Period 27
AiC Report to the NOT Council and STC

39^{th} STC meeting, November 6, 2003
&
43^{rd} Council meeting, November 7, 2003

Thomas Augusteijn, Astronomer in Charge,
NOT, Santa Cruz de la Palma

November 1, 2003

Contents

1 Introduction

This report covers the operations of the Nordic Optical Telescope for period 27: 2003-04-01 to 2003-09-31. For the first time this report was prepared with the help of our new, dedicated fault reporting system and data-base.

2 Down Time

The down time statistics are now based on individual fault reports instead of what was reported in the general end-of-night reports. To keep in line with previous reports, I give in Table 1 the general down time statistics for period 27.

A total of 107 fault reports were submitted, with an average time lost of 28 min per fault, for a total down time of 3.5% (2.3% on scheduled observing nights). Of these, 67 reported no time lost, 31 reported < 2 hr lost, and 9 reported 2 or more hrs lost.

Table 1: Technical down time statistic period 27: 2003-04-01 to 2003-09-31

Night included	Time lost	Nights	Percentage[a]	Last period
All nights	3042 min	183	3.5%	1.5%
Scheduled observing nights[b]	1267 min	114	2.3%	2.1%
Technical nights	370 min	23.5	3.3%	0.4%
Visitor instruments	1405 min	45.5	6.4%	0.0%
Service nights[c]	746 min	22	7.1%	–

[a] Assuming an average of 8 hr per night
[b] Excluding technical nights and visitor instruments
[c] Not included are the 23.5 SOFIN nights

This compares to a down time of 1.5% over all nights (2.1% on scheduled observing nights) in period 26 (2002-01-10 to 2002-03-31). For that period the numbers were based on the End-Of-Night reports where in 50 End-Of-Night faults were reported with an average time lost of 32 min per fault. Of these, 29 reported no time lost, 19 reported < 2 hr lost, and 2 reported 2 or more hrs lost.

Comparing the two periods, there are two things to note. In general, the number of fault reports is more than double that of the number of End-Of-Night reports which reported problems in the last semester. This is at least partly because in the past some of the End-Of-Night reports contained more than one fault, but we also believe that the system has made it easier to submit problems (as is also indicated by the fact that twice as many fault reports with no time lost were reported compared to the End-Of-Night reports which reported faults with no time lost). The second thing to note is that the number of cases with 2 or more hrs lost has increase a lot with respect to last semester, which largely explains the significant increase in down time.

2.1 Main problems

Below are listed those faults for which 2 or more hours were lost. Also repetitive errors which loose little time but occur frequently (if present) are included here.

- **2002-04-09: Building safety system problem**: 2 hr

  The safety system was activated and stopped the telescope. It was found that this was due to the sensor of the safety system being iced over.

- **2003-06-08: Azimuth encoder failure**: 4 hr 5 m

  The Stegmann absolute encoder for azimuth showed failing bits and after a while too many for the TCS software to accept it. It cannot be excluded that it was damaged by the (at that time) allowed power-off command while the building was rewinding cables in the morning when 'parking' the building. It now is nolonger possible to power-off while parking the building.

- **2003-08-15/16/18: NOTCam filter wheel no. 1**: 9 hr 15 m

  There were intermittent problems with filter wheel no. 1 not reaching its position when moving it to a specific position or when initializing it, which resulted in various amounts of time lost on different nights. As it takes at least 10 days to warm-up and cool-down the instrument this could not be investigated in depth during the observing run.

  When the instrument was later opened one of the bearing in the worm wheel drive for filter wheel #1 was found to be stiff, though functioned at room temperature. The bearing was replaced, and the instrument worked well during a subsequent observing run.

- **2003-08-16: Building crash**: 3 hr 30 m

  The building crashed various times consecutively. In the end it was found that the support arm of one of the IR sensors at the bottom of the main entrance stairs case was damaged. The support of the sensor was replaced after which no more crashes occurred.

  The sensor support might have been damaged during the "open day" which took place one and a half days earlier.

