Period 42
Report to the NOT Council and STC

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Thomas Augusteijn, Deputy-Director,
NOT, Santa Cruz de la Palma

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1 Introduction

This report covers the operations of the Nordic Optical Telescope for period 42: 2010-10-01 to 2011-04-01.

2 Down Time

The down time statistics are based on individual fault reports. In Table 1 I give the general down time statistics for period 42.

A total of 85 fault reports were submitted, with an average time lost of 7 min per fault, for a total down time of 0.5% (0.6% on scheduled observing nights). Of these, 59 reported no time lost, 26 reported $<$ 2 hrs lost, and none reported 2 or more hrs lost.

This compares to a down time of 0.4% over all nights (0.4% on scheduled observing nights) in period 41, and 0.5% over all nights (0.5% on scheduled observing nights) in period 40. Of the 79 fault reports reported in period 41, 57 reported no time lost, 22 reported $<$ 2 hrs lost, and none reported 2 or more hrs lost. Of the 87 fault report in period 40, 58 reported no time lost, 29 reported $<$ 2 hrs lost, and none reported 2 or more hrs lost.

Table 1: Technical down time statistic period 42: 2010-10-01 to 2011-04-01

Night included	Time lost	Nights	Percentage[a]	Last semester	Last winter
All nights	605 min	183	0.5%	0.4%	0.5%
Scheduled observing nights[b]	600 min	152.5	0.6%	0.4%	0.5%
Technical nights	5 min	22	0.0%	0.7%	0.2%
Service nights[c]	285 min	37	1.1%	0.1%	0.5%
Visitor instruments	0 min	7.5	0.0%	0.0%	0.4%

[a] Taking the average length of time within nautical twilight. Exact numbers for each night are used when looking at "All nights"
[b] Excluding technical nights and visitor instruments
[c] Excluding service nights with SOFIN

Also with reference to Table 2, the general conclusion is that the level of downtime is rather stable with similar amounts of fault reports and no major failures during the past 5 semesters.

2.1 Weather

For period 42 a total of 782hr 10min was lost due to bad weather which corresponds to 38.4% of all the dark time, as compared to 17.5% in period 41 and 31.8% in period 40. The total amount of clear dark time was 1255hr in period 42, as compared to 1340hr in period 41 and 1390hr in period 40.

2.2 General overview

In Table 2 the number of faults and total time lost as a function of the system and kind of fault is presented together with the overall numbers for the previous two period (40 and 41).

Table 2: Down-time statistics for period 42[a]

Syst/Type	Soft		Elec		Optics		Mech		Others		Total		P41/P40	
Telescope	3	00:30	8	02:15	0		4	00:45	1	01:00	16	04:30	14/16	01:30/02:15
Building	0		2	01:40	0		0		0		2	01:40	6/9	00:50/02:05
Computers	13	00:10	1	00:00	0		0		0		14	00:10	7/17	00:50/00:30
ALFOSC	13	00:25	1	00:00	2	00:05	0		0		16	00:30	19/15	00:35/00:50
MOSCA	1	00:15	1	00:00	0		0		0		2	00:15	0/1	00:00/00:05
NOTCam	13	01:20	1	00:10	0		1	00:00	0		15	01:30	16/7	00:30/00:20
StanCam	3	00:40	1	00:30	0		0		1	00:00	5	01:10	2/6	00:10/00:45
FIES	7	00:20	3	00:00	0		0		0		10	00:20	13/11	02:15/00:55
Others	2	00:00	2	00:00	0		1	00:00	0		5	00:00	2/5	00:00/01:30
Total	55	03:40	20	04:35	2	00:05	6	00:45	2	01:00	85	10:05	79/87	06:40/09:15
P41	44	03:30	24	02:55	2	00:00	6	00:05	3	00:10	79	06:40		
P40	44	03:15	21	02:20	1	00:00	12	02:10	9	01:30	87	09:15		

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

2.3 Main problems

There were no faults causing more than 2 hours downtime during period 42, nor any problem that caused down time on various occasions. I here just discuss the single problem that cause the most downtime in the semester.

- **2011-02-16: Building drive**: 1hr 40m

  One of the motors of the new building drive stopped which made the telescope crash. It takes some time to reset the system and restart the telescope control system, but most of the time was actually lost due to a delay in contacting the support staff. The problem was very likely caused by the encoder cable to this motor. A new cable was purchased and has been installed.

3 Instrument use

Table 3 lists the number of scheduled observing nights and technical nights for each instrument. This covers all nights, including CAT, CCI, OPTICON 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.

Table 3: Instrument use

Instrument	No. of nights		No. of runs	Nights/run
	Scheduled	Technical		
FIES	70.5	5	16[a]	3.4
ALFOSC	57	8	10[b]	2.5
NOTCam	35	7	13[c]	2.0
MOSCA	11	1	2	5.0
SOFIN	8.5	1	1[d]	7.0

[a] Excluding 10.5 service nights [b] Excluding 24 service nights
[c] Excluding 2 service nights [d] Excluding 0.5 service nights
[d] Test scintillation-correction instrument (Sheffield & Durham,UK)

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

As before, most comments written in the reports during period 42 were very positive, both about the observing system and the support from the staff.

There was actually no common theme to the remarks made accept for the poor phone connection in the control room (see below) being mentioned twice. In more or less chronological order; it was requested that the new Atmospheric Dispersion Corrector (ADC) as a default is moved out of the beam at start-up (this was changed); a request was made for a better printout of the FIES cookbook (provided); it was noted that the things in the dome standing in front of the side ports make it hard to open them completely (some rearranging has been done); it was noted that one of the side ports was hard to close (was repaired); a request was made to have WiFi in the control room (as there is an issue of potential interference with the electronics we are planning some tests before considering installing any such system); a request was made for a humidifier in the control room (as this is more an issue for the summer we have not looked at this for the moment); it was requested to modify the ALFOSC slit acquisition script such that the image giving a through-slit-view of the target is displayed in physical instead of world coordinates (this was implemented); some improvements were requested in how different windows appear on the screen of the observing system (this is an on-going action); it was noted that doing NOTCam imaging using a dither pattern (the standard way of observing) can be made more efficient by letting the telescope offset between exposures be started as soon as the detector is being readout (this is actually something we already are working on); it was requested to include the obslog generated at the end of the night on the DVD copy with data for the observer (we plan to implement this together with an upgrade of the existing data archiving system). Also, again a request was made for a sauna.

It was also suggested to have a better system to check for ice on the dome. This was triggered by a night where the weather cleared up after many nights of high humidity and sub-zero temperatures, with the temperature staying below zero. As the problem is actually primarily the ice that forms between the rails and the upper hatch there is no simple way of checking this beyond trying to open the hatch itself, while because of the low temperatures the main risk is that the hatch can be opened more or less completely but then gets stuck and can not be closed again.

