Keele Observatory Annual Report 2011

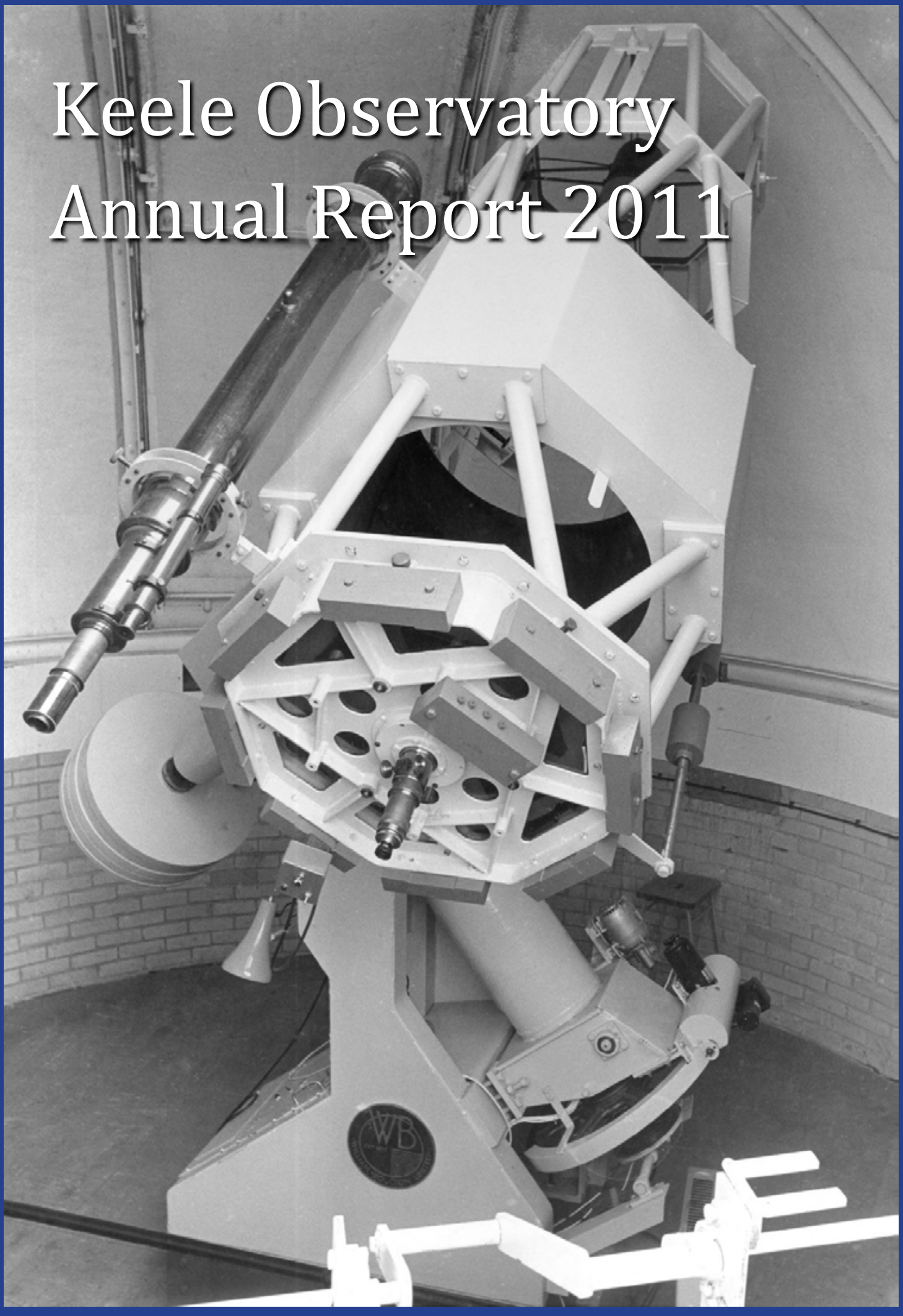

Table of Contents

From the Director

The year 2011 started brilliantly with the BBC2's "Stargazing Live" extravaganza. The whole year has been very successful if measured by the sheer popularity of the Observatory with individuals and groups visiting, and the hugely positive responses received on those occasions.

