STELLA operations model

Version 4 – 2009

0.1 Revision history

Issue	Date	Changes	Responsible
V1	24.3.2001	First issue	KGS
V2	14.11.2001	Maintenance requirements included	Kgs, epopow, mweber
V3	2002	Various updates	kgs
V4	2009	Various updates	Kgs, tgranzer

0.2 Table of contents

0.3 About this document

This document summarizes the operations and maintenance requirements for STELLA.

1. Personnel responsibilities

1.1 The STELLA Observatory, legal representative

STELLA is a robotic observatory with two fully automatic 1.2m telescopes (STELLA-I and STELLA-II) for the Teide Observatory in Tenerife, Spain. Not only the telescopes are automatic but also the entire observatory, no human presence is needed on site for observing – also not in remote control. STELLA-I supports a high-resolution, fiber-fed and bench-mounted echelle spectrograph (SES) while STELLA-II feeds a wide-field CCD imaging photometer (WiFSIP).

The STELLA observatory is an installation of the AIP and is operated by the AIP under contract with the Instituto de Astrofisica de Canarias (IAC). The STELLA installation is manifested in the site agreement between IAC and AIP from 1.12.2000. STELLA is represented in the CCI by Prof. Klaus G. Strassmeier, Director at AIP, and in the German Science Foundation (DFG) by Prof. Oskar von der Lühe, Director at KIS, Freiburg.

The STELLA "Executive Board", or just "Board", comprises one member from each partner institution. The Board itself is not a legal entity but rather a scientific collaboration acting on behalf of their respective home institutions. Chair of the STELLA Board and representative of the AIP for STELLA is its P.I., Prof. Klaus G. Strassmeier, who also serves on the CCI Finance Sub-Committee (currently chaired by Wolfgang Schmidt, KIS Freiburg). The IAC representative is the acting head of science operation (currently *tbd*), while the CCI (Comite Cientifico Internacional) representative is Dr. Campbell Warden, secretary of CCI.

1.2 STELLA ownership and users

STELLA is owned by the AIP and is a time-limited installation on land provided by the Spanish government through the IAC. The building, the telescopes and all other subcomponents like instrumentation, AG-units, CCD cooling and vacuum support systems etc. is owned by the AIP.

Both telescopes have three principle user institutions: the AIP, the IAC, and the CCI. The IAC is our joint partner and represents the Spanish community who receives 20% of the time on each telescope through the IAC. Another 5% is reserved to the international astronomical community (CCI) that operates telescopes on the Canary islands in Tenerife and LaPalma and which is organized in a body called the CCI with an office located at the IAC. All users are registered with either of these two institutions or the CCI, and telescope time is billed automatically to the respective institution.

1.3 Scientific partner representatives

Besides the legal representative, each partner names a STELLA scientist from their staff with the task of detailed management of the partner's time share. In the following, this person is referred to as the "partner representative". His/Her task is to manage the partner's telescope load and provides (and removes) target upload files to the STELLA operator at AIP. The IAC scientific representative is Dr. Garik Israelian. There is no CCI representative. The AIP representative is Dr. Michael Weber, who also serves on the Teide Operations Sub-Committee (currently chaired by Bernard Gelly, Themis). The communication platform is the STELLA web interface. Only the partner representatives may submit target files for execution, not a particular program P.I. (see also Sect. 2.2).

1.4 Time and target allocation

STELLA is not a multi-purpose observatory but rather a dedicated experiment for monitoring "<u>Stell</u>ar <u>A</u>ctivity". Therefore, no classical time allocation committee exists. In routine operation mode, roughly 80% of the AIP time is envisioned to be scheduled for the scientific core program, the remaining 20% can be used for free scheduling.

