WAS NEWS

Monthly Newsletter of the **W**orthing **A**stronomical **S**ociety
www.was.org.uk

Number 190 **October 2005**

ALMANAC

All times U.T.

October / November

LUNAR

October	Date	Time	Rise	Set
First Quarter	10th	19.01	14.42	21.20
Full Moon	17th	12.14	16.54	06.16
Last Quarter	25th	01.17	22.47	14.41
November				
New moon	2nd	01.25	07.33	16.18
First Quarter	9th	01.57	14.10	23.33
Full Moon	16th	00.58	15.52	08.08
Last Quarter	23rd	22.11	22.56	13.17

EARTH

October	Sunrise	Sunset
10th	06.16	17.18
17th	06.28	17.03
25th	06.42	16.46
November		
2nd	06.56	16.31
9th	07.08	16.20
16th	07.20	16.10
23rd	07.32	16.01

PLANETS (As at October 25th)

	Constellation	Rises	Sets	Mag.
Mercury	Libra	08.57	17.21	-0.2
Unfavourable				
Venus	Ophiuchus	11.21	18.32	-4.3
Evening object in the west				
Mars	Aries	17.25	08.25	-2.2
Visible most of night				
Jupiter	Virgo	06.29	16.49	-1.7
Unfavourable				
Saturn	Cancer	22.59	14.16	+0.3
Morning object				
Uranus	Aquarius	15.06	01.39	+5.8
Evening object in the south				
Neptune	Capricornus	14.16	23.32	+7.9
Evening object in the south				
Pluto	Serpens cauda	10.31	19.57	+14.0
Evening object in the southwest				

PHENOMENA

Day	Hour	October
17th	12	Partial eclipse of moon
19th	11	Mars 5° S. of moon
22nd	13	Jupiter in conjunction
25th	19	Saturn 4° S. of moon
26th	23	Neptune at stationary point
		November
1st	10	Jupiter 3° N. of moon
3rd	16	Mercury at greatest elongation E. 24°
3rd	19	Venus at greatest elongation E. 47°
3rd	23	Mercury 1° N. of moon
5th	19	Venus 1° N. of moon
7th	8	Mars at opposition
14th	6	Mercury at stationary point
15th	5	Mars 3° S. of moon
16th	00	Uranus at stationary point

Minima of Algol

October 12th 04.18 15th 01.06 17th 21.54
November 4th 02.48 6th 23.36 9th 20.24 24th 04.30

Lunar Occultation's

Times as at Old W.A.S. Observatory

Date	U.T.	S.A.O. No	Mag	Phase
Oct	**h. m. s.**			
12th	19.45.07	190252	7.1	Diss
12th	20.15.16	190272	9.1	Diss
12th	20.40.51	190295	5.5	Diss
12th	21.29.53	190311	9.0	Diss
14th	22.11.41	146603	8.8	Diss
14th	22.28.05	146613	8.6	Diss
14th	22.54.58	146612	5.1	Diss
18th	22.25.31	93081	6.5	Reapp
19th	22.38.07	76043	6.6	Reapp
19th	23.05.55	76056	7.7	Reapp
21st	22.00.08	77224	8.4	Reapp
22nd	00.09.14	77295	6.5	Reapp
22nd	22.03.03	78410	8.8	Reapp
23rd	00.19.32	78480	8.7	Reapp
23rd	00.25.03	78483	7.7	Reapp
23rd	00.32.24	78488	8.4	Reapp
23rd	00.46.25	78496	7.8	Reapp
25th	00.35.13	80113	5.9	Reapp
Nov				
7th	17.55.36	188873	8.1	Diss
9th	17.49.38	164803	7.8	Diss
9th	19.09.22	164829	7.4	Diss
9th	19.09.31	164830	7.2	Diss
10th	17.46.55	165346	8.5	Diss
10th	20.14.56	165396	8.9	Diss
10th	20.29.13	165395	8.5	Diss
10th	23.04.32	146446	7.8	Diss
11th	19.53.05	146906	8.5	Diss
11th	20.39.15	146910	8.5	Diss
11th	20.15.17	146924	9.0	Diss
12th	20.14.26	109323	8.3	Diss
12th	20.18.49	109315	6.6	Diss
12th	21.02.44	109348	7.4	Diss
12th	22.05.49	109355	7.3	Diss
12th	22.33.22	109370	8.3	Diss
12th	23.26.17	109396	8.4	Diss
12th	23.58.00	109392	7.9	Diss
17th	20.08.30	76945	7.6	Reapp
18th	19.30.10	77837	6.1	Reapp