Having concentrated on our public outreach provision over the past year, the main challenge for the coming year is to bring the 61cm Thornton telescope back into active research service.

The year 2012 also marks the 50th anniversary of the Keele Observatory, coinciding with the 50th anniversary of Keele's University Charter. I would like to express my deep gratitude to all the people who have made Keele Observatory possible over the past half century, and to those who currently maintain and operate it. I wish the Observatory a Happy Birthday and a great future ahead.

Jacco van Loon

Administrative report

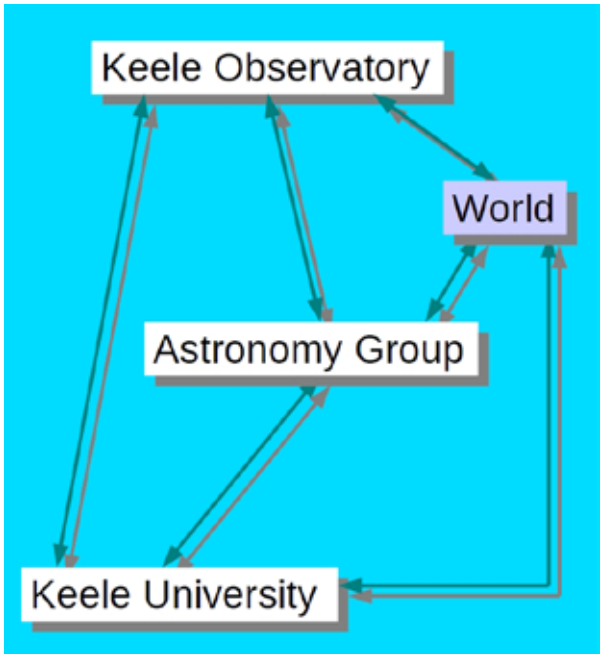

Figure 1 Organogram placing Keele Observatory in its broad context.

Personnel

Keele Observatory is operated and maintained by a unique partnership between the Astronomy Group in the School of Physical and Geographical Sciences at Keele University (Fig. 1), and a group of skilled and enthusiastic volunteers: the Observatory Support Team a.k.a "The Observatory Crew" (see Fig. 2). In 2011 the Crew was composed of James Albinson, Alan Bagnall, Dave Caisley, Edd Doody, Stephen Doody, Keith Heron, Paul Klimczak, Alan Mason, St.John Robinson, Matthew Stretch and (joining us) John Webb, with an advisory role by former Director and founder of Keele Observatory, Ron Maddison.

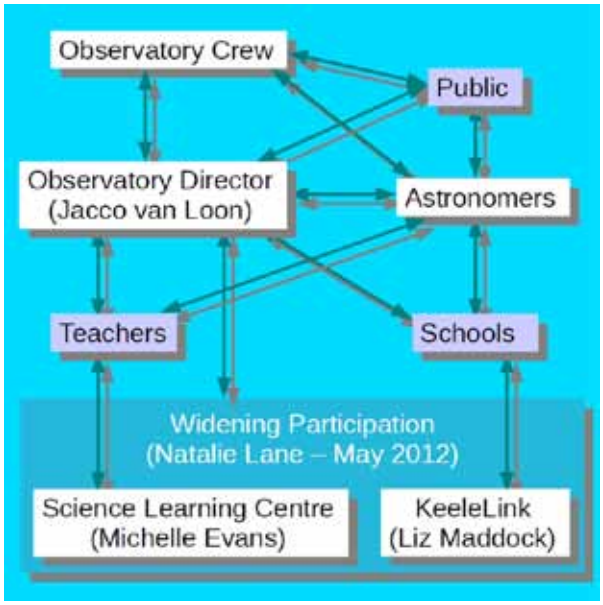

Figure 2 Organogram showing specifically the interactions between the observatory and related parties and the public, schools and teachers.

Figure 3 Dog Parry, of the Keele Observatory Crew.

One special member of the crew, dog Parry (pictured in Fig. 3) has helped children overcome their fear of entering the dome of the 12" Grubb.

Meetings

A general meeting was held in May 2011, of which the minutes have been posted on the Observatory's website (restricted access).