There was also a complaint about the amount of time being that ToO requests were allowed to take, noting that it should be limited to 1hr per 3 nights.

5 Operations

5.1 Additional services

5.1.1 Educational activities

We have been extensively involved with organising and preparing for the Nordic-Baltic Research Training Course "Young Stars across Time and Wavelength" that will take place at Tuorla Observatory, Turku, Finland, during the period 6-16 June 2011. The course is organised jointly by the NOT, StarPlan (Denmark), Onsala Space Observatory (Sweden), and Tuorla Observatory, with financial support from NordForsk,

`http://www.not.iac.es/Turku2011/ .`

During the school the NOT will be used in remote mode as during the previous NordForsk training courses.

The NOT will also be used in remote mode as part of the 9^{th} NEON Observing School that will take place at the Molėtai Observatory, Lithuania, during the period 14 -27 July 2011, see

`http://www.iap.fr/neon/neon_schools/2011/MoletaiProgram2011.html .`

We also will have the regular on-site observing courses for the Stockholm University (5 nights in May) and the master school in CUO/NBI guaranteed time (3 nights in August).

A general issue we have noted in the training of our students at the telescope is that with the increased automation of observing it is harder to get a deeper, more complete understanding of the whole process of observing. This is especially relevant when visiting astronomers have questions about their observing strategy or if one needs to identify problems properly. To improvement the understanding of the observing system we have set-up a list of procedures defined in existing observing scripts and started a program in which students have to execute these procedures in manually mode when they are being trained at the telescope.

As part of a collaboration with the ING started by our former NordForsk post-doc Raine Karjalainen (who now works at the ING) on various occasions students from the ING joined our students at the telescope during technical nights, and our students joined the students at the INT to get a broader perspective of telescopes and observing.

5.1.2 Service observing

During period 42 a total of 37 nights of service observing were done, excluding the 7 SOFIN nights done in service mode by Dr. Ilya Ilyin (Potsdam). Nordic service nights consisted of various more or less isolated observing nights spread throughout the semester. In addition, also in this semester there was a large number of observations that were done by the staff for the ToO and monitoring programs during technical and Nordic service nights.

5.1.3 "Fast-Track" Service Program

Program status: In period 39 there were 9 proposals accepted. Of these there were 7 'grade 1' proposals, 2 'grade 2' proposals, and no 'grade 3' proposal. Of the 'grade 1' proposals, 6 have been completed and 1 has been partially completed. Of the 'grade 2' proposals, 1 has been completed.

In period 40 there were 23 proposals accepted. Of these there were 15 'grade 1' proposals, 5 'grade 2' proposals, and 3 'grade 3' proposal. Of the 'grade 1' proposals, 14 have been completed. Of the 'grade 2' proposals, 4 have been completed and the last one is nearly completed. Of the 'grade 3' proposals, 2 have been completed.

In period 41 there were 21 proposals accepted. Of these there were 17 'grade 1' proposals, 3 'grade 2' proposals, and 1 'grade 3' proposal. Of the 'grade 1' proposals, 11 have been completed and 3 have been partly completed. All the 'grade 2' and 'grade 3' proposals have been completed.

In period 42 there were 25 proposals accepted. Of these there were 18 'grade 1' proposals, 6 'grade 2' proposals, and 1 'grade 3' proposal. Of the 'grade 1' proposals, 8 have been completed and 3 have been partly completed. Of the 'grade 2' proposals, 2 have been completed and 2 have been partly completed.

One proposal submitted in period 42 and 1 submitted in the new semester 43 are still in the process of being graded.

Program execution: The way in which observing instructions are provided through a 'Observing Block' form has been slightly modified and now requires the use of the target pointing scripts through which target coordinates and finding charts can be uploaded directly for execution. Also, it is now possible to define more sophisticated system scripts as part of the observing sequences in an Observing Block, instead of being limited to the use of the script generator which only allows for the definition of (a set of) exposures.

5.2 General

5.2.1 Safety

New emergency lights were installed in the telescope building and the service building. As for the improved protections that were added to the old machines in the mechanical workshop to comply with the requirements to obtain CE certificates we are still waiting for an inspection by the the licensed company that checks our installations.

Also this time during bad weather there was an issue with visiting observers driving up to the observatory although the access to the ORM was restricted. In this case the observers did contact us and on our advise also the Residencia. The problem was that the observers did not get very clear advice (taking 'the road is passable' as a permission to drive up) where they were under the impression that it is actually the Residencia that decides if the roads are open or closed. It was noted to the observers that as everybody else they should follow the official signs where only the local authorities can say if the road is open or not. The role of the Residencia in this is just that they are the ones that are in contact with the local authorities and should have the latest information. This is now also explicitly stated in our web pages and the guidelines that are send to the PI of a proposal one month before the start of an observing run.

One issued highlighted to the administration of the observatory was that it is not the task of lowly paid employees of a company hired by the observatory to manage the reception desk at the Residencia to have the responsibility to advice people if they can drive up or not.

5.2.2 Power generator

During a lightning storm in march 2011 the external power was lost for some reason (been investigated) the emergency generator did not start. Various possible causes were mentioned like the Diesel being to old and the motor being to cold (there was a long period of cold temperatures before the lightning storm and the generator room is not heated). Also, it is not clear what the logic is in the PLC that starts the generator (e.g., does it try continuously for an extended period, does it try more than once, etc.). This is work already going on, but a general maintenance plan should be defined and implemented and it should be decided if we should get a new PLC which we can program ourselves.

When the generator does not start the emergency batteries supplies power to our UPS, but eventually ($\sim$1.5hrs) they run out. Beyond having to start-up the different systems after the power returned, the only consequences was that both StanCam and FIES detectors had warmed up because their CryoTigers had stopped.

5.2.3 Snow

After it has snowed the access road to the NOT is the last to be cleaned, and often the observatory snowplow can not remove the snow if it is relatively high as on the side away from the mountain there is an embankment which prevents the snow being pushed aside easily which together with the step road carries the danger for the snowplow to get stuck. This requires a shovel machine which typically takes some time to arrive. It was agreed to buy a small shovel machine for common ORM use, where it was noted that in general it would be good to have such a machine for the area around the Residencia. This machine might then be used on the access road to the NOT if a shovel machine is not available yet, which in some circumstances might allow access to the telescope one night earlier. It was noted that Mercator and the Liverpool telescope actually are planning to get a snow machine and it was decided to buy a similar one for common use. They are actually not so expensive and as there is no guarantee that the common machine will be available when we really need it we are considering to purchase one ourselves.