- **2003-09-9/10/11: Building crashes**: 18 hr

  There were intermittent problems with the building crashing. Several solutions were tried which every time seemed to work, but after a few hours of observing the system would crash again. In the end it was found that a power supply of the brakes of one of the two pairs of motors which rotate the building was faulty. This caused the brakes sometimes to be activated which made the telescope run into the building.

  One problem encountered in trying to solve the problem was the lack of documentation, both of the original design as well as of modifications that had apparently been made later (see below).

  In is not entirely clear if the cause of the fault reported above was different, but given that there were more than 3 weeks between these faults and there was a well defined cause for the first fault we believe this to be the case.

- **2003-09-14: SOFIN cross disperser**: 3 hr

  The cross-dispersion profile of star images observed with SOFIN were found to be very asymmetric. It was first thought that this was a problem with the telescope optics, but images with StanCam showed normal round stars at the nominal telescope focus and in the end it was concluded that the problem was with the new cross-disperser which will be send back to the manufacturer.

2.2 General overview

The new fault data base allows a more detailed overview of the faults that are reported. In Table 2 the number of faults and total time lost as a function of the system and kind of fault is presented.

Table 2: Down time statistics for period 27[a]

Syst/Type	Soft		Elec		Optics		Mech		Others		Total	
Telescope	14	01:30	5	04:12	2	03:00	2	00:00	1	00:15	24	08:57
Building	0	–	4	18:00	0	–	6	00:40	2	05:30	12	24:10
Computers	13	01:00	6	01:00	2	00:00	1	00:00	2	00:00	24	02:00
ALFOSC	6	00:45	4	00:50	1	00:00	4	00:50	0	–	15	02:25
MOSCA	1	00:00	0	–	0	–	0	–	1	00:40	2	00:40
NOTCam	6	00:25	5	03:35	0	–	6	06:15	0	–	17	10:15
StanCam	6	02:15	0	–	0	–	4	00:00	1	00:00	11	02:15
Others	0	–	0	–	0	–	1	00:00	1	00:00	2	00:00
Total	46	05:55	24	27:37	5	03:00	24	07:45	8	06:25	107	50:42

[a]For each system-type category the total number of faults and total time lost are given

One thing that one can see from Table 2 is that the relative limited categories both in system and type do provide a proper frame work to classify the large majority of faults. The simplicity of this system makes it also much easier to search the data base and allows us to draw more general conclusions about the problems. A straightforward conclusion from the information in Table 2 is that the main problems we have are with the electronics of the building.

3 Instrument use

Table 2 lists the number of scheduled observing nights and technical nights for each instrument. This covers all nights, including CAT, CCI and guaranteed time. In this table I have also included the number of observing runs, and the number of nights per observing run for each instrument.

Different from before, StanCam is specifically mentioned as time was awared to a programme using this instrument. In general, since the CryoTiger cooler is installed StanCam is in principle available permanently.

Table 3: Instrument use

Instrument	No. of nights		No. of runs	Nights/run
	Scheduled	Technical		
ALFOSC	55	10	20	2.8
NOTCam	45	5.5	12[a]	2.4[a]
MOSCA	8	1	2	4
StanCam	6	–	–[b]	–[b]
SOFIN	23.5	3	8	2.9
TurPol	9	–	2	4.5
SIRCA	9	–	3	3
LuckyCam	4	4	1	4

[a] Excluding 16 service nights
[b] All 6 service nights

4 Comments recorded in End-Of-Night & End-Of-Run reports

As before, most comments written in the reports during period 27 were very positive.

As far as not covered in the fault reports, some comments were made about the poor pointing and astigmatism (see below concerning both point). Also, some people requests for saving data from the 'data reduction' work station which is now available for the observers to do some online reduction. We are currently planning to buy and install a dedicated DAT drive, and probably also a DVD drive for this machine.

5 Operations

5.1 Goals and Objectives

A set of operational goals and objectives for the NOT for the period 1 July 2003 to 30 June 2004 were defined. They present the general goals for the operation of the telescope.