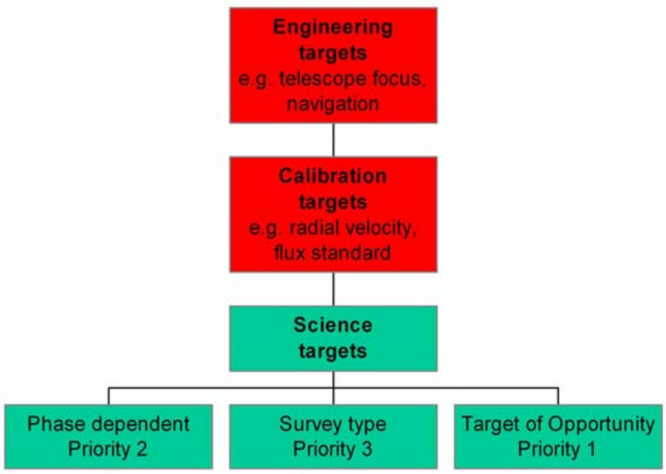
Each partner may handle their own telescope time as they wish. “Telescope time” for a robotic telescope is defined within the STELLA Control System (SCS) as the time a particular input file takes to be executed. E.g., for a single integration with the SES, it consists of the time to slew to the target, center it onto the fiber, close the guiding loop, carry out the integration, read out the CCD and open the guiding loop. This procedure implies that instead of the usual time allocation, STELLA is run based on a target allocation procedure. The SCS logs the actual time used to execute the various commands and presents a nightly summary to the operator-in-chief.

Any AIP scientist may submit a target scheduling request to the operator-in-chief at any time. This request must be submitted as an executable target-input file based on a *target-definition form* supplied on the STELLA web pages (see Sect. 2.3). Note that a simple e-mail to the operator containing a target request in form of a target name and/or coordinates can not be considered. The operator must receive the formatted target-input file through the STELLA web services.

Target scheduling is done by the SCS according to the merit function based on the user's specifications in the input file and the actual environmental situation. Almost any wishes may be programmed, but for the moment we will support only three observing modes (for both telescopes), see below.

1.5 Target priorities

Fig. 1 summarizes the three modes for STELLA-I with SES and STELLA-II with WiFSIP: Priority 1 is assigned to “targets of opportunity”, Priority 2 is assigned to “phase or time critical” observations while Priority 3 is given to “survey” type of observations. Within Priority 2 and 3 there are another 3 sub-priority assignments. Priority 1 observations are rather exceptional because they terminate any other science exposure that is scheduled or even ongoing. Its use must be very restrictive but needed for certain programs, e.g., for optical follow up of bright gamma-ray bursts or nearby supernovae where a very quick response time is needed (see Sect. 2.8). E.g. rotational modulation studies of spotted stars or asteroseismology monitoring will be done in Priority 2 mode. A target's actual merit function increases with the number of observations (phases) that were already acquired though but does not change the priority level. Above Priority 1-3 are all systems engineering targets (c/o Fig. 1), usually not seen by the user.



A detailed description of target priority handling and computation of merit functions within the SCS scheduler is given in the document
`S-sched-methods_20031024.pdf`
available from the STELLA documentation web pages.

Fig. 1 Target priorities (from top to bottom).

2. Operations guidelines

2.1 Personnel

The STELLA “operator-in-chief” is *Dr. Thomas Granzer*, AIP (tgranzer@aip.de). He also manages the Remote Control Center at AIP including its 80cm RoboTel, a small copy of STELLA-II for STELLA instrument development and software troubleshooting. The personnel acting on behalf of the operator-in-chief is recruited from AIP and its partner personnel on a volunteer basis (called the “operator-in-charge”). A weekly list of operators-in-charge will be prepared and posted on the intranet.

2.2 Standard operations procedure

After approval within a partner institution, a *Program Principal Investigator* (PPI) prepares a target input file and submits it to his/her scientific partner representative, who checks its flawlessness and then submits it to the telescope operator-in-chief at AIP. Only the *operator-in-chief* may accept input files, not the *operator-in-charge*. Also, only the partner representatives may submit target-input files.

