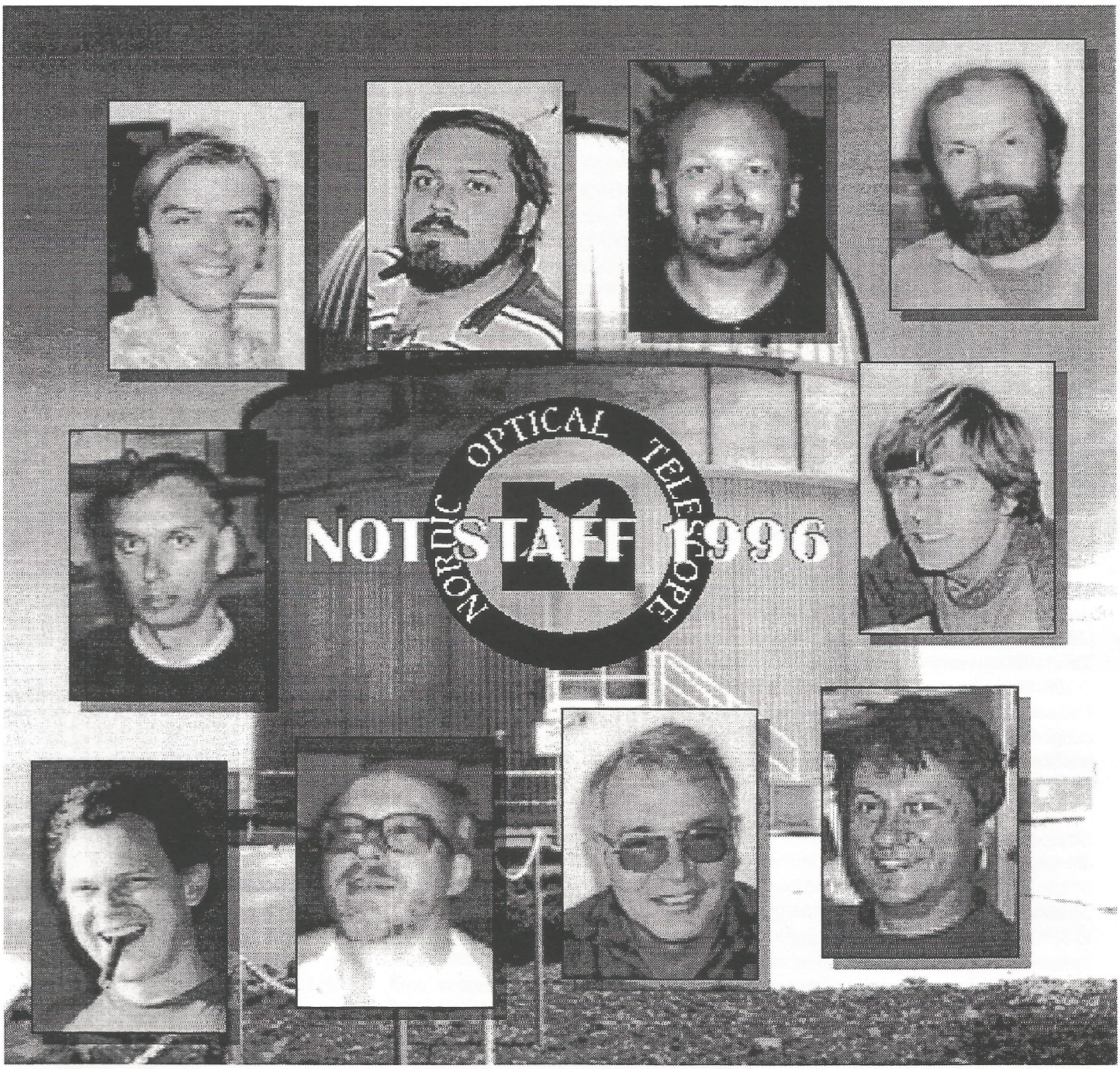
NOT NEWS

No. 9 *** December 1996

Nordic Optical Telescope Scientific Association



Window of opportunity for the NOT
New staff at the NOT
Questionnaire survey

The Nordic Optical Telescope (NOT) Scientific Association was founded in 1984 to construct and operate a Nordic telescope for observations at optical and infrared wavelengths. Associates are Statens naturvidenskabelige forskningsråd, Denmark, Suomen Akatemia, Finland, Norges forskningsråd, Norway, and Naturvetenskapliga forskningsrådet, Sweden. Executive bodies are the Council and the Directorate. Advice and assistance is provided by an Observing Programmes Committee and Scientific-Technical Committee.

The Nordic Optical Telescope is a 2.56 m telescope with altazimuth mounting and Cassegrain focus. The primary mirror has a focal ratio of f/2.0, the combined optical system a corresponding focal ratio of f/11.0. The telescope is installed at Cruz del Fraile, Observatorio del Roque de los Muchachos, La Palma, Islas Canarias. Geographical longitude is 17° 52' 59.7" West, geographical latitude 28° 45' 20.5" North and altitude 2382 metres above sea level.

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Cover: The NOT staff in 1996. Clockwise from the upper right corner : Vilppu Piirola, Peter Brandt, Peter Dierckx, Paco Armas, Ingvar Svärdh, Hugo Schwarz, Craham Cox, Andreas Jaunsen, Carlos Perez and Colin Aspin.

In this issue :

Window of opportunity for the NOT

Vilppu Piirola, NOT Director

The two main recommendations of the NOT Evaluation panel in 1993 were to 1. strengthen the local support staff, and 2. establish a carefully selected set of a few core instruments, which would exploit the outstanding imaging capabilities of NOT in the scientifically most productive way.

With the recently advertised Support Astronomer position we are now near to the completion of the restructuring process of the operation of NOT. The remaining further staffing arrangements will be the inclusion of one PhD student position in the NOT budget of 1997, and two student positions thereafter. We are grateful for the increased contributions from the Associates, the Research Councils of the four member Countries, which have made possible the substantial strengthening of the local support group at La Palma.