The list above is a selection of about 20 % of the more easily observed evening events, there are lots more in the wee small hours for the insomniacs amongst us

Dave Wells

Editors Note

I'm not bitter.

I truly hope that all of you who travelled to Spain last week to see the Eclipse had great success.

The area of low pressure forever destined to hover 1000ft above my head during these events performed perfectly – once again preventing me from even seeing a 'wafer thin slice' of the performance.

Still, as a work colleague advised me, 'it wasn't a *proper* eclipse'…..bless him.

Rob

Reports

Solar Section Report - September 2005

By Section director, Brian Halls

September was an active month – the large naked eye and extremely active sunspot group visible over the last month or two reappeared, and was responsible for activity that caused a number of geo-storm alerts on Earth.

Region 808 as it was called during its September incarnation, (Region 798 during its August visit) created an X17 type flare a few days into its appearance – only a handful of flares during each sunspot cycle produce anything above X10. This event was seen as a white light flare by observatories in the US.

These events are very energetic and this one in particular temporarily knocked out some sensors onboard an orbiting solar observatory.

Graham observed this group as a naked eye object on three days.

Sunspot activity otherwise was relatively quiet, with few spots appearing.

Observations were reported on 23 days by Graham Boots (22) and the Director (9).

MDF = 1.31 (R = 19.22)

All solar drawings and photographs being produced are automatically saved to computer, and I am in the process of digitising the solar section archive (something to do during the dark, cloudy winter days ahead)! Eventually, a CD copy of the 40 years worth of solar section observations will be available to any member who wants a copy.

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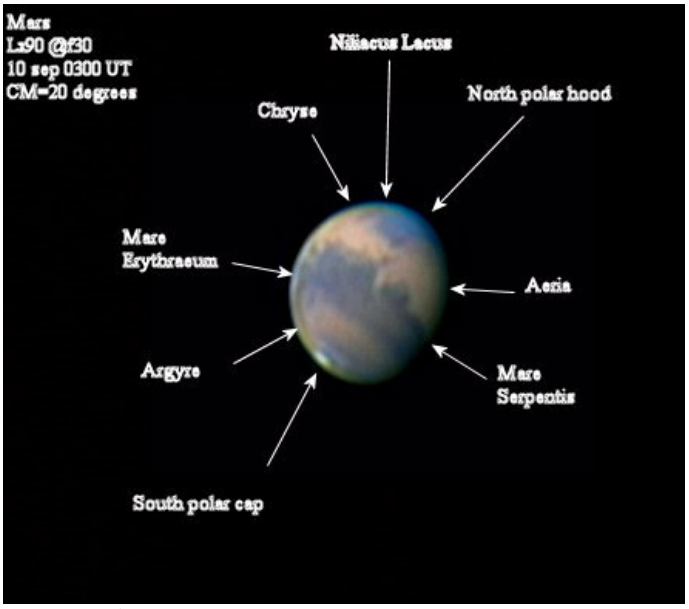
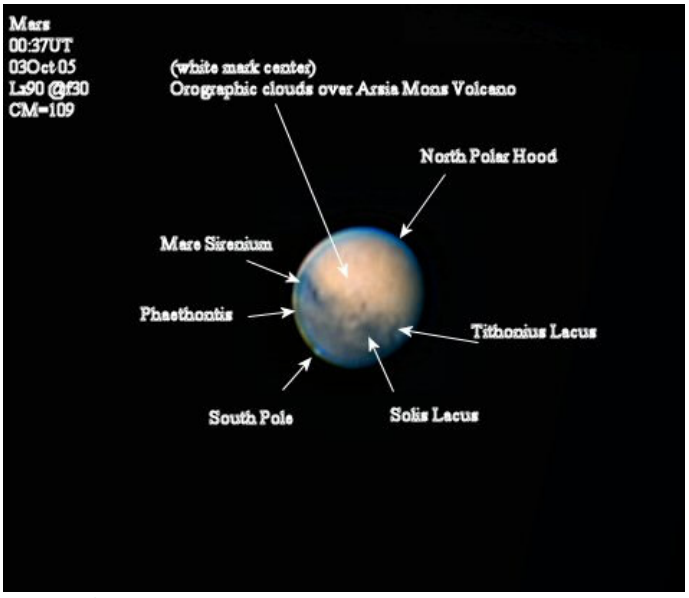
Mars

