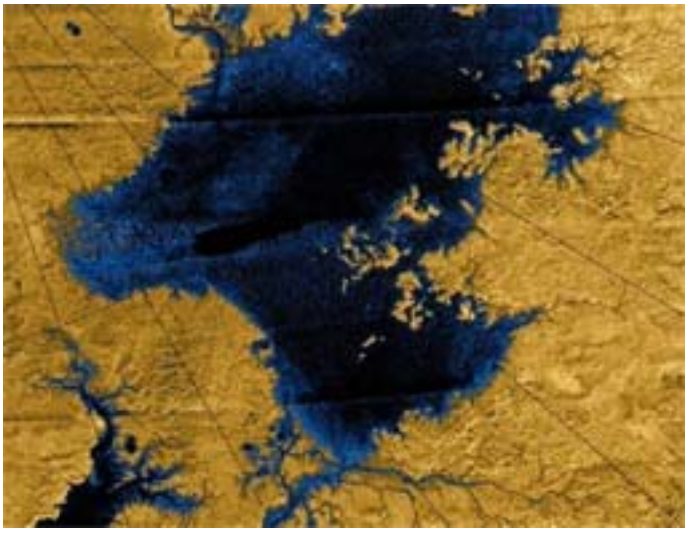
Researchers at MIT and the University of Tennessee at Knoxville have analyzed images of Titan's river networks and suggest two possible explanations: either erosion on Titan is extremely slow, or some recent phenomena has wiped out older surface features.

Taylor Perron, the Cecil and Ida Green Assistant Professor of Geology at MIT explains, "It's a surface that should have eroded much more than what we're seeing, if the river networks have been active for a long time. It raises some very interesting questions about what has been happening on Titan in the last billion years."

Perron suggests that geological processes on Titan may be like those we see here on Earth. Here too, impact craters are scarce, as plate tectonics, erupting volcanoes, advancing glaciers and river networks reshaped our planet's surface over billions of years, so, on Titan, tectonic upheaval, cryovolcanic eruptions, erosion and sedimentation by rivers could be altering the surface.

Discovering which processes are at work is not easy. The images from Cassini are like aerial photos but with much coarser resolution. They are flat, with no information about a surface elevation or depth.

Perron and MIT graduate student Benjamin Black analyzed the images and mapped 52 prominent river networks from four regions on Titan. They then compared the images with a model of river network evolution



Caption: Images from the Cassini mission show methane river networks draining

developed by Perron. Their data depicts the evolution of a river over time, taking into account variables such as the strength of the underlying material and the rate of flow through the river channels. As a river erodes, it transforms from a long, spindly thread into a dense, treelike network of tributaries. Titan's river networks have maintained their long and spindly composition. They compare with recently renewed landscapes here including volcanic terrain on the island of Kauai and recently glaciated landscapes in North America.

Besides Earth, Titan is the only world with an active hydrologic cycle forming active river networks. Titan's surface temperature may be about 94 K and its rivers run with liquid methane but as Perron says "It's a weirdly Earth-like place, even with this exotic combination of materials and temperatures, and so you can still say something definitive about the erosion. It's the same physics."

Dawn Has Departed the Giant Asteroid Vesta

Mission controllers received confirmation today that NASA's Dawn spacecraft has escaped from the gentle gravitational grip of the giant asteroid Vesta. Dawn is now officially on its way to its second destination, the dwarf planet Ceres.