The Crew met informally for dinner, and again at a late-Summer barbecue at the Observatory (Fig. 4), which was joined also by Iranian colleagues.

Figure 4 The August 2011 barbecue.

Finances

The Keele Observatory building is part of the School of Physical and Geographical Sciences, and the directorate of Estates are called upon to service and maintain the infrastructure. The equipment, however, needs regular attention carrying some expenses with it. Therefore we seek to generate a steady income, while offering our services to the public for free or for a small donation. Major developments will require special funding.

Income was generated mainly through events organized by the Science Learning Centre at Keele University, which are professional courses for teachers. Community groups were usually asked for a £1 per head donation (up to £2 per head), and Adult Education sessions generated additional income. Workshops for schools were coordinated by KeeleLink.

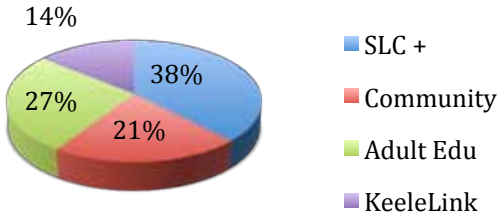

Table 1 Financial account for 2011. The income through the SLC includes one teachers event not organized through SLC itself (which raised £80). Likewise, the KeeleLink value includes one school visit arranged directly with the observatory (and which raised £110).

1. Balance brought forward	£574
Income	
Science Learning Centre +	£560
KeeleLink + school activities	£210
Community group visits	£321
Adult Education	£396
2. Total income	£1487
Expenditure	
General maintenance	£94
Acquisition drill press + vice	£236
Installation cloud sensor	£20
Printing Annual Report 2010	£50
3. Total expenditure	£400
Surplus (items 1 + 2 – 3)	£1661

Table 2 Budget for 2012.

1. Balance brought forward	£1661
Income	
Hospitality	£1200
Donations	£0
2. Total income	£1200
Expenditure	
General maintenance	£300
Acquisition of equipment	£500
Printing Annual Report 2011	£50
50th anniversary	£250
3. Total expenditure	£1100
Surplus (items 1 + 2 – 3)	£1761

Based on the 2011 account, we set a budget for 2012. The Observatory does not yet have the financial cushion to absorb major unforeseen expenditure, hence we adopt a conservative estimate of income and generous budgeting of maintenance expenses with the aim to end the year with a modest surplus over the previous year. The entry for donations is a placeholder for income not generated through events.

Keele Observatory website

The Keele Observatory website underwent a complete revision in October. Apart from a re-organization of the file system and web menus in an attempt to make the site simpler to navigate and maintain, and a makeover of the visual appearance, all information was checked and updated where necessary. Some old external links were removed whereas a few useful ones have been added.

Infrastructure developments

With contributions by St.John Robinson

Development of Observatory Hill

The Sustainability Hub on the site of Home Farm was inaugurated in October 2011. It is linked with the Observatory by means of a tarmacked path (wheelchair accessible). The Observatory greatly appreciates the steps taken by the Hub and the Innovation Centres to limit light pollution from their buildings and car parks, and to limit the turbulence generated by heat exhaust and by a planned wind turbine.

To further limit light affecting observations, shrubs have been planted on the bank facing the Hub. Meanwhile, some pollarding of trees has improved access to the ecliptic, important for viewing planets, the Sun and the Moon.

Plans have been drawn up to further develop the grounds surrounding the Observatory, which could include a viewing platform if a sponsor is found.

Maintenance of the Grubb and its dome

The 12" (31cm) Grubb refractor enjoyed its usual care to maintain it in operation. This involved also some work on the worm drive of the RA axis (Fig. 5). It has later been necessary to rectify a very serious problem with the RA drive system seizing up close to the end of its travel – whilst we are not sure how this occurred, steps are to be taken that should prevent this from occurring in the future (e.g., involving switches that take off the power).