Ed Sampson

Showing the shrinkage of the southern polar ice cap



10 September 2005



03 October 2005

September Lecture Reviewed *– Report by Peter Atkinson*

Black Holes and White Rabbits (physics & magic)

Professor John C. Brown – Astronomer Royal for Scotland,
Dept. of Physics & Astronomy, Glasgow University

Professor Brown explained that his interest in astronomy was inspired in the late 1950s by –

- Sputnik I launched in 1957
- Comet Arend-Roland: a bright comet seen in 1957
- Patrick Moore; who has inspired a great many people to become interested in astronomy

The use of magic to illustrate esoteric subjects like black holes grew from the idea that astronomy is not as experimental as physics – we can't change something physical and try again, but we can seek to demonstrate astounding effects.

Following early collaborative work inspired at PPARC 'Magic' colourings books were produced by the lecturer for use in the introduction of astronomy to children. One of these was demonstrated showing initially blank pages, then monochrome pictures, and finally coloured pictures – all by merely flipping the pages.

The main considerations were to be

1. What are Black Holes
2. Where do Black Holes come from
3. How dense are Black Holes.

The most important factor in connection with Black Holes is gravity. A terrestrial view of gravitational effect was considered in relation to tides. Why are there two tides a day rather than simply one? The answer given was that the rotation of the earth introduces centrifugal force which, combined with the gravitational pull of the moon produces a twisting effect in the seas resulting in tides both sides of the earth simultaneously.

These concepts were then illustrated:

Firstly a ball bearing was dropped through a copper pipe to demonstrate gravity. Then following exposure to the Black (TopHat) Hole it was dropped through again and this time travelled much more slowly than before. This was explained by the second case using a magnetic ball, which generated an electric current moving through the pipe, producing an electromagnetic field which slowed the ball down.

A second demonstration saw a metal ball rolling down a slope at normal speed, then much more slowly. In this case the 'magic' involved using a different ball on the second run: one which was filled with a viscous liquid which gave it a different centre of gravity.

The question of what exactly is a Black Hole was then explored. From its evolution beginning as a supergiant star which has used all its fuel, it collapses in on itself forming a dense ball of neutrons at the centre. The collapsing gases rebound violently from this incompressible core, creating a shock wave which triggers nuclear reactions in the outer layers – a supernova explosion. There remains the dense core – a neutron star. In cases where the mass of the core is great enough the gravity is so great that it shrinks even smaller than a neutron star and becomes a black hole.

Black holes are invisible because not even light can escape from them, but their presence can be detected by the effect they have on the space and matter around them. Another demonstration was employed here to explore space time and curvature. A latex sheet was stretched over an embroidery hoop and a ball bearing rolled across it to show the effect of a curve induced in the background.

A graphic was displayed showing space time rolled up into a cylinder (the Guedel Universe) which represents the time and position of objects. Then a coin was pressed against the latex sheet and it suddenly disappeared, reappearing on the other side of the sheet. The suggestion was that this could represent a cosmic worm hole in space of the type conjectured in relation to black holes. The professor noted that the trick with the coin through latex had caused some observer's sleepless nights trying to work out how it was done. A process which he declined to elucidate….

