



Meteor Section

A busy two months for meteor observers

The Geminids in December

During last year's very favourable display, peak Geminid Zenithal Hourly Rates (ZHR) approached 140 meteors/hr. This year, Geminid activity is expected to peak around dawn on Tuesday December 14. The maximum is broad, however, and it is important to have a spread of observers making observations during the pre-dawn hours of Dec 13 and 15 to cover the shower maximum well.

Active from Dec 7–16, but with a slow rise to maximum, the Geminids are currently the most active of the regular annual showers, with rates outstripping those of the Perseids for a 24-hour interval centred on the peak – a real treat for observers prepared to brave the winter cold and damp.

The Geminid radiant (at RA 07h 32m, Dec +33°, just north of Castor) rises early and reaches a respectable altitude well before midnight, but observers will achieve better results in the early morning hours this year because, as for the Leonids, the waxing gibbous Moon (in Pisces for the Geminids) will rather hamper observations earlier in the night. The early morning hours of Dec 14, as dawn approaches, are likely to yield the best observed rates this year, but watches on the mornings of Dec 13 and 15 should also be worthwhile, with the radiant still high in the sky.

Geminid meteors enter the atmosphere at a relatively slow 35 km/sec, and thanks to their robust (presumably rocky/asteroidal as opposed to dusty/cometary) nature tend to

last longer than most in luminous flight. Unlike swift Perseid or Orionid meteors, which last only a couple of tenths of a second, Geminids may be visible for a second or longer, sometimes appearing to fragment into a train of 'blobs'. Their low speed and abundance of bright events makes the Geminids a prime target for imaging.

Associated with an asteroid – (3200) Phaethon – rather than a comet, the Geminid shower has grown in intensity since the 1980s as a result of the meteor stream orbit being dragged gradually outwards across that of the Earth. A consequence is that we currently encounter the most densely-populated parts of the stream. This happy situation is unfortunately only temporary – in a few more decades, Geminid displays can be expected to diminish in intensity. Here we have an excellent opportunity to follow, year on year, the evolution of a meteor stream.

The Quadrantids in January

The New Year opens with very favourable conditions for the Quadrantids, one of the three most active regular annual showers. Active from January 1–6, the Quadrantids

have been poorly observed in recent years thanks to a combination of factors – a very narrow period of high activity, poor January weather, and moonlight interference in at least one year out of three! However, when the shower was last well-covered by BAA observers, a peak ZHR of 100–120 m/h was found. Unfortunately, activity is close to peak levels for only about six hours: at other times, only a 'trickle' of a few meteors per hour might be detected. The Quadrantid radiant (RA 15h 28m, Dec +50°) actually lies in northern Boötes, and from the latitudes of the British Isles it is circumpolar.

Timing of the Quadrantid peak in 2011 January is quite favourable from the UK perspective, especially as the peak coincides with new Moon, so there will be a complete absence of interference from moonlight. The shower maximum is expected around Jan 04d 00h UT, midnight at our longitudes. Although the radiant is rather low in the northern sky during evening, it rises higher by midnight and climbs to a very favourable elevation as dawn approaches. Observations in the hours after midnight on 2011 Jan 3/4 will be the most productive. Much of the high activity close to the peak comprises moderately bright to faint meteors. As a result of particle-sorting, brighter Quadrantids (produced by larger meteoroids) become more numerous following the maximum, and this might be evident by dawn on Jan 4. Quadrantids are, like the Geminids, relatively slow meteors, with an atmospheric entry velocity of 42 km/sec. The brighter shower members are sometimes strongly coloured (often blue or green).

The stream's dynamic orbital history – much perturbed by Jupiter's gravity – has made identification of its parent body complicated. Recent studies have suggested that



Several Quadrantid meteors, including a bright fireball (top right), shoot out from the radiant in Boötes at the height of the shower on 2009 January 3. The position of the radiant in relation to the Plough can be clearly seen. (Pete Lawrence).



A Geminid meteor darts through the constellation of Hydra, close to the star Alphard, the 'Solitary One' on 2009 December 13 (Pete Lawrence).

the Quadrantids may be debris from asteroid 2003 EH1 (another similarity with the Geminids!), a possible break-up product of Comet 1490Y1 following the latter's close approach to Jupiter in 1650.

The Quadrantids can certainly be listed as a shower very much in need of observation – so why not make it your New Year's Resolution to start 2011 with a few hours of me-

teor watching between midnight and dawn on January 4. And observers who have been out Quadrantid watching during the early morning hours of January 4 can reward themselves with a most interesting partial eclipse of the Sun at sunrise that same day.

For further information, or copies of report forms, observing notes, and details of how to carry out group meteor watches,

please visit the BAA Meteor Section website at <http://britastro.org/meteor> or contact the Acting Director, who will be pleased to answer any queries regarding further aspects of visual meteor work.

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From the President

'Stargazing LIVE'

The BBC is planning a 3-part astronomy series called 'Stargazing LIVE' to be shown on BBC2 at 8pm on 2011 January 3, 4 and 5. This will be presented by Prof Brian Cox and Dara O'Briain and will feature live broadcasts from Jodrell Bank and possibly other sites in the UK, plus live images from spacecraft and telescopes around the world. As well as providing a general guide to the night sky, the programmes will feature Jupiter and Uranus, the Quadrantid meteor shower which peaks on the night of January 3/4, and the partial solar eclipse on the morning of January 4. The intention is to provide practical guidance on observing and photographing the night sky, and to make this an interactive event by encouraging people to share their own images.

BBC regions around the country will also be involved and there may be opportunities for individual BAA members and their local astronomical societies to contribute to the event. At the time of writing details are still sketchy but we will be keeping in close touch with the BBC's developing plans and will pass on information as we get it via e-bulletins and the BAA blog.

By Jove, time for a star party?

With Jupiter high in the evening sky and the Moon at 1st quarter on December 13, there is no better time to invite your neighbours and friends round to show them why you are so fascinated by astronomy. The Moon shows spectacular surface detail, and Jupiter will reveal the main features of its turbulent atmosphere in even a modest telescope. And of course there are the four satellites, the same ones Galileo watched change position from night to night four centuries ago in 1610, as it gradually dawned on him that this was like a miniature planetary system – but one which didn't have the Earth at its centre.

The established order, which held that the Earth was at the centre of the Universe, had prevailed for over two thousand years but was about to change for ever. Even today this view, and its historical significance, can impress newcomers to astronomy. If you're lucky, you and your friends might also catch a glimpse of a Geminid meteor.

Follow the BAA Blog

The 'blog' is proving very popular, now averaging over 10,000 hits per month. Steve Owens regularly uploads items of interest from BAA Section Directors and others within the Association. In view of its popularity, we have now opened up blog posts for comments to encourage discussion through the blog, so please make use of this facility if you want to comment on any of the posts. (We will be moderating this to ensure nothing unsuitable is posted.)