The building, both telescopes and their instruments are run from within the same control system under a single human interface. During a normal night, the operator-in-charge is usually not physically present but must be reachable by the STELLA emergency SMS system. The operator-in-charge’s job is to monitor the telescope load, to check the data transfer on a daily basis, and to write a nightly report to the operator-in-chief.

The operator-in-chief is not the time allocation committee but he/she monitors the telescope-time contribution within the partners and posts status reports on the STELLA www data and logistics pages. He/She runs an auto-check program to make sure the submitted input file is also executable. This auto-check is done in two levels. Firstly, an automated “insanity” check is run that looks for typos, not existent set-ups a.s.o.. Secondly, the SCS may automatically block the target because, e.g., the guider sees a not-specified binary, then the operator-in-charge informs the operator-in-chief who will contact the PPI with cc to the partner representative. Higher level of errors, i.e. when a file is executable but does not produce the desired up-time on pointings and readings, are monitored by the operator-in-charge and also issued as warnings to the respective PPI-owned data section, in severe cases probably also via e-mail. The operator-in-chief will assist in case of a severe error or in case of unforeseeable difficulties, e.g. when the target turns out to be an unknown close visual binary or has a bright nebula close by. However, the operators are not responsible of editing user-input files in case a severe fault was discovered. This is solely the responsibility of the partner representative in collaboration with the PPI. The operator-in-chief will simply disable execution in such cases, notify the user and possibly suggest cures. It is the responsibility of the partner representative that the PPI is informed and takes action. Formally, in case of acute errors, the operator-in-charge is principally allowed to disable target execution even before notification of the PPI and the partner representative. Small programming errors that would not the affect the scientific success will be corrected by the AIP operators.

Each partner takes care of their own time allocation. To prevent or at least minimize target duplications, all active observing programs – on both telescopes – are published on the STELLA web pages with program title, name of the PPI (and Co-Is if there are), the institution where the time contingent comes from, the target ID, type of observation, number or time (span) of observation, priority requirement (target-of-opportunity, phase- or time critical, or survey), quality requirements (dark, grey, bright; S/N etc.), and a short scientific abstract. The operator-in-chief also overviews the “program status web pages” where each PPI can view the current status and data quality of his/her program in detail and, of course, all partner representatives can monitor the time share.

The operations environment and its computers are part of the Remote Control Center located in the Media- and Communication Center (MCC) at the AIP in Potsdam/Babelsberg. It features a fast fiber internet link, an internal GigaBit switch with its own UPS battery system and a number of user workplaces. It hosts the operator consoles, the emergency modem, a video conferencing link to Tenerife, six web cameras that watch the telescopes and the environment, the computers for pipeline data reduction, the RAID arrays and a tape robot for the archive, and auxiliary equipment like documentation, backup software etc..

2.3 Target definition and upload

The STELLA homepage supplies a web-based *target-definition form* to the user for the creation of target-input files for both telescopes as part of the "program status web pages". The form is accessible any time via a username and a password. It also provides relevant information on current telescope load, the current and annual telescope-time quotas, and other technical information relevant for a successful input-file submission. The web form is linked to CDS, Sky Survey maps and others to resolve target name, positions, surrounding targets etc.. Eventually we will link to the German Astrophysical Virtual Observatory (GAVO) under its universal protocol.

The detailed description of the target-definition form is given online in the link at the STELLA home page (currently enabled only for "SES data").

2.4 Archive interface

Once an input file has been accepted and uploaded by the operator, an archive interface is set up with a password protected secure-shell login. The user will be notified by e-mail that an account is active. He/she has then exclusive access to the program's pre-allocated archive space. The operator and the SCS will manage the data transfer and the archiving, the user will have access to his/her data immediately after archiving. An e-mail is sent to the user once per week with a summary of the weekly observations.

The time to get access to the reduced data is program dependent and is different for the two telescopes. STELLA-I SES quick-look 1-D data are transferred immediately (but see below in Sect. 2.6) and can be viewed shortly after exposure. These data will be overwritten/removed once the final reduced data are generated by the respective pipelines (see Sect. 2.9).