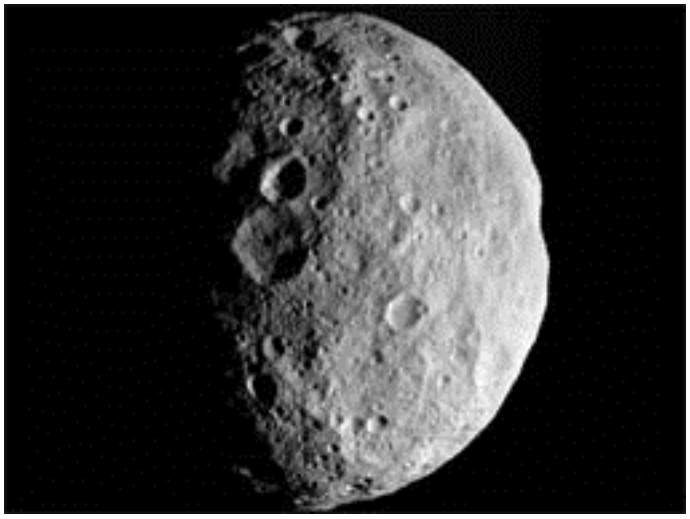
Dawn departed from Vesta at about 11:26 p.m. PDT on Sept. 4 (2:26 a.m. EDT on Sept. 5). Communications from the spacecraft via NASA's Deep Space Network confirmed the departure and that the spacecraft is now traveling toward Ceres.

"As we respectfully say goodbye to Vesta and reflect on the amazing discoveries over the past year, we eagerly look forward to the next phase of our adventure at Ceres, where even more exciting discoveries await," said Robert Mase, Dawn project manager, based at NASA's Jet Propulsion Laboratory, Pasadena, Calif.

Launched on Sept. 27, 2007, Dawn slipped into orbit around Vesta on July 15, 2011 PDT (July 16 EDT). Over the past year, Dawn has comprehensively mapped this previously uncharted world, revealing an exotic and diverse planetary building block. The findings are helping scientists unlock some of the secrets of how the solar system, including our own Earth, was formed.

A web video celebrating Dawn's "greatest hits" at Vesta is available athttp://www.nasa.gov/multimedia/videogallery/index.html?media_id=151669301. Two of Dawn's last looks at Vesta are also now available, revealing the creeping dawn over the north pole.

Dawn spiraled away from Vesta as gently as it arrived. It is expected to pull into its next port of call, Ceres, in early 2015.



This image is from the last sequence of images NASA's Dawn spacecraft obtained of the giant asteroid Vesta, looking down at Vesta's north pole

Dawn's mission is managed by JPL for NASA's Science Mission Directorate in Washington. Dawn is a project of the directorate's Discovery Program, managed by NASA's Marshall Space Flight Center in Huntsville, Ala. UCLA is responsible for overall Dawn mission science. Orbital Sciences Corp. in Dulles, Va., designed and built the spacecraft. The German Aerospace Center, the Max Planck Institute for Solar System Research, the Italian Space Agency and the Italian National Astrophysical Institute are international partners on the mission team. The California Institute of Technology in Pasadena manages JPL for NASA.

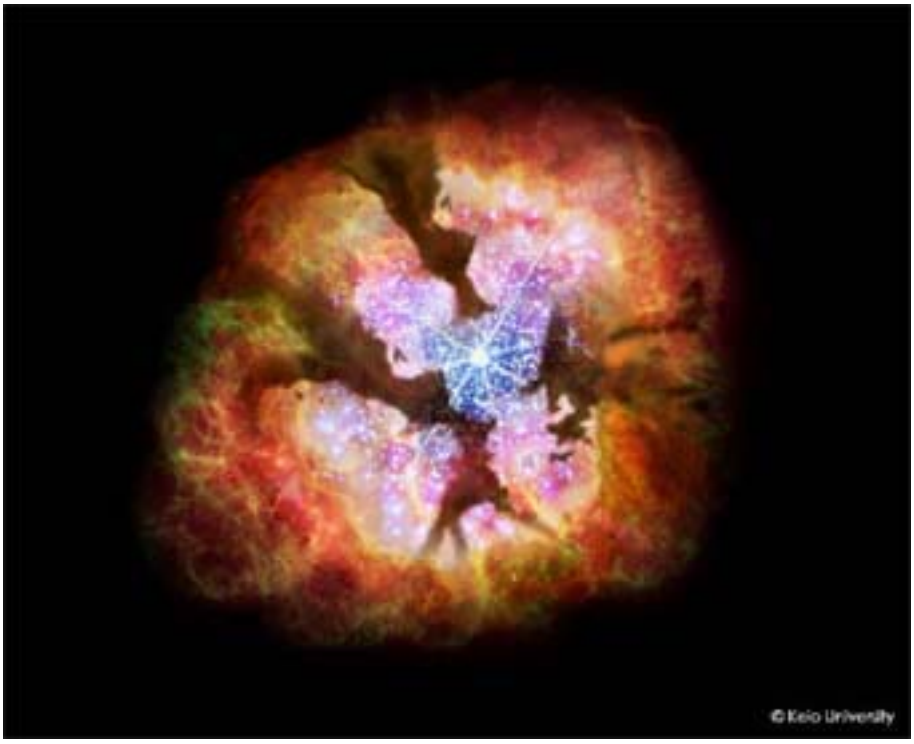
ScienceDaily (Sep. 5, 2012)