It has been rather obvious during all the years of the regular operation of NOT that the set of the available auxiliary instruments, though abundant in number and variety of design, has not always been to the satisfaction of the visiting astronomers. This developement has its origin from the early history of NOT, when it was decided that no instrument money could be included in the NOT budget itself. The responsibility of providing the necessary tools for using the telescope for research remained within the Astronomical Institutes, active working groups, and in particular, ethusiastic individuals. Without their efforts NOT would certainly be much less famous today.

With the more sound economical basis, we can now for the first time, really plan major instrument developements within our organization. For this aim, a Questionnaire Survey of the Nordic Astronomical Community was carried out by the NOT-STC (Scientific and Technical Committee). The results are summarized elsewhere in this issue by the STC Chairman, Dr. Per Barth Lilje. The three highest priority fields which emerged from the survey are: 1. High resolution Imaging, 2. Wide-field imaging, and 3. IR-Imaging.

Following these scientific priorities expressed by the user community, and after considering the best ways of utilizing the potential of NOT for front-line research work, a proposal for three new core instruments was made by the STC. These are:

1) A High-Resolution Optical Camera, including a low-order adaptive optics device HiRAC II (tip-tilt + astigmatism & focus corrections of rapid atmospheric seeing disturbances), and a mosaic of four thinned Loral 2048x2048 CCD chips, covering a total of 7.5x7.5 arcmin field with a resolution of 0.11 arcsec/pixel.

2) A Focal Reducer, for converting the f/11 beam into f/5 with an 'Off-axis Schmidt' type re-imaging camera. The full 17x17 arcmin useful field of NOT would be covered with a 0.25 arcsec/pixel resolution. The reflective corrector plate gives optimum ghost suppression and freedom of chromatic aberrations.

3) NOTCAM, a near-IR (1-2.5 μm) wide-field and high resolution camera using a 1024x1024 Rockwell ('Hawaii') array.

With the excellent image quality of NOT, and the low-order adaptive optics system for atmospheric image motion corrections (tip-tilt version was successfully tested in January 1996 at NOT), diffraction limited performance can be obtained at NOT in the near infrared. With such capabilitites, NOT would compete even with the largest existing telescopes. There is a clear 'Window of Opportunity for NOT', to carry out outstanding scientific work for a few years to come, before several of the comparable quality telecope projects will be finished by early 2000's.

In its meeting of April 1996, the NOT Council unanimously decided to pursue this plan, and encouraged coordinated funding proposals to be submitted to the funding agencies in the member countries. The total estimated costs of the new instrumentation developements (6.6 MDKK) would take far too long to be covered through the regular NOT budget, and the instruments would be outdated before being finished. Subsequently, applications were submitted to the Nordic Research Councils in May/June.

The outcome from the funding proposals has been encouraging. The Mosaic CCD + HiRAC project has already been secured in Denmark through a 2 MDKK grant. The Swedish Natural Sciences Research Council (NFR) has allocated in November 1996 1.7 MSEK for the NOTCAM project, and it seems highly probable that 1.1 NOM will become available also through the Norwegian NFR for the same purpose, which would essentially cover the developement costs of NOTCAM. The proposal submitted in Finland for building the Focal Reducer is still pending.

The NOTCAM project has been moving on about with a full steam since May 1996, under the lead of the Project Scientist, Dr. Colin Aspin, Senior Staff Astronomer at NOT. Works for the optical, electronic, and the mechanical design are well under way. Efforts are being joined together with our UK colleagues, as similar camera will be built for the ING telescopes on La Palma.

It will be exciting time for our team and collaborators to make the new instruments to work, and even more, then to see what they can reveal and show us through the telescope, on the nights of the best seeing.

Present status and plans for the next few years at the NOT.

Hugo E. Schwarz, AiC

Over the last few months several changes have taken place at the NOT and there are several things planned for the future. Here I briefly go over all of these topics.

Move to sea level office.

To be able to work more efficiently, better separate research work from telescope support work, and stimulate the scientific and technical collaboration between the various groups present on the mountain, a joint sea level office has been created. Isaac Newton Group, NOT and Telescopio Nazionale Galileo will jointly occupy a building of 6 floors on the seafront near the post office in Santa Cruz de La Palma. There will be a library, seminar room, optical and electronic laboratories, and offices for all astronomers, technical staff and administration. It is foreseen to make this into a major astronomical facility on La Palma. NOT will occupy about half of the 4th floor or 110 square metres divided into four offices, a hall and a space for storage. Computing facilities are being installed for the astronomers, both staff and visitors to reduce their data, and for the software engineers to develop programmes, or through the 2 Mbaud link that will form part of the installations, communicate with the computers on the mountain. Total staff working in the sea level facility, numbering about 100 people, were able to move into the offices in early August this year.

Extension of service building.

The present service building is too small for the new tasks that the NOT staff has to perform. Since the termination of the NTG group in Risø Roskilde, Denmark, all maintenance of and improvements to the NOT have to be done on the mountain. This involves new machines to be purchased and installed in the workshop, improved storage space for spares and materials, a small clean area for optical and electronic work, and some more office space for the duty staff and visitors. A design for an extended building has been made and the architect's drawing has been finished. We are now in the process of obtaining all the necessary planning and building permissions from the various committees, an enviromental impact study being part of the process. If approved, the 4 containers that we have been using for years as temporary office and storage space will be removed and the building extended by about 90 square metres. The new workshop will have 44 square metres of space for the new milling machine and lathe, and a room for "dirty" work such as spray painting and acid cleaning. We will have a roomy, new NOT service building!

Instrumentation

Since September 1995 we have decommissioned 3 instruments: the Stockholm CCD camera, the ESA PCD, and the LDS. These are not being offered anymore.

The Brocam1 CCD camera with the TEK1024 chip is now permanently mounted at the standby focus, allowing imaging at all times and independently of any other instrument that may be mounted on the telescope. All that has to be done is the filling of the CCD dewar and starting up the control programme of the Brocam1.