5.2.4 Weather station

The power line from the telescope to the weather station was physically damaged and was replaced with a line from the service building. This was considered better as it means less power lines going in to the telescope building which reduces the danger of lightning affecting the telescope. The line itself was fitted with a newer model of lightning protection as the old ones are no longer available. The worked well during the lightning storm in March.

5.3 Telescope Building

The final changes to the system needed with the change of the building drive were made and the switch over to the new system was completed with the new electronics now permanently mounted in the racks in the electronics room fully replacing the old system.

We have had intermittent problems with the telephone line in the control room and it finally became clear that the problem is the new repeater that was installed at the entrance door. It appears that in some cases the phone is halfway between the repeater and the base station in the basement and switches continuously between them, causing the machine gun noise. Switching off the repeater removes this problem, but than the phone in the dome can not be used as it can not reach the base station. The repeater was moved to the control room such that it always is closer to the phone in the control room then the base station.

One of the goals in the longer term objective of making the operation of the telescope more autonomous and safer is to motorise the side ports (these are currently opened and closed manually). We have started to look at how to achieve this, where the main issue is being able to close the side ports (e.g., in the case of bad weather).

5.3.1 Drive System

As noted above, we had one major crash caused by the new building drive. The main concern (and surprise) was that one of the motors could fail without the system detecting it and actually continuing trying to turn the building. No specific mention of this could be found in the very extensive documentation. This error was already detected earlier during tests and to avoid the building continuing to move hardware signals to TCS were installed for each of the 4 motors so if any of them failed the TCS would take immediate action by fast stopping the building drive and the telescope azimuth drive to avoid a building crash between them and above all to avoid grinding flat surfaces on the drive wheels. At this time also a system was set-up to diagnose the problem and instructions were provided for resetting the system after such an event. This system was in place during the reported error and an analysis pointed to the communication with the motor which was already suspected, and as a result the encoder cable to the motor was replaced.

A computer is being purchased to provide a dedicated building drive error display that can also be remotely accessed, thereby giving full remote access to the building drives in case of problems or for test purposes.

5.3.2 Relative positioning of telescope and building

The already implemented emergency ramping down speed of azimuth at a building safety cut has been extended so that both azimuth/altitude and building drives ramp down in speed to zero in a smooth way if the other one has a serious problem. This is to avoid any damage to equipment due to the enerby involved in an unplanned emergency stop.

5.4 Telescope

5.4.1 Telescope control system

The general display of the telescope control safety system status panel showing any sensor was triggered broke down and it was found that buying a replacement was very expensive. A simple replacement board was build, but we are considering to integrate the whole safety system in to the TCS so we have not decided if this will be the permanent solution.

With the possibility to operate most of our (observing) systems at the mountain remotely there is a safety issue. Preparations were made to implement a command that can only be issued from the TCS user interface in the control that would disable any command issued from out side of the TCS itself.

5.4.2 Telescope drive

Again on a few occasions telescope oscillations were noted and some of the motor brushes were replaced but the problem recurred intermittently. In the motor was partly disassembled, the top motor bearing support was removed to provide proper access to the where all the brush holders are mounted in so it could be replaces with a spare (originally from an altitude motor) containing properly mounted new brushes. During the procedure the motor was cleaned of carbon dust and metal shaving from the broken holders. Also the opportunity was taken to clean an old repair which may have been the cause of the problem being seen only over a limited range of the azimuth position. Afterwards it was noticed that the azimuth drive current while slewing had reduced to a more normal 3.5A from a previous high of $\sim$6A. No more problem have been reported since.

Clearly, the many repairs just replacing brushes without partly disassembling the motor to gain proper access do not work very well. It was decided to do more regular preventive checks including partly disassembling the motor. A complete set of 16 brushes have been received with extra parts to be able to repair any future problems with the brush assembly.

5.4.3 Mirror support system

The air drying system of the compressor system used to run the active support of the main mirror is aging and has been failing relatively often. A replacement system has been identified which we plan to purchase, where the idea is to maintain the current system but have the new system in standby as functional spare in case of problems.

5.4.4 Pointing

The telescope pointing model procedure has been migrated from the TCS to the sequencer which will allow for fully automated (and more specialised, e.g., by instrument) scripting of pointing tests. However, no complete pointing test using the sequencer has been made yet.

5.4.5 Atmospheric dispersion corrector

As of December 2010 we have the ADC on offer for regular use. The ADC can be used to minimise the wavelength-dependent fiber-aperture losses that are due to the atmospheric dispersion at large zenith distances. The ADC swings into the telescope beam before the FIES/STANCAM pickoff mirrors, and provides an unvignetted field of view of about 3 arc-minutes. The ADC consists of a set of two rotating prisms, that together compensate for the atmospheric effect. The ADC was primarily designed for use with FIES, but can be also be used with ALFOSC or NOTCAM. For use with FIES the ADC is expected to be advantageous in terms of throughput and radial-velocity precision for sources at high ($\geq$1.5) airmass.

The general use of the ADC has been documented on the web-pages providing commissioning results and a concise user guide. Sequencer commands to operate the ADC were implemented and were added to the list of available commands. The status of the ADC has been integrated in the FIES status display and added to the FITS keywords. The telescope setup scripts for the various instruments have been modified to make sure the ADC is not in the light path upon start up.

5.4.6 Guiding system

The software that finds suitable guiding stars has been rewritten to allow for an easier description of the available area withing the field-of-view of the telescope. Especially, for most options this is now combined in a single set of limits which are defined in the same way for the different instruments where the as additional parameter a margin in the selection area can be defined such that any telescope offset smaller than this margin can be safely made without the possibility of loosing the guide star because it gets outside the available area. The software has also been expanded to take into account the ADC when it is in the light path.

Testing will be completed in the near future after which the new software will be implemented.

One of the features of the current guiding system is that the focus of the guide camera is set to a value that is based on the telescope focus to avoid for the camera to be completely out of focus when changing instrument which might mislead people to think there is no guide star available. However, this automatic camera focus is far from perfect and has to be adjusted often manually. The variation in focus is likely caused by distortions as a function of position of the guide camera with respect to the optical axis as it will be in different places for different telescope positions. To calibrate this and see if these variations can be mapped in some way a command has been added that allows the user to register the camera focus along with various parameters that might be relevant after the camera focus was adjusted by the user. At a later date these data will be analysed to see if there is a pattern to these values which might be incorporated in the automatic focus determination.

5.4.7 Catalogues

The web pages with information about the catalogue of empty fields that was prepared for twilight flat field observations with the optical imaging instruments has been expanded to include information about the presence and magnitude of stars detected in the K-band and the galactic coordinates such that NOTCam users can better judge if a field is suitable for flat field observations in the infra-red.

A new list of bright focus stars for focussing the telescope with narrow band filters was prepared and made available for use by all optical imaging instruments.