The idea is that the general goals and objectives are defined on a yearly basis by the Director and the Astronomer in Charge, and presented for approval to the NOT Council during the Spring Council meeting. The goals and objectives for individual staff members are based on the general goals and are set in agreement with each staff member. They form the basis for the annual performance evaluation and salary review of the staff member, which will happen on a yearly basis close to the Spring Council meeting.

The general aim of the goals and objectives is to be able to properly assign and prioritize work. This will allow a better overview of what has been done, and what can be done in the future, and they also allow a better coordination of people's activities.

5.2 Additional services

5.2.1 Service observing

A total of 22 nights of service observing were made, which corresponds to 17% of all time available to the Nordic community. The service nights consisted of 13 more or less isolated observing nights spread throughout the semester, and a period of 12 consecutive nights (including 3 nights officially assigned as technical nights) in August. The observations performed in service mode were limited to imaging observations with NOTCam and StanCam.

The main additional task beyond performing the specific observations in service mode, was mostly administration. This includes communicating with the PIs to obtain proper instructions for the observations they needed, keeping track off which observations were done when, and under what conditions, and distributing the data and details of the observations to the PIs. This is especially important in the case were various programmes are executed at the same time, as was the case during the 12 night observing run in August.

For service observing to be useful and efficient we need to be sure that the observations provide useful data to the PIs. An important part of this is to provide a way (for the PI) to define the requirements of the observations, and (for us) to make sure that observations meet the goals of the proposed programmes.

For this we have set-up a system of Observing Blocks (OBs) which define the requirements for a set of observations. Software was developed to aid in defining OBs and the corresponding observing scripts, and schedule the observations in flexible queue mode.

Although the execution of the service observations was largely successful, the service nights were hit by relatively many technical problems (see Table 1) and unseasonal bad weather. However, a lot of experience was gained with the system to define and schedule the observations which will be useful in the future. In principle this system can now be used on a regular basis for imaging observations with NOTCam or StanCam, but further development of this system to include more complicated observations, e.g., spectroscopic or polarimetry, will require a significant amount of work and it seems better to await the new sequencer system described in below.

5.2.2 Educational use

A course in observation astrophysics was organized by Stockholm University using the telescope over a period 5 nights in May, and a NORFA-sponsored summer school used the telescope over a period of 6 nights in July.

Both courses were well organized, and properly prepared in advance. Apart from some work mostly by the computer group in advance, the course in May did not need much support beyond the standard introduction to the telescope and instrument for ALFOSC and NOTCam on two separate nights.

The NOT involvement in the summer school was much more extensive. A significant amount of support was needed from the computer group to set-up the computers and prepare the network for use by the different student groups to reduce and analyze their data. Furthermore, one member of the NOT staff was a teacher at the school, while also effectively being in charge of organizing all local matters (hotel bookings, food, transport, etc.). In addition, there was a significant involvement from the NOT students who all jointed the summer school, but also helped with the local organization and the night-time astronomical support.

5.2.3 Astronomy support

Both the introduction of service observing, and the use of the NOT for educational support have of course an effect of the amount of support required. This can be easily been seen for the service observing. Given an average of $\sim$3 nights per observing run (see Table 3) we normally would have had 7 regular support nights, compared to 22 full working nights.

To make a rough estimate of the additional effort spend, I have made the following calculation:

Support night: In this case, the support astronomer will spend the night on the mountain, where s/he typically is at the telescope until midnight and is on-call the rest of the night. In principle, a day including a night on the mountain is counted as 2 working days to account for the extended work hours and the need to stay over-night on the mountain and be on-call. On the other hand, some time during these days are left for other tasks and I estimate the equivalent effort for 1 support night to 1.5 working days.

Technical or Service night: In this case, the support astronomer will spend the whole night at the telescope and the few hours in the day time are needed to prepare for the night. Also here staying a day including a night on the mountain is counted as 2 working days, which in this case are fully spend on astronomical support.

