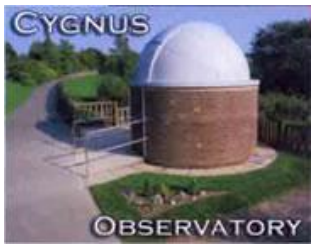
SAS NEWS

Sunderland Astronomical Society



Jupiter: King of the Planets

In this issue: Society events + The Darke Side + NASA's *SpacePlace* + News

December 2012/ January 2013

www.sunderlandastro.com **Registered Charity #1071527**

David Hughes (Chairman) 0191 416 2625 chairman@sunderlandastro.com
Martin Kennedy (Secretary) 0191 534 1432 secretary@sunderlandastro.com
Dave Newton (Publications) 0191 237 0355 double.cluster@tesco.net

Editorial address: Dave Newton, New Hartley Centre for Computational Cosmology
13 Alston Road, New Hartley, Whitley Bay, NE25 0ST
Tel: 0191 237 0355 / 07823 332 347

Events list

Friday 21 December: **End of the World Party**
Thursday 27 Dec: **Winter Benker Night** at the Grey Horse, Boldon
Friday 29 Dec: Full Moon

Wed 9 January 2012: **Stargazing Live!** At Gibside Chapel
Friday 11 Jan: New Moon
Friday 11 & Sat 12 Jan: **Jupiter Nights** at Cygnus Observatory
Sat 19 January: Observing at RSPB bird sanctuary at **Saltholme**
Tues 22 Jan: Trefoil Guild at Cygnus Obs, 6 – 8pm
Sunday 20 Jan: **Lecture evening** (details tbc)
Sunday 27 Jan: Full Moon

Saturday 2 February: **Nissan** astronomy event (full details tbc)
Sunday 10 February: New Moon
Sunday 17 February: Lecture evening (details tbc)
Wed 6 – Sun 10 March: Kielder Star Camp

All Society events
- are free,
- are held in the Washington WWT facilities, and
- evening meetings start at 7:00pm

unless otherwise noted.

Please bring a torch and warm clothing to any night-time observing sessions.
All observing sessions are dependent upon favourable weather and **may be subject to cancellation**.

Above: New Chairman David Hughes with the official SAS Benker.

Editorial

December and January can have some of the clearest and most spectacular nights of the year for astronomy, if the weather is kind. If not, these months can be awful. This year, we fortunately seem to have had a lot of good clear spells and Jupiter is the number one target, well placed in Taurus. The SAS Facebook page is regularly receiving updates with stunning pictures of the giant planet – and other celestial sights – that our Facebook members have taken.

On the Society front, we say a big thank you to Graham Darke, who exited the Chairman's role at the AGM in November. In his place, Graham handed over the noble and ancient society benker of power to David Hughes (pictured at left) who now takes on the role of Chairman. We also say a thank you to Paul Meade, who has stood down as Secretary and is replaced with Martin Kennedy. The Society is in great shape, thanks to the efforts of Graham, the committee and all the members over the last few years. Thank you all.

On a sad note, I must mention the loss of Sir Patrick Moore, astronomer extraordinaire and a great British eccentric. He will be sadly missed by many people, not just the astronomers. It won't be the same without him.

– Dave N., Editor.

SAS Yahoo Forum
The Society's Yahoo group provides a forum for members to exchange ideas, ask questions, and a place to post their pics:
http://tech.groups.yahoo.com/group/SunderlandAstronomicalSociety/

It Takes More Than Warm Porridge to Make a Goldilocks Zone

By Diane K. Fisher

The “Goldilocks Zone” describes the region of a solar system that is just the right distance from the star to make a cozy, comfy home for a life-supporting planet. It is a region that keeps the planet warm enough to have a liquid ocean, but not so warm that the ocean boils off into space. Obviously, Earth orbits the Sun in our solar system’s “Goldilocks Zone.”

But there are other conditions besides temperature that make our part of the solar system comfortable for life. Using infrared data from the Spitzer Space Telescope, along with theoretical models and archival observations, Rebecca Martin, a NASA Sagan Fellow from the University of Colorado in Boulder, and astronomer Mario Livio of the Space Telescope Science Institute in Baltimore, Maryland, have published a new study suggesting that our solar system and our place in it is special in at least one other way.

This fortunate “just right” condition involves Jupiter and its effect on the asteroid belt.