5.5 Observing system

5.5.1 Safety

As the the telescope control system (see above) the same safety issue posed by the possibility to operate most of our (observing) systems at the mountain remotely is also present by commands to the rest of the observing system through the sequencer. After discussing this in some depth it was decided that the simplest solution was to install a separate firewall limited to all the computers in the observing system that would exclude any outside access and can be activate (and deactivated) when needed.

5.5.2 Instrument set-up

A general database system has been set-up with information on all optical elements that are used at the NOT. This includes the physical properties and a description of where every optical element may be located. Likewise, current wheel contents for the different instrument are stored in the database.

The instrument setup facilities used by NOT staff to configure the instrument wheel content has been rewritten, now based on this optical element database. Having all elements defined centrally allows for easy consistency checks and simple administration.

5.5.3 Observing Blocks

Work on the web-based application that will allow observers to define and upload observing block descriptions for later execution is now moving fast forward, where the implementation of the database of optical elements was a fundamental requisite. Generating a valid observing block requires defining parameters at various levels: Observing Group, Observing Block (OB) & Observing Sequence. A Group is one or more OBs that must be executed in one single night. An OB is defined as one telescope pointing & target acquisition in a specific observing mode (imaging or spectroscopy), which consists of one or more Observing Sequences that describes the actual exposures.The navigation between the levels has been completed, and instrument specific content is currently being defined and implemented.

The above interface will allow complete definitions of observations with appropriate consistency checks. A resulting OB will correspond to a set of commands that is generated for execution, where this mostly will be just a few already existing sequencer scripts. Beyond simply running these resulting scripts our plans is to develop an interface to execute these scripts (the ‘Executor’) to allow to both follow the step-by-step execution of the observations, and manage the execution by allowing to skip certain parts (e.g., when running the same OB on the same target the telescope pointing can be skipped), or let it pause or stop at a certain point. This is partly for debugging purposes, but this is mainly intended to make it easier to manage the observations if the weather changes or if there is a technical problem during the execution of the script where simple re-executing a complete OB would be very inefficient.

5.5.4 FITS keywords

As a more continuous task we have been working on improving the FITS keyword information provided in the observing data. As a general objective the keywords should provide a complete and unique description of the data in the FITS file. The current set of FITS keywords still not complete and there are a few things which are not, or not correctly defined. We have now started a project to define and implement a full set of keywords which should be complete in the sense that it will cover all the possible relevant parameters for the current 'observing system' (telescope, instrument, detector) set-up. A specific set of keywords are those defining the type of any observation (referring to category [science, calib, test, etc], type [object, std, sky, flat, lamp, etc], and [observing] technique (image, spectrum, echelle, polarimetry, etc). For all of the different types of observations the (combination of) values for the 3 'observing type' keywords have been defined. The latter is strongly linked to the OB system that will be involved in setting these keywords, and to the data acquisition and archiving system that will use this information.

5.5.5 Data analysis and archiving system

In relation to the new data acquisition system being introduced with the new detector controller (see below) and the planned upgrade of the set of FITS keyword for the acquired data (see above) that will provide a complete description of the obtained data we are are now designing and implementing the computer system that will be the backbone for the system that will manage the data analysis and archiving of the data. Specifically, where to store data (beyond the general archive this can be ftp directories for ToO observations, service observing programs or general calibration data) and what to do with the data (which beyond quicklook analysis and quality control programs could also be full blown data reduction pipelines). The main issue would be to make this system such that it does not interfere when the observing system, while it should provide easy access and timely results.

5.5.6 Data display

A new sequencer command was implemented and documented for all imaging instruments that allows the an image to be displayed either according to the orientation on the detector (i.e., the column direction up), or use the world coordinates in the header and display the image such that North is up. This later is specifically included as part of the target acquisition script for slit spectroscopy with ALFOSC where often the instrument is positioned at an angle different from the default (e.g., because the observation is done at the parallactic angle, or the slit needs to be aligned with specific features in the field) and it is difficult to recognised the field when comparing to a finding chart which has the standard orientation with North up.

There were various comments and complaints from the staff about where the graphics displays of the post-processes would appear on the screen of the observing system computers and what it would do with the cursor. Specifically, certain windows would first briefly appear in one place before appearing somewhere else, and/or appear on top of the normal observing system windows, while the focus of the mouse would be 'taken' from the user, or the cursor would have to be moved out and back in to a window already being used when a graphics window would appear. At least part of the solution to the mouse behaviour might be the specific settings of the window manager, while the graphics display behaviour might be something which needs to be managed in the post-processing calls (to pyraf). One thing to specifically look at is if it is possible to keep the graphics display (at least for a given task) the same such that it can be moved but stays (or reappears) in the place where it was left. For the quickspec post-processing systems it would also be good to have an option where every time a new spectrum is extracted, the graphics display with the last spectrum is removed before a new display is opened (or even better, let a new spectrum replace the last spectrum in the same display).

5.5.7 Exposure time calculator

Some minor upgrades where made to the Exposure Time Calculator to include the new Y and Z filter for NOTCam, and adding the Z filter for ALFOSC and StanCam so a comparison can be made. Also, the results provide by the calculator now also includes the object brightness in milli-Jansky as derived from commonly used flux calibrations for the different photometric systems.

5.5.8 Observing tools

Some of the tools we provide to assist observers during the night were linked to pages of other telescopes at the observatory. To avoid that any local Internet or computer problem would affect access local installations were made of the the most relevant tools.

There was a question if we should get a copy of the Digitised Sky Survey (DSS) from the ING which is used to make finding charts for optical observations and is a useful tool to have available at all time. This is kept on a CD jukebox and we are going to see if we easily can get a copy of all the data on hard disk, and if so, if the program that accesses the data can be easily adapted to getting the data from disk instead of from the CD jukebox. Else, we might look at getting a more up-to-date (but much larger) catalogue for local installation.

In a related effort, we are currently testing a new facility that presents an image of the sky for the current telescope pointing. This uses the WikiSky web site which provides a more sophisticated interface than the DSS images and would actually be a nice tool for visiting observers though it also depends more on the Internet connection. There is a certain degree of proprietary right involved as for having the telescope pointing being publicly available so this tool will only be accessible from within the NOT computer network.

5.5.9 Information system

As part of the observing system a more general information and data logging system has been developed and implemented. This was started by the need to develop a new system for NOTCam (see below) but has been expanded to all instruments run through the observing system.

The system information (Talker) and data logging (Obslog) system where separate programs running as part of the observing system for each instrument. This introduced (sometimes quite significant) overheads during data readout and saving, especially for NOTCam. Also, they were taking a significant amount of space on the screen. This two different programs have now been combined in to one (called InfoSys) which runs on a dedicated computer with all the information displayed on a separate screen, with the possibility to switch between the data logs for different instrument and filter the system information for each specific observing system. The relevant documentation about the system and its use has been updated.