'SEEDS' OF SUPERMASSIVE BLACK HOLES DISCOVERED

Analysis by Ian O'Neill - *Discovery News*

We've found small black holes and we've found really, really big black holes. But what about the "inbetweener" black holes?

The very existence of this class of black hole is disputed, but a Japanese group of astronomers have found the potential locations of *three* intermediate black hole (IMBH) candidates inside previously unknown star clusters near the center of the Milky Way.



But what are IMBHs and why are they so important?

Conventional *stellar-mass black holes* are the ones we are taught at school when discussing the life cycles of massive stars. When a star -- over ten-times the mass of our sun -- runs out of fuel, its death throes culminate in a supernova. This powerful explosion will create the extreme gravitational conditions ripe for a stellar black hole to form.

At the other end of the black hole spectrum are the *supermassive* ones. As the superlative suggests, these black holes are **monsters**. We know that the majority of galaxies we can observe -- including our own -- play host to supermassive black holes in their cores. These black holes are very different from their stellar tiddler counterparts; supermassive black holes grow from tens of thousands to *billions* of times the mass of our sun.

But some big questions have vexed astrophysicists as to where supermassive black holes come from. How did they become so massive? What's the link between stellar-mass black holes and supermassive black holes? And is there an "intermediate" black hole phase?

Logic would dictate that IMBHs *should* be out there, but there were few candidates until the discovery of Hyper-Luminous X-ray Source 1 (HLX-1) was confirmed earlier this year by the Commonwealth Scientific and Industrial Research Organisation (CSIRO) telescope in Australia. The apparent dearth of the objects, however, is causing some puzzlement.

When Black Holes Unite

Black hole formation theories suggest that supermassive black holes were formed through the agglomeration of many intermediate-sized black holes. Therefore, it stands to reason that there should at least be *some* IMBHs near the centres of galaxies.

One environment that may be fertile for the growth of IMBHs is that of densely packed star clusters surrounding the galactic centre -- these clusters could be dense enough to regularly kick-off supernovae, creating a supply of stellar black holes that also accumulate and grow into intermediate black holes.

So, with this theory in mind, using the 10-meter Atacama Sub-millimeter Telescope Experiment (ASTE) in the Atacama Desert, Chile, and the 45-meter Nobeyama Radio Observatory (NRO) in Japan, a research group headed by Keio University's Tomoharu Oka hunted for the emissions from molecular gases associated with supernovae in star clusters.

"Huge star clusters at the centre of the Milky Way Galaxy have an important role related to formation and growth of the Milky Way Galaxy's nucleus," said Oka.

Find the Gas; Find the Cluster

One would think that finding giant star clusters is easy, but as we look through the Milky Way's disk toward the galactic centre (30,000 light-years away), it is hard to see the star clusters through the gas, dust and stars in front. It's a cosmic equivalent of "you can't see the wood for the trees!" -- ***we*** *can't see the star clusters for the stars (and dust)!*.