Further illustrations of the similarity between magic and physics were made with some striking examples of rope tricks, which as all good magic does, defied explanation.

Another way of detecting a black hole, predicted by Einstein, was explored: the phenomenon of gravitational lensing which causes the light from distant stars to appear to curve. This can be seen at a total solar eclipse, as we were shown on photographic slides. Actual measurements have confirmed Einstein's theory.

A final set of magic displays was given using playing cards which appeared successively blank, monochrome and coloured and with sequences appearing and disappearing in rapid succession. These accompanied the lecturer's references to questions such as 'How does one see the unseeable? (Black Hole)', 'Can an isolated black hole radiate? (Steven Hawking is thinking again)', 'Are there parallel universes?'.

Prof. Brown answered a number of challenging questions from the floor concerning for example, the evidence for the existence of black holes and the interchangeability of energy and matter.

The session ended with the audience showing its appreciation of a most enjoyable and stimulating presentation.

Articles

The Magnetic Ball and Copper Pipe Experiment

Michael A Marshall

Michael Faraday (1791—1867) was the great experimenter on the properties of electricity and magnetism and their relationship with motion and force. John Ambrose Fleming (1849-1945) enunciated the rule relating the relative directions of electrical current, magnetic flux and motion, each being at right angles to the other two, the directions depending upon whether motion was being applied (generator action) or being produced (motor action). Heinrich Lenz (1804—1865) enunciated the rule that, in relevant terms, the induction by a magnetic field of electric current is in such direction that the current creates an opposing magnetic field. This is like the recoil of the fireman's hose in projecting the water: equal and opposite forces hold the status quo.

So as the magnetic ball moves down the electrically conducting pipe under the force of gravity, the combination of magnetism, gravitational force and motion set up an electric current and in turn an opposing magnetic field. It is as if the falling magnet had its south pole pointing downward to meet a south pole pointing upward, and like poles of course oppose one another. If the magnet were stopped from falling then there would be no opposing magnetism set up to cause the stoppage. If, however, the magnet were to fall too fast, then the greater opposition would initially send the magnet upward. Initially, because the reversed direction would reverse the opposing field as to retard the magnet's upward flight. The actual rate of fall of course depends upon the strength of the magnet, the electrical conductivity of the pipe and the force of gravity. The rate was not zero and so the status quo was not held: heat was generated.

What is electricity? Electrons and protons of atoms are held together by the electrical attraction between their unlike charges. Some electrons can be wiped off one material by another, as with comb and dry hair. Whilst separated, the charge with surplus electrons mutually attracts the charge with a surplus of protons. The charges when held motionless of course constitute static electricity. Surplus electrons will flow by attraction to surplus protons along a conductive path, this flow constituting an electric current. An electric current is always associated with a magnetic field, so whichever is produced, the other comes too.

The Gentleman in the audience mentioned Eddy Currents. Generally, when no arrangement is made to use the electric current produced, it will circulate in all conductive directions until it is all turned into heat by the frictional resistance to the flow of the electrical charges. This random circulation is an eddy current. However, in this experiment much of the electric current is used to retard the ball's fall, and is generated by the magnetic ball that is motivated by the force of gravity. The orientation of the ball's magnetism at any moment must dictate the exact circulation of the useful electric current, the unuseful circulation being the eddy current. Eddy current is often given as a cause of an action, but a more direct cause is as stated by Heinrich Lenz, our German cousin. Interestingly it was Heinrich Rudolph Hertz (1857—1894) who investigated the production of electromagnetic waves, as radio waves.

Messier Objects - Continued

Janet Young

The Messier Objects are so called because they were a list of fuzzy objects in the night sky compiled by Charles Messier (1730-1817) a French comet hunter. While hunting for comets he kept finding these faint and fuzzy objects, so decided to compile a catalogue of them to avoid them being mistaken for comets. He listed them as M or Messier followed by a number. Charles Messier did discover several comets, but it is for the Messier catalogue he is best remembered.