2.5 Data policy

All scientific data belong to the PPI for a period of three years, counting from the date the data were taken. The PPI can make them public at any time before the three years though as he/she wishes. All calibration data are public immediately after generation. For the case when data is requested and executed but not retrieved from the PPI's archive section, they automatically become public after 3 years as well. Long-term programs, where it is shown that the science goal can only be achieved after more than 3 years, are excluded from above 3-year policy. Note that long-term status is not granted for programs where the sheer number of targets determines the length of the program, e.g., a spectroscopic survey of all *Hipparcos* stars.

2.6 Target policy

For the case two or more users request the same target for the same or a comparable time slot, the principle "first come first serve" will be applied. The operator-in-chief will enforce the policy not to double observations, even across partners.

2.7 Data transfer limitations and policy

The current file size for the SES 2k-camera on STELLA-I is 8 MB, and for the 4k CCD of WiFSIP on STELLA-II it is 33,5 MB. The "guider CCD" read-outs are also stored and are intended to be used for single-filter photometry (tbd). The operations data from the telescopes, the instruments, the building, and other auxiliary equipment under robotic control (e.g. SkyCam images) amount to just a few MB per day-night cycle. However, these increased to 500 MB when the guiding frames are transferred for posteriori trouble shooting. A good 10-hour night with fairly bright targets may peak in something like 20 GB of data. An average 8-hour night with 100sec integrations will result in some 300 full-frame images, or 10 GB. Compression by a factor of 3 results in a total of 3.5-7 GB. The current bandwidth from Teide to LaLaguna and further on to the MCC in Potsdam peaks at 80 Mbit/sec. Obviously, data transfer for STELLA-II can not be accomplished instantly after data taking but is feasible within the same night.

Our current policy is to transfer data from "target-of-opportunity" targets first, then calibration data from both telescopes, then science data from STELLA-I/SES and then lossless compressed science data from STELLA-II/WiFSIP. Note that operations and status data are transferred immediately and continuously. Currently, STELLA-II/WiFSIP data are only back-upped in Potsdam, not in Tenerife.

2.8 User/operator/telescope interaction during an observation

User-Operator interaction
In special observing programs there may be the need that a user interacts with the operator. In principle, this can be done by any type of communication but usually will be restricted to cases where the science goal needs to be changed due to the experience from previous observations. However, it is preferable that, in case the observer foresees such interaction, that he/she is present together with the operator in the STELLA control room in Potsdam during the observations.

Operator-telescope interaction in case of "Target of Opportunity" (ToO)
ToO status can be given to a particular program and is principally different to all other programs in that no targets are specified. At the moment we still need to gain experience with this observing mode but will start with the following procedure: a partner representative submits an observing request for a given period of time (at the beginning, say, for no more than one month) within which an "alert" is possible. Within that time the operator expects any time to receive a target input file from the program PI (the PPI) or from a direct link from, e.g., the Gamma-Ray-Burst Coordinates Network homepage (or similar triggers). The original proposal should define the character and constraints of the observations to be done, e.g., in case of Gamma-Ray Bursters it must be clear that the operator knows how much integration time is needed and is able to determine the time to move to the target and after what time it is obsolete to move there. In case the operator is not online and an unforeseeable target-of-opportunity appears, ironically likely the standard case, a restricted access by an approved-program P.I. may be allowed. A clear policy of this interruption must be stated in the input file before execution and is *tbd*. ToO time must be limited to a small percentage of the total available telescope time because it overrides all other programs. At the moment we allow at most one ToO program per telescope. PPIs whose scheduled observations are cancelled due to the appearance of a ToO will not be refunded *per se* but their loss of observation will be automatically compensated by the SCS at the earliest possible time if not otherwise decided by the PPI.