Some non-critical features of the old system are not present yet in the new system, but they will be implemented in the near future. Also, a web interface will be added to be able to read the information from any other computer (mainly intended as a tool in case of trouble shooting).

As part of the discussions related to setting up the new information system a recurring issue is that of the mix of information that is presented for the observing system which includes both information about the working of the observing system, but also more observing specific information such as the results from post-processing of the data, e.g., the seeing of the imaging data, the telescope focus offset that was (automatically) calculated, a telescope offset was done to put a star on a specific slit or fiber, etc. In the current situation this kind of information partly appears in the sequencer window where a specific command is given and partly in the InfoSys described above. In neither case is it easy to extra the relevant information, nor is it easy to find back earlier data (did I put the star on the correct fiber, what was the seeing in that image, etc).

In general there are two issues to define. What are the specific values that are of interest to the observer (e.g., in the case slitoffset is run), and in what way is this presented specifically to make it easier to view the data and extract the values of interest. One idea is having a separate information display that acts as an output display for observing related information and is separate from the observing system information on the InfoSys display.

5.5.10 Instrument change logs

To centralise the information about work that is done to each system (be it hardware or software) a new database system was set-up where things can be recorded and checked. In general, this just contains a minimal description and a date which already can help a lot in pointing to, or excluding possible causes for a problem. The system allows checks by date, sub-system (e.g., ALFOSC, Telescope, etc) and type (e.g., software, electronics, etc), or a combination of them.

5.5.11 Obsolete files

With time and the continuing development of the observing system many files (both documentation and observing related files, e.g., observing scripts but also instrument related configuration files etc.) have become obsolete. In most cases we keep copies of these files because we keep the old and new systems available during a transition period or we want to keep them for information, but also because we just do not remove them. These files typically are not directly visible to users, but a simple search in the observing computers or on the web pages will show them up which can lead to misunderstandings or incorrect use of files. To avoid this we have started to specifically remove obsolete files as much as possible and we are setting up a separate file system that will have the same structure as the existing system where files can be put in the same relative place (i.e., the same sub-directory name but in a different physical location) to make it easy to move old files away and find them back when need be, but which makes it hard to access them as they will not show up in any simple search of the normal operational system.

5.5.12 Documentation

With the completion of the cookbooks for ALFOSC and NOTCam now all the instruments operated through the sequencer observing system are defined in a common way, where parts common to the instruction for users of different instrument now are taken from the same source so relevant changes only have to be made in a single place. This strongly limits the possibility of having different (incorrect) information about the same thing being present in various places, while making maintaining the cookbooks easier and less prone to error.

A common access to all the cookbooks can be found at

`http://www.not.iac.es/observing/cookbook/current/`

where one either can choose one of the instrument, or only get all the information relevant for observers when observing with a visitor instrument.

With all the new cookbooks the printed documentation in the control room has changed to smaller, more concise booklets with the relevant information for each instrument separately. It was noted that the printed documentation for the TCS in the control room was rather outdated and scattered. A printed version of all the information about the new TCS in a single binder will be made. There was some discussion how extensive this should be as for, e.g., including a copy of the original TCS manual where the question is if that would be relevant for regular users. Maybe a general user version and a more complete version for the staff should be provided. Also, all outdated printed information will be removed.

The new sequencer command documentation database was introduced for ALFOSC. At the moment we are discussing the issue of defining the Type for each command/script. Specifically, what names are needed to describe commands/scripts such that they can be properly searched and selected in a structured way. E.g., it should be possible to (only) view all the commands/scripts needed to do spectroscopy, or the basic commands/scripts that are normally needed for observing (where there could actually be [significant] overlap between these different selections). A direct implication is that a command/script can have more than one Type. A full list of the possible Types that commands/scripts can have is being made. On the basis of this, for each command/script one or more Types should be set to define them, where the database then provides a way to select them in a dynamical way. This would also allow to simply add a new command/script with the appropriately defined Types.

In the end all sequencer commands and scripts will be managed through this database system.

5.5.13 YNAO

As a part of our collaboration with the YNAO a visit was made by one of the staff members from the software group together with people from CUO to YNAO as part of the installation and commissioning of YFOSC. This included setting-up a basic sequencer observing system similar to what is operated in general at NOT, and the installation and commissioning of the CCD data acquisition program for the new controller. This has been successful and some follow-up work has been done on the initial installation and preparations have been made to to include their TCS in the sequencer environment and integrate it with YFOSC.

As part of a further visit by people from CUI to do some additional work on YFOSC and install and commission the science grade CCD a new visit will be made by our staff member with the plan to conclude the work on the basic sequencer environment for their TCS and YFOSC instrument.

5.6 New detector controller and data acquisition software

The main task has been prepare and plan for the installation of the first new CCD controller for ALFOSC. The first stage is the final preparation of the detector control computer, the software for running the detector controller and the supporting software systems for interacting with the NOT (sequencer commands, TCS/instrument status in headers). The second stage will be the physical installation of the ALFOSC CCD in a new camera housing that is compatible with the new controller and the commissioning of the complete system for operational use. Largely constrained by the availability of the staff from the CUO coming with the new controller we have recently agreed to plan the installation for the period 20-27 July.

The next step will be planning the installation and commissioning of the detector controller for the other instruments which we hope to complete by the end of this year.

As part of the development of the CCD3 detector controller software the NOT is now hosting the documentation and “development tracking” for the software. A new server has been specifically acquired, installed and configured for this purpose.

5.7 ALFOSC

5.7.1 Imaging

The "easyflat" sequencer script that automatically takes a number of well illuminated twilight flat fields has been upgrade to include specific check if anything is in the light path that might affect the flat field and provide appropriate error and warning messages to avoid observers taking flat fields with an incorrect set-up. A script is being developed that will take the flat fields obtained with the "easyflat" script and analysis them for quality control purposes, and provide the resulting combined flat fields for general use through out ftp server (the latter is specifically intended for ToO projects where the target data often need to be viewed on short notice and a quick data analysis is required).

A common issue with ALFOSC is that different optical elements (like filters, but also the calcites) change the required telescope focus. An sequencer script was developed that checks the current instrument set-up, obtained the corresponding telescope offsets from our database system and applies the cumulative offset to the telescope focus. The main limitation of the script is that we do not have focus offsets measured for all elements, which means that the script will not be able to apply a focus offset which takes in to account all element. However, for all the most commonly used elements we have measured focus offsets while extensive warnings are provided about the limitation of the system. Our aim is to measure the missing focus offsets and provide a more specific warning to the user about the validity of the applied focus offset.