M22
Constellation: Sagittarius
RA 18 33
Dec -23 58
Distance: 10,000 light years
Type: Globular Cluster
NGC 6656

Probably first sighted by A.Ihle in 1665. Lies close to Lambda Sagittarii. Stars are mostly RR Lyra type.

M23
Constellation: Sagittarius
RA 17 54
Dec -19 01
Distance: 30 light years
Type: Galactic Cluster
NGC 6494

Contains about 120 stars. Is a good sight in as little as a 4" telescope.

M24
Constellation: Sagittarius
RA 18 15
Dec -18 27
Distance: 16,000 light years
Type: Milky Way Patch
NGC 6603

Designation has been applied to two different objects, one inside the other. Messier described this as a patch of the Milky Way. Can been seen by the naked eye under good conditions and binoculars show it well.

Black Holes Re-visited

Michael A Marshall

Whether Black Holes are real or not, the concept may be a useful one in our comprehending what is going on in the heavens and our making predictions. The following is a personal deduction open to reader comment. Readers are of course invited to a textual discussion on what is an astronomical subject, shaping a deduction into the best current account. Without useful concepts in science we cannot progress in our understanding, hence my past mentions of sub-dimensions and super- dimensions: dimensions themselves are of course age old concepts, two created for navigational purposes and an extra third for building purposes, unless you know differently.

As we know, the enormous gravity of a Black Hole attracts astronomical objects and light, even though they are normally travelling in other directions to one side or another. Upon arrival at the vicinity of the hole they are travelling in all elliptical directions, virtually in their parking orbits. As they collide they lose energy of motion which is converted into frictional heat. They draw closer whilst generating more intense heat and losing energy of motion. Electrons and protons are separated as to create a conductive medium, a plasma.

The plasma in motion creates an enormous electrical current and so magnetic field, provided the motion has a predominant direction as seems likely. The magnetic field is at right angles to the plane of that predominant motion, indeed in the direction of the polar jet streams of the black hole. Indeed some of the plasma will spiral to constitute electric current along the magnetic field as to create visible jets, reminiscent of aurora behaviour. Spiraling current is accelerating current, and accelerating electric current always produces electromagnetic radiation.

As the remaining plasma enters the black hole, it is unaware but continues to heat up more intensely and to concentrate toward the centre. The situation is like the creation concept of the Universe in reverse: all matter and energy are almost finally crushed into a quark soup.

The question arises, as more matter is converted into radiation within the black hole, does the hole lose any mass in consequence? From E=MC2, it is intimated that energy, when created from matter, is related to mass and the velocity of electromagnetic radiation, not intimated that either mass or velocity is sacrificed. Indeed, light is pulled by gravitational bodies as if its photons carried mass. There is the concept that particles of matter are wavelets like photons but whose ends are tied together and therefore the particles are constrained to rotate in one place rather than untied and traveling to other places. A great deal of energy is released when the ends are untied, but the mass is merely sent traveling whilst retaining the attraction to gravity, not residing in matter in the form that we can measure.

Because the hole continues to grow as more matter and energy pour in, and the mass continues to grow, the mass and its gravity cannot be escaping into another world. However, intensely concentrated mass and its gravity is supposed to be interpreted as a pinch in space, conceivably connected to a pinch in another space, but does such a connection really transfer anything? Is it conceivably just a string in a super-dimension for others to ponder on? Certainly the outside of the black hole is the same all around.

Does the black hole evaporate? Apparently it does so, but only apparently. The steeply rising gravitational force at the holes boundary, tidal gravity, will exert a stretching force on the fabric of space, just as our moon stretches the ocean into an ellipsoid about the Earth as to create what we see as two tides in one day. The fabric is not exactly the old ether through which light and radio wave were supposed to travel, or is it? Transient particle-antiparticle pairs are supposed to become real for less time than it takes to detect and therefore they are considered virtual, but in that time they are pulled apart by tidal gravity never to pair off again and take back the energy of release from the vacuum. One partner flies off into space as if had evaporated from the surface of the black hole, whilst the other flies into the black hole and takes back the energy from the hole and so reduce the mass of the hole as if energy had mass.