Steve would also be glad of help in writing for the blog so if you are interested in becoming a BAA blogger, contact Steve at steve.owens@britastro.org.

'Back to Basics' and other BAA meetings

The recent Back to Basics meeting at Cardiff and the Observers' Workshop at Burlington House both clearly demonstrated that there is a lot of enthusiasm for learning about practical observational astronomy. The combination of talks and practical sessions at these meetings seems to go down well. A further two Back to Basics meetings are planned for 2011 at Macclesfield Town Hall on Saturday March 5 (not the 6th as it says on the printed Meetings Card!) and Shurdington Social Centre near

Cheltenham on October 1. There will also be an Observers' Workshop on September 24, at a venue yet to be decided. If you think you, and any of your astronomical friends, might be interested in coming to these meetings make a note in your diary and watch for announcements in the *Journal* and on the BAA website.

We are also holding meetings at Norwich in May and in Jersey in September, plus the usual weekend event at Winchester in April. We hold several meetings each year at venues other than London to enable as many members as possible to attend at least one BAA meeting during the year. If you have never or rarely been to a meeting, perhaps because it is difficult or expensive for you to come to London, do watch out for a meeting near you and try to come along.

It's a team effort

I am writing this just after delivering my review of the past year at our Annual General Meeting, in which I was able to thank the many people who give their time and effort during the year to support the Association in one way or another. We are very fortunate in having such a committed team and I would like to use this forum to repeat my thanks to them all on your behalf.

Good observing, and don't forget the Geminids on December 13/14!

David Boyd, President



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Mars Section

Mars in 2009–2010: 2nd interim report

General

Despite the extremely cold winter and difficult observing conditions, reports were received from some 120 observers, and the telescopic work has continued (remarkably) till late August this year. Most observers managed considerably fewer observations than in recent years. Current work was briefly discussed in the 1st interim report,¹ in the Reports of Council,^{2,3} and in two E-circulars.^{4,5}

Albedo features

These seemed quite similar to 2007–'08, except that *Solis Lacus* had largely returned to its former shape and orientation. The map by Martin Lewis (Figure 1) nicely summarises the present appearance of the markings. The patchy linear feature in *Aethiopsis* (produced by the 2007 global dust storm) persists, as shown in Bill Leatherbarrow's image (Figure 2A). According to Figure 1 and to David Arditti's image in Figure 2B, the dark streak across *Noachis* (also generated by the 2007 global storm) continues to exist in place of *Pandorae Fretum*.

Dust storms

In 2009 Nov, Bill Flanagan (USA) and others caught a small dust storm in *Utopia*, which was surely created by a small frontal system moving off the N. polar cap. According to Wang,⁶ such front-generated events can begin only in one of two annual L_S 'windows'.

Another N. polar dust event, the subject of BAA E-circular no. 472,⁵ was observed in late 2010 Jan in *Baltia*. It soon disappeared, but a slight orange tint remained upon the NPC. An image by Damian Peach (Figure 2C) which captures the event on its first day shows that it was quite complex at high resolution.

Orographic clouds

We were well placed to see the evening orographic clouds this time, over the *Tharsis Montes*, *Olympus Mons* and also *Elysium Mons*. One example from a long sequence of images by Andrea Tasselli (Figure 2D) will suffice: the Director also had many fine views of these features. After opposition the *Tharsis Montes* (as well as *Olympus Mons*) showed up as dusky spots on the morning side of the disk.

White clouds

The Equatorial Cloud Belt (ECB) appeared seasonally right on schedule, and was caught in many post-opposition observations. Paul Abel's blue light drawing (Figure 3A) shows an apparently continuous belt of white water-ice cloud from limb to limb. Observa-

tions in blue light will always enhance white clouds: Peter Grego's drawing (Figure 3B) shows other white clouds over *Elysium*, the morning limb, etc.

N. polar cap

The shrinkage of the cap was followed in great detail. From 2009 Nov onwards, an annular rift (drawn by David Gray in Figure 3C) was beginning to emerge, and was notified to observers by BAA E-circular no. 467.⁴ This feature had been observed in the 1990s series of aphelic oppositions, but better quality imaging has revealed it in much greater detail this year. The cap sometimes showed an irregular edge, as shown by Ken Howlett in Figure 3D. Long after opposition, observers were able to catch *Olympia* separated from the cap.

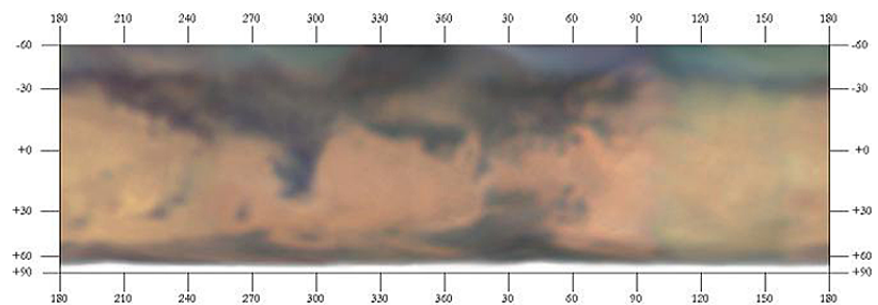


Figure 1. Albedo map compiled by M. R. Lewis from his own images, 222mm refl., 2010 Jan 17–Mar 5.

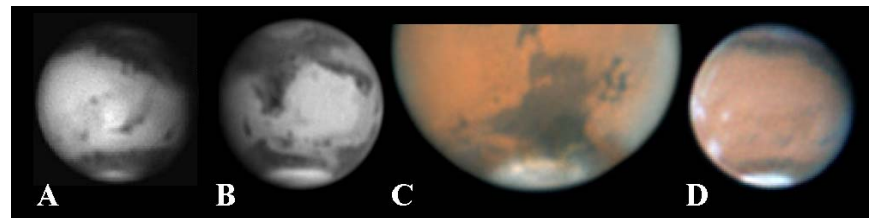


Figure 2. A. 2010 Feb 16, CML= 218°, 300mm MKT, infrared image by W. J. Leatherbarrow. B. 2010 Jan 4, CML= 306°, 355mm SCT, red light image by D. L. Arditti. C. 2010 Jan 29, CML= 21°, 355mm SCT, RGB image by D. A. Peach. D. 2010 Feb 19, CML= 174°, 300mm refl., RGB image by A. Tasselli.