"The huge amount of gas and dust lying between the solar system and the centre of the Milky Way Galaxy prevent not only visible light, but also infrared light, from reaching the Earth," said Oka. "Moreover, innumerable stars in the bulge and disc of the Milky Way Galaxy lie in the line of sight. Therefore, no matter how large the star cluster is, it is very difficult to directly see the star cluster at the centre of the Milky Way Galaxy."

So to detect the clusters, Oka and his team surveyed the centre of our galaxy for the emissions from molecular clouds -- particularly the millimetre wavelength emission from carbon monoxide. This wavelength can penetrate the obscuring galactic disk, providing the researchers with a window into the core of our galaxy. The distribution of warm gas of more than 50 Kelvin (-370 degrees Fahrenheit/-223 degrees Celsius) with a density of more than 10,000 hydrogen molecules per cubic centimetre could then be mapped.

The group managed to find three previously unknown warm clumps of gas, all of which exhibit signs of rapid expansion. A fourth clump was found in the location of Sagittarius A (Sgr A), a very well-known radio source and lair of Sagittarius A* (Sgr A*) -- the Milky Way's very own supermassive black hole with a mass of 4 million suns.

"It can be inferred that the gas clump 'Sgr A' has a disk-shaped structure with radius of 25 light-years and revolves around the supermassive black hole (Sgr A*) at a very fast speed," added Oka.

According to the National Astronomical Observatory of Japan press release, the expansion detected inside the other three previously unknown clumps of molecular gas can be attributed to recent supernova activity. The researchers believe these clumps therefore correspond to clusters of stars, where one of the clusters is comparable to the largest known star cluster in the Milky Way, with a mass of around 100,000 solar masses.

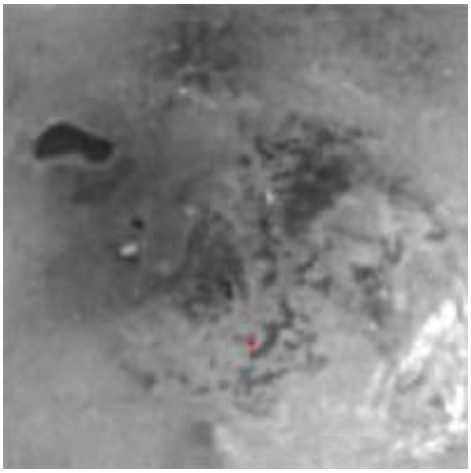
Seeds of the Supermassive

Where there's regular supernovae popping-off inside a cluster, stellar black holes are form-

(Continued on page 17)

Liquid Lake on Titan Confirmed

by NANCY ATKINSON Universe Today



The dark area near the top is Ontario Lacus. Credit: NASA / JPL / Space Science Institute

NASA's Cassini mission has detected liquid hydrocarbons on Saturn's moon Titan, in a large, glassy lake near the moon's south pole. Before the Cassini mission began, scientists thought Titan would have global oceans of methane, ethane and other light hydrocarbons. But after more than 40 close flybys of Titan by Cassini, data showed no global oceans exist. However hundreds of dark, lake-like features are present. Until now, it was not known whether these features were liquid or simply dark, solid material.

Using Cassini's Visual and Infrared Mapping Spectrometer (VIMS), which identifies the chemical composition of objects by the way matter reflects light, a liquid ethane lake 235 kilometres (150 miles) long was detected. This makes Titan the only body in our solar system beyond Earth known to have liquid on its surface.

"This is the first observation that really pins down that Titan has a surface lake filled with liquid," said Bob Brown of the University of Arizona, Tucson, leader of the VIMS instrument.

Scientists had deduced through earlier observations that there was likely liquid on Titan, but this is the first incontrovertible evidence.

Emily Lakdawalla at the Planetary Society explains this excellently.

"Detection of liquid ethane confirms a long-held idea that lakes and seas filled with methane and ethane exist on Titan," said Larry Soderblom, a Cassini interdisciplinary scientist with the U.S. Geological Survey. "The fact we could detect the ethane spectral signatures of the lake even when it was so dimly illuminated, and at a slanted viewing path through Titan's atmosphere, raises expectations for exciting future lake discoveries by our instrument."