The new imaging camera, Brocam2, has a thinned, UV flooded Loral chip of 2048 15 micron pixels on a side. Each pixel projects 0.11" onto the sky with a total FOV of 3.7' by 3.7'. The quantum efficiency is above 65% from 300 to 800nm, and peaks at 700nm with 94%. At the wavelength of the HeI line (1083nm) the chip still has about 6% QE left. Read-out noise is about 6.5e, and the read-out takes about 75 seconds for a full frame.

Due to thermal cycling problem in the silicon substrate, and the induced damage of electrical connection for readout inside the chip, the 2k Loral CCD of Brocam 2 was lost in July 1996. Replacement chips have arrived and are being tested in Copenhagen.

The camera will be mounted onto HiRAC, an adaptive tip-tilt unit with a filter wheel holding up to eight 60mm round filters. A wheel for 65mm filters is being built at the time of writing. This means that the ESA PCD filter set can be used too, adding over 50 high quality filters to the NOT filter bank. HiRAC uses the light reflected from the front surface of the filter in use to pick off a bright star in the FOV to derive the wavefront tilt allowing the corrector plate to move in such a way as to compensate the atmospheric movement. To this end a set of 5 special, high quality optical filters has been acquired. These UBVRI filters have their front surface coated with a reflective coating that sends any light outside the passband to the HiRAC 64 × 64 CCD used for driving the adaptive optics unit. This chip can be read-out up to 300 times a second when windowed allowing fast movements of stellar images to be tracked. One application is the study of the mirror oscillations that have been plaguing the NOT since it was built.

In October 1996, ALFOSC was commissioned at the NOT. ALFOSC is a focal reducer camera that can be used for imaging and (multi-object) spectroscopy. With the super achromatic half wave plate that has been ordered from B.Halle in Berlin, ALFOSC will be able to do imaging and spectropolarimetry over a wide wavelength band. See NOT News number 8 of December 1995 for more detailed information about ALFOSC.

From 1st October 1996 onwards, the Turku photopolarimeter is offered as a user instrument. The polarimeter measures 5 (UBVRI) channels simultaneously, allowing its use in weather conditions which are less than photometric. The instrument can measure linear and circular polarization to an accuracy of 0.01%.

The NOT council has decided, on the recommendation of the STC, based in turn on the replies to the recent questionnaire to the Nordic

astronomical community, to present a coherent instrumentation plan for the NOT to the four Nordic research councils. Part of the NOT budget and a possible collaboration with the Spanish Instituto de Astrofisica de Canarias will complement the plan.

Three new instruments are proposed: a 1024 array IR camera for direct imaging in the 1 to 2.5 micron non-thermal IR region; a focal reducer to give, with a 2 by 2 array of thinned 2048 CCDs, a FOV of 17' square at 0.25" per pixel; a 5-mode adaptive optics corrector for high resolution imaging on one 2048 CCD.

It is felt that the combination of these three instruments best exploits the particularly good image quality of the NOT and will allow a wide range of mainstream scientific programmes to be performed. The recent arrival at the NOT of Colin Aspin, who has 15 years of experience in the building and running of IR instruments, also makes the acquisition of a modern IR array camera both attractive and timely.

The active optics system of the NOT is being upgraded with a new CCD, and the ultimate goal is to provide system that at the beginning of the night sets the telescope primary mirror optimally within 2 minutes. Automatic pointing to one of a list of bright stars, acquisition of this star and taking of the images will require no observer intervention, as will the data processing and subsequent setting of the mirror.

The telescope and its control system have also had some attention recently. There is a GPS (Global Positioning System) module installed which provides UT to within a microsecond. This used to be done by hand to about half a second.

New optical fibres have been installed in the adapter and cablke twist so that all instruments now can communicate with their host computer through these fibres.

These are the main items and we hope that most or even all of it can be achieved over the next two or three years!

Nordic Optical People: new staff at the NOT.

Hugo E. Schwarz

Since early 1995, when I accepted the job of Astronomer in Charge at the NOT, several new staff members have joined the group on La Palma. Here I introduce them (in alphabetical order) to all those who will come to the NOT to observe and probably meet them.

Colin Aspin, specialist in ground-based IR astronomy and instrumentation started at the NOT on the 1st of May this year as Senior Staff Astronomer. Colin has worked at the JAC on Hawaii for the last 9 years taking care of IRCAM, the main IR camera at the 3.8m UKIRT. His research interests include star formation, AGB stars and planetary nebulae. At the NOT his work will concentrate on the building of a new IR camera, mentioned elsewhere in this issue, general support at the telescope, and doing his research. Student supervision will also be part of Colin's activities.

Graham C. Cox, electronic engineer, joined the NOT in January 1996. He has worked in Cambridge, UK and at ESTEC in the Netherlands on astronomical instrumentation, especially on adaptive optics systems. He has visited the observatory in La Palma several times to commission instrumentation at the ING of telescopes. His responsibilities at the NOT include the active optics and wavefront sensor systems, general maintenance and improvements, and technical support duties.

Peter Dierckx, formerly with ESO in Garching, Germany, started on the 1st of May 1996 as System Manager/Applications Programmer. He spent 7 years with ESO during which he has gained extensive experience with the management of large computer networks, UNIX etc. His tasks at the NOT are to design and set up a new computer system on two locations (ORM and Santa Cruz), install this system and maintain and upgrade it. In addition, he will write applications programmes for NOT instrumentation and give technical support.

Hugo E. Schwarz began work for the NOT as Astronomer in Charge in September 1995 after being with ESO in La Silla, Chile for 9 years as Staff Astronomer. His task at the NOT is to lead and coordinate the activities and make sure that the NOT becomes and stays a top class facility for optical and IR astronomy. His research interests concentrate on the very late stages of stellar evolution; formation of planetary nebulae, symbiotic stars, and AGB stars. Part of his duties are to give support to observers at the telescope, and student supervision.

In the near future, short term staff will include:

Tina Christensen from Aarhus University as Student Astronomer

Jacob Clasen from Copenhagen University Observatory as Programmer

Roy Ostensen from Tromsø University as Student Astronomer

These are the people you might meet when you come to the NOT. To see what they look like you can consult the new NOT WWW pages at not.iac.es from the end of May 1996 onwards. We will do our best to make the NOT a scientifically productive, user friendly, and reliable state-of-the-art telescope.