Many other solar systems discovered in the past decade have giant gas planets in very tight orbits around their stars. Only 19 out of 520 solar systems studied have Jupiter-like planets in orbits beyond what is known as the “snow line”—the distance from the star at which it is cool enough for water (and ammonia and methane) to condense into ice. Scientists believe our Jupiter formed a bit farther away from the Sun than it is now. Although the giant planet has moved a little closer to the Sun, it is still beyond the snow line.

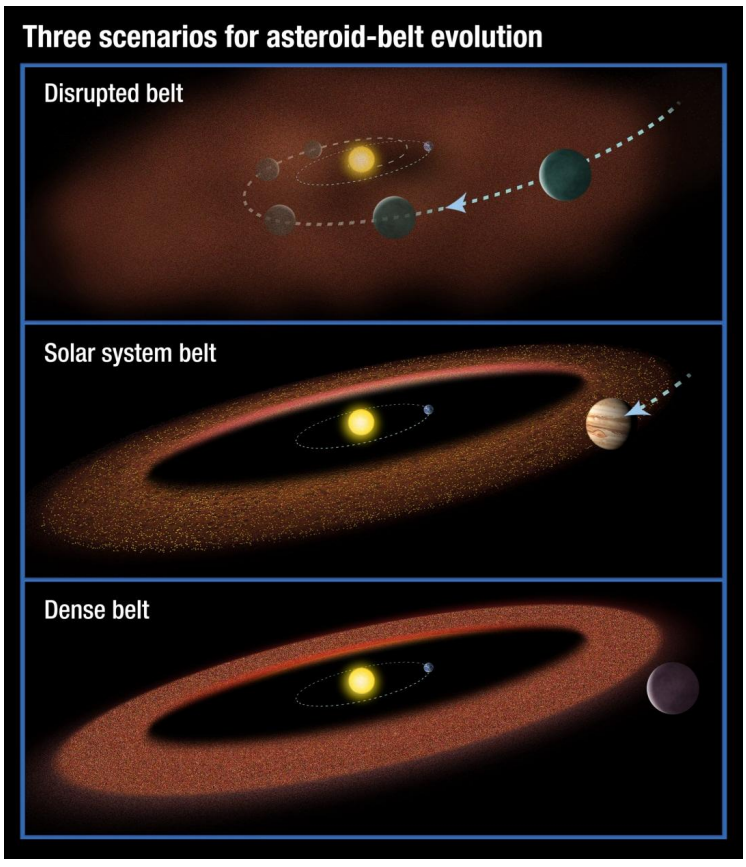
So why do we care where Jupiter hangs out? Well, the gravity of Jupiter, with its mass of 318 Earths, has a profound effect on everything in its region, including the asteroid belt. The asteroid belt is a region between Mars and Jupiter where millions of mostly rocky objects (some water-bearing) orbit. They range in size from dwarf planet Ceres at more than 600 miles in diameter to grains of dust. In the early solar system, asteroids (along with comets) could have been partly responsible for delivering water to fill the ocean of a young Earth. They could have also brought organic molecules to Earth, from which life eventually evolved.

Jupiter’s gravity keeps the asteroids pretty much in their place in the asteroid belt, and doesn’t let them accrete to form another planet. If Jupiter had moved inward through the asteroid belt toward the Sun, it would have scattered the asteroids in all directions before Earth had time to form. And no asteroid belt means no impacts on Earth, no water delivery, and maybe no life-starting molecules either. Asteroids may have also delivered such useful metals as gold, platinum, and iron to Earth’s crust.

But, if Jupiter had not migrated inward at all since it formed father away from the Sun, the asteroid belt would be totally undisturbed and would be a lot more dense with asteroids than it is now. In that case, Earth would have been blasted with a lot more asteroid impacts, and life may have never had a chance to take root.

The infrared data from the Spitzer Space Telescope contributes in unexpected ways in revealing and supporting new ideas and theories about our universe. Read more about this study and other Spitzer contributions at spitzer.caltech.edu. Kids can learn about infrared light and enjoy solving Spitzer image puzzles at spaceplace.nasa.gov/spitzer-slyder.

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



Left: Our solar system is represented by the middle scenario, where the gas giant planet has migrated inward, but still remains beyond the asteroid belt.

THE DARKE SIDE

With **Graham Darke**

Some unusual sights for cold Winter nights...