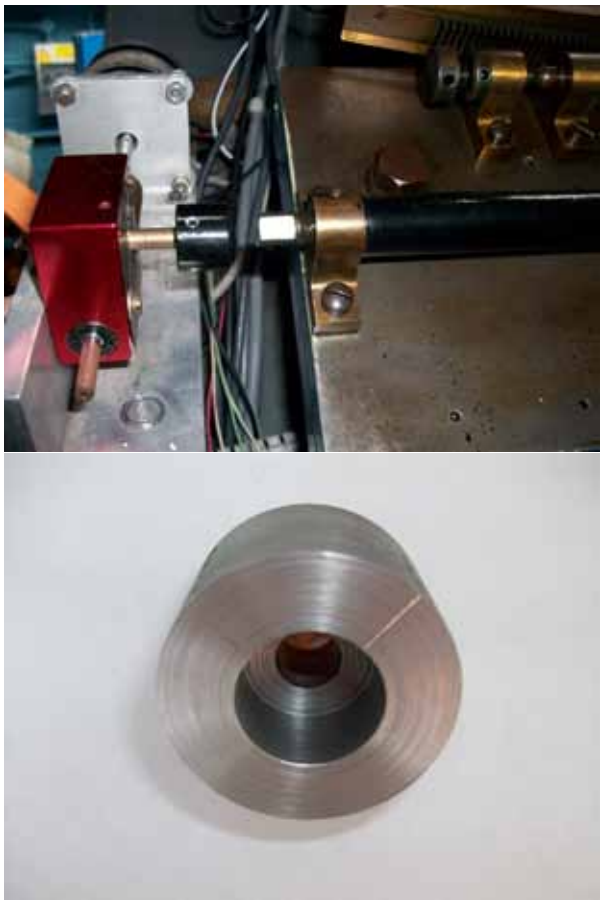

Figure 5 The disconnected worm drive of the Grubb refractor (top) and the expertly (in-house) crafted connecting collar (bottom).

It had been noticed that the dome drive had been slipping in one particular position. This problem was traced to the drive V belts having stretched in service. In attempting to re-tension the belts we discovered that the base motor plate had run out of adjustment. During the summer months the dome drive motor/gearbox assembly was stripped down, serviced and provision was made to increase the belt tension adjustment. It has since performed

admirably. The opportunity was also taken to strengthen and paint the dome motor and drive cover (Fig. 6).

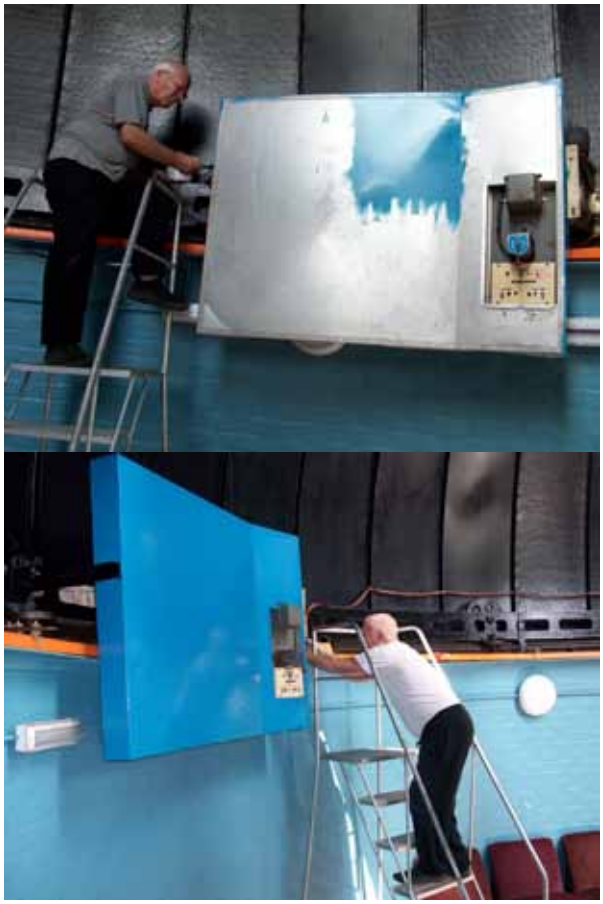

Figure 6 St.John Robinson painting the Grubb refractor dome control panel.

We also tidied up the cable loom that climbs the polar axis carrying both low power and data circuits, such that the 12 " Refractor can now 'go over the pole' without snagging the cable harness.