2.9 Data reduction and archive policy

AIP attempts that any STELLA user will be supplied with fully reduced data that is qualified and ready for any scientific analysis. The data-reduction history is recorded in the FITS header of each CCD frame. Besides the actual raw data, reduced data together with its history will also be stored in the archive. A PPI can retrieve the raw data along with the calibrations and may use them to re-reduce his/her data with own software but must be aware of bandwidth limitations. However, raw data will be moved to tape after a certain time in the archive depending on space constraints (*tbd*). The current archive space is 6 TB and is sufficient for the current operations model.

Pre-analyzed data are provided also automatically but without quality control, see below.

The SES data pipelines

The automatic data-reduction pipeline for SES is based on the NOAO Image Reduction and Analysis Facility (IRAF). It consists of a number of IRAF-CL scripts which are invoked by a master script. The reduction process is started automatically after the morning calibration exposures are finished and the raw data transferred to Potsdam. The first and largest part of the pipeline contains the bad-pixel correction, bias subtraction, scattered-light subtraction, cosmic-ray correction, flat fielding and aperture extraction. Because the orders from about 600nm and shorter overlap in the current SES version, we use the program HAMSCAT to fit the scattered light and the light-pollution from adjacent orders and remove it. Order extraction is done using IRAF's optimal extraction. The current wavelength calibration uses a pre-defined Th-Ar line list and interpolates between two Th-Ar exposures closest in time before and after the science observation. The raw FITS images along with the end products of the data reduction pipeline are then moved to the backup-server. The second part of the data-reduction pipeline consists of continuum fitting which is currently not automated but will be once the SES upgrade is installed.

Once the spectra are reduced and properly back upped, an automated analysis pipeline is launched. It currently includes radial velocity measurements with both a template spectrum computed from a model atmosphere appropriate for the target star, and with a radial velocity standard star spectrum. Template spectra are tabulated with precomputed metallicities between −1dex and +0.5dex in steps of 0.5dex, logarithmic gravities between 0 and 5 in steps of 0.5, and effective temperatures between 3500K and 50,000K in steps of 250K for a wavelength range of 380–920nm. The user can choose the radial velocity that gives the most consistent result for his/her particular type of target. The next step is the determination of the best-fit (stellar) effective temperature, gravity, and metallicity of the target star. This is done with a program named PARSES by fitting atmospheric models to the spectral region containing Balmer Hβ. For this purpose, the SES spectra are degraded to a resolution of $\approx$7,000 because PARSES in its current zero version does not compute rotational line broadening, $v\sin i$. An update will be implemented and then the full SES resolution in five selected spectral orders will be used, and a value of $v\sin i$ will be provided to the database as well.

The WiFSIP data pipeline

As for the spectrograph, data reduction for WiFSIP CCD images will be done in Potsdam once the raw data has been transferred. For flat-fielding of the science data, sky flats are taken at morning and evening twilight. The high number of available filters inhibits a procedure where flats for all filters are taken during a particular twilight. Thus, during the nearest twilight in time only flats for a single photometric set (Johnson, Strömgren, Sloan or narrow Hα) are obtained and processed. The SCS already precomputes within the evening twilight which filter set is the one with the most urgent need, depending on flat history, flat stability, and filters to be used in the upcoming night; a decision that could be refined later during dawn twilight. Once all data has been transferred to AIP, the pipeline assures that for any given night, the most recent bias and flat calibration frames are available. Depending on the secured flat-field stability, a warning is issued if the flats in proximity to the night in question are too far off in time in order to assure a pixel-to-pixel stability exceeding 10^{-3}. This makes WiFSIP data availability different to the SES data availability because it is not known when the best flats for a particulart program will be obtained.

The science-data pipeline itself is based on the ICAT-pipeline which, in turn, also utilizes NOAO-IRAF for bias and dark subtraction and (master) flat-fielding once the master flat is available. Astrometric calibration is done using WCSTools. For photometry, two methods are available, the aperture-photometry package SExtractor, and the PSF-modelling package DAOPHOT. The instrumental magnitudes along with the astrometric data are collected in a database. From there, time-series of ensembles of images are extracted using a modified version of the ENSEMBLE4 package. The current development focuses on the incorporation of standard stars to gain full-sky absolute photometric solutions. The science pipeline is still under testing in 2009.