The smaller the black hole the more intense is tidal gravity, the tearing of the fabric of space and the more rapid the apparent evaporation of the black hole. In a previous article I did explain that the passage of light might be considered an interchange of light photons with virtual particles. I also mentioned the concept of sub—dimensions wherein what are called virtual particles are actually real particles living within these ethereal sub-

dimensions. In so far as they are inaccessible to us they may indeed be considered virtual, but the sub-dimension concept may be easier to comprehend. Indeed is not Heaven a concept, a belief, that in its benign form gives understanding to the great benefit of the human race. That does not mean heaven does not really exist in a presently inaccessible place, in another dimension or world.

WAS Ad

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Ask for Paul Farmer (Club Member)

What's on the Box

Tuesday 18th October 2005

22.00 – 22.30 **Supernova**
Comedy series about a disillusioned astronomer who is swept from his boring life in London to the Royal Australian Observatory in the middle of the Outback.

WAS News News

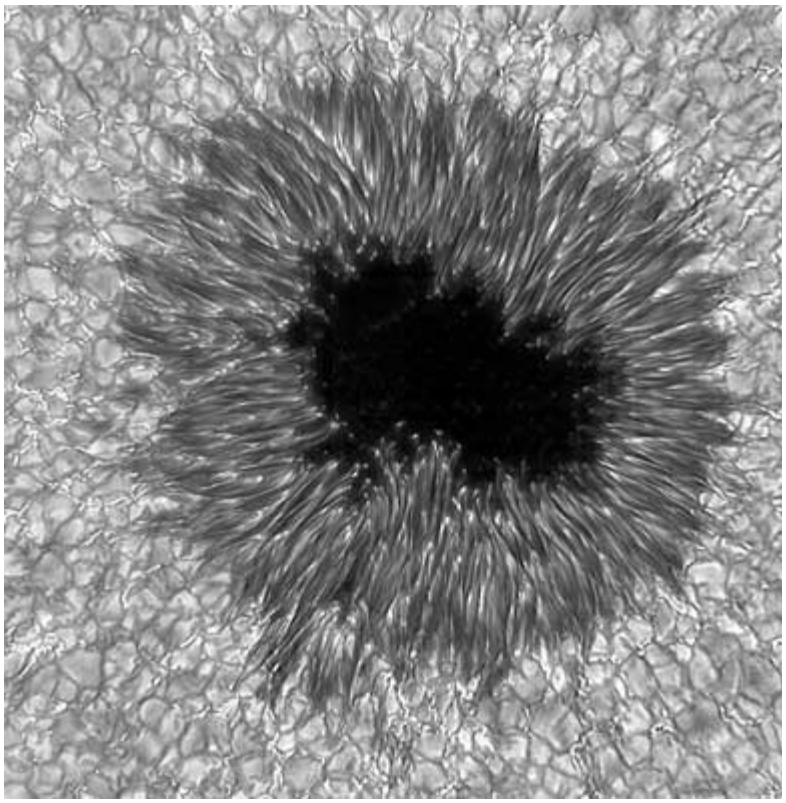
New optics produce ultrasharp images of sunspot

National Solar Observatory News Release

Advanced technologies now available at the National Science Foundation's Dunn Solar Telescope at Sunspot, New Mexico, are revealing striking details inside sunspots and hint at features remaining to be discovered in solar activity

This image, spanning an area more than three times wider than Earth, was made possible by the Dunn's recently completed AO76 advanced adaptive optics image correction system and a new high-resolution CCD camera.

The Dunn is the nation's premier high-resolution solar telescope. The Association of Universities for Research in Astronomy operates the Dunn as part of the National Solar Observatory under a cooperative agreement with the NSF.