Webcam feed from the Hindle reflector

One of Professor Evans' suggestions was achieved: a video stream to the lecture room from an unmodified Phillips SPC900c web cam mounted on the 17" (43cm) Hindle reflector. This provides for those who cannot stand for too long, wheelchair-bound visitors, and others who – if it is very busy on open nights – can see what is going on prior to their turn at the eyepiece.

This project has been brought to fruition by a number of the support team members in particular Keith Heron and Paul Klimczak who have already provided some very good imaging (Fig. 7). It remains to complete the axial alignment of the 12" Grubb refractor and 17" Hindle reflector to make image acquisition easier. A number of other entry-level web cams and CCDs are available to try. An offshoot of this project is that visitors can be shown what can be achieved with modest equipment.

Figure 7 Picture of Jupiter taken on 22 November 2011 with a webcam on the 43cm Hindle reflector. Credit: Paul Klimczak and Keith Heron.

The 5" Watson Century refractor

This year has also seen the refurbishment of the antique 5" (13cm) Watson Century refractor. This instrument was previously mounted on the 24" (see the cover photo) but the brass work had become tarnished during the last 15 years since it was first redone. It has now found a place on the 12", forming an elegant historical suite of fine optical instruments.

Engineering work on the Thornton

2011 has seen no engineering activity on the 24" (61cm) Thornton reflector platform itself. The reason is that whilst the contractors (AWR) have commenced work on the upgrade to the pointing system, it has fallen behind schedule. It is anticipated that the engineering activities to support the newly acquired filter wheel will be carried out during 2012 when the upgrade is completed.

The new filterwheel is a Fingerlakes Instruments CL1-10. It has two wheels each with a blank and positions for four filters of 50mm. The following filters were purchased: *griz*, narrowband Hα, [OIII] and

[SII], and a broadband "L" filter with an ultraviolet and infrared cut-off.

In support of the pointing system upgrade we acquired the SkyX Professional software package, which will allow for single click operation to acquire the object of interest, rather than the current working but cumbersome system which requires 3 PCs to operate the telescope.

The new collimation tools purchased during 2010 have already proved invaluable in closing the currently configured optical paths for both the 24" and 17" reflectors. They have also been of benefit during telescope surgeries.

A Boltwood Cloud Sensor II was acquired (paid from the refurbishment funds) and installed with help of St.John Robinson and calibrated by John Webb. It performs well. The plan is now to link it to a web interface for general access, and to store the records for long-term monitoring of the conditions at Keele Observatory.

The Keele Observatory Workshop

Keele University no longer has a workshop, which in the past has provided high quality components for the Observatory. Recently we have relied upon one of our support team members, Stephen Doody, to carry out lathe operations on our behalf. Whilst that is still a requirement, the support team have been given a Myford ML4 lathe. It was a kit of parts, some of which were missing, but it was successfully rebuilt (Fig. 8).

Figure 8 The rebuilt Myford lathe spinning happily. James Albinson (on the left) seems confident while St.John Robinson (on the right) watches it carefully.

A substantial bench drill press and drill press vice were purchased. Support team members Matthew Stretch and Dave Caisley donated a bench grinder/finisher and a number of useful hand tools, respectively. As a result, the Observatory's Workshop has become better equipped to support the engineering activities.

Research activities

Solar observations

Stephen Doody has continued to perfect electronic photography of the Sun, with a Lumenera camera through the Coronado 4cm solar telescope (Fig. 9).

Publications

In 2011 one research publication appeared, based on data from Keele Observatory:

K.A. Alsubai, et al. (includes Keele astronomers Prof. Coel Hellier and Mr. David Anderson), Monthly Notices of the Royal Astronomical Society, **417**, 709: "*Qatar-1b: a hot Jupiter orbiting a metal-rich K dwarf star*"

Photometry obtained with the Thornton reflector of the eclipse of this transiting extra-solar planet (see Keele Observatory Annual Report 2010) helped the authors refine the planet's parameters.

Keele Observatory Publications

In 2011, Keele Observatory's own publication series was started with the release of two titles:

"Keele Observatory Annual Report 2010", J.Th. van Loon (ed.). KOP 1

R. Maddison: "The First fifty Years of the Keele University Observatory". KOP 2

KOP1 was printed in a production of 50 copies, and distributed in December 2011; it is available on-line from the observatory website. KOP2 will be printed in 2012. This annual report is the third in the series.