Results from the questionnaire to Nordic astronomers on future NOT instrumentation

Per Barth Lilje, STC chairman

Introduction

To follow up a 1991 survey, the NOT-STC in late 1995 conducted a questionnaire survey of the Nordic astronomy community. The main aim was to give input about the community's wishes and requirements to aid the STC's effort to build a coherent plan for future core instrumentation for the NOT. A most important input had already come from the evaluation of NOT by an international high-level committee, which very strongly advised that the NOT should not have more than 4–5 core instruments in a given observing period. This has since been discussed by the STC who agreed that 5 core instruments is what NOT can realistically support within the present framework. For a core instrument, NOT assumes full maintenance and operation support. Thus, the staff will have full working knowledge and experience with these instruments, and full documentation. It should be stressed that this does not prevent the use of other instruments – but it means that the observer him/herself will have to take full responsibility for the operation and maintenance of such user-provided instruments, and must convince the OPC that he/she is able to do so. A secondary aim was to get other feedback about NOT performance which could be of interest to the STC.

Response

A total of 55 questionnaire forms were received by 1 December, 1995. The replies were distributed by country as follows: Norway: 9, Sweden: 14, Finland: 15, Denmark: 17, and non-Nordic NOT-employee: 1. It is estimated that a large fraction of the potential user community reacted to the questionnaire. The interest for the survey seems to be quite representatively distributed among the countries and institutions, and the survey should therefore suffice to be an important tool in establishing our long-term plans.

Research subjects

To establish if the answers were representative, we asked for the main research interests of the astronomers. These are also of interest for other purposes. The answers are given in the table below (NB! One astronomer can get in more than one category, so the total number of answers is larger than 56!):

Research interest	N	S	FIN	DK	NOT	Total
Solar system	2	2	3			7
Stars & struct. of the Galaxy	2	4	3	10	1	20
Galaxies & cosmology	6	5	8	9		29
ISM & star formation		4	2	1	1	8

There is a broad distribution of subjects of research, showing that the survey again can be considered representative.

Priorities

The astronomers were asked to mark off the three most important types of future instrumentation for him/her, and to give them a grade of 3 (highest), 2 or 1 (lowest of the three). The results are given in the table:

Type of instrument	ticked off by	average grade
High res. imaging	35	1.69
Wide-field imaging	34	1.19
Infrared imaging	21	0.69
Medium res. spectroscopy ($5000 < R < 60.000$)	17	0.65
Low res. spectroscopy ($R < 5000$)	17	0.56
Photo-polarimetry	14	0.44
High res. spectroscopy ($R \geq 60,000$)	11	0.47
Infrared spectroscopy	8	0.29
Other aperture photometr	6	0.22

The following remarks might be of interest: While most of the other instruments were described in the covering letter, infrared imaging was only mentioned in passing. There does not exist any IR imaging instruments at the NOT, and at the time of the survey, none were planned. Photo-polarimetry is mostly a demand from the Finnish community, were it was ticked of by 11 of the 15 replying astronomers (only 3 astronomers outside Finland had photo-polarimetry among their 3 highest priorities). Most of those who ticked it off had it as their second priority (average grade 1.7). High-resolution spectroscopy was in demand from a relatively small but strong community which mostly had this as their highest priority (average grade 2.4).

Wide-field imaging

Wide-field imaging (defined as field $\geq 7.'5 \times 7.'5$) is clearly a high priority in the Nordic community. There have been several suggestions for such future instrumentation (after the ALFOSC is removed), mostly utilising a mosaic of 4 $2k^2$ Loral CCD chips, either using the mosaic camera in direct focus (giving a $7.'5 \times 7.'5$ field) or with a focal reducer. Of course there will always be a play-off between spatial resolution and field size, so we were interested in seeing which compromises in this respect were most supported by the community. A planned focal reducer would give a reduction factor of 2.3, giving a field of $17' \times 17'$ with 0."25 pixels. We gave these as options, plus an intermediate solution. The planned focal reducer would have much higher ghost suppression, more well-behaved PSF and a very much higher price than other constructions. It would not have a secondary low-resolution spectrographic role. We also wanted to know how important these features are for the user community. Only the 34 replies with wide-field imaging among the three top priorities answered these questions.

"Rate from 0 (no possibility) to 5 (excellent) the quality of science you would do with the following combinations of field size and resolution:"

Field/res. combination		Average rating
Field= $17' \times 17'$	Resolution= 0."25:	3.8
Field= $13.'6 \times 13.'6$	Resolution= 0."20:	4.2
Field= $7.'5 \times 7.'5$	Resolution= 0."11:	3.7

It seems most astronomers can do good science with all three options, and the results are not significantly different.

"Rate from 0 (not important) to 5 (vital) the following qualities of a wide-field CCD camera:"

Feature	Average importance
Extreme ghost suppression:	2.6
Well behaved (uniform, symmetric etc.) PSF:	3.9
Large field size:	3.6
High angular resolution:	3.5
Also low-resolution spectroscopy:	2.5

Again there is no guide on where to compromise, since field size and angular resolution seems to be of equal importance! Secondary spectrographic mode and very strong ghost suppression seems to be of less importance to most of the replying astronomers than shape of PSF, field size and resolution.