In the last semester there were a total of 51 support nights and 28 technical nights, which correspond to 132.5 working days. In this semester there were a total 48 support nights, 23.5 technical nights and 22 service nights, corresponding to 163 working days. Apart from the support nights for the instruments and telescope for the two course which are included under the normal support nights, there were an additional 4 nights of full support by the staff member, plus the effort by the students which I estimate at 1 full night support. Taking these numbers, I get a total amount of support for this semester corresponding to 173 working days, i.e. an increase of just over 30% (the biggest part of 23% is for the service observing alone).

Note that for the service observing I did not include the additional effort needed to obtain and process the information from the PIs of the proposals, plus collecting and distributing the data and details of the observations to the PIs, which would not be needed for a regular observing or technical night. In this semester this also included a significant amount of development work to set-up the system to define and schedule the observations (see above). Furthermore, the effort spend in advance preparing for the summer school was also not included.

As this rather conservative estimate show a very significant increase in effort (also on the technical staff!), one should realize that providing these services does have its implications for the available effort for other (development) tasks.

5.3 Building

As seen in Sect. 2.1 & 2.2, there were many problems with the electronics of the building in this semester. One thing that complicated these problems was the lack of documentation, both of the original design as well as of modifications that had apparently been made later. This both made it very difficult to trace the problem and increased the time needed to repair things. Potentially the most worrying part is that many of the electronic parts of both the building and the telescope have been installed more than 15 years ago, and many of the spares are of a similar age.

5.4 Telescope

5.4.1 Wavefront sensing

In April 2003 a full night of WFS observations were made. These results agreed with most of the previous measurements. The most important feature that can be seen in both sets of data taken in 2003 is a significant mean increase in astigmatism over the March 2002 measurements. These latter measurements were made before the aluminisation of the mirrors. After two reports from observers of elongated images we attempt to remove this offset in astigmatism by applying appropriate corrections to the M1 active optics system. A check of the mirror figure, after the correction, with the WFS in early August verified the astigmatism had been reduce to the pre-aluminisation level.

A consistent and most significant feature in all the data is a clear linear dependence of astigmatism with zenith angle and it the idea is that this in the future will be corrected for by the TCS through the active optics system.

5.4.2 Pointing

Still reports of poor pointing have come in. On two occasions during the semester a new pointing model was made, which improved things significantly. On the first occasion a model was calculate from 'on-the-fly' pointings (basically regular telescope pointings [made by any observer] which comply to some specific criteria), which do not require any dedicated observations. However, the RMS of this model was not so good as before, and later a model based on dedicated observations was made which showed better results.

The repeated complaints do indicate a problem, and tests have shown that there are deviations in the pointing in both azimuth and altitude which seem to vary with time. Recently we have started a programme to do regular pointing tests to see if we can define the cause for these changes. Unfortunately, up to now most of the technical nights have been affected by very poor weather.

5.4.3 The new TCS

The programming of the new TCS has progressed very slowly, and at the moment only 74% has been implemented. Although with his new work schedule Ingvar has more time to spend on things like the TCS, a very big fraction of his time was spend on regular problems when he was on duty on La Palma. There were also a few problems related to the old TCS (including the before mentioned pointing problems), which together with the normal holiday period left little time to work on the new TCS. Currently, the new TCS is expected to be finished in May 2004. However, note that this does not include the user interface or the catalogue handling.

Most of the hardware for the new TCS has arrived, and the few missing parts are expected soon (none of which should affect progress on the new TCS in any case).

5.4.4 Time server

The TrueTime time server was commissioned, together with its own local no-break power supply that also supports the old clock system. Through NTP it is now possible to get time in our own network to millisecond accuracy for all computers. The instrumentation computers have accurate time, and the work on the rest of the network is on-going.

5.4.5 Thermal Monitoring System

The thermal monitoring system of sensors measuring the temperature and humidity on the telescope and its surroundings that was based on a MS-DOS computer was commissioned on a new Linux system. This has made access to the system easier, and will allow its future inclusion in a general data-base system.

5.4.6 Mirror cleaning

We had planned to review the washing procedure of the mirrors, but the weather in the form of high humidity and/or high dust levels affected the few attempts we made. For the time being we will perform CO_2 cleaning when considered necessary (visible dust) and possible (humidity not too high).

