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# The CHESTERFIELD ASTRONOMICAL SOCIETY

Newsletter MARCH 2014

CAS website [www.chesterfield-as.org.uk](http://www.chesterfield-as.org.uk)

Registered Charity No. 514048

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**Subscriptions - full membership £55  
or £5.50 per month by Standing Order (10 months)**

**Senior citizens (60 yrs and over) and students (18 yrs and over) £35  
or £3.50 per month by Standing Order (10 months)**

**Juniors members - (17 yrs and under) £0.  
(All juniors must be accompanied by an adult who must be a fully paid up member).**



TO THE MARCH ISSUE OF THE CAS NEWSLETTER.

### **CAS News**

It has been another busy month for visits at the Observatory in February with a total of nine visits from Cubs, Scouts, Beavers, Guides, Brownies etc. with one adult group as well. Some nights we have been lucky with the weather but some unfortunately we have not.

Many thanks to people who have helped with this by doing talks in the lecture room and in the dome.

#### **1<sup>st</sup> Hasland Brownies**

A lady turned up one night from the 1<sup>st</sup> Hasland Brownies who had visited the Observatory on a previous occasion. She brought with her an envelope full of messages and drawings from the Brownies saying thank you for their evening, addressed to "Mark (E) and friends". They had written about the planets and which was their favourite accompanied by drawings. It was a lovely gesture!

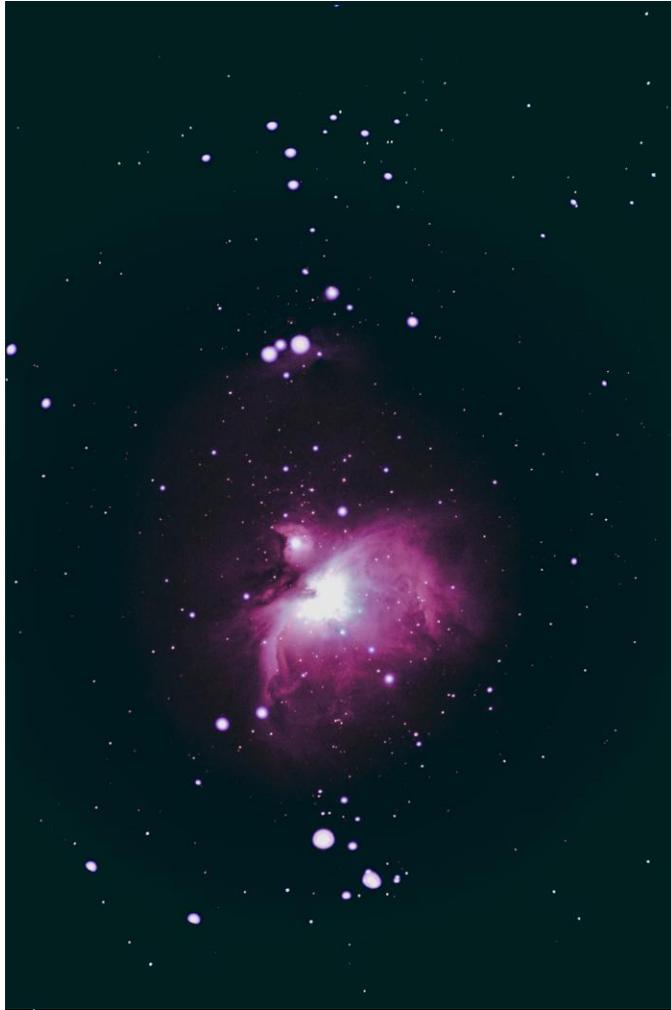
#### **Supernova in M82**

Taken by Graham Jenkinson – 12 minute exposure on 2<sup>nd</sup> February



These two were taken with his home made 12 inch f6 telescope (jenkoscope) they are both 30 second exposures at 1600 asa, one was taken a couple of years ago and the other a few days ago. One shows the supernova and the other doesn't.