High-resolution spectroscopy

For high-resolution spectroscopy, the NOT is presently equipped with the High Resolution Spectrograph (SOFIN) with R up to 170,000. The Fibre-fed spectrograph (a cross-dispersed echelle spectrograph with $R \sim 60,000$) is under construction. One aim for this survey was to see if any of these instuments (and if yes, which) would be wanted as a future core instrument for the NOT. Only the relatively small community putting high-resolution spectroscopy among its 3 top priorities answered the questions about this item. The first question was: "Rate from 0 (no possibility) to 5 (excellent) the quality of science you would do with the following instruments:" The answers are summarised in the table:

Instrument	Average rating
High-resolution spectrograph:	3.4
Fibre-coupled spectrograph:	4.3

The second question was: "Rate from 0 (not important) to 5 (vital) the following qualities of a "high"-resolution spectrograph" The answers are summarised in the table:

Feature	Average importance
Very high spectral resolution:	2.0
Large simultaneous wavelength coverage:	3.9
High wavelength stability:	4.3
High reliability:	5.0
User friendliness:	3.8
Permanent access with other instrument mounted:	2.4

Furthermore the astronomers were asked to give the minimum resolution needed for their research. The answers are classified in this table:

Minimum resolution	percentage
$\leq 60,000$:	75%
$> 60,000$ for some but not all projects:	17%
$> 60,000$ for all projects:	8%

It can be concluded that the resolution of the Fibre-fed spectrograph will be adequate for the majority of the community wanting to do high-resolution spectroscopy at the NOT.

Other comments and suggestions

The main comments and suggestions were positive. Many suggested that documentation etc. should be on the World Wide Web (something which is now being implemented).

To see the interest in different future upgrades or operating modes of the telescope (of which some, i.e., active optics, are in the process of being implemented), the following question was asked: "How important (0–5) are the following suggestions for you:" The results are shown in the table:

Suggestion	Average rating
Active optics:	3.1
Adaptive optics:	2.6
Remote telescope control:	1.1
Service mode observations:	2.0
Time given to **large** projects ($\gg$ 10 nights):	2.3

It seems to be a large demand for active optics and to some extent also for adaptive optics. There is very little demand for remote observing possibilities. It may be noted that there is some interest for both service mode observations and for the possibility of getting time for very large observing projects.

A large number of other comments were received. It is impossible to summarise them in this report.

Conclusions

The main conclusion is, as expected, that high resolution optical imaging is clearly the number one priority for most of the NOT user community. Wide-field ($\geq 7.'5 \times 7.'5$ field size) is also clearly the number two priority. However, the survey gives no conclusive guidance to how wide-field imaging should be implemented, a relatively "small" field with high resolution, a huge field with less resolution, or something in between. Possibly as a surprise (seen in the context of the form and its covering letter), infrared imaging is a clear third priority for the NOT community. This suggests that IR imaging should be thoroughly discussed by the STC. Very

small communities request IR spectroscopy or "other aperture photometry" (Strömgren, high-speed etc.). Such instruments need no further discussion. Among the other instruments, medium resolution spectroscopy (many have indicated need for long-slit mode) leads with low resolution shortly after. Photo-polarimetry is a high priority for most of the Finnish community, but almost not in other countries.

Telescope control system

The communication to and from the NOT telescope control system (TCS) has been implemented by means of Remote Procedure Calls. The first test was to get a programme to steer the telescope and write a message "in the stars"! Figure 1 shows the message which was written during a 1400 second exposure on Brocam2 by offsetting the telescope and adjusting the tracking rates in both axes. There are some other, fainter stars in the field which are just about visible too, each writing its own message.

Some useful information can be immediately extracted from this image. Just looking at the star trails shows that the "O" is not perfectly matched, as is the symbol with the star. The tracking drift over the exposure time gives some idea of the tracing and offsetting accuracy of the telescope.

Another thing that becomes obvious is that there are significant seeing changes on timescales of less than 2 or 3 minutes. For instance, at the top of the leg of the symbol "n" there is a short period of degraded seeing, and in several places along the letters "NOT" the same effect can be seen.

Finally, to start the image a star was placed outside and at the bottom left of the CCD FOV and then a large telescope offset was used to bring the star into the field. One can see the slight trail at 45 degrees down the leg of the "N" of "NOT" and the bend in the leg of that N. This bend indicates that one of the servos on the telescope drive is not quite correctly damped; there is some overshoot and then a slow recovery. This can be adjusted.

The RPCs are now being implemented to implement automatic focus exposures, routines to put objects into the slit of ALFOSC for spectroscopy, and various other improvements.

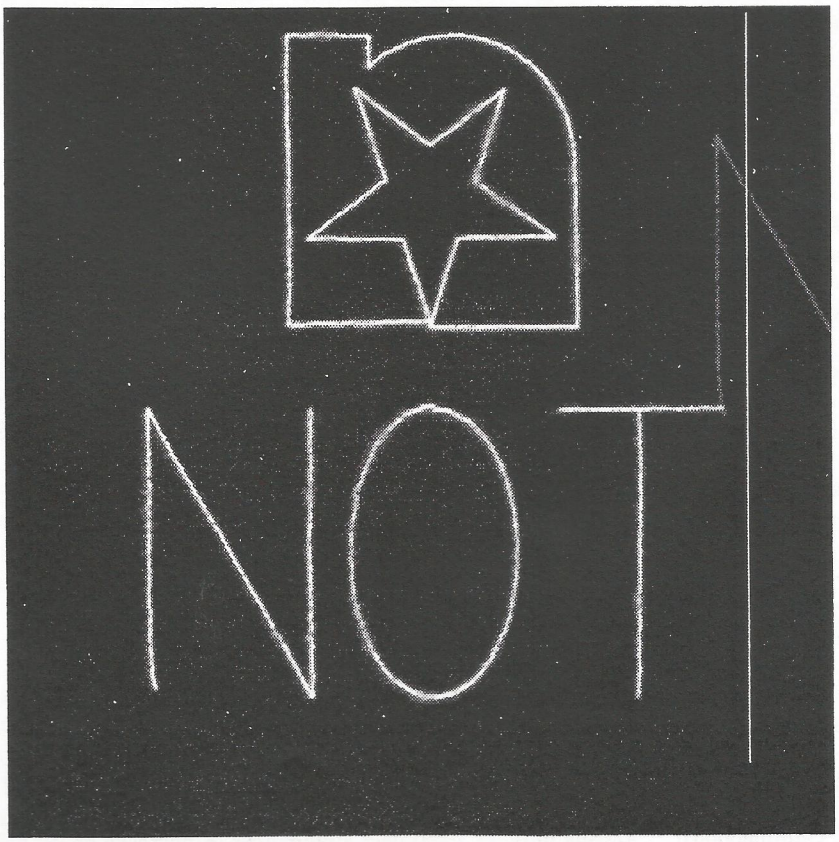

Figure 1: A demonstration of the tracking and offsetting capabilities of the new TCS communications system. The telescope was offset during a 1400 second exposure using the implemented remote procedure calls to write a message on the CCD.