5.5 Autoguider

A report has been made about a possible upgrade of the autoguider system. This has been prompted due to the frequent difficulties in finding guide stars and the possible arrival of FRED. The deteriorated sensitivity of the camera and the limited field of view (FOV) of the autoguider, due to the large guide head (45 degree mirror mount) are the main reasons guide stars can't be found. Also for FRED the existing system will have no unvignetted autoguider field hence FRED will not be able to be used with autoguiding. A study was carried out into what options for improvement could be made. The preliminary conclusions are, either keep the existing x-y carriage but with a smaller head to increase the FOV, for which CUO has manufactured one, and a new more sensitive camera. Alternatively a fixed large format CCD system, similar to that proposed by CUO for the IIAs 2m telescope could be used, though this would require much more development.

5.6 Exposure Time Calculator

A user-interface, based on the 'SIGNAL' programme developed at the ING has been installed and commissioned to estimate required exposure times. It provides signal-to-noise calculations for imaging with ALFOSC, MOSCA and NOTCam in Wide-Field and High-resolution mode, and for spectroscopy with ALFOSC.

5.7 ALFOSC

5.7.1 New CCD and Camera

In September the new CCD and camera was installed and commissioned at the telescope. The main objective of the change was to increase the stability of the PSF across the field, and reduce the degradation in the PSF due to charge diffusion of the CCD.

The new CCD and camera combination did show a significant improvement in image quality across the field of view, reaching close to the practical limit of a 2 pixel resolution obtained in data taken during the commissioning. An increase in the throughput of the system compared to the old CCD and camera is measured below 4000 Å, but the efficiency at all other wavelengths have decrease by between 15 and 20%, which is well below what was expected. Also an increase in the level of fringing by a factor of $\sim$2 in the red part of the spectrum was observed.

From an analysis of the commissioning data it was conclude that most likely the coating of the new optics were the problem. Indeed, the manufacturers found that they had made a mistake in preparing the optics for the camera. Currently we are looking at options how to improve the situation in the best way.

5.7.2 State of the Instrument

During the installation of the new camera, people from CUO made a full check-up of the instrument, and they concluded that even after many years all parts still work very well and there is no reason to believe that any part of the instrument will fail soon.

5.7.3 QuickLook analysis tool

A first version of a 'Quicklook' data analysis tool for ALFOSC data was installed. This tool provides a basic reduction of spectral and imaging data and allows some basic analysis using IRAF scripts as soon as the data has been read-out. This system is under development and will be gradually enhanced and upgraded, and extended to other instruments.

5.7.4 Long-slit spectroscopy

Information on expected count rates have been completed for all grisms, including Echelle mode. See

`http://www.not.iac.es/technical/astronomical/instruments/alfosc/speccounts.html`

A new grism has been ordered with a resolving power of $\sim$2000 in the blue. The grism will cover the wavelength range 3550–5100Å, and is expected to arrive in November.

5.7.5 Detector

Scripts have been made to perform Gain and RON noise tests, analysis the data and present the results in graphical form on the web.

5.7.6 Multi-object spectroscopy (MOS)

During the installation of the new CCD and camera in ALFOSC also the MOS machine was checked by Niels Michaelsen (CUO). It was found that the control card for one of the axis of the machine did not work properly.

5.8 NOTCam

5.8.1 Wheel bearings

One of the main faults during the semester was due to problems with the wheel bearing of one of the filter wheels. This was the second time in a few months that one of the bearings failed.

5.8.2 The detector

Further investigations were made in to the pick-up noise seen in the data, and it was found that the power supply unit of the array controller caused this. The design of the controller was modified, increasing the separation between the power supply and the electronics, which basically eliminated the pick-up noise. The overall readout noise has been reduced by half and is now close to specifications (10–12 electrons) for both readout modes.