Two more from Graham, this one of M42 the Orion Nebula on 13/02/14.

The one below is the horse head and flame nebula in Orion. It's a total of 100 frames stacked with deep sky stacker. The total exposure time was 75 mins, taken with his Skywatcher Startravel 120 refractor on 20/02/14.



*The "boss" has been busy this month! Many thanks Graham.*

**Reminder.....**

Don't forget if you are ordering from Amazon please do it through our website. Mark McKeown has kindly set up the link to follow – this earns us commission!!  
<http://www.chesterfield-as.org.uk/>

**Reminder.....**

**Astro-camp at Haddon Grove – 28<sup>th</sup> – 30<sup>th</sup> March (Friday to Sunday)**

Another reminder for the astro-camp at the end of March. If you are interested and/or you need to borrow some equipment please contact Peter at [peterdavison45@virginmedia.com](mailto:peterdavison45@virginmedia.com) and he will bring the equipment up to the Observatory the week before.

**National Sidewalk Astronomy night – Saturday 8<sup>th</sup> March  
In commemoration of John Dobson**

Sidewalk astronomy (sometimes know as “pavement astronomy” or “street corner astronomy”) was originally set up by John Dobson who sadly died last month (piece in last month's news letter) who developed what is known as the Dobsonian telescope .

He also co-founded Sidewalk Astronomers, a public service association whose members set up telescopes in streets and parks to allow the passing public to look at fascinating objects in the night sky.

Amateur astronomers around the globe can join in and celebrate John's life and continue to carry the torch that he lit back in 1968 when he co-founded the San Francisco Sidewalks Astronomers. (Information from the “Sky at Night” magazine)

*Some of you may fancy getting together and taking your scopes out on to the streets to give the general public a look at what is above!*

**Things to see in March .....**

**Saturday 1<sup>st</sup>** Look for Galaxies as our own Milky Way appears to rotate out of the way. We get to see regions such as the Realm of Galaxies and the Leo Triplet well placed for telescope viewing.

**Tuesday 11<sup>th</sup>** It looks as if Jupiter has an extra moon this evening – the planet passes close to a mag. +9.9 star. The four Galilean moons, Io, Europa, Ganymede and Callisto are all located to the west of the planet until 01:40 UT.

**Sunday 16<sup>th</sup>** A double shadow transit on Jupiter occurs this evening. This begins as soon as the sky gets dark enough to find Jupiter. At 19:30 UT Ganymede will be transiting the planet's disc and moves off at 20:38 UT. Io then begins its transit at 21:07 UT. Ganymede's shadow moves onto the disc at 22:08 UT closely followed by Io's shadow at 22:21 UT. Io moves off the disc at 23:22 UT and the shadows follow suit on the morning of the 17<sup>th</sup>. Io's shadow transit ends at 00:37 UT and Ganymede's at 01:24 UT. Both shadows are more or less on the centre line of the planet at 23:18 UT, the larger shadow being that of Ganymede.

**Thursday 20<sup>th</sup>** The March equinox occurs at precisely 16:57 UT. This is the time when the centre of the Sun crosses the celestial equator. The Sun's centre therefore officially moves from the southern celestial hemisphere to the northern celestial hemisphere at this moment.

**Friday 21<sup>st</sup>** The waning gibbous Moon (80% lit) is just 1° to the south of Saturn this morning around 02:30 UT. For comparison the diameter of the Moon in the sky is 0.5°.

**Saturday 22<sup>nd</sup>** Dazzling Venus reaches western elongation today. The planet currently appears 47° to the west of our star making it a morning object visible before sunrise.

**Thursday 27<sup>th</sup>** The waning crescent moon (16% lit) is less than 3° to the north of Venus in the dawn twilight.

There is a trio of Galilean moons to the east of Jupiter as the sky darkens with Europa, Ganymede and Callisto and with Io off to the West.