Titan's hazy, nitrogen and methane atmosphere makes it difficult to study the moon's surface. The liquid ethane was identified using a technique that removed the interference from the atmospheric hydrocarbons.

The VIMS instrument observed a lake, called Ontario Lacus, in Titanâ€™s south polar region during a close Cassini flyby in December 2007. The lake is roughly 20,000 square miles (7,800 square miles) in area, slightly larger than North America's Lake Ontario.

The ethane is in a liquid solution with methane, other hydrocarbons and nitrogen. At Titanâ€™s surface temperatures, approximately 300 degrees Fahrenheit below zero, these substances can exist as both liquid and gas. Titan shows overwhelming evidence of evaporation, rain, and fluid-carved channels draining into what, in this case, is a liquid hydrocarbon lake.

Earth has a hydrological cycle based on water and Titan has a cycle based on methane. Scientists ruled out the presence of water ice, ammonia, ammonia hydrate and carbon dioxide in Ontario Lacus. The observations also suggest the lake is evaporating. It is ringed by a dark beach, where the black lake merges with the bright shoreline. Cassini also observed a shelf and beach being exposed as the lake evaporates.

"During the next few years, the vast array of lakes and seas on Titan's north pole mapped with Cassini's radar instrument will emerge from polar darkness into sunlight, giving the infrared instrument rich opportunities to watch for seasonal changes of Titan's lakes," Soderblom said.

(Continued from page 16)

ing. In one of the most active clusters, there is evidence to suggest that, on average, one supernova every 300 years is detonating. The other two clusters also show signs of recent supernova activity.

According to theory, inside these dense violent supernova pressure-cookers of star clusters, stellar black holes are being born, merging and then bulking-up to form IMBHs. Oka's team predicts that there should be an IMBH inside each of these three clusters, weighing-in at several hundred solar masses. In the grand galactic scale, these IMBHs would eventually sink into the centre of the galaxy and get swallowed by Sgr A*, potentially explaining how the supermassive black holes in the cores of galaxies get so massive.

Although the possible IMBHs in the centres of the clusters have yet to be observed, the environment is certainly ripe for their creation. What's more, Oka is confident that indirect evidence for these intermediate black holes may be forthcoming: "We would like to observe IMBHs in the star cluster. Actually, our observation data has already indicated traces of IMBHs."

Inside one of the clusters, two clouds of gas have been observed apparently orbiting a central mass very quickly -- should follow up observations confirm this to be the case, it could revel that our galaxy not only contains a supermassive behemoth at its nucleus, it may have the 'seeds' of star clusters containing IMBHs slowly falling into the supermassive black hole at the core.

"In order to confirm the existence of IMBHs, we are planning to conduct further observations," concludes Oka. "The new discovery is an important step toward unravelling the formation and growth mechanism of the supermassive black hole at the Milky Way Galaxy's nucleus, which is a top-priority issue in galactic physics."

I hate to be predictable, but isn't it time for Muse to sing us out?

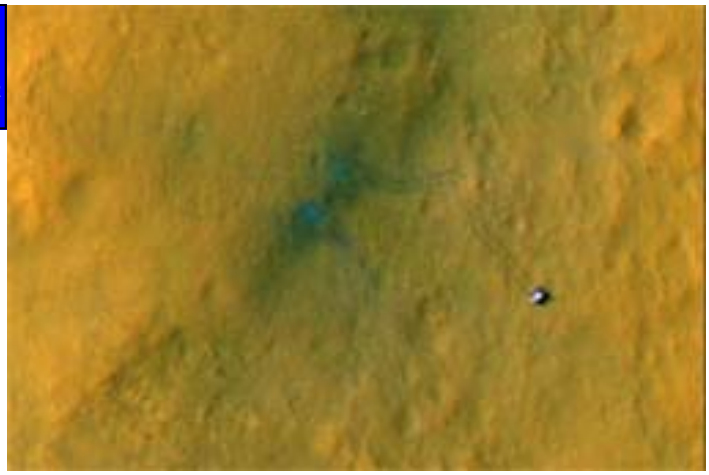
Amazing Mars Rover Shifting Into Science Gear After 1st Martian Month

by Denise Chow, SPACE.com Staff Writer Date: 06 September 2012

NASA's Mars rover Curiosity has wrapped up its first full month on the Red Planet and is gearing up its robotic arm to reach out and touch Martian rocks for the first time, scientists say.