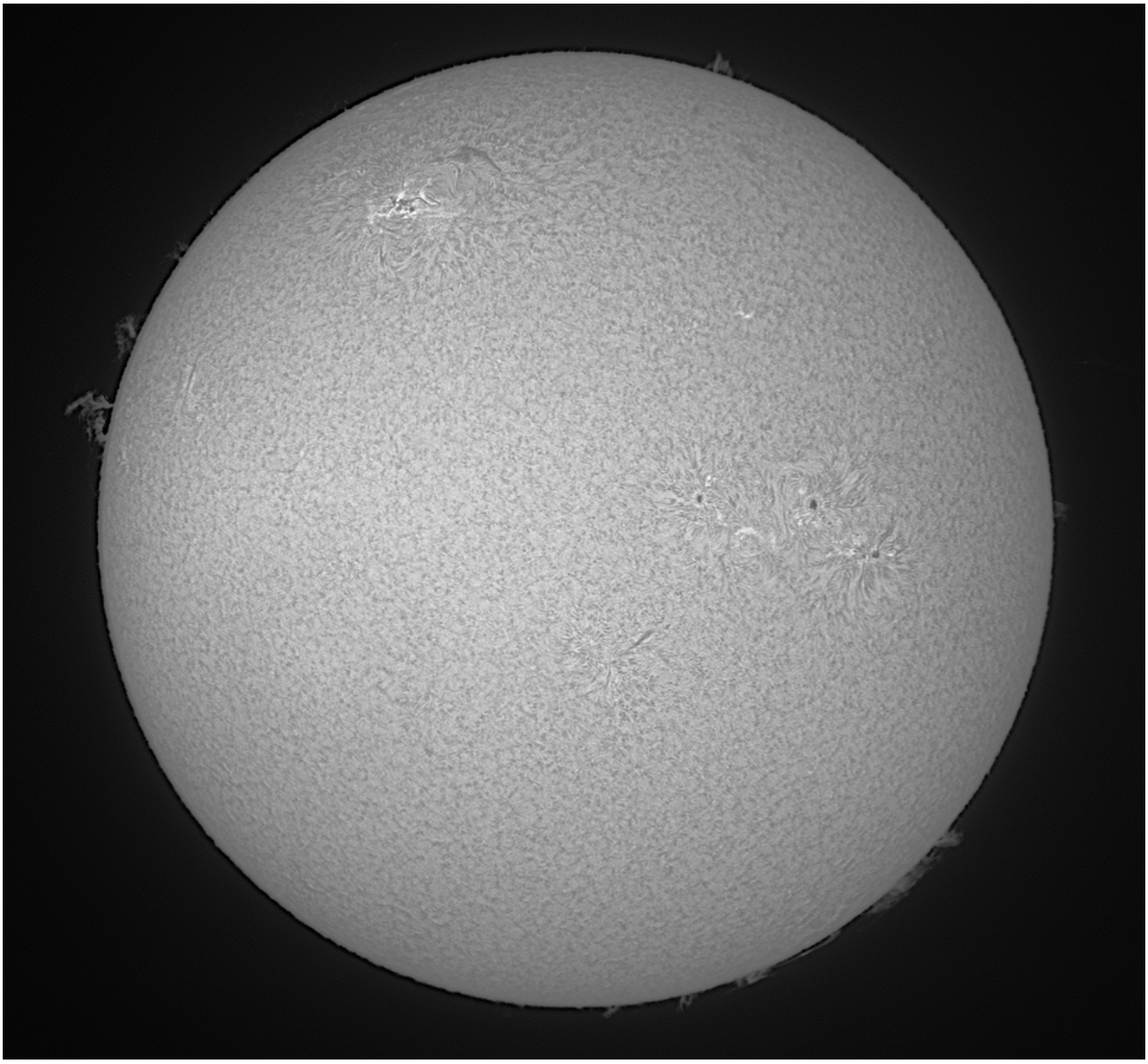

Figure 9 An active Sun on 17 April 2011, captured with the Coronado telescope and Hα filter. Credit: Stephen Doody.