The skies in December and January are, traditionally, some of the best when cold and frosty conditions give the Winter constellations an appropriate stage. The damp, dewey conditions so common in October and November often give way to cold dry air. This was noticeable when I was out observing in the garden on the night of Saturday 1st December. I had six layers on that night to keep the cold out but it was nice being able to put the telescope away at the end of the night without it feeling like a slippery eel!

This time of year is dominated by the familiar constellations of Orion, Canis Major, Taurus, Gemini and Auriga, all of which contain bright stars. The sky in this region is full of bright deep sky objects too such as the Orion Nebula, the Pleiades, the clusters M35, 36, 37 and 38. These are some of the sky's showpiece objects. In this article, however I want to introduce you to some less well known but certainly no less interesting objects. Some of these will be a challenge to see from urban skies but do have a go at finding them. From the Society's dark site at Derwent, you should have no problems...

First is a Messier object which is often overlooked in favour of its more famous neighbour. Telescopes turned in the direction of Orion are often pointed at M42, the Orion Nebula and why not, it is a fantastic sight and the finest example of its kind visible in the Northern Hemisphere. But just a degree or so above the star Alnitak (the left hand star in Orion's belt) is the small reflection nebula **M78**. Through the telescope, this object reminds me of a celestial troll! Enveloped in the wisps of nebulosity which make up the troll's hair and face are two stars which peer out like two glowing eyes.

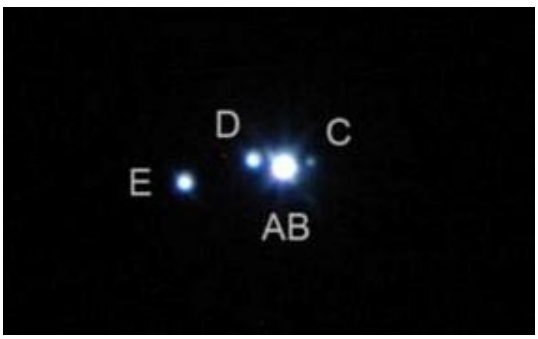
Above: Messier 78

Heading back to Alnitak in the belt of Orion, our next object can be found in the same lower power field of view and it is the **Flame Nebula – NGC2024 (below)**. It surprises people how bright this nebula is, somehow you expect it to be very faint. I think this is because of its proximity to the Horsehead Nebula which is a very challenging object to spot visually and the Flame is part of the same complex and is often featured on wide angle photographs of the Horsehead.

A nebula filter such as a OIII (Oxygen 3) or UHC (Ultra High Contrast) filter will help to make the Flame Nebula stand out. It often helps to put Alnitak just out of the field of view to stop its light from overpowering the nebula.

Our next object is one of those quirky chance alignments of stars. **NGC2169 (below)** is a cluster of stars up close to Orion's raised arm. It is commonly known as the *Number 37 Cluster*. When you look at it you'll see why. In the eyepiece is an arrangement of stars which spells out the number 37. Depending upon what type of telescope you're using and also whether you're using a star diagonal it may be that you'll see the number back to front.

Our next object is a multiple star system just below the belt of Orion. **Sigma Orionis (below)** is a grouping of four blue coloured stars. On the very best nights of clarity, the subtle differences in colour tones can be made out. Sigma looks like a wavy line of three brighter stars packed together with a fainter fourth component off to one end and is one of my favourite multiple stars.



The final object on this month's tour is another often overlooked Messier object this time **M79** in Lepus the Hare. Lepus is a constellation that never attains much altitude in Northern England. For this reason, the constellation and its brightest deep sky object, the globular star cluster M79, are not regularly observed this far North. It lies below the knees of Orion. Due to its low altitude M79 will require a clear Southern horizon and a dark site will help too. You certainly won't see a fully resolved cluster like M13 in Hercules however and M79 is more a fuzzy glow. It's still worth though more because of what it is. M79 is not thought to be a native cluster of the Milky Way Galaxy but rather is a component of the Canis Major Dwarf Galaxy that the Milky Way is currently cannibalising.

Above: Globular cluster M79

I do hope that you'll try and track a few of these objects down, or perhaps the imagers among you might like to try and capture them.

Next month, I shall return with another clutch of interesting objects for your observing pleasure and will include some of Patrick Moore's "Caldwell" objects.