Nordic Optical Telescope Schedule: 1996 Apr 1 - 1996 Sep 30

Starting date	Ending date	Principal Investigator	Institute	Programme	Instrument(s)
Apr 1	Apr 7			technical t.	
Apr 7	Apr 9	J. M. Rodriguez Espinosa	IAC	Obs. Pre-ISO de una muestra completa de AGN	Brocam
Apr 9	Apr 12	D. E. Pérez-Olea	UAM	Circumnuclear starbursts in radio quiet galaxies	BroCam
Apr 12	Apr 14	P. Lilje	Oslo Univ.	Multi-waveband imaging of hyperlum. IRAS galaxies	BroCam
Apr 14	Apr 17	P. Beckman	IAC	CCI programme	BroCam
Apr 17	Apr 21	C. Fransson	Stockholm obs.	Circumstellar interaction in type II supernovae	LDS
Apr 21	Apr 25	X. Barcons	IFCA	Morphology and photom. of Lyα absorption galaxies	Brocam
Apr 25	Apr 28	P. Møller	STScI	Core properties of ellipticals: high resolution imaging	BroCam
Apr 28	May 2	J. Casares	Oxford Univ.	Spectropol. study of V795 Her and other SW Sex stars	LDS+own
May 2	May 9			technical t.	
May 9	May 12	C. Esteban	IAC	Imagen profunda Hα de galaxies Wolf-Rayet	Brocam
May 12	May 17	M. Moles Villamate	IAA	Universalidad de la relación plano fundamental para ...	BroCam
May 12	May 17	R. Rebolo	IAC	El test de brillo superficial de Tolman y ...	BroCam
May 17	May 19	P. Hakala	Oxford Univ.	X-ray source population of M5 and M33	BroCam
May 19	May 24	J.M.M. Mirones	IFCA	Identificatión de protogalaxias a $z \approx 3.5$ ...	BroCam
May 24	May 28	E. Harlaftis	St Andrews Univ.	Echo tomography in X-ray binaries	TPh
May 28	Jun 1	H. Schwarz	NOT	The inner regions of bipolar planetary nebulae	own
Jun 1	Jun 4	H. Schwarz	NOT	Distances to planetary nebulae: precision parallaxes	BroCam
Jun 4	Jun 8			Commissioning of ALFOSC	ALFOSC
Jun 8	Jun 12	A. Jaunsen	Oslo univ.	Galaxy-galaxy weak gravitational lensing	ALFOSC
Jun 12	Jun 16	M. Näslund	Stockholm obs.	Luminosity function and populations of ...	ALFOSC
Jun 16	Jun 20	T. Pursimo	Tuorla obs.	Polarization of radio-emitting X-ray BL Lac candidates	BroCam
Jun 20	Jun 24	H.S. Sanghera	JIVE	The host galaxies of compact steep spectrum sources	BroCam
Jun 24	Jun 25	J. Hjorth	Cambridge Univ.	Short time-scale monit. of the lens B1422+231	BroCam
Jun 25	Jun 27	H. Schwarz	NOT	Distances to planetary nebulae: galactic reddening	BroCam
Jun 27	Jun 28			Commissioning of IACUB	IACUB
Jun 28	Jul 2	J. Beckman	IAC	Propiedades y parámetros físicos de la nube ...	IACUB
Jul 2	Jul 5	V. Reglero Velasco	Univ. of Valencia	Modelos cromosféricos de estrellas frías	IACUB
Jul 5	Jul 8		NOT	staff time	
Jul 8	Jul 13	L. Takalo	Tuorla obs.	High-resolution imaging of radio-selected BL Lacs	BroCam
Jul 13	Jul 17	P. Linde	Lund obs.		BroCam
Jul 17	Jul 21	J. Kotilainen	Tuorla obs.	Optical imaging polarimetry of active galactic nuclei	BroCam
Jul 21	Jul 26	P. Lilje	Oslo univ.	Radio quiet and radio loud QSO evironments	BroCam
Jul 26	Jul 28	H. Schwartz	NOT	Distances to plan. nebulae: reddening of the nebulae	B&C
Jul 28	Aug 2	I. Tuominen	Oulu univ.	Magnetic field and starspot imaging of RS CVn stars	SOFIN
Aug 2	Aug 4			technical t.	
Aug 4	Aug 5		NOT	staff time	
Aug 5	Aug 9	A. Manchado	IAC	Catálogo de imágenes de nebulosas planetarias	IAC CCD
Aug 9	Aug 13	P. Muhli	Helsinki univ.	CCD photometry of Cyg X-3 and AC211	BroCam
Aug 13	Aug 15	P. Hakala	Oxford univ.	X-ray source population of M5 and M33	BroCam
Aug 15	Aug 18	P. Magnusson	Uppsala obs.	Observations of trans-neptunian objects	ALFOSC
Aug 18	Aug 21	K. Lehtinen	Helsinki univ.	Long-slit spectroscopy of globules	ALFOSC
Aug 21	Aug 24		NOT	staff time	
Aug 24	Sep 3	G. Olofsson	Stockholm obs.	An IR search for very faint young objects	Arnica
Aug 24	Sep 3	L. Hunt	Arcetri obs.	The connection between AGN and their host galaxies	Arnica
Aug 24	Sep 3	L. Testi	Arcetri obs.	The initial mass function of star forming regions	Arnica
Aug 24	Sep 3	G. P. Tozzi	Arcetri obs.	Activity of comet C/1995 01 (Hale-Bopp)	Arnica
Sep 3	Sep 4		NOT	staff time	
Sep 4	Sep 8	P. Gammelgaard	Aarhus univ.	Sulphur abundances in northern spiral galaxies	ALFOSC
Sep 8	Sep 14	J. E. Solheim	Tromso univ.	Astroseismology of white dwarf stars	TPh
Sep 14	Sep 19	P. Møller	STScI	The Lyα "silver lining" effect at high z	BroCam
Sep 19	Sep 22	P. Møller	STScI	Core properties of ellipticals: high-resolution imaging	BroCam
Sep 22	Sep 24	A. M. Hidalgo-Gamez	Uppsala obs.	Spectroscopy of a sample of dwarf irregular galaxies	ALFOSC