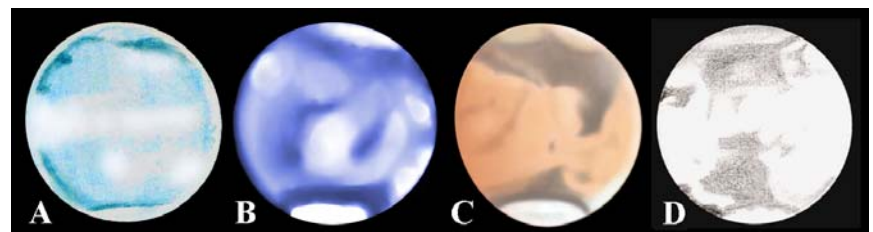


Figure 3. A. 2010 Mar 2, CML= 128°, 203mm refl. $\times 312$, blue filter drawing by P. G. Abel. B. 2010 Jan 14, CML= 221°, 200mm SCT $\times 200$, W80A blue filter, computer-coloured drawing by P. T. Grego. C. 2009 Dec 8, CML= 257°, 415mm DK Cass. $\times 365$, computer-coloured drawing by D. Gray. D. 2010 Jan 26, CML= 36°, 203mm SCT, drawing adapted from *Registax*-processed videos by K. C. Howlett.

Past opposition reports

Our analysis of the great perihelic opposition of 2003 was published in October and the current *Journals*. The final report on the 2005 opposition was accepted for publication by Council at its meeting in September, whilst the 2007–'08 report is about half completed, so that the Director hopes to be working upon the full Section Report for the present apparition during the next year, thereby bringing our work up to date. A list of all contributors will appear in the final reports.

Richard McKim, Director

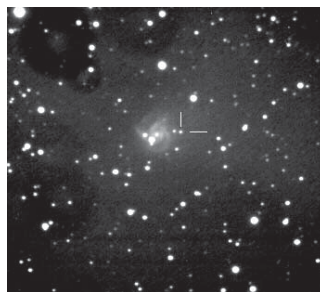
- 1 R. J. McKim, *J. Brit. Astron. Assoc.*, **120**(1), 10–11 (2010)
- 2 R. J. McKim, *ibid.*, **119**(5), 266–267 (2009)
- 3 R. J. McKim, *ibid.*, **120**(5), 299 (2010)
- 4 BAA E-circular no. 467, 2010 Jan 28
- 5 BAA E-circular no. 472, 2010 Feb 4
- 6 H. H. Wang *et al.*, 'Cyclones, tides and the origin of a cross-equatorial dust storm on Mars', *Geophys. Res. Ltr.*, **30**(9), doi: 2002GL016828 (2003)

Deep Sky Section

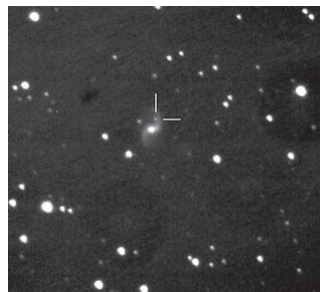
Autumn supernova discoveries by BAA members



SN 2010ha in IC 1764



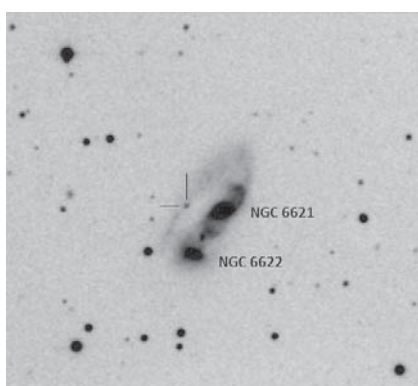
SN 2010hb in UGC 2537



SN 2010hf in MCG+09-11-21



SN 2010hl in MCG+10-24-122



SN 2010hi in NGC 6621 (Ron Arbour)

Both Tom Boles and Ron Arbour have made further supernova discoveries. They were found in 2010 August and September but came just too late for the October

Journal. Tom's discoveries were made from his observatory in Coddham, Suffolk using one of his 35cm Schmidt-Cassegrain patrol telescopes. They are listed above, and bring his total to 136.

Ron Arbour's latest discovery, his 24th, was made on 2010 Sept 1 in galaxy NGC 6621, a 12.2 mag Sb galaxy in Draco. The

Recent SN discoveries by Tom Boles

No.	SN	Galaxy	Date	Type	IAU Circ.
133	2010ha	IC 1764	2010 Aug 19	??	CBET 2423
134	2010hb	UGC 2537	2010 Aug 24	II	CBET 2424
135	2010hf	MCG+09-11-21	2010 Aug 31	IIb	CBET 2432 -2437
136	2010hl	MCG+10-24-122	2010 Sept 2	??	CBET 2440

discovery, made using his home built 40cm f/5 Newtonian, was announced on CBET 2436 and has been designated 2010hi. The supernova type has not as yet been determined.

All five discovery images are given here.

Stewart L. Moore, *Director*

UK Nova/Supernova Patrol

David Grennan's supernova: a first for Ireland!

David Grennan, based in Dublin, joined the UK Nova/Supernova Patrol early in 2010 with the specific aim of looking for supernovae by imaging regular galaxy fields using a 36cm Schmidt-Cassegrain telescope and CCD. Some patrolling had been carried out in earlier years but the appeal of a team approach was that others could help confirm possible discoveries reasonably promptly.

Imaging is now the favoured method as although Rev Evans of Australia has found many bright supernovae visually, the fainter extra-galactic supernovae ideally require an imaging technique, with many found in the range of magnitudes 17–19. David's observatory is called Raheny (MPC J41) and was founded in 2006.

David selected target galaxies in the magnitude range 12–15 and closer than 150 megaparsecs with the intention that a supernova would hopefully be bright enough to record, but in galaxies which, in many cases, were not intensively covered by other observers. Given local conditions and an aim to

reach magnitude 19, exposure times of 60 seconds are normally used, with two shots on each patrol session to eliminate cosmic ray hits and other spurious objects. Much of the target selection, investigation and reporting has been computerised using software written by David.

On 2010 September 17, after an observing run on potential Near Earth Asteroids, David debated whether to close down for the night but luckily changed his mind and moved on to a supernova patrol. On imaging only the second galaxy of the night, UGC 112 in Andromeda, he noted a magnitude 18.7 star which was not on an earlier exposure of 2010 August 20 which had a limiting magnitude of 19.2. It was also not shown on images

from the Palomar Sky Survey (Figure 1). The image of UGC 112 was the 2,611th survey image taken in 2010 by this observer. A further check was made at: <http://www.cfa.harvard.edu/iau/lists/RecentSupernovae.html> in case the object was already known but nothing corresponded. A lengthy series of exposures also eliminated movement and the possibility of an asteroid.