5.7.2 Spectroscopy

It was noted that the information provided on the width and length of the Echelle slits was not correct. All the slits were remeasured and found to be 0.1-0.4 arcsec less wide than their names indicated, while the length of the different slit was more in line with the original data. The information on the web pages where update.

5.7.3 Polarimetry

The position angle of the polarisation when using FAPOL is wavelength dependent. This was measured and the results are provided on the ALFOSC web pages so people can correct for this effect.

A post-processing procedure is being developed that would automatically analyse linear polarisation data taken with FAPOL and provide a polarisation estimate for all the stars in the field of view.

5.8 NOTCam

5.8.1 Instrument

With the arrival of the new Y and Z filters (see below) it was needed to warm-up and open the instrument. The opportunity was taken to check the bearings of the various wheels, which were all found to be working smoothly, and a new PROM containing the low level program that controls the instruments focus mechanism was installed to solve a problem in which the focus mechanism would not always initialise properly. It is foreseen that as part of our preventive maintenance the bearings of the different wheels will have to be replaced within the coming 12 months.

5.8.2 Observing system

A returning problem when observing with NOTCam is that occasionally observations are skipped. The precise cause is not known but is being investigated. In general it concerns only one in a series of many (short) exposures, and having one image less can easily be missed. In many cases this is an image in a dither pattern where losing an image can affect the final reduction significantly. In the case when a dither script is used it is actually known a priori how many images should be produced at the end. A method based on comparing the number of expected images with the number of images recorded in database has been developed and implemented but needs to be tested.

The sequencer command that provides the option to define an image as 'sky' image to be subtracted before an image is displayed was modified. Apart from the options to define the 'filename' of a specific image, the 'prev(ious)' image, or 'no' image it is now possible to select the 'prev(ious)-N' image.

5.8.3 Observing overheads

The NOTCam observations have significant overheads. Both the telescope dither overhead and the data acquisition related overheads are well understood but the overheads in readout, on the other hand, are not well understood and have increased from 2006 to 2008. During the remote summer school in June 2010 it was found that substantial load on the NOTCam data acquisition computer was taken up by the observing system "talker" log and the electronic observers log. A new talker was written, and in December 2010 both the talker and the obslog were moved from marissa to dedicated computer. From two observing nights in February we measured overheads and found that we were back to the nominal (2006) overheads.

Still the nominal overheads are not small, and in principle we are waiting for the new controller to shorten the too long readout-time. In the mean time, a special exposure command for NOTCam was suggested in which the dither overhead can be folded into the readout and file storage overhead. Depending on the type of NOTCam observations being made, this can save a very significant amount of time per night. For the exposure command, which now has ∼13 seconds overhead, it is expected that this work-around would lower the overhead to around 6-7 seconds per exposure, quite an impact for short exposures. This has been given the highest priority.

5.8.4 Filters

The new Z and Y filter which were purchased during the last period were installed in NOTCam in January 2011. It was noted that the Z-filter looks quite different compared to all the other NOTCam filters (non-transparent coating only on one side, a different edge fitting), but consultation with the provider assured it was completely vacuum grade proof and should not out-gas, and the direction of mounting should be arbitrary.

In February the filters were tested inside NOTCam on the sky for the first time. An internal report about the results where presented to the staff. The main results are that the zeropoints look good, the image quality looks good, but the background in the Z-band is very high. Tests indicate that part of the leak may be due to physical leaks around it and it is believed that this may improve by making a special mounting for this filter, potentially turn it around and installing a cold stop on top of it. However, some tests indicate there is a high percentage of thermal emission in this additional background. By crossing filters it is clear that there are no leaks in the J, H, and K wavelength regions, so it is thought that the thermal emission may originate from leaks at wavelengths longer than the K-band.

A main task will determining the specific cause of the additional background in the Z filter and looking at ways how to reduce it. Specifically, we are considering to open the instrument (in principle in conjunction with the replacement of the wheel bearings; see above) to improve the mounting and maybe add a long-wavelength blocking filter to reduce the background.

5.8.5 Imaging

When the instrument was opened the camera wheel housing and the detector where cleaned and when re-assembling NOTCam we realized that it was possible to adjust the detector plate alignment somewhat and took care to measure and align it well with respect to the camera wheel with the hope that this would remove the slight focus shift seen over the array. After mounting NOTCam and focusing fields with many stars it was found that: i) there was a smaller scatter over the field than before and, ii) that focusing now converged quicker. We believe this is the result of better alignment of the detector, and possibly also of an improved calibration of the focus pyramid implemented at the same time. Before this, focus measurements showed a larger scatter and it was more difficult to converge on a focus value.

In relatively good seeing (< 0.7 arcsec) the filter and camera focus offsets was (re-)measured for all broad band filters ZYJHKs. The new values were checked and confirmed one week later, and the automatic focus corrections in the instrument setup scripts as well as the documentation were updated.

5.8.6 Spectroscopy

With the installation of the new Z and Y filter they can be used as order sorter filter with the grism and these wavelength regions also become available for spectroscopy. Tests are planned using standard stars to determine the spectroscopic capabilities of NOTCam in these filters. Wavelength calibration tests will be made so we can provide line maps.

Still, the status of the baffle lamps used for spectroscopy calibration with NOTCam needs to be added to the TCS database such that this information can be added to FITS keywords. Also the status of the lamps needs to be added to the NOTCam user interface so it is easier to see which lamps are on or off.

5.8.7 Vacuum & Cooling

When NOTCam was set to warm up on December 13th for a planned opening, it had been running cold for 19 months, the longest time ever. This is the result of an excellent vacuum obtained from 1) the new entrance window installed March 2008, 2) an improved LN2 filling nozzle, 3) an improved alert system, and 4) proper baking of the entire cryostat in March 2008. We therefore decided to go for a long-term baking also in January 2011, but in order to streamline things and reduce the work load, we selected to do only a one-stage baking with the radiation shield in. In hindsight this was probably not a good idea since the vacuum obtained when pumping was not as good as back in 2008. For the future we know that a two-stage baking, first with the radiation shield removed, and then with the shield back in place, though more laborious, gives better vacuum.

The opening in January was reduced to a minimum of days, and special care was taken with respect to cleanliness and statics all the time when touching the instrument.

The minor problem with faulty readings of the cryostat pressure and four temperature detectors suddenly disappeared by itself after NOTCam was opened. Since NOTCam was back in the dome early February we have not seen any faulty readings.

Since the Helium leakage of the hose of the PTR cooler was fixed in June 2010, we have seen no problems, i.e. no new leaks. Care is taken to treat the hoses well when moving NOTCam across the floor, but some wear and tear is expected as these are constantly moving around when mounted on the telescope. We got quotes for a set of new hoses, but in the past we have been able to simply repair the existing one and we have still to decide if we buy new hoses as a set of spares.