Clear Skies,

Graham

Society Update

with Natalie Lowes

December has once again been an eventful and lively month for Sunderland Astronomical Society members, and with Christmas and the New Year drawing near we have some exciting society events around the corner...

Firstly, looking back on the month on Saturday 15th, society members were invited to Cygnus at WWT for an observing session, where we were greeted with clear views of Jupiter and the Orion nebula. We hope to provide members with more opportunities such as this to make use of the facilities at Cygnus, as well as enjoying the dark skies of our regular Derwent observing sessions.

On December 16th our monthly lecture was delivered by **Claire Poppet** of Lawrence Berkley National Laboratory, California. Claire shared with us the details of the ground breaking international project "**Big BOSS**," a new spectrographic instrument proposed to study baryon acoustic oscillations and the growth of structure with an all-sky galaxy redshift. This included a discussion about the use of robotics in improving the efficiency of spectroscopy, in order to study the redshift of more galaxies than ever before, and from this attempt to determine the fate of our universe.

Which neatly brings us to our next event on 21st December, when Sunderland Astronomical Society and Newcastle Astronomical Society invite their members to meet at WWT for an **"End of the World Party."** We invite members to come in fancy dress, the theme being favourite apocalyptic disasters. As well as talks, we'll be offering an observing session to ensure you have the best seat in the house for the demise of humanity.

Providing we're still here, we'll be meeting on 27th December at the Gray Horse, Boldon for our annual **Winter Benker night**. As usual all are welcome. We'll be meeting at **7pm**, and leaving when they ask us to go!

In the New Year, following the great success of our Stargazing Live Events, we are again attending the **BBC Stargazing Live** event at Gibside on 9th January, and will be hosting with the WWT and the Institute of Physics our own **Jupiter Nights** events on 11th and 12th of January. We are expecting these events just as last year to be very busy and a great opportunity to introduce the public to astronomy, and hopefully introduce some new members to our club. We would therefore be very grateful to any society members who can offer any help and/or bring telescopes, please contact us via our facebook page or any of the usual channels for further information.

Also in January we have a visit from the **Trefoil Guild** on the 22nd at WWT, in which we would again appreciate the help of societies members, and a public observing session at the RSPB bird sanctuary at **Saltholme** on the 19th.

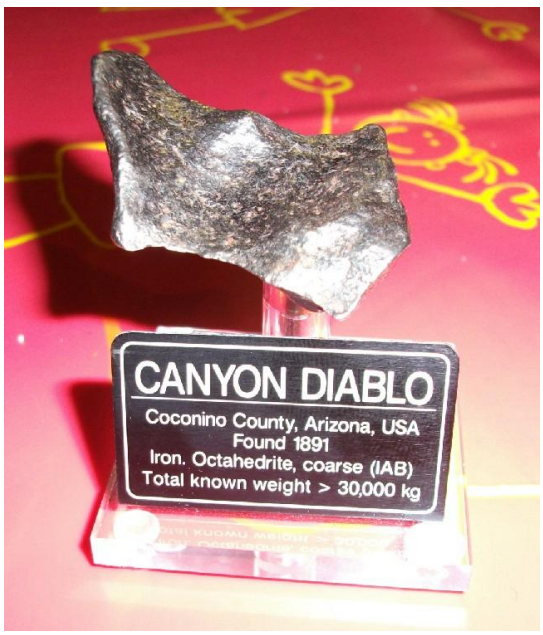
So as 2012 draws to a close we look forward to the new challenges and opportunities 2013 has to offer our Society, and we thank all of our members for your continuing support and contributions that make our events so special.

Stay up to date

Keep up to date with all society developments on the website www.sunderlandastro.com and why not sign up for the news group. Also check out our Facebook and Twitter pages.

Above: Graham Darke at the Society's AGM in November, having stepped down as Chairman. David Hughes has now taken on this role.

Below: The commemorative piece of the Diablo Canyon meteorite presented to Graham by the Society, in thanks for his long and successful service as Chairman.



Sir Patrick Moore, 1923 - 2012

British astronomer and broadcaster Sir Patrick passed away peacefully at his home in Selsey, West Sussex.

Sir Patrick presented the BBC programme The Sky At Night for over 50 years, making him the longest-running host of the same television show ever.

He wrote dozens of books on astronomy and his research was used by the US and the Russians in their space programmes.