### ***Something for the April diary.....***

Friday April 4<sup>th</sup>

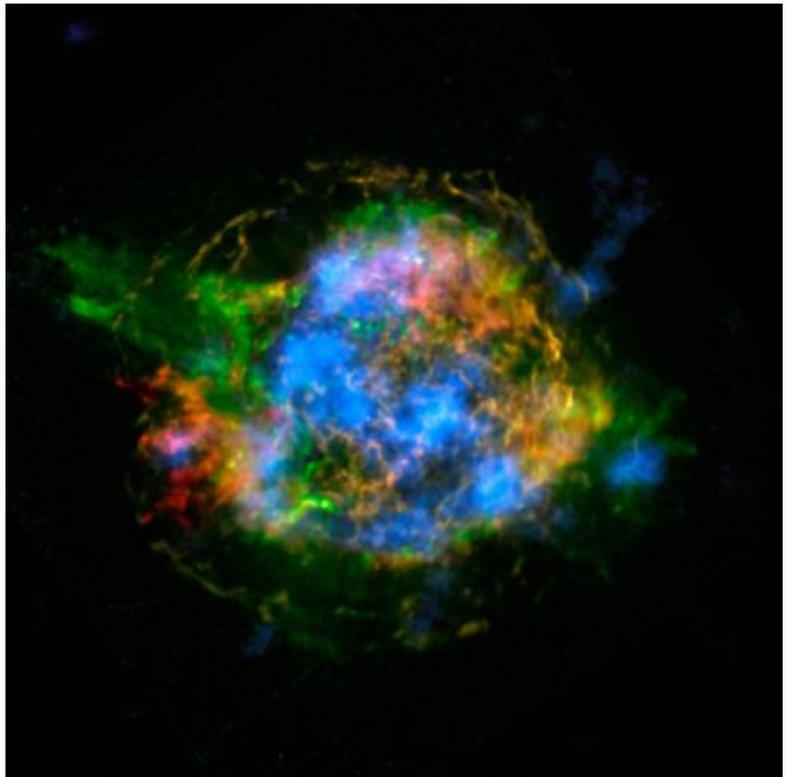
Peter Davison is giving a talk on Gemini. So please come along and enjoy the evening.

## ASTROSTUFF

### Astronomers get first peek into core of supernova

Astronomers have peered for the first time into the heart of an exploding star in the final minutes of its existence. The feat by the high-energy X-ray satellite NuSTAR provides details of the physics of the core explosion inaccessible until now, says team member Steven Boggs of UC Berkeley. NuSTAR mapped radioactive titanium in the Cassiopeia A supernova remnant, which has expanded outward and become visible from Earth since the central star exploded in 1671.

The feat is one of the primary goals of NASA's NuSTAR mission, launched in June 2012 to measure high-energy X-ray emissions from exploding stars, or supernovae, and black holes, including the massive black hole at the centre of our Milky Way Galaxy.



The NuSTAR team reported the first map of titanium thrown out from the core of a star that exploded in 1671. That explosion produced the beautiful supernova remnant known as Cassiopeia A (Cas A).

The well-known supernova remnant has been photographed by many optical, infrared and X-ray telescopes in the past, but these revealed only how the star's debris collided in a shock wave with the surrounding gas and dust and heated it up. NuSTAR has produced the first map of high-energy X-ray emissions from material created in the actual core of the exploding star: the radioactive isotope titanium-44, which was produced in the star's core as it collapsed to a neutron star or black hole. The energy released in the core collapse supernova blew off the star's outer layers and the debris from this explosion has been expanding outward ever since at 5,000 kilometres per second.

"This has been a holy grail observation for high energy astrophysics for decades," said co-author and NuSTAR investigator Steven Boggs, UC Berkeley professor and chair of physics. "For the first time we are able to image the radioactive emission in a supernova remnant, which lets us probe the fundamental physics of the nuclear explosion at the heart of the supernova like we have never been able to do before."