Starting date	Ending date	Principal Investigator	Institute	Programme	Instrument
Sep 24	Sep 27	L. Festin	Uppsala obs.	Deep JK photometry for determination of the Pleiade IMF	Arnica
Sep 27	Sep 29	R. Rebolo	IAC	CCI programme	Arnica
Sep 29	Oct 1	J. E. Beckman	IAC	CCI programme	Arnica
Sep 24	Oct 1	G. P. Tozzi	Arcetri obs.	Activity of comet C/1995 01 (Hale-Bopp)	Arnica

Nordic Optical Telescope Schedule : 1996 Oct 1 - 1997 Mar 31

Starting date	Ending date	Principal Investigator	Institute/ Country	Programme	Instrument(s)
Oct 1	Oct 4	Y. Aquilar	Spain	Parámetros atmosféricos y origen de estrellas sdB	IAC-CCD
Oct 4	Oct 6	A. Berdyugin	Crimea	Search for polarization variability in GD 229	Polarimeter
Oct 6	Oct 8	M. Kidger	IAC	Polarimetry and spectropolarimetry of ISO blazars	- " -
Oct 8	Oct 10	E. Perez Jimenez	Spain	La actividad en núcleos de galaxias	BroCam
Oct 10	Oct 13	I. Garcia de la Rosa	IAC	Test del brillo superficial de Tolman	BroCam
Oct 13	Oct 18		NOT	Staff time *)	
Oct 18	Oct 21			Commissioning of ALFOSC, technical time *)	ALFOSC
Oct 21	Oct 23	P. Kjaergaard	Denmark	An IR search for very faint young objects	ALFOSC
Oct 23	Nov 1	P. Petrov	Crimea	Accretion and luminosity of T Tau stars	SOFIN
Oct 23	Nov 1	I. Tuominen	Finland	Magnetic field and starspot imaging of RS CVn stars	SOFIN
Oct 23	Nov 1	T. Hackman	Finland	Evolution of magnetic regions in FK Comae type giants	SOFIN
Nov 1	Nov 4	M. Hjelm	Sweden	Nuclear kinematics of the Seyfert 2 galaxy NGC 1358	B&C
Nov 4	Nov 7	L. Festin	Sweden	Determination of the Pleiade IMF *)	BroCam
Nov 7	Nov 8	S. Green	U.K.	Coma imaging and nuclear properties of 46P/Wirtanen	BroCam
Nov 8	Nov 11	P. Hakala	Finland	Missing cataclysmic variables in globular clusters	BroCam
Nov 11	Nov 13	J. Rönnback	Sweden	Globular clusters in low-surface brightness galaxies	BroCam
Nov 13	Nov 16	P. Hakala	Finland	Missing cataclysmic variables in globular clusters	BroCam
Nov 16	Nov 17		NOT	Staff time *)	
Nov 17	Nov 20	R. Garcia Lopez	IAC	Destrucción de berilio en estrellas de tipo F	IACUB
Nov 20	Dec 2	G.M. Wahlgren	Sweden	Pt and Hg in metallic lined A-type stars	SOFIN
Nov 20	Dec 2	H.F. Henrichs	Netherl.	Magnetic field of the O giant xi Persei	SOFIN
Nov 20	Dec 2	O. Engvold	Norway	Study of starspots and differential rotation on UX Ari	SOFIN
Nov 20	Dec 2	V. Grinin	Crimea	Are the UX Ori type stars the precursors of CP stars?	SOFIN
Nov 20	Dec 2	N. Polosukhina	Crimea	The lithium in magnetic CP stars	SOFIN
Dec 2	Dec 4	M. Kidger	IAC	Polarimetry and spectropolarimetry of ISO blazars	Polarimeter
Dec 4	Dec 9	M. Fridlund	ESA	A study of extinction towards galactic nebulae	BroCam
Dec 9	Dec 12	T. Pursimo	Finland	Polarization in a sample of X-ray BL Lac candidates	BroCam
Dec 12	Dec 14		NOT	Staff time *)	
Dec 14	Dec 17	R. Rebolo	IAC		
Dec 17	Dec 19	J. Beckman	IAC	Barred and ringed spirals ("BARS")	
Dec 19	Dec 22	J. Trapero	Spain	Delimitando el "Hueco" del medio interstelar local	IACUB
Dec 22	Dec 27		NOT	Technical time	
Dec 27	Jan 3	H. Joench-Soerensen	Denmark	The galactic extinction of the Perseus cluster *)	BroCam
Jan 3	Jan 5	H. Pedersen	Denmark	Variables in the GRB 940301 error box	ALFOSC
Jan 5	Jan 10	P. Magnusson	Sweden	Observations of trans-neptunian objects *)	ALFOSC
Jan 10	Jan 12	G. Östlin	Sweden	Imaging of nearby dwarf irregular galaxies	BroCam
Jan 12	Jan 17	B. Garcia Lorenzo	IAC	Espectroscopía de regiones circumnucleares de galaxias	HEXAFLEX-2
Jan 17	Jan 19	A.M. Hidalgo-Gamez	Sweden	Spectroscopy of a sample of dwarf irregular galaxies	ALFOSC
Jan 19	Jan 21		NOT	Technical time *)	
Jan 21	Jan 26	B. Montesinos	Spain	Parametros fisicos y rotacion en gigantes frias	IACUB
Jan 26	Jan 27		NOT	Staff time	
Jan 27	Feb 1	J. Beckman	IAC	Barred and ringed spirals ("BARS")	
Feb 1	Feb 4	L. Labhardt	Swizerl.	Pulsational variability in the blue stragglers of ...	ALFOSC