5.8.3 Spectroscopy

The first IR grism was installed together with some slits. First 'spectroscopic' light with NOTCam was successfully made in August 2003. See for the first-light report and commissioning

`http://www.not.iac.es/technical/astronomical/instruments/notcam/spectroscopy/`

The grism allows separate J (5th order), H (4th order), and K (3rd order) observations with spectral resolution of ∼2500 for a 0.5 arcsec slit width using the Wide Field camera. NOTCam in spectroscopic made is now available to the community on a shared risks basis

Further upgrades to the spectrocopic capabilities of NOTcam, e.g. R=6000 on HR camera and R=800 on WF camera, are awaiting input from Nordic astronomical community regarding science drivers etc.

5.8.4 Focus pyramid

A preliminary design for a focus pyramid has been made, and tests will be made soon to check the behavior of the vacuum grade epoxy intended for making the pyramid when exposed to the thermal cycling that NOTCam experiences when being cooled-down and warmed-up.

5.8.5 Dectector controller

We are still awaiting a modification of the array controller such that an 'ABORT' command can be implemented in the BIAS detector control programme. Further improvements to increase the readout speed will have to wait until the new controller for the detector array is available.

5.9 MOSCA

5.9.1 Filters

The last filter (g') missing in the SDSS filter set has finally arrived and was commissioned. Also, two narrow-band red-shifted Lyα filters (3920 and 4050 Å) were purchased in collaboration with the Science Institute of the University of Iceland, and are available for general use.

Currently, the set of filters allowing a full field of view (7.7'$\times$7.7') with MOSCA consist of:

- **Wide band**: SDSS u',g',r',i',z', Bessel U,B,V,R,I
- **Medium band**: Strömgren u,v,b,y
- **Narrow band**: 3930Å, 4050Å, Hα narrow & wide

5.9.2 Detectors

It was noted that the bias level of all 4 CCDs seem to vary between observing runs, and the bias level of one of the CCDs has shown some variability on timescales of minutes. Both of these things are being investigated in detail.

Some observers also expressed an interest in increasing the amount of over-scan pixels to be able to properly estimate the bias level of the different CCDs during an exposure. However, due to the limited size of the memory of the array controller this will be at the cost of the science pixels, and we have to look carefully how to minimize this.

5.10 StanCam

5.10.1 Cooling

The cooling with the CryoTiger has worked well and it is relatively service free. From experience it was found that the dewar needs to be pumped approximately once every four months.

5.10.2 Filter mechanism

Although the filter mechanism was repaired after some problems with it during the last semester, still some problems occurred at the start of the semester. An extensive overhaul of the mechanism was made and since then it has worked very smoothly.

5.11 FASU

5.11.1 FAPOL

The first visitor run using FAPOL was successfully made in April, where it was used to do spectropolarimetry. The ALFOSC polarimetry web page were updated with observing instructions for linear and circular imaging polarimetry and spectropolarimetry. Short guides for reduction and analysis in each mode are also available.

5.12 FIES

5.12.1 Building

The process of getting an official design and applying for the required building permits has been much more difficult than expected, and has been impossible to start building before the Winter as hoped. However, we are well on course to start building in Spring for which we still have a fairly large safety margin.

5.12.2 ADC

Extensive discussions have been made with people in Aarhus about the design and location of the ADC. Some questions remain open which will be considered during the tests of the instrument planned for the end of November (see below).

5.13 SIRCA

SIRCA is operated as a visitor instrument, and observations with the short-wavelength camera (1–5.4 μm) our now made on a regular basis. During the July observing run very good quality imaging data (0.3–0.4" seeing) was obtained which produced some very nice images:

`http://www.not.iac.es/general/photos/astronomical/index.html`

5.14 Computers and software

5.14.1 General developments

Various software and computer developments have occurred in the past few months. Below I list the most relevant things.