As part of maintenance of the PTR it is needed to exchange the oil filter in the compressor as well as the rotary valve for the cold head. For the rotary valve we have a spare and in principle we can just run the existing one until it stops and replace it. The oil filter was refurbished in 2006 when the system had a total running time well beyond the recommended time for exchanging the filter, while the total running time since then is even slightly longer. It is not entirely clear how necessary the exchange of the oil filter is, but it is mentioned that it might otherwise damage the cold head. Also given the fact that we attempt to keep NOTCam cold as much of the time as possible which means high running time ($\sim$8000 hours a year) we decided to refurbish the filter. Normally we would have to send out our current filter, but we have now an offer from the company to supply us with a replacement filter before we send our current filter so that we can exchange the filter without having to stop the cooling for any extended period of time.

5.8.8 Detector

The amount of cold pixels has slowly increased (from 0.2% to 0.4% of the array) over the period 2008 - 2009. It was getting difficult to find clean vertical areas for spectroscopy which is typically done dithering the objected along the slit. When NOTCam was opened in January the detector plate was dismounted and dry air blown across it in an attempt to clean it. Also, the whole interior of NOTCam was vacuum cleaned. The new cold pixel mask obtained after NOTCam was closed again showed that the cleaning helped somewhat, where the number of dust particles on the detector (seen as cold pixels, or pixels with low response) has diminished, though still not as low as it was in early 2008.

We further looked at the increased background that is measured in dark exposures when the instrument focus mechanism is at low values. The structure in the darks seem to indicate a shading, and a rough estimate pointed to the focus mechanism as a possible origin of the extra dark emission. However, disconnecting power to the mechanism showed no change in count level. The only thing that came to mind is radioactive materials possibly used in that mechanism. When NOTCam was opened we looked at ways to shield the mechanism, but there is no space to mount anything. The effect is being investigated and is briefly described in the NOTCam User's Guide.

5.8.9 Quality control

The detector quality control analysis scripts initially written in IDL have been translated to python (RC) and somewhat simplified and improved. Testing was finalised and the new analysis script was released in November 2010. A new database was made for data output from the new script and a few selected nights from 2009 and 2010 were re-run for comparison. The old databases and web-pages are kept available for access.

5.8.10 Reduction software

The scripts in the quick-look IRAF reduction package for NOTCam is being upgraded to include options for correcting for non-linearity and image distortion. This package is in principle not intended for a full reduction of data, but it might still be useful for people to get in a quick and easy way a rough idea of the results. When the package has been upgraded it will be made available for downloading through the NOTCam web page with the clear indication that this is only intended for a rough reduction of the data.

5.9 FIES

5.9.1 Instrument

A possible polarimetry upgrade for FIES was discussed with Nikolai Piskunov & Andrey Dolgopolov from Uppsala University. They concluded that it is possible to mount a small polarimetry unit consisting of 2 sets of retarder+splitter on a slide in the adapter. In principle this unit will be constructed by then and tests were foreseen later in the year.

The initialisation switch and encoder electronics of the instrument focus mechanism of FIES were damage. Both the switch and the electronics were replaced, but a different type of switch had to be used which turned out to have the reverse logic of the original switch. With the working encoder it was possible to refocus but we do not know the precise position so this would have to be redone manually if we would loose the focus. The software now needs to be changed such that the mechanism can be initialised using the reversed logic. It is not clear what broke these items of the focus-drive, but some of these items have been broken once before by lightning.

5.9.2 Radial velocity stability

Prompted by the radial velocity stability degradation seen for the medium-resolution fiber with the current bundle in use, we have looked into the possibility of detecting modal noise in FIES. Modal noise may appear as a consequence of the fiber-output speckle pattern being different at different wavelength, and different as well when the fibers are moved. When a variable or moving speckle pattern is inserted into the spectrograph, the amount of light vignetted by the exit slit (for the high-resolution fiber) or the grating (all fibers) or other items that may vignette the beam will be variable as a function of time due to the inclusion/exclusion of speckle points close to vignetting edges, and hence as a function of wavelength and time, 'noise' will be recorded in the spectra.

Such modal noise will not flat-field out, as due to the fiber movements invoked by the telescope, the flat field will change as a function of time as well. Modal noise is a symptom of non-perfect scrambling of the light in the fibers, and it may be possible that the radial velocity stability problem is another symptom of this.

From the experiment it is clear that modal noise induced by fiber movements (by telescope movement) is severely limiting the maximum S/N that can be reached in FIES spectra to about S/N=450 (high-resolution) and S/N=650 (medium-resolution).

In consultation with Gerardo Avila from ESO it was decided to do some test moving the fiber around during an exposure in an attempt to scramble the average signal as much as possible and obtain a better radial velocity stability. A fiber "shaker" was constructed using Lego and placed in the basement of the telescope relatively close to the exit of the fiber and well removed from the part of the fiber that moves with the telescope. The linear-slide shaker operated at 1.5 Hz, with a stroke of 6.5cm. See,

http://www.not.iac.es/instruments/fies/images+drawings/fibershaker/prototype1/DSC00694.JPG
http://www.not.iac.es/instruments/fies/images+drawings/fibershaker/prototype1/DSC00696.JPG

Preliminary tests were very promising with an intra-night stability of 5m/s been achieved with the shaker switched on compared with about twice that value when the shaker was not used.

A more permanent design is being made for the shaker to be able to do more extensive tests (also because the owner of the Lego wanted his property back). To solve the issue of controlling the unit remotely a simple motor controller has been designed that can be operated via Ethernet. For the mechanical part of the shaker we are looking at modifying a leg/massage unit that has two modes of operation, one similar to the Lego shaker with a slow (<3.5Hz) large amplitude (∼3cm) moving arm and a fast low amplitude pair of vibrating plates. Once modified we will have to test if the slow large amplitude motion or the faster lower amplitude is better. From the literature it has been found that the typical way of doing 'optical fiber mode scrambling', as it is formally referred to, is to use piezos and squeeze the bare fiber. We do not readily have access to the bare fiber but it is noted that these system use very low amplitude and high frequencies to do the scrambling.

Information was added to the web pages about the simultaneous sky mode observing a target and the sky with the two medium-resolution fibers. Instructions were provided on how to calibrate the relative throughput of the two fibers.

5.9.3 Observing system

The observing system interface has been improved be removing and resizing some windows so they can be better distributed and do not overlap. With the introduction of a dedicated computer that runs the InfoSys showing system information and data logging these windows were also removed from the observing system and further improvements can be made.

The scripts to take well exposure wavelength and flat field exposures have been upgrade to allow for multiple exposures to be requested at the same time.