The suspect was flagged with Dan Green at the Central Bureau for Astronomical Tel-

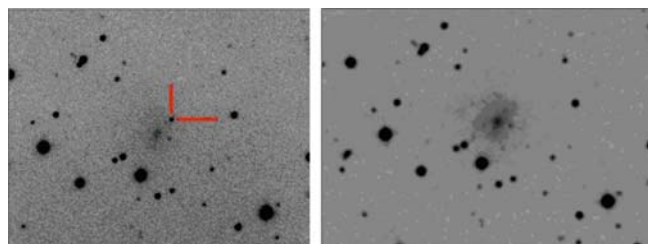


Figure 1. SN 2010ik discovery image on 2010 Sept 17 compared with Palomar Sky Survey

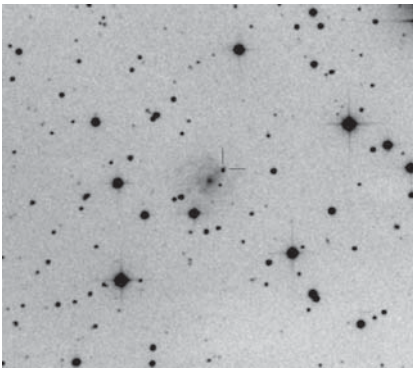


Figure 2. SN 2010ik, 2010 October 6. *Ron Arbour*

egrams (CBAT). An image confirming the presence of the new object was secured by Ron Arbour of South Wonston the next evening (September 18) and a follow-up report sent to CBAT. There was, however, some concern in Dan Green's mind that the magnitude of the object was only marginally brighter than the limit of some earlier images by the discoverer and Ron Arbour.

Further confirmation images by Martin Mobberley and Tom Boles obtained in near Full Moon and often damp conditions, unavoidably introduced some scatter in the photometry. All of this meant that whilst the object was clearly on multiple images and genuine, Dan Green was ideally waiting for spectral confirmation that the object was actually a supernova rather than some form of variable star.

The author contacted Chris Benn at the William Herschel Telescope at La Palma and the team there were quite receptive about the possibility of using that instrument to secure a spectrum, although it might need to wait for a service slot in several weeks time. After liaison with Stephen Smartt at the Astrophysics Research Centre at Queen's University Belfast who had access to earlier time slots, he agreed to arrange a spectrum on alternative telescopes.

On 2010 October 3, Stephen's team secured a spectrum using the Nordic Optical Telescope confirming the new object was a peculiar supernova of type-Ib/c, then apparently 1–2 weeks after maximum light with similarity to supernovae 2008bo, 2005bf and 2008ax. The R magnitude was derived as 18.7 which was faint for the proposed type.

The patrol team continued to secure images and photometry (Figure 2) and although scatter did arise, the overall impression was the object remained in a plateau phase, equally unusual for type-Ib/c and more often seen in type-IIP.

Based on the spectral confirmation, CBAT designated the object Supernova 2010ik and announced it on their Electronic Telegram 2479. Hopefully this announcement may have encouraged others to extend the light curve. On the date of the meeting of the As-

sociation in London on October 27 the author mentioned to those present that the object had not shown a fade and perhaps had slightly brightened. Peter Birtwhistle recorded it on October 16 at magnitude 18.2 (comparisons from the CMC14 catalogue) and Virgilio Gonano, based on an unfiltered exposure of 2010 October 19 with a 0.45m telescope at Remanzacco Observatory,

about one month after the discovery, derived a magnitude of 17.7, apparently still brightening. We welcome further results.

Congratulations to David Grennan on the first supernova found by an observer in Ireland.

Guy M Hurst, *Coordinator, UK Noval Supernova Patrol*

Solar Section

2010 July

Solar activity continued to increase for the third month in a row since the low of April. Activity was more akin to that in March this year but with a more even north/south divide. The Quality figure also increased to the highest figure since 2010 February. Observers reported activity on every day of the month during July.

AR1084 S19°/143° remained on the disk from the previous month type Hsx. The group continued its progress westward unchanged and was last seen on Jul 8.

AR1086 N18°/150° formed on the disk in the NW quadrant on July 5 type Bxo consisting of 3 small spots. The group became type Hrx on July 7 but was not seen thereafter.

AR1087 N19°/334° appeared on the eastern limb on July 9 type Axx which rapidly developed to type Dso by July 10, surrounded by a large area of faculae. On the following day, small spots could be determined between the leader and follower spots with a total area estimated around 140 millionths. By July 13 the group displayed only one penumbral spot type Cso before losing its accompanying spots by July 17 type Hsx. The group was last seen near the western limb on July 20 type Bxo consisting of 4 small spots.

AR1088 S21°/340° was seen in the SW quadrant on July 11 type Axx and on the following day the single spot had developed a small penumbra type Hsx. The group was not seen thereafter.

AR1089 S23°/202° appeared close to the eastern limb on July 19 consisting of 3 small spots. By July 21 the group had developed to type Dac comprising several penumbral and other spots. The group developed further the following day to type Eac with an estimated area of 260 millionths. The group consisted of 10 sunspots on July 25 but then started to reduce in size as it approached the western limb. The group was type Cao consisting of 6 spots on July 29 and was last seen on Jul 30.



Streamer prominence estimated to be some 200,000 miles in height on July 28. Image by Alan Friedman.

AR1090 N23°/149° appeared near the NE limb on July 24 type Axx. The following day it was type Bxo consisting of 3 small spots but faded back to Axx on July 26 and was not seen thereafter.

AR1091 N12°/253° appeared for one day only on July 26 type Axx.

AR1092 N13°/079° was first seen emerging over the eastern limb on July 28 type Hsx. The group remained on the disk to the end of the month showing an enlarged penumbra by July 31 which made the spot visible to the protected naked eye.

6 observers reported a Quality number Q=3.38

H-alpha

Prominences

15 observers reported a prominence MDF of 3.16 for July.

July started with small unremarkable prominences, the bulk of H-alpha activity being in the form of filaments. On Jul 5 a pair of prominences was seen above the N limb having presumably been ejected from the limb.

A major prominence group was seen just south of the W limb on Jul 9 and another major curtain prominence was present just north of the W limb. A large incomplete arch graced the NW limb.

A hedgerow prominence reached a height



of 47,000km above the NW limb on Jul 13 which stretched across the limb for approximately 223,000km.

On Jul 19 a large bright prominence group graced the NNW limb and a prominence hedge was visible on the E limb with an associated filament.

An extensive prominence hedge was seen on the ENE limb on Jul 21 including a fine pennant prominence. Two large flame prominences were on the SSE limb and a prominence hedge on the WNW limb included a fine arch.

Two large double masses seen on Jul 22 at NE40° became a high Eiffel Tower on Jul 24. Also on Jul 24 another hedgerow prominence stretched along the NE limb for approximately 214,000km and a rocket shaped prominence on the SE limb reach a height of about 84,000km.