This week, Curiosity has been steadily trekking east toward its first major science destination, a spot called Glenelg, where scientists are keen to investigate three different types of Martian terrain that can be found there.

But first, the rover will take a weeklong hiatus from driving to test the instruments on its 7-foot-long (2.1-meter) robotic arm. Mission managers first flexed Curiosity's robot arm on Aug. 20, to make sure the mechanical appendage had survived the journey to the surface of Mars.



Tracks from the first drives of NASA's Mars rover Curiosity are visible in this image captured by the Mars Reconnaissance Orbiter. The rover is seen where the tracks end. The image's color has been enhanced to show the surface details better. Image released Sept. 6, 2012. CREDIT: NASA/JPL-Caltech/Univ. of Arizona

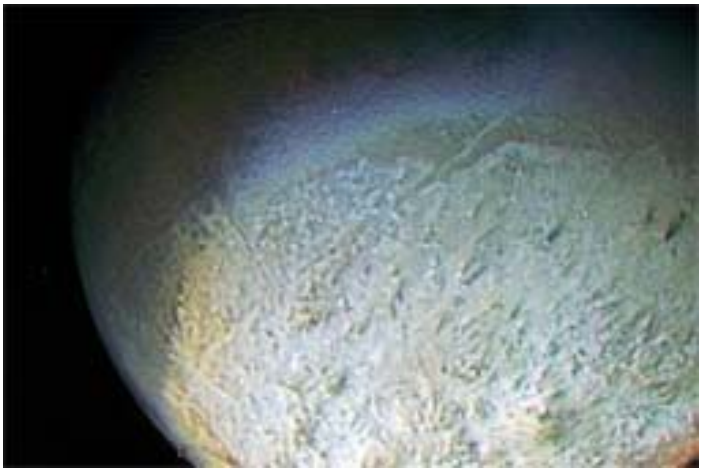
Does Neptune's Moon Triton Have a Subsurface Ocean?

Amanda Doyle, Astrobiology Magazine Date: 06 September 2012

Triton was discovered in 1846 by the British astronomer William Lassell, but much about Neptune's largest moon still remains a mystery.

A flyby by NASA's Voyager 2 spacecraft in 1989 offered a quick peek at the satellite, revealing a surface composition comprised mainly of water ice, along with some nitrogen, methane, and carbon dioxide.

As Triton's density is quite high, it is suspected that the moon has a large core of silicate rock. It is possible that a liquid ocean formed between the rocky core and icy surface shell, and scientists are investigating whether or not this ocean could have survived until now.



This color photo of Neptune's largest moon Triton was obtained by NASA's Voyager 2 probe on Aug. 24, 1989, from 330,000 miles away. The resolution is about 6.2 miles, sufficient to begin to show topographic detail. CREDIT: NASA/JPL

Captured from the Kuiper Belt

Triton, which is about 1,680 miles (2,700 kilometers) wide, has a unique property among large solar system moons: a retrograde orbit.

Planets form from a circumstellar disc of dust and gas that surrounds a young star. This disc circles the star in one direction, and thus most planets and their moons orbit in this same direction. These orbits are known as prograde, and a rogue object that orbits backward is said to be in a retrograde orbit. The retrograde orbit of Triton means that it most likely did not form around Neptune.

The early solar system was a place of dynamic violence, with many bodies changing orbits and crashing into each other. Triton likely originated in the Kuiper Belt — the ring of icy bodies beyond Neptune — and was sent hurtling inward until it was captured by Neptune's gravity.