"Supernovae produce and eject into the cosmos most of the elements important to life as we know it," said UC Berkeley professor of astronomy Alex Filippenko. "These results are exciting because for the first time we are getting information about the innards of these explosions, where the elements are actually produced."

Boggs says that the information will help astronomers build three-dimensional computer models of exploding stars, and eventually understand some of the mysterious characteristics of supernovae, such as jets of material ejected by some. Previous observations of Cas A by the Chandra X-ray telescope, for example, showed jets of silicon emerging from the star. "Stars are spherical balls of gas, and so you might think that when they end their lives and explode, that explosion would look like a uniform ball expanding out with great power," said Fiona Harrison, the principal investigator of NuSTAR at the California Institute of Technology. "Our new results show how the explosion's heart, or engine, is distorted, possibly because the inner regions literally slosh around before detonating."

### **Expanding supernova remnant**

Cas A is about 11,000 light years from Earth and the most studied nearby supernova remnant. In the 343 years since the star exploded, the debris from the explosion has expanded to about 10 light years across, essentially magnifying the pattern of the explosion so that it can be seen from Earth.

Earlier observations of the shock-heated iron in the debris cloud led some astronomers to think that the explosion was symmetric, that is, equally powerful in all directions. Boggs noted, however, that the origins of the iron are so unclear that its distribution may not reflect the explosion pattern from the core.

"We don't know whether the iron was produced in the supernova explosion, whether it was part of the star when it originally formed, if it is just in the surrounding material, or even if the iron we see represents the actual distribution of iron itself because we wouldn't see it if it were not heated in the shock," he said.

The new map of titanium-44, which does not match the distribution of iron in the remnant, strongly suggests that there is cold iron in the interior that Chandra does not see. Iron and titanium are produced in the same place in the star, said UC Berkeley research physicist Andreas Zoglauer, so they should be similarly distributed in the explosive debris. "The surprising thing, which we suspected all along, is that the iron does not match titanium at all, so the iron we see is not mapping the distribution of elements produced in the core of the explosion," Boggs said.

He and his UC Berkeley colleagues also launch balloon-borne high-energy X-ray and gamma-ray detectors to record the radioactive decay of other elements, including iron, in supernovae to learn more about the nuclear reactions that take place during these brief, catastrophic explosions.

"The radioactive nuclei act as a probe of supernova explosions and allow us to see directly into densities and temperatures where nuclear processes are going that we don't have access to in terrestrial laboratories," Boggs said.

NuSTAR continues to observe radioactive titanium-44 emissions from a handful of other supernova remnants to determine if the pattern holds for other supernovae as well. These supernova remnants must be close enough to Earth for the debris structure to be seen, yet young enough for radioactive elements like titanium -- which has a 60-day half-life -- to still be emitting high-energy X-rays.

## FUN STUFF

When my three-year-old son opened the birthday gift from his grandmother, he discovered a water pistol. He squealed with delight and headed for the nearest sink. I was not so pleased. I turned to Mother and said, "I'm surprised at you. Don't you remember how we used to drive you crazy with water guns?"

Mother smiled and then replied....."I remember."

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Creation vs Evolution has been settled!

A little girl asked her mother, "How did the human race come about?"

The Mother answered, "God made Adam and Eve, they had children and so all mankind was made."

A few days later, the little girl asked her father the same question. The father answered, "Many years ago there were monkeys and we developed from them."

The confused girl returns to her mother and says, "Mummy, how is it possible that you told me that the human race was created by God and Daddy says we developed from monkeys?"

The Mother answers, "Well, dear, it is very simple. I told you about the origin of my side of the family, and your father told you about his side."

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That's all folks.



*Don't forget to put your clocks forward on March 30<sup>th</sup> when British Summertime begins.*



*This newsletter is sent out to all present members without whom the Society could not survive. Also to previous members and people with an interest in astronomy in the hope that they may wish to join/re-join the Society.*

*If you no longer wish to receive this newsletter by e-mail please let us know. Thank you.*