Outreach activities

BBC2's "Stargazing Live"

Keele Observatory took part in the first edition of BBC2's "Stargazing Live", on the 4th and 5th of January 2011. This is a series of events and television programmes fronted nationally by the inspiring Professor Brian Cox.

Keele's contribution started with the partial solar eclipse as the Sun rose on the morning of the 4th. Unfortunately the sky was cloudy but a number of visitors turned up. The evenings of the 4th and 5th were very busy; a couple of hundred members of the public visited the Observatory, including a large number of children, who had glimpses of Jupiter through the cloud (Fig. 10), were given a tour of the Observatory facilities, and had advice on purchasing and setting up their own telescopes.

The Keele events were covered in local and regional media, including in the The Sentinel newspaper, by radio stations, and as a feature on BBC's "Midlands Today" with an interview with St.John Robinson.

We would like to thank the Crew, staff and students, as well as Chris Stone at the Keele University press office, for having supported the events at Keele Observatory in various ways. At the time of writing (mid-January 2012), four days of a second edition of BBC2's Stargazing Live are about to commence!

Figure 10 Keele Observatory's Director (on the left) and maybe a future famous astronomer (on the right) looking up at a cloudy sky during BBC2's Stargazing Live 2011. Credit: Claire Jennings (The Sentinel).

Public viewings

Approximately 400 people visited the Observatory this year for its Tuesday evening free public viewings. Visitors are treated to views through the historic 31cm Grubb refractor (weather permitting), and a tour of the observatory.

The public viewing evenings were added to BBC1's Countryfile "Things to do" calendar towards the end of the year. Keele Observatory also was a day on the "advent calendar" (5th of December) of BBC Radio Stoke, whose delightful reporter Rebecca Wood interviewed the Director, viewed the Sun and toured the observatory, ending in a flurry of the season's first snowflakes.

Schools and teachers

The Science Learning Centre, based at Keele University, hosted six events for teachers in 2011 that included the use of the Observatory. Over 80 teachers were reached in this way. A brochure has been developed describing Keele Observatory and giving an impression of astrophysics research at Keele University.

KeeleLink is Keele University's Widening Participation unit working with schools and colleges. A workshop was held at the Observatory in 2011, and two other schools visited in the evening. These events reached approximately a hundred learners.

Community group visits

The year 2011 was very busy with 13 community visits and another 8 visits from other interested parties including the Keele University Council, Wolfson Foundation, Keele Alumni, participants of a Royal Astronomical Society sponsored UK – Iran science meeting, and visits arranged by the Sustainability Hub including the National Advisers and Inspectors Group for Science.

A number of telescope surgeries were conducted, where the users have not been happy with the performance of their instruments. In all but one case (where it was advised `return to supplier') the Crew could improve the performance of the instruments over that with which they had been received from the suppliers. In addition, advice and guidance has been provided to prospective telescope buyers.

The Director wishes to express his thanks to the Crew and Keele Ph.D. student Deepak Mahtani for helping – especially in the case of large groups visiting. These visits attracted about 400 visitors to the Observatory, among whom many children.

Adult Education sessions

By Prof. Rob Jeffries

Keele Observatory hosted 15 `adult education' evenings on Wednesdays. These were attended by an average of approximately 25 people from the local community. In the first half of the year these sessions continued (from 2010) to focus on exo-planets and the search for life elsewhere in the universe. There were many exciting discoveries from the Kepler and Super-WASP experiments to talk about. Two of the sessions were lead by Keele postgraduate student Patricia Wood and by research associate Alex Smith, who talked about discoveries and follow-up observations in the exo-planet field.

In the second half of the year there were approximately six classes devoted to the discussion of cosmology and modern cosmological ideas, which followed the Oxford paperback series text: "Cosmology: A Short Introduction" by Peter Coles. We plan to continue this approach in 2012, but with the topic changing to Relativity.

Keele Observatory Publications 3

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Keele Observatory – http://www.astro.keele.ac.uk/Observatory

Front cover: the 24" (61cm) Thornton reflector of Keele Observatory, 2nd half of the 1970s.