Directly after capture, the moon would have been in a highly elliptical, eccentric orbit. This type of orbit would have raised large tides on the moon, and the friction of these tides would have caused energy to be lost. The energy loss is converted into heat within the moon, and this heat may have melted some of the icy interior and formed an ocean beneath Triton's ice shell.

The energy loss from tides is also responsible for gradually changing Triton's orbit from an ellipse to a circle, researchers say.

Heating the interior

Friction from tides is not the only source of heat within a terrestrial body; there is also radiogenic heating. This is heat produced by the decay of radioactive isotopes within a moon or planet, and this process can create heat for billions of years.

Radiogenic heating contributes several times more heat to Triton's interior than tidal heating; however, this heat alone is not sufficient to keep the subsurface ocean in a liquid state over 4.5 billion years.

But tidal dissipation causes heat to be concentrated at the bottom of Triton's ice shell, which impedes the growth rate of the ice and effectively acts as a tidal-heated blanket. This tidal dissipation is stronger for larger values of eccentricity, meaning it would have played a major role in heating Triton in the past.

"While the concentration of tidal dissipation near the bottom of ice shells was known for some time, we believe our work is the first to demonstrate that it indeed controls the rate of freezing and sustainability of subsurface oceans,"

said Saswata Hier-Majumder at the University of Maryland. "Radiogenic heating, in comparison, heats up the shell uniformly, and thus doesn't have as disproportionate an influence as tidal dissipation does."

Sustaining the ocean

The exact point in time when Triton was captured by Neptune and the length of time it took for the moon's orbit to become circularized are unknown.

Triton's orbit is currently almost exactly circular. Investigating how the shape of the orbit evolved through time is important to determine the level of tidal heating that occurred, and thus if the subsurface ocean could still exist today.

As Triton cools, the ice sheet will grow to engulf the underlying ocean. The new research calculates how the thickness of the ice shell can influence the tidal dissipation and thus the crystallization of the subsurface ocean.

If Triton's ice shell is thin, then the tidal forces will have a more pronounced effect and increase the heating. If the shell is thick, then the moon becomes more rigid and less tidal heating will occur.

"I think it is extremely likely that a subsurface ammonia-rich ocean exists in Triton," Hier-Majumder said. "[But] there are a number of uncertainties in our knowledge of Triton's interior and past which makes it difficult to predict with absolute certainty."

For instance, the exact size of Triton's rocky core is unknown. If the core turns out to be larger than the value used in the calculations, then there will be more radiogenic heating, with extra heating increasing the size of any existing ocean.

The depth of the ocean also may not be constant across the moon, as tidal dissipation concentrates energy near the poles, meaning that an ocean would likely be deeper there. In addition, recent calculations estimate that icy bodies in the outer solar system could be comprised of up to 15 percent ammonia. Ammonia-rich volatile material works to lower the temperature at which a solid turns to a liquid, and the presence of such volatiles may also help a liquid layer persist beneath the ice.

Subsurface oceans on icy solar system bodies could provide potential habitats for primitive extraterrestrial life.

Jupiter's moon Europa is currently the leading candidate for such a habitat, although there is still much debate about this. The probability of life existing within the depths of Triton's ocean is much smaller than for Europa, but it still can't be completely ruled out, researchers say.