High-resolution image of sunspot produced with the new camera attached to the Dunn's adaptive optics system. Credit: Friedrich Woeger, KIS, and Chris Berst and Mark Komsa, NSO/AURA/NSF

This ultrasharp image of sunspot AR 10805 shows several objects of current scientific interest. G-band bright points, which indicate the presence of small-scale magnetic flux tubes, are seen near the sunspot and between several granules (columns of hot gas circulating upward).

The dark cores of penumbral fibrils and bright penumbral grains are seen as well in the sunspot penumbra (the fluted structures radiating outward from the spot). These features hold the key to understanding the magnetic structure of sunspots and can only be seen in ultra high-resolution images such as this one. Magnetism in solar activity is the "dark energy problem" being tackled in solar physics today.

Normally such features are beyond the grasp of ground-based solar telescopes because of blurring by Earth's turbulent atmosphere. The Dunn's AO76 system compensates for much of that blurring by reshaping a deformable mirror 130 times a second to match changes in the atmosphere and refocuses incoming light. This allows the Dunn to operate at its diffraction limit (theoretical best) of 0.14 arc-second resolution, rather than the 1.0 to 0.5 arc-second resolution normally allowed by Earth's atmosphere.

The Dunn has two high-order adaptive optics benches, the only telescope in the world with two systems, which enhances instrument setup and operations.

This image was built from a series of 80 images, each 1/100th of a second long (10 ms), taken over a period of 3 seconds by a high-resolution Dalsa 4M30 CCD camera in its

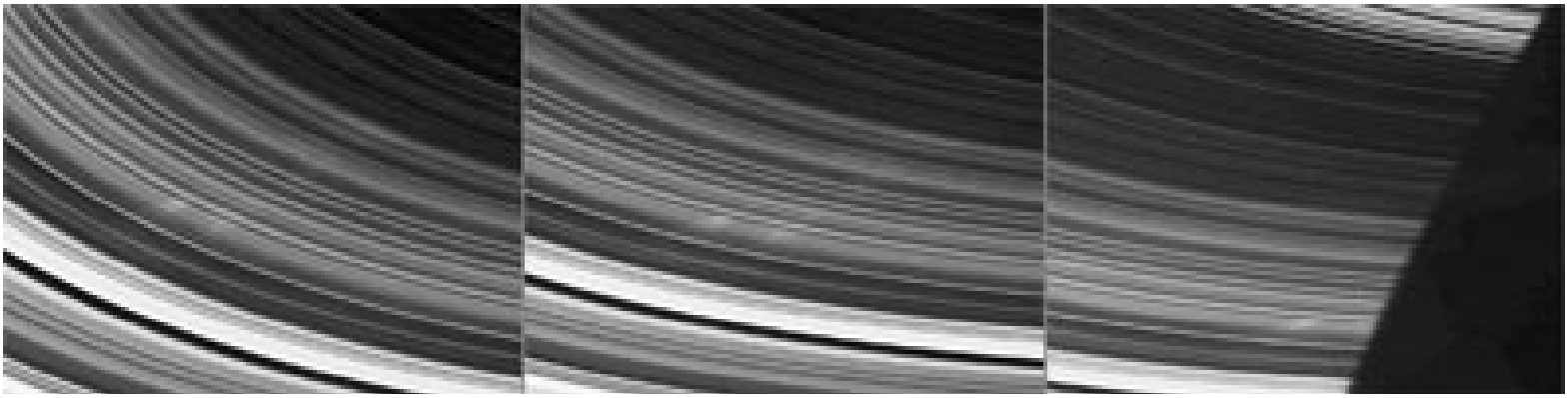
first observing run after being added to the Dunn. Speckle imaging reconstruction then compiles the 80 images and greatly reduces residual seeing aberrations.
The camera is part of the equipment suite for the Dunn's Diffraction-Limited Spectropolarimeter, which is designed to analyze magnetic field strength and direction inside sunspots.