We have discussed the possibility of implemented an on-fiber guiding facility. Specifically, the system used by Mercator was mentioned. It was agree that the software used by Mercator should be checked to see how much work it would be to implement this software for FIES at the NOT.

5.9.4 Target acquisition

The speed of the target acquisition process was further increased by doing the first full-frame StanCam image in binned 4x4 mode, instead of binned 2x2. A method is being investigated in which the final guide probe position is recorded when centering an object on a given fiber such that the time needed for target acquisition during any repeat observation of the target (fairly common in FIES observations) can be reduced even more.

5.9.5 FIESTool

Normally FIESTool is run during an observing night and the automatic reduction provided can be of use to the observers (be it to assess the observations and decide which data to analyse first or, as fies.calibs is typically run in the afternoon before the observation, even use them directly in publications). As a service to the observers were are planning to add any reduced FIESTool spectra for a given night to the observers DVD containing the raw data.

It was mentioned that some people had made their own MIDAS reduction software to reduce FIES data. Apparently one reason was that FIESTool does not do the order merging that well. It will be checked (with Eric Stempels) if this can be improved.

5.9.6 Detector

Again, we got similar problems as before with the temperature of the CryoTiger and the detector. It was suspected that the vacuum seals of the dewar were not made to precision, possibly leading to vacuum problems that causes the CryoTiger to no longer be able to maintain the temperature of the cold head as the required capacity increases, which in the long run also causes the detector temperature to rise.

The front flange, entrance window and ring, the mounting for the pressure sensor and the pressure valve, and the right-angled pipe connecting the valve to the main vessel were all dis-assembled. Some scratches were found under the O-rings which were polished, cleaned with acetone and baked in the oven. The vacuum connectors for the valve and sensor were modified such that they can no longer turn and the sensor was electrically isolated so it does not introduce pick-up noise. Despite all these changes no direct improvement was found in the dewar temperature reached by the CryoTiger though the detector did stabilise at its normal reference value. In the mean time the dewar temperature has dropped to close to -200 degrees Celsius which is the normal temperature to be reached by the CryoTiger, though a jump up by 5 degrees and later down by 5 degrees was also noted.

As part of our investigations some extra technical drawings of the FIES dewar were obtained from Copenhagen and additional photos were made of the detector, dis-assembled dewar, fiber-shutter train, and the fiber shaker (see above), and all were added to our documentation pages.

5.9.7 Quality control

The calibration plan for FIES has been expanded to include a test for light pollution. It has repeatedly happened that when working on the dewar or the controller of the CCD LEDs and/or the controller display inside the white box were left without being taped off. This gives rise to low-level (about 10 ADU in 300 sec) diffuse scattered light on the red side of the CCD when exposed with the shutter open which will be visible in longer exposures of fainter target.

A test has been added that makes a 300 sec exposure with the dome- and calibration-lights switched off. The test should be run every time electronic components have been changed (controllers, pressure sensor, etc.), or in general when the CCD controller has been touched.

We still need to make an automated temperature-stability analysis tool based on shifts of the Echellogram. In connection with this, a script will be created that checks for changes in ThAr line-ratios in order to detect the "dying-lamp" phenomenon. A database will be made of the results to monitor the calibration lamps.

5.9.8 FIES building

In preparation for the coming summer some extra shading is needed to avoid the building heating up too much during the warmest days and losing its temperature stability. A specific option will have to be decided soon.

5.10 MOSCA

5.10.1 Data acquisition

As noted in the last report, MOSCA was the last instrument to be put under sequencer control. At the time the MOSCA-sequencer had been used only during one technical night. Since then it was operated during various observing runs without any significant problem.

5.11 StanCam

5.11.1 Detector

Somewhat similar to FIES, we also had problems with maintaining the StanCam detector cold. After some investigation it was concluded that this was the common feature of the CryoTiger cooler for unknown reasons loosing cooling capacity. For StanCam it is only possible to see if the CryoTiger is functioning properly by looking at the detector temperature which is 0.1 degree below its set temperature of -95.0 degrees Celsius.

One of the potential causes for the CryoTiger loosing cooling capacity is the dewar loosing vacuum. Ever since StanCam was mounted we have been unable to obtain its pressure without having to go in to the dome and read it off a digital display. It was found that the pressure sensor display is actually a complete controller unit, and has an RS-232 port through which it is possible to obtain the pressure reading. Via a system using an Ethernet/RS-232 (Moxa box) interface it is now possible to see the pressure in the data base. The main limitation is that the sensor only goes down to $10^{-}5$ millibar which implies that under normal circumstances it will only provide an upper limit, but at least we have now a way of automatically detecting any major loss of vacuum such that any corrective action can be taken in a timely manner.

5.12 SOFIN

5.12.1 Data acquisition

For some time we have consider to set-up a simple system to archive the SOFIN data. In principle the data for a whole run can be saved in one go (probably on only one DVD). The main issues to sort-out are the naming of the files (which should be something like SOddmmyyyy.fits to comply with our naming convention) and the names of the headers.

Ilya Ilyin (Potsdam) who normally performs the observations was contacted and we are discussing the possibility to include his data and their FITS headers in our general system. The plan is that he will bring all his archive data the next time he comes to observe so we can look atthis in more detail.

5.13 TurPol

5.13.1 Data acquisition

After the failure of the TurPol computer some time ago it was replaced with an other computer where in principle we should have all the relevant software. However, we still do have the hard disk of the old computer and we could try to recover things but it was not clear if there was anything worthwhile on that disk. The disk is stored and well protected. It was thought that probably most data ever taken with TurPol was on the disk but also likely the observers had copies of all the (reduced) data. We are thinking to just keep the disk stored and only look at it if there is a specific request.

We are still looking for a proper spare for the TurPol computer used to operated the instrument and obtain data. It was agree that we first should define what the specific issues are with getting a proper spare and ask help from Turku.

5.14 Computers and software

There are various points related to the general computer system:

- **Operating system**: Ubuntu 10.04 was made the new standard for the staff computers at the sea level office. Most of the computers have been upgraded.
- **Monitoring system**: The monitoring system that checks the health of the computers at the observatory is being expanded to cover more computers, services and subsystems. The main objective is to is to have a system that monitors the observing critical computers and provides warning and error messages so it can be determined if (preventive) maintenance is required.

- **Network**: The increase the flexibility and security of our computer network the design is being changes. As part of the redesign two new routers were purchased. The routers already have been tested, and the network change will be implemented in the next few months.
- **Computer replacements**: New computers were purchased, installed and commissioned to replace the old computers used by the visitors and staff in the control room and staff office to analyse observations or do other work not directly involving the use of the observing systems.
- **Printers**: New laser printers have been purchased and installed to replace the aging ones in the control room and in the staff office at the observatory.