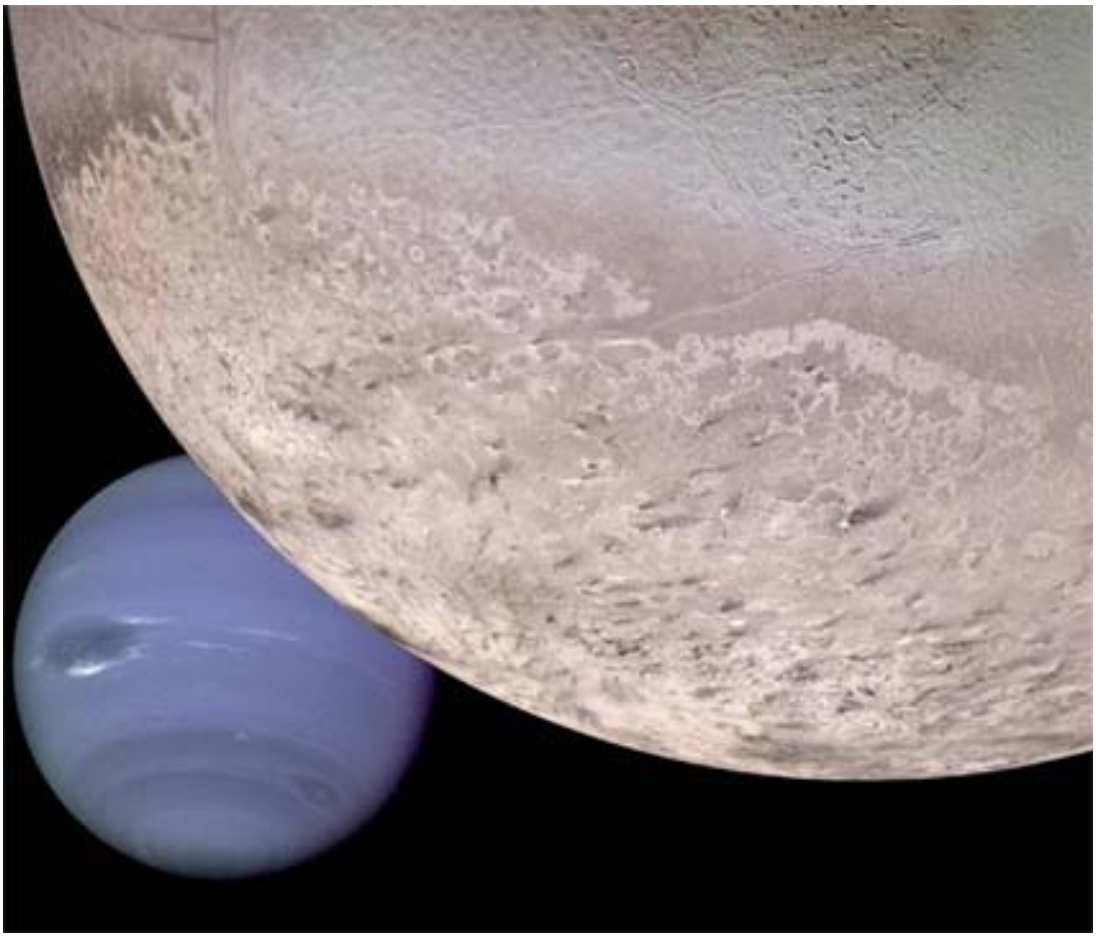
The ammonia that is likely present in Triton's subsurface ocean might act to lower the freezing point of water, thus making it more suitable for life. The temperature of the ocean is still probably around minus 143 degrees Fahrenheit (minus 97 degrees Celsius), which would slow down biochemical reactions significantly, and impede evolution. However, terrestrial enzymes have been found to speed up biochemical reactions down to temperatures of minus 153 degrees Fahrenheit (minus 103 degrees Celsius).

A more remote possibility is that Triton could host silicon-based life, assuming that silicon can actually be used as a foundation for life instead of carbon.

Silanes, which are structural analogues of hydrocarbons, could be used as a building block for life under the right conditions. The frigid temperatures and the limited abundance of carbon on Triton could be suitable for silicon-based life, but there isn't enough known about the behavior of silanes in such unusual conditions to firmly state that such life could exist.

The research by Jodi Gaeman, Saswata Hier-Majumder and James Roberts was published in the August issue of the journal Icarus.

This story was provided by Astrobiology Magazine, a web-based publication sponsored by the NASAastrobiology program.



This computer generated montage shows Neptune as it would appear from a space-craft approaching Triton, Neptune's largest moon. CREDIT: NASA