Described by one of his close friends as "fearlessly eccentric", Sir Patrick was notable for his habit of wearing a monocle on screen and his idiosyncratic style.

Sir Patrick presented the first edition of The Sky at Night on 24 April 1957. He last appeared in an episode broadcast on Monday.

A statement by his friends and staff said: "After a short spell in hospital last week, it was determined that no further treatment would benefit him, and it was his wish to spend his last days in his own home, Farthings, where he today passed on, in the company of close friends and carers and his cat Ptolemy.

"Over the past few years, Patrick, an inspiration to generations of astronomers, fought his way back from many serious spells of illness and continued to work and write at a great rate, but this time his body was too weak to overcome the infection which set in, a few weeks ago.

"He was able to perform on his world record-holding TV programme The Sky at Night right up until the most recent episode .

"His executors and close friends plan to fulfil his wishes for a quiet ceremony of interment, but a farewell event is planned for what would have been Patrick's 90th birthday in March 2013."

Patrick Alfred Caldwell-Moore was born at Pinner, Middlesex on 4 Mar 1923.

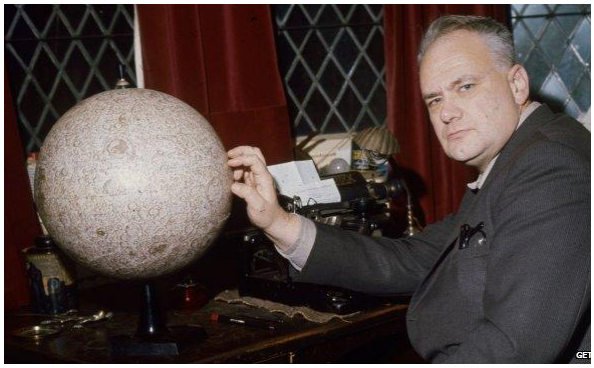
Heart problems meant he spent much of his childhood being educated at home and he became an avid reader. His mother gave him a copy of GF Chambers' book, The Story of the Solar System, and this sparked his lifelong passion for astronomy.

When war came he turned down a place at Cambridge and lied about his age to join the RAF, serving as a navigator with Bomber Command and rising to the rank of Flight Lieutenant.

But the war brought him a personal tragedy after his fiancee, Lorna, was killed when an ambulance she was driving was hit by a bomb. He never married.

Sir Patrick, who had a pacemaker fitted in 2006 and received a knighthood in 2001, won a Bafta for services to television and was a honorary fellow of the Royal Society.

He was a member of the UK Independence party and, briefly, the finance minister for the Monster Raving Loony Party, and attracted some controversy for his outspoken views on Europe and immigration.



BBC science correspondent Pallab Ghosh said Sir Patrick's appearance sometimes aroused as much comment as his astronomy: "He was six-foot-three, and was once described as having 'an air of donnish dishevelment', with his raised eyebrow, scarcely-brushed hair and poorly-fitting suits.

"His enthusiasm was unstoppable, and on occasions he would talk at 300 words a minute."

Queen guitarist Brian May, who published a book on astronomy written with Sir Patrick, described him as a "dear friend, and a kind of father figure to me".

He said: "Patrick will be mourned by the many to whom he was a caring uncle, and by all who loved the delightful wit and clarity of his writings, or enjoyed his fearlessly eccentric persona in public life.

"Patrick is irreplaceable. There will never be another Patrick Moore. But we were lucky enough to get one."

Television presenter and physicist Professor Brian Cox posted a message on Twitter saying: "Very sad news about Sir Patrick. Helped inspire my love of astronomy. I will miss him!"

The acting director general of the BBC, Tim Davie, said his achievements at the corporation "were unmatched", adding that Sir Patrick will be missed by his "countless fans".

UKIP leader Nigel Farage said: "Since I first met Sir Patrick when he dominated a UKIP stage in 1999, he has been a friend and an inspiration - not only to us in UKIP, but across the country and around the world. Today we have seen the passing of a true great, and a true Englishman."

And Dr Marek Kakula, public astronomer at Royal Observatory in Greenwich, described him as a "very charming and hospitable man".

"When you came to his home he would always make sure you had enough to eat and drink. He was full of really entertaining and amusing stories.

"There are many many professional astronomers like me who can actually date their interest in astronomy to watching Patrick on TV, so his impact on the world of professional astronomy as well as amateur is hard to overstate."