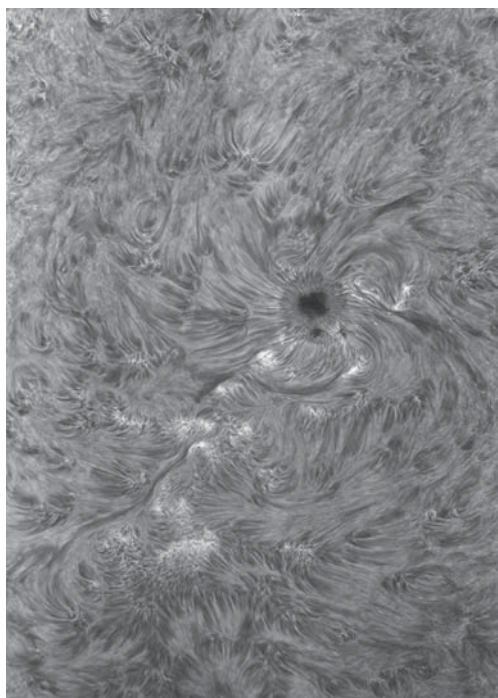
At 11:36 UT on Jul 28 an enormous tongue of plasma was seen on the SE limb extending at least 10° above the solar surface. This streamer was still present at 14:15 UT.

Filaments & plage

10 observers reported a filament MDF of 2.43 for July.

On July 2, 3 & 4 a string of filaments was present in the northern hemisphere, straddling the meridian on July 2. On July 3 when it was less fragmented, the total length of the feature was estimated to be 30°. Most of this filament disappeared by July 5 but a long dark filament was still evident.

An S shaped filament was seen near AR1087 on July 10 & 11.



AR1092 imaged by Rogerio Marcon in Brazil at 12:30 UT on 2010 August 1.

Two filaments were seen in association with AR1087, east and west of the sunspot group, on Jul 12. The following day a strong filament aligned north/south was west of AR1087 and an east/west aligned filament was just south of the same group.

Bright thin plage was seen curling around AR1087 on Jul 13 forming an intricate pattern around the sunspot group.

On Jul 19 an area of bright plage and embedded spots (AR1087) and filaments were observed near the WNW limb. Three further dark filaments were seen in the NW sector and an extensive area of bright plage was seen near the SE limb and a small dark filament.

Very bright plage was seen on the W limb against a small filament on Jul 21. Also a long filament graced the NW quadrant and two dark filaments were seen with associated plage near the E limb.

Two very long dark filaments aligned east/west were present in the NE quadrant on Jul 28 and were still distinct the following day.

2010 August

A substantial increase in activity in the northern hemisphere this month has produced the highest relative sunspot number since 2010 February and the second highest number since 2007 January. The MDF for the northern hemisphere is the highest recorded since 2005 December. However, most observers recorded August 19 to 23 as a blank disk.

AR1092 N13°/079° remained on the disk from the previous month (see image) and was recorded as visible with the protected naked eye on Aug 1–5 inclusive. The group was a stable H type spot which was occasionally accompanied by a small companion. The penumbra of the group decreased in size during its transit and it was last seen on Aug 9 rounding the western limb. The group possibly re-emerged on Aug 24 as AR1101.

AR1093 N11°/353° appeared round the eastern limb on Aug 4 type Cso containing 6 spots. The minor spots in the group declined leaving a single Hsx spot on Aug 7. By Aug 14 the group was type Dso and approaching the western limb together with AR1099. The group was last seen unchanged on Aug 15.

AR1094 N25°/104° was first seen on the disk on Aug 4. The group remained type Bxo until Aug 7 but rounded the western limb and was not seen again Aug 29, when the group made a possible reappearance as AR1102, again forming on the disk.

AR1095 S17°/001° was first seen from Australia on Aug 4 type Axx. The group developed in size to type

Hsx but declined back to type Axx on Aug 10 and was last seen on Aug 11.

AR1096 N22°/014° appeared on the disk near the CM on Aug 8. The group developed to type Cai on Aug 10 consisting of a cluster of 10 small spots before reducing to type Bxo on Aug 11. The group was not seen thereafter.

AR1097 N33°/272° made a brief appearance on Aug 10 & 11 type Axx.

AR1098 N14°/302° appeared on the disk type Bxi on Aug 11 amongst 4 other groups that day. The group was type Cro on Aug 12 but faded to type Axx the next day and was not seen again until a re-emergence on Aug 16. The group faded again and was last seen on Aug 18.

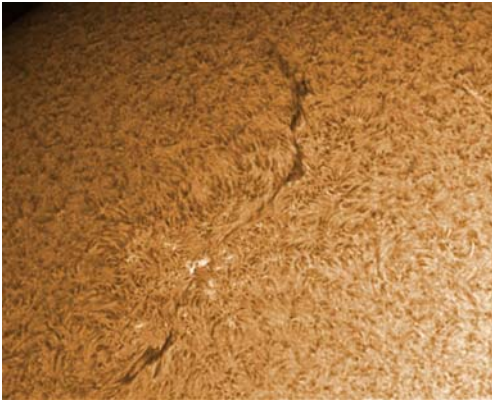
BAA sunspot data, 2010 July–August

Day	July		August	
	g	R	g	R
1	1	11	1	16
2	1	11	1	18
3	1	11	1	15
4	1	14	2	28
5	2	22	3	41
6	2	20	4	45
7	1	12	3	38
8	1	10	3	36
9	1	7	4	47
10	1	16	4	49
11	1	23	4	55
12	2	26	3	33
13	1	21	2	29
14	1	15	2	31
15	1	17	2	30
16	1	14	2	35
17	1	12	1	19
18	1	13	1	14
19	1	12	0	2
20	1	23	0	2
21	1	24	0	0
22	1	29	0	0
23	1	30	0	1
24	2	35	1	10
25	2	29	1	17
26	1	23	1	12
27	1	15	1	12
28	2	27	1	13
29	2	29	2	25
30	2	25	2	27
31	1	16	2	27
MDFg	1.28 (56)		1.81 (53)	
Mean R	19.06 (47)		23.44 (45)	

North & south MDF of active areas g

	MDFNg	MDFSg
July	0.63	0.65 (42)
August	1.51	0.41 (39)

g = active areas (AAs)
MDF = mean daily frequency
R = relative sunspot number
The no. of observers is given in brackets.



Filaments and plage in the SW quadrant on 2010 Aug 22 imaged by Bill Leatherbarrow at 14:02 UT.

AR1099 N18°/347° appeared on the disk to the north and west of AR1093 on Aug 13 as the pair approached the NW limb. Initially type Bxi the group developed to type Dsi on Aug 15 containing 9 elements before rounding the western limb.

AR1100 S24°/202° rounded the eastern limb on Aug 16 as a single Axx spot. The group remained unchanged until Aug 18 but was not seen the following day. The group remained active in H-alpha.

AR1101 N12°/082° rounded the eastern limb on Aug 24, a possible second rotation of AR1092. The group remained a stable Hsx type with an area of 120 millionths as it progressed across the solar disk. By Aug 31 the group had crossed the CM and was unchanged in appearance.

AR1102 N27°/104° appeared on the disk to the north and west of AR1101, a possible re-emergence of AR1094. The group was type Bxi on Aug 29 consisting of 6 small spots and developed to type Dao with an area of 60 millionths on Aug 30 & 31.