- Although the CD carousel now works properly at sea-level, it still fails regularly when being operated on the mountain. We believe this is due to the relative harsh environment on the mountain, and we have placed the carousel in a closed room in which we are currently installing an air-conditioning system
- Extensive experiments were made with DVD+R for data saving. With current software, we have been able to burn DVDs with astronomical data at a very high success rate. However, no definite choice on archive media has been made
- The Fault Report System was taken in to full operation at the start of the semester. This system works very well, and its usage has in a short time become part of core operations. The data-base provided by this system has also been very useful in preparing this report
- A new web camera was purchased and installed. This system includes its own server, which removed the need for a dedicated (windows) PC
- Investigations were made into the setup and operation of a data backup system for the SLO computers
- The SLO network was upgraded from 10 Mbit/s to 100 Mbit/s

5.14.2 Service Observing

Specifically for the extended period of service nights a basic system was developed to define sets of observations in the form of Observing Blocks (OB). Each OB consist of observations of a single object in one or more filters, and includes the requirements (e.g., weather conditions, time-critical, etc.) for the observations. For NOTCam, the observations themselves are defined in observing scripts which can be executed directly at the telescope. To define these scripts, an observing script generator was developed which is now available for all users.

For the scheduling of the observations a simple user-interface was made to select an OB on the basis of the observing conditions and the requirements defined in the OB.

The extended period of service observing also required a system for data storage for the various PIs, and a system based on 3 DDS3 DAT drives was developed and used for storing data from NOTcam and STANCAM.

5.14.3 The sequencer

An interface between instrument control software and the telescope system is being developed. The plan is to maintain the current user-interfaces for the different instruments/detectors and have a command 'sequencer' as overall system on top of this. This system is based on shell scripts, and is currently being developed for use with StanCam + FIES. The first tests will be made at the end of November when the FIES team is coming out for testing of the instrument. One of the main objectives will be to integrate the system that is controlling StanCam and the Telescope, with the FIES instrument and detector control systems provided by Aarhus.

The primary aim is to complete the system for FIES, which is foreseen for the middle of next year.

6 Looking ahead

6.1 Telescope and building

6.1.1 Electronics

A large fraction of the electronics is rather old, many of which having more than 15 years. Together with the lack of documentation, this has the potential to generate more extensive down time in the future. Considering this, we intend to make an inventory of the different electronic components which are part of the telescope and building drives, check if any documentations and spares are available, and see if there are ways that parts can be replaced, e.g., in software.

6.1.2 Rotary valve

As the telescope plus building rotates as a whole, a rotary valve exists at the base of the telescope to allow water for the cooling system to circulate. In the center of this valve there is a small hole which is used for things like the fiber connection between the computers in the control room and the outside world. In the current valve, the central hole is completely filled, and more space is needed (e.g., for the fiber which connects the telescope with FIES when it is installed in its new housing). For this, a new rotary valve was designed which has a larger central hole. The new valve is currently being assembled and tested.

6.1.3 Cooling system

A significant amount of time is being spend on maintaining the cooling system of the telescope and building. A plan is being considered to replace the current system with a more efficient, higher capacity system which would reduce the maintenance and running cost. However, such areplacement will be a major investment, though no proper cost estimate has been received yet from the companies that were approached.

6.2 Monitoring programme

A monitoring programme will be started to combine the zero-point monitoring programmes for the different optical imaging cameras (ALFOSC, StanCam and MOSCA), which will provide a way to continuously monitor the performance of the telescope. Also, tests have been made with the automating reduction of the data taken with StanCam in a quick way to limit the resources this is taking. This will now be expanded to include the other optical imaging instruments.

6.3 ALFOSC

6.3.1 Optics

It is clear that the coating of the need camera optics need replacing. There are three options: i) when the instrument is not used, the camera is send back for re-coating and reinstalled afterward. The main problem with this is that ALFSOC is seldom off the telescope for any extended period, and it also seems unlikely we get a firm guarantee that the camera would return before a given date; ii) the new camera is send back, and replaced in the mean time with the old camera and CCD. The disadvantage of this is that it would require two additional periods of work on the instrument, with the need for people from Copenhagen to come out on both occasions, and; iii) new optics are purchased for the camera and coated (for free), before being send out to La Palma. The main advantage of this is that it only requires a limited amount of extra effort, but would require additional expenses to buy the optics.