A less explosive start for the Solar System?

A new study published by University of Chicago researchers challenges the notion that the force of an exploding star forced the formation of the solar system.

In this study, published online last month in Earth and Planetary Science Letters, authors Haolan Tang and Nicolas Dauphas found the radioactive isotope iron 60 -- the telltale sign of an exploding star -- low in abundance and well mixed in solar system material. As cosmochemists, they look for remnants of stellar explosions in meteorites to help determine the conditions under which the solar system formed.

Some remnants are radioactive isotopes: unstable, energetic atoms that decay over time. Scientists in the past decade have found high amounts of the radioactive isotope iron 60 in early solar system materials. "If you have iron 60 in high abundance in the solar system, that's a 'smoking gun' -- evidence for the presence of a supernova," said Dauphas, professor in geophysical sciences.

Iron 60 can only originate from a supernova, so scientists have tried to explain this apparent abundance by suggesting that a supernova occurred nearby, spreading the isotope through the explosion.

But Tang and Dauphas' results were different from previous work: They discovered that levels of iron 60 were uniform and low in early solar system material. They arrived at these conclusions by testing meteorite samples. To measure iron 60's abundance, they looked at the same materials that previous researchers had worked on, but used a different, more precise approach that yielded evidence of very low iron 60.

Previous methods kept the meteorite samples intact and did not remove impurities completely, which may have led to greater errors in measurement. Tang and Dauphas' approach, however, required that they "digest" their meteorite samples into solution before measurement, which allowed them to thoroughly remove the impurities.

This process ultimately produced results with much smaller errors. "Haolan has dedicated five years of very hard work to reach these conclusions, so we did not make those claims lightly. We've been extremely careful to reach a point where we're ready to go public on those measurements," Dauphas said.

To address whether iron 60 was widely distributed, Tang and Dauphas looked at another isotope of iron, iron 58. Supernovae produce both isotopes by the same processes, so they were able to trace the distribution of iron 60 by measuring the distribution of iron 58.

"The two isotopes act like inseparable twins: Once we knew where iron 58 was, we knew iron 60 couldn't be very far away," Dauphas explained.

They found little variation of iron 58 in their measurements of various meteorite samples, which confirmed their conclusion that iron 60 was uniformly distributed. To account for their unprecedented findings, Tang and Dauphas suggest that the low levels of iron 60 probably came from the long-term accumulation of iron 60 in the interstellar medium from the ashes of countless stars past, instead of a nearby cataclysmic event like a supernova.

If this is true, Dauphas said, there is then "no need to invoke any nearby star to make iron 60." However, it is more difficult to account for the high abundance of aluminum 26, which implies the presence of a nearby star.

Instead of explaining this abundance by supernova, Tang and Dauphas propose that a massive star (perhaps more than 20 times the mass of the sun) sheds its gaseous outer layers through winds, spreading aluminum 26 and contaminating the material that would eventually form the solar system, while iron 60 remained locked inside the massive star's interior. If the solar system formed from this material, this alternate scenario would account for the abundances of both isotopes.

"In the future, this study must be considered when people build their story about solar system origin and formation," Tang said.

How White Dwarfs Mimic Black Holes

A remarkable observation by astronomers from the University of Southampton, Professor Phil Charles, Professor Malcolm Coe and postgraduate student Liz Bartlett, has appeared in The Astrophysical Journal.

Bright X-ray flares in nearby galaxies, once assumed to indicate the presence of black holes, can in fact be produced by white dwarfs.

They made the discovery by detecting a dramatic, short-lived X-ray flare that was picked up by an X-ray telescope on the International Space Station.

Using optical telescopes in South Africa and Chile, the Southampton astronomers showed that the flare, called XRF111111 as it happened on 11 November, 2011, was located in the Small Magellanic Cloud. The flare from XRF111111 was so luminous that astronomers initially thought it was likely to be a black hole producing X-rays but further research by Phil and his team revealed that its X-ray temperature was so low that it had to be a white dwarf instead.

Material was probably collecting on the surface of the white dwarf from the companion B star and eventually underwent runaway thermonuclear burning that was seen on Earth as a nova explosion.

Professor Charles says: "Our observations show that the thermonuclear burning probably caused a shell of matter to be ejected from around the white dwarf and when the shell hit the hot wind of the B star it produced a huge shock leading to the X-ray flash that was seen on the International Space Station."