6 observers reported a Quality number Q=3.94

H-alpha

Prominences

14 observers reported a prominence MDF of 3.66 for August.

On Aug 4 the NE limb boasted a prominence reaching a height of approximately 84,000km and also a hedgerow prominence stretching around the limb for 168,000km. These were still present on Aug 5 and were joined by an impressive prominence display on the SW limb.

A strong flame was seen on the NE limb on Aug 12 and also a tall forked pillar prominence on the SW limb which reached a height of 121,000km. The flame prominence was still strong on Aug 13 but had now developed into a loop with a central column.

A parasol shaped prominence was evident on the SW limb on Aug 18 and also a thick

arch which appeared broken by the following day at NE30°.

The NE limb was covered in prominences on Aug 20 and an Eiffel Tower shaped prominence was seen on the W limb.

A double arch prominence and a filaprom were seen on the N limb on Aug 22 and also a major prominence hedge just north of the E limb point.

On Aug 23 a prominence reached the height of 140,000km on the NE limb and several very tall narrow strand prominences were noted above the SE limb. A very striking prominence was seen on the SW limb at 09:10 UT on Aug 27.

A major prominence hedge was present on the SE limb on Aug 31 with connecting matter to a smaller prominence to the north. Also a complex prominence curtain graced the NNW limb.

Filaments & plage

9 observers reported a filament MDF of 2.45 for August.

On Aug 4 a dark east/west filament was seen to the north of AR1092. A large 'S' shaped filament was seen in the region of AR1093 on Aug 6.

A long filament was present in the NE quadrant on Aug 9 and plage was noted around AR1093 and AR1096.

Two long filaments were seen on the disk on Aug 12, one in the NW quadrant and the other in the NE.

Plage was seen around AR1098 on Aug 17 & 18.

Three filaments were seen on Aug 18 all in association with AR1100, together with a very bright plage patch to the east and north of the sunspot group. Filaments remained evident around this active region on the following day although the group was no longer visible in white light.

On Aug 22 a dark filament was near the N limb and two dark filaments were between the disk centre and the E limb. Two long dark filaments were seen either side of an AR plage in the SW quadrant. A long dark filament was seen approaching the western limb on Aug 25 in the SW quadrant.

Bright plage was noted around AR1100 on Aug 26.

On Aug 31 plage was seen preceding AR1102. Also a large filament was north of the disk centre with a detached dusky patch at the northern extremity, and a filament was seen near the W limb.

Lyn Smith, Director

Campaign for Dark Skies

CfDS award for Isle of Wight hotel

On 2010 October 7, BAA member Peter Mugridge and Campaign for Dark Skies (CfDS) coordinator Bob Mizon travelled to the Isle of Wight to recognise and reward good lighting practice at a popular tourist hotel.

The owners of the Sentry Mead Hotel at Totland Bay near Yarmouth much impressed Peter on a family holiday in August when they offered, unbidden, to turn off all the exterior lights to facilitate viewing of the Perseid meteors.

Such a degree of awareness of the value of the starry sky prompted Peter to write to Bob, recommending an award, which Bob agreed was well deserved. Proprietors Sarah Langford and Jean-Pierre Kujawa were present to receive the CfDS Award of Appreciation, and Brian Curd of the local Vectis Astronomical Society kindly supported the event with both his presence and with transport.

The Award of Appreciation has been given to many friends of the night sky,



Left to right: Bob Mizon, Peter Mugridge, Sarah Langford, Brian Curd. Photo by Jean-Pierre Kujawa.

who, while not necessarily astronomers, have shown regard for the environment above. Previous recipients include broadcaster John Humphrys, who has often mentioned light pollution in his broadcasts (see *JBAA* 110(4), p.172), and Professor Monica Grady, who in the TV series *Seven Wonders* (1997) spoke out in defence of dark skies.

Bob Mizon, Coordinator, CfDS

Comet Section

Comet prospects for 2011

For many, the best comet of the year is likely to be 2009 P1 (Garradd), which might reach 7th magnitude at the end of the year. 45P/Honda–Mrkos–Pajdusakova makes a close pass to the Earth and will be well placed in the southern hemisphere prior to perihelion in September, and visible in the north post-perihelion. 73P/Schwassmann–Wachmann also returns, but it is not clear how many of the multiple fragments will be visible and even the brightest is likely to

be fainter than 12th magnitude. P/Levy (2006 T1) may reach 9th magnitude at the end of the year prior to perihelion in mid January 2012.

Theories on the structure of comets suggest that any comet could fragment at any time, so it is worth keeping an eye on some of the fainter periodic comets, which are often ignored. This would make a useful project for CCD observers. Perhaps the most spectacular example of such fragmen-

tation is 73P/Schwassmann–Wachmann, which exhibited a debris string of over 60 components as it passed close to the Earth in 2006 May, and which returns this year. Ephemerides for new and currently observable comets are published in the BAA *Circulars*, Comet Section *Newsletters* and on the Section, CBAT and Seiichi Yoshida's web pages. Complete ephemerides and magnitude parameters for all comets predicted to be brighter than about 21^m are given in the *International Comet Quarterly Handbook*; details of subscription to the ICQ are available on the Internet. A Section booklet on comet observing is available from the BAA Office.

27P/Crommelin has a poor return and will not be visible from the UK. Its maximum elongation whilst brighter than 14th magnitude is only 37°, and it is then at a northern declination, so it is possible that no-one will make a visual observation. The comet is named for the BAA Comet Section Director, A. C. Crommelin, who first computed a linked orbit for comets seen in 1818, 1873 and 1928. It was quite well observed in 1984 when it served as a test object for the International Halley Watch.

29P/Schwassmann–Wachmann is an annual comet that has outbursts, which in recent years seem to have become more frequent. The outbursts were more or less continuous in 2008/9 and at some the comet became as bright as 10th magnitude. The comet is an ideal target for those equipped with CCDs and it should be observed at every opportunity. The comet begins the year retrograding in Leo and reaches opposition on March 7, when it may show some additional brightening because of the small phase angle. It moves into Sextans in late March and resumes direct motion in May, when UK observers will lose it. The comet passes through solar conjunction in September but UK observers are unlikely to pick it up again until the new year as it is now at a southern declination.