6.3.2 Fast photometry

For the old CCD a modified control card existed which allowed for a specialized multi-window fast photometry mode with ALFOSC. For the new CCD no such card exist yet, and this needs to be prepared before the next observing run using this mode in January next year.

6.3.3 Detector

The current programmes to perform Gain and RON noise tests use IDL and will have to be ported to IRAF. The system will also be expanded to include the other CCDs.

6.3.4 Long-slit spectroscopy

The measured efficiencies of the different grisms will have to be updated for the new CCD. These measurements will be the basis to define a monitoring programme of ALFOSC in spectroscopic mode, which will compliment the imaging monitoring programme.

6.3.5 Multi Object Spectroscopy

A new control card for the MOS machine will be ordered from the manufacturer SERVO Impact.

6.4 NOTCam

6.4.1 Wheel bearings

As a preventative measure, originally it was planned to replace all the wheel bearings in the middle of next year. However, because of the new problems NOTCam is currently being warmed-up and a complete overhaul of all the bearings is planned for the middle of November.

6.4.2 Coronagraphy

The possibility of doing coronagraphy with NOTCam is being investigated.

6.5 StanCam

6.5.1 Cooling

Currently, the cooler is being moved to the service loft below the observing floor, and the correct (50ft) tubes are being installed. To commission this system fully we only need to test operating it together with NOTCam + PTR.

6.6 FIES

6.6.1 Dectector

At the end of November people from the University of Aarhus will come out to La Palma to do some tests with the instrument. At that time we will also discuss the final design for the mounting of the ADC, and the way the fiber will run from the telescope to the new housing.

The new detector and the CryoTiger cooler have already arrived on La Palma.

6.6.2 Reduction package

As part of the FIES project, pipeline reduction software will be developed. The first step in this process will be the definition of the user requirements for this software.

6.7 FRED

6.7.1 FRAME

The adapter FRAME used with FRED can contain a total of 6 filters. Quotes are being requested for two different filters sets (UBVRIz' and u'g'r'i'z'Hα).

6.8 SOFIN

The new cross-dispersion prism with higher refraction index for a larger separation of echelle orders necessary to record two polarized beams in one exposure was found to have a very poor image quality. It will be sent back to the manufacturer in February.

Ilya Ilyin, who provides the primary support for the instrument, is moving to a new job in Potsdam which might make future support for the instrument difficult.

6.9 Computers and software

Various developments are planned for period 28:

- *Proposal parser*: Starting from the current deadline for applications for observing time in period 29, a submitted proposals will be parsed automatically to check basic validity and be assigned a proposal ID for later reference. PIs will be notified immediately after submitting the proposal. The plan is to further automatize this process and integrate the system, combining the proposals, the observing schedule, the required instrument set-up, the observing logs, the weather conditions, the data archive, etc.
- *Data archiving*: If the problems with the CD carousel persist, we have to look for alternative ways to archive the data. We already have a fairly well developed plan to use a system with a dedicated PC and a simple mechanical disk exchanger, which we would likely use with DVD writers. The CD carousel might in that case be used for the backup system of the SLO computers
- *Data flow system*: Currently we are working on various aspects (proposal processing and scheduling, fits headers, data archiving, observing logs, the sequencer, data reduction software, etc.) of our general data flow system. An overall plan is being made to include all these different components in a single system. The main aim of this is to avoid any inconsistencies or incompatibilities in the system
- *Network access*: The Web server, ftp server and Mail server will be upgraded and moved to ORM to provide faster access. This will also guarantee that the observers can access the web pages at all times

- *Network connection*: Plans for improving the reliability of the connection between the sea-level offices and the observatory are being investigated in collaboration with the ING
- *Web pages*: A work plan for the web pages has been defined with the aim of improving the use and maintainability. Once the new web server is in use, updates to the web pages will take place gradually.
- *Reduction computer*: The observer's data reduction computer in the control room requires a way for people to store any online reduction they have made. A DSS3 DAT drive has been ordered, and we are considering to also offer a DVD writer