Starting date	Ending date	Principal Investigator	Institute/ Country	Programme	Instrument(s)
Feb 4	Feb 7	D.I. Mendez Alcaraz	IAC	Imagen profunda H_α de galaxias Wolf-Rayet	BroCam
Feb 7	Feb 13	A.O. Jaunsen	Norway	Galaxy-galaxy weak gravitational lensing	ALFOSC
Feb 10	Feb 15	K. Aksnes	Norway	CCD imaging of P/Wirtanen	ALFOSC /BroCam
Feb 13	Feb 17	C.K. Young	China	Kinematics & substructure of the Virgo cluster & H_0	BroCam
Feb 17	Feb 20	A. Broeils	Sweden	Central kinematics of spiral galaxies	ALFOSC
Feb 20	Feb 26		NOT	Technical time	
Feb 26	Mar 1	P. Kjaergaard	Denmark	An IR search for very faint young objects	ALFOSC
Mar 1	Mar 4	J.E. Solheim	Norway	Spectroscopy of interacting degenerate stars	ALFOSC
Mar 4	Mar 7	H.U. Norgaard-Nielsen	Denmark	Optical identifications of faint ISO infrared sources	ALFOSC
Mar 7	Mar 10	P. Lilje	Norway	Weak gravitational lensing in rich clusters of galaxies	ALFOSC
Mar 10	Mar 12	J. Sollerman	Sweden	Circumstellar interaction in core-collapse supernovae	ALFOSC
Mar 12	Mar 17	P. Mähönen	Finland	Kinematics & substructure of the Virgo cluster & H_0	ALFOSC
Mar 17	Mar 19	M. Kidger	IAC	Polarimetry and spectropolarimetry of ISO blazars	Polarimeter
Mar 19	Mar 23	J. Knude	Denmark	Polarization in EUV shadowy clouds, ...	- " -
Mar 23	Mar 28	P. Teerikorpi	Finland	Interstellar magnetic field and dust in the NGP	- " -
Mar 28	Apr 1	H. Schnopper	Denmark	Optical identification of the softest ROSAT sources	BroCam

*) 2h on one night is scheduled for a program on comet 46 P/Wirtanen by Aksnes.

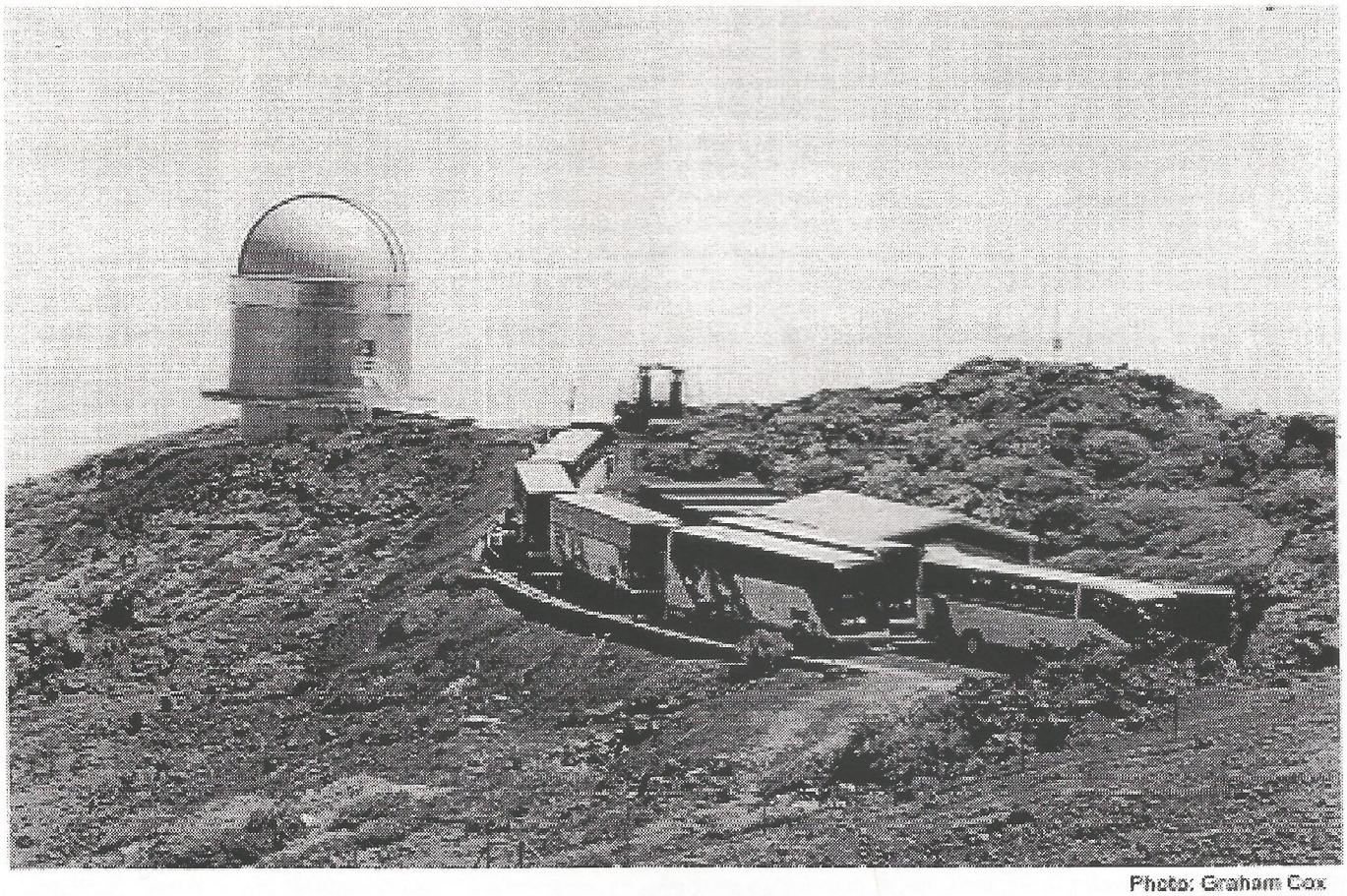

Photo: Graham Cox

NOT is getting even more popular among the observers!