This year there is an excellent return of **45P/Honda–Mrkos–Pajdusakova**. Southern hemisphere observers are likely to pick it up near opposition in July, when it is a 12th magnitude object in Pisces Austrinus. It heads even further south, brightening rapidly

Comets reaching perihelion in 2011

Comet	T	q	P	N	H ₁	K ₁	Peak mag
Beshore (2009 K3)	Jan 9.3	3.90			8.5	10.0	17
9P/Tempel	Jan 12.4	1.51	5.52	11	7.0	21.5	13
Catalina (2009 Y1)	Jan 28.9	2.52			9.0	10.0	15
D/Helfenzrieder (1766 G1)	Jan 29.7	0.42	4.52	1	6.0	10.0	
Cardinal (2010 B1)	Feb 7.1	2.94			7.5	10.0	14
D/Swift (1895 Q1)	Mar 1.4	1.48	7.40	1	11.4	10.0	
243P/NEAT (2010 P5)	Mar 3.5	2.46	7.52	1	12.5	10.0	19
D/Barnard (1884 O1)	Mar 7.9	1.33	5.45	1	8.9	10.0	
238P/Read (2010 N2)	Mar 10.7	2.36	5.63	1	14.5	10.0	20
P/LINEAR (2006 U1)	Apr 15.8	0.51	4.63	1	18.5	10.0	16
D/van Houten (1960 S1)	Apr 23.3	4.07	15.7	1	8.5	10.0	
P/LINEAR–NEAT (2004 T1)	Apr 24.9	1.71	6.47	1	12.5	10.0	17
231P/LINEAR–NEAT	May 16.7	3.03	8.08	1	14.5	5.0	19
164P/Christensen	Jun 2.4	1.68	6.98	2	11.0	10.0	15
Boattini (2008 S3)	Jun 7.4	8.02			4.0	10.0	17
213P/Van Ness	Jun 16.2	2.12	6.33	2	10.5	10.0	14
130P/McNaught–Hughes	Jun 24.8	2.10	6.65	3	12.5	10.0	16
62P/Tsuchinshan	Jun 30.4	1.38	6.37	7	9.5	15.0	13
123P/West–Hartley	Jul 4.5	2.13	7.58	3	11.5	10.0	17
69P/Taylor	Jul 17.2	2.27	7.64	6	7.3	10.0	13
3D/Biela	Jul 29.9	0.80	6.56	6	7.5	10.0	
D/Harrington–Wilson (1952 B1)	Jul 30.1	1.28	5.58	1	12.1	10.0	
27P/Crommelin	Aug 3.8	0.75	27.92	5	12.0	20.0	11
97P/Metcalf–Brewington	Aug 21.0	2.60	10.53	3	4.6	15.0	12
228P/LINEAR (2009 U2)	Aug 23.8	3.43	8.51	1	14.5	5.0	19
Hill (2010 G2)	Sep 2.1	1.98	930		8.0	10.0	12
P/SOHO (1999 R1)	Sep 7.1	0.05	3.99	3	22.1	12.8	6
45P/Honda–Mrkos–Pajdusakova	Sep 28.8	0.53	5.25	11	12.5	20.0	6
48P/Johnson	Sep 29.3	2.30	6.94	9	5.6	15.0	12
115P/Maury	Oct 7.0	2.04	8.76	3	11.5	15.0	17
73P/Schwassmann–Wachmann C	Oct 16.8	0.94	5.36	2			12?
P/Lagerkvist (1996 R2)	Oct 17.1	2.61	7.38	1	11.0	10.0	16
73P/Schwassmann–Wachmann B	Oct 18.6	0.94	5.36	6			12?
49P/Arend–Rigaux	Oct 19.1	1.42	6.72	9	11.3	11.0	14
41P/Tuttle–Giacobini–Kresak	Nov 12.2	1.05	5.43	10	9.4	17.2	11
P/Larsen (2004 H3)	Nov 23.3	2.45	7.72	1	13.0	10.0	19
P/LINEAR–NEAT (2004 R3)	Nov 28.4	2.13	7.49	1	14.5	10.0	19
LINEAR (2010 R1)	Nov 28.5	6.66			6.0	10.0	18
Lemmon (2009 S3)	Dec 10.3	6.48			6.5	10.0	19
37P/Forbes	Dec 11.0	1.58	6.35	10	10.5	10.0	15
71P/Clark	Dec 15.8	1.57	5.53	7	9.7	7.9	13
Garradd (2009 P1)	Dec 23.8	1.55			4.0	10.0	7
36P/Whipple	Dec 29.6	3.09	8.54	11	8.5	15.0	17
McNaught (2009 F4)	Dec 31.9	5.45			3.0	10.0	14

The date of perihelion (T), perihelion distance (q), period (P), the number of previously observed returns (N), the magnitude parameters H₁ and K₁ and the brightest magnitude (which must be regarded as uncertain) are given for each comet. The magnitudes, orbits, and in particular the time of perihelion of the D/ comets, are uncertain. Note: m₁ = H₁ + 5.0 * log(d) + K₁ * log(r)



Breakup of Comet 73P/Schwassmann-Wachmann 3's fragment B, imaged on 2006 April 18 by the Hubble Space Telescope. NASA/ESA/ H. Weaver (APL/JHU), M.Mutchler & Z.Levay (STScI)

as it passes only 0.06AU from the Earth on August 16, when it might be seen with the naked eye. It passes through conjunction at the end of the month and fades a little, but brightens again as it approaches perihelion at the end of September. UK observers get a chance to see it between mid September and mid October, although it will be quite low in the morning sky.

73P/Schwassmann-Wachmann is un-

likely to be as well seen this year when compared to its astonishing display in 2006, when many fragments were seen strung along the orbit. The two brightest fragments should be recovered, but their brightness is uncertain as the fresh surfaces from the break-up are likely to have aged.

2009 P1 (Garradd) currently holds the best prospect for UK observers. We should be able to pick it up around mid-summer, when it may already be 10th magnitude. Moving north and west from Pisces, it reaches opposition in early August on the borders of Pegasus at perhaps mag 9. It becomes nearly stationary in Hercules in November, but then accelerates northwards, ending the year here at approaching mag 7.

One SOHO comet is predicted to return, and should become visible in the SOHO LASCO field if the satellite is still operational, or in the STEREO fields.

The other periodic and parabolic comets that are at perihelion during 2011 are unlikely to become brighter than 12th magnitude or are poorly placed. Ephemerides for these can be found on the CBAT WWW pages. Several D/ comets have predictions for return, though searches at fa-

vourable returns in the intervening period have failed to reveal the comets and it is likely that they are no longer active. There is however always a chance that they will be rediscovered accidentally by one of the sky survey patrols.