The Dunn and its new systems are available for the world solar physics community to use.

Ghostly spokes in Saturn's rings spotted by Cassini

CICLOPS News Release

Delighted scientists on the Cassini imaging team will be breaking out the champagne in celebration of the first Cassini sighting of spokes, the ghostly radial markings discovered in Saturn's rings by NASA's Voyager spacecraft 25 years ago.



A sequence of images taken on the unilluminated side of the rings has captured a few faint, narrow spokes in the outer B ring, about 3,500 kilometers long and about 100 kilometers wide (2,200 miles by 60 miles). The images show the spokes as they march into the shadow of the planet on the rings due to their orbital motion.

Dr. Carolyn Porco, Cassini imaging team leader at the Space Science Institute in Boulder, Colo., and one of the first individuals to study spokes in Voyager images, was attending the Division of Planetary Sciences meeting in Cambridge, England, when she was informed of the discovery by her staff members. "This is really a joy, and very unexpected," she said. "It takes me back to my early days on the Voyager mission."

According to the latest ideas, the visibility of spokes is believed to depend on the elevation of the Sun above the rings, the less sunlight, the more visible the spokes. For this reason, scientists weren't expecting to see spokes until later in the mission when the sun angle is low.

"We had convinced ourselves that conditions wouldn't be right for seeing spokes on the lit side of the rings until about 2007," Porco said. "But this finding seems to be telling us that conditions on the dark side of the rings are almost as good right now for seeing spokes."

In Voyager images from 25 years ago, these narrow wedge-shaped features typically extended 10,000 to 20,000 kilometers (6,200 to 12,400 miles) radially outward across Saturn's B ring. When seen at low phase angles, spokes appeared dark; when seen at high phase angles, they appeared bright. This behavior indicated they were comprised of very small icy particles, about the size of the wavelength of light. Since Voyager days, spokes had been seen in images taken by NASA's Hubble Space Telescope. The new Cassini images were taken at very high solar phase angles, where small particles can brighten substantially, making them more visible.

Porco's analysis of spokes in the early 1980s found that these narrow arrangements of small particles came and went with a period equal to that of the powerful bursts of radio waves, called Saturn Kilometric Radiation (SKR), discovered by Voyager and coming from Saturn's magnetic field.

This association indicated that spokes were a phenomenon involving electromagnetic effects and partly connected to Saturn's magnetic field.
Of intense interest will be a Cassini determination of the periodicity in the appearance of spokes. This will require monitoring spoke activity from a variety of geometries over several years. "Cassini has found that the SKR period has changed since Voyager, which though hard to believe, may mean that the rotation of Saturn's interior has changed," said Porco. "That would be a finding of enormous consequence, so, we'll be looking very closely to see if the frequency of spoke activity has changed too."

There is no commonly accepted theory for the creation of spokes. Some ideas suggest that spokes result from meteoroid impacts onto the rings; others suggest that they are created by instability in the magnetosphere near the rings.

Whatever the cause, imaging team members will study the new spoke images and maintain their vigil for additional spoke sightings. Viewing conditions on the dayside are expected to improve toward the end of Cassini's nominal four-year mission, as Saturn continues in its nearly 30-year orbit and the Sun's angle above the rings continues to drop.

Diary

12th October 2005 Member's Contributions Inc The Super String Theory - David Storey.

9th November 2005 Universe in 4D- Cosmic Light Show - Dr. Christopher Baddiley Infrared Physicist Worcester

14th December 2005 Adventures with a Small Telescope - Neil Bone Meteor Section Director of the British Astronomical Association

All meetings **(bold)** are held on the second Wednesday of every month unless otherwise stated, at Heene Church Rooms, Worthing at 7.30 p.m. Meetings include the latest astronomical work, reports and, photographs by members. For further information find us on the Internet at *www.was.org.uk* or email: *chairman@was.org.uk*

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Contributions & Correspondence for the **November** issue of WAS NEWS should be with the Editor by **November 1st**. All material for inclusion should be sent to the Editor.

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