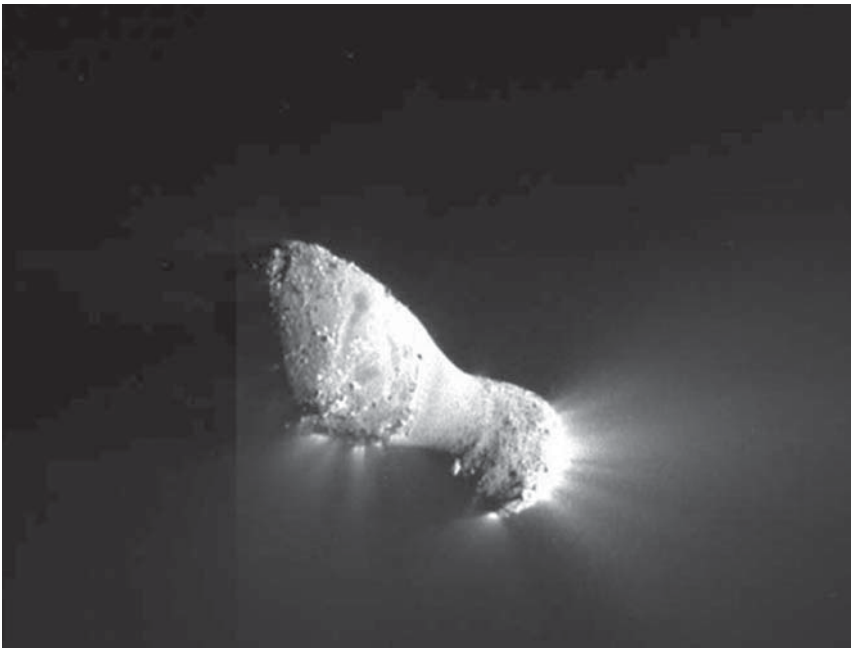
Looking ahead to 2012, **P/Levy (2006 T1)** could be 7th magnitude just after perihelion in mid-January, when it passes 0.19AU from the Earth. It is well placed prior to perihelion and UK observers should be able to follow it through the autumn and winter of 2011, with the comet reaching 9th magnitude by the end of the year. There is however some uncertainty about its brightness, as it seems probable that it was in outburst at discovery. **2009 P1 (Garradd)** will be at its best during the first couple of months of the year and becomes circumpolar at this time. **96P/Machholz** will be a bright object at perihelion, but is then close to the Sun and will not be visible from the UK.

Jonathan Shanklin, Director

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Comet Hartley 2 seen by NASA's EPOXI



An image of Comet Hartley 2 taken by NASA's *EPOXI* mission from a distance of about 700km as the spacecraft flew by on 2010 November 4. The comet's nucleus is approximately 2km long and 0.4km wide at the 'neck' or narrowest portion. Jets can be seen streaming out of the nucleus. *NASA/JPL-Caltech/UMD*

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A day to remember – a meeting with Sir Patrick Moore

by Mark Stewart

They say you should never meet your heroes for fear of disappointment. Perhaps that's true in most cases but not when it comes to Sir Patrick Moore. On a fine day in July this year my family and I visited Patrick at his home in Selsey and spent a memorable afternoon with the world's most famous astronomer.

The visit was sparked by my son's growing interest in astronomy and his wish to study physics at university. We eventually arrived at mid-day having been delayed twice en-route by unexpected traffic jams and a malfunctioning satnav. Twice we had phoned ahead to say we'd be late and on both occasions our host had been charming and gracious about the delay. Indeed those two qualities were to epitomise both the man and the few hours we spent at *Farthings*, Patrick's home now for over forty years. The thatched cottage and surrounding gardens are idyllically quiet, with a rural feel, a local microclimate helping to create a sensation that one might be in the south of France.

Not knowing quite what to expect we were ushered into Patrick's office, where we were immediately made to feel welcome. Although you are undoubtedly in the presence of scientific royalty, there is no standing on ceremony when you meet Patrick, and he quickly asked me to stop addressing him by his knighthood! 'Please, not Sir Patrick....'

Patrick's study is smaller than it seems on the *Sky At Night* but is still large enough to contain a huge number of books, awards – including Patrick's knighthood and CBE – photos and certificates, along with Patrick's cricket bat, a cherished memento of former campaigns. Our host was quick to point out that his skill on the cricket pitch had always revolved around his unorthodox bowling style, rather than his batting ability.

As a long standing fan of Arthur C. Clarke I was fascinated to learn about



Patrick's early association with the inventor of the geosynchronous communications satellite, and their combined participation in the early days of the British Interplanetary Society as two of its founding 'space cadets.' I was surprised to learn that Patrick thought the space elevator was 'not one of Arthur's better ideas.' I didn't disagree, though the space elevator is surely an idea whose time will come.

The visit offered a chance to quiz Patrick on all manner of subjects, from his views on Wernher von Braun – 'a decent man with a sense of humour' – to his meeting with Orville Wright: 'Neil Armstrong and Orville Wright never met, though they could have,' Patrick told us, clearly delighting in the historical possibilities of such an encounter. Orville, we learned from Patrick, 'had done very little flying' after the ground breaking events at Kitty Hawk, having been saddened by the use of aircraft in warfare.

Other luminaries who have crossed orbits with Patrick include Armstrong's fellow Apollo astronauts, the first man in space Yuri Gagarin, and Brian May – the Queen guitarist – now Dr Brian May, a well respected astrophysicist. As for the chance of a human walking on Mars, Patrick thought this unlikely in my own lifetime but something that Alex and Natasha might live to see. But not until we 'have solved the radiation problem' that will inevitably arise in transit to Mars and on the surface of the planet itself. The Sun was also responsible, Patrick felt, for the problems associated with global warming, rather than any man made causes.

Having recently written an article for the BIS *Spaceflight* magazine on the difference between the future foreseen in *2001: A Space Odyssey* and the current reality of space travel, I was intrigued to discover Patrick's views on the subject. I was not at all surprised when he offered a different perspective, suggesting that the collapse of the Soviet Union had blown space exploration off course by helping to extinguish the space race.

Talk turned to 'dark matter', which Patrick felt was real enough but he had less enthusiasm for 'dark energy'. I was left with



the impression that he thought a variation of Einstein's cosmological constant was likely to emerge in the future, proving that Einstein had been right even when he'd been wrong!

Throughout the conversation Patrick's sense of humour was never far from the surface, as when he recited the famous ditty about von Braun: 'Once the rockets are up, who cares where they come down? That's not my department,' says Wernher von Braun.'

Patrick, of course, is an expert on the Moon and when Alex asked him about the possibility of water on or below its surface he seemed very dubious, a view that was borne out only a few days later by a study undertaken by US researchers and subsequently published in *Science*.

Apart from meeting Patrick himself the highlight of the visit was a tour of the telescopes in the garden of *Farthings*, a location immediately recognisable from the programme which Patrick has been hosting now for over half a century. Patrick's first telescope stands in the hall (a three inch brass refractor supported by a wooden tripod, which the young Patrick Moore bought when he was eleven years old), still an impressive instrument and taller than any of his visitors. All the exterior telescopes are protected by cowlings of some description and stand pointing at the sky waiting for the arrival of the *Sky At Night* team and the next broadcast.

We left with three signed copies of Patrick's books, including his autobiography, which now occupy pride of place on Alex's bookshelf in our own home, and a feeling that we had just spent a lovely afternoon with a very special man and his family. To have received such hospitality and to have been treated to such entertaining and intelligent company was very humbling.

Thank you, Sir Patrick!