2.10 Calibration procedures

Calibration procedure for SES

Fig. 2 shows a typical day-night cycle for STELLA-I. Default SES calibration frames are usually taken during daytime shortly before and after observations and are user independent, i.e., the user must not specify the calibration frames. The reduction pipeline will use these frames to reduce the SES data that are then deposited in the archive. They are also used for (semi)automatic quality control. User specified calibration requirements can be taken into account but are not part of the automatic pipeline unless the pipeline can be adapted for it (*tbd*). Such additional calibration requirements will be billed to the PPI who requested it but will be avoided if possible. The standard calibration frames are part of an engineering-time allotment and will be marked accordingly. All three institutional users split the engineering time into proportional shares. Observations of a nightly encoder zeroing star, a bright radial-velocity standard and possibly other control observations are also billed to the engineering-time pool.

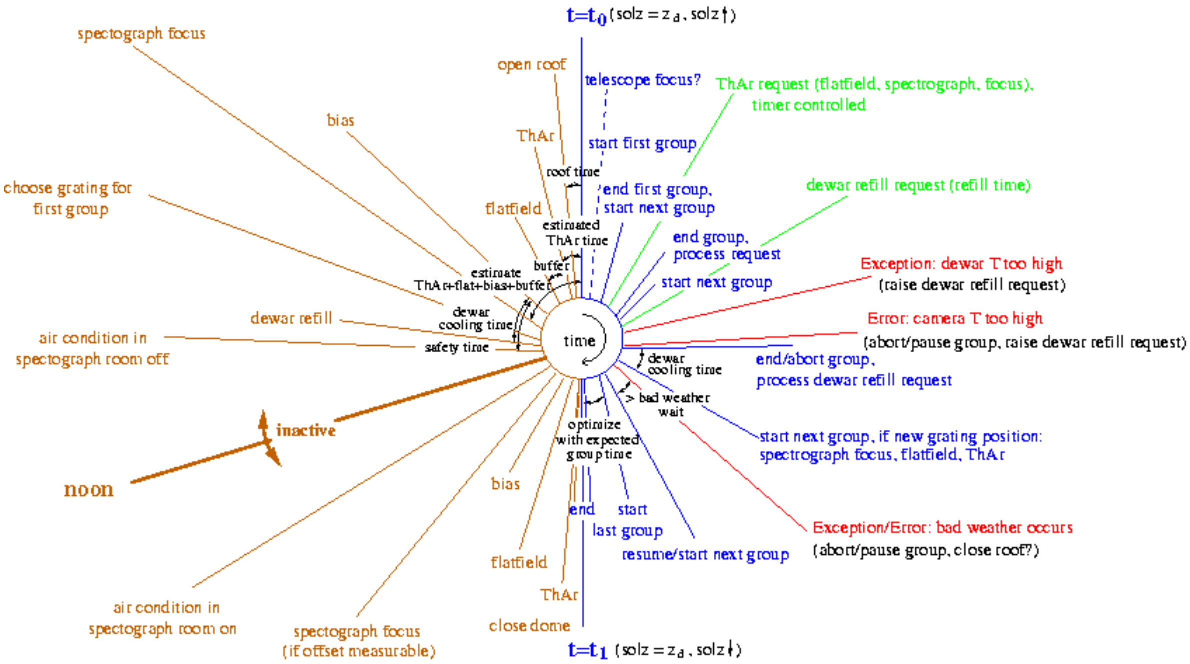


Fig. 2 A standard day-night cycle for STELLA-I. Time is proceeding clockwise. Daytime is on the left side, nighttime is on the right side. Standard calibration frames are usually taken during daytime or dawn.

Calibration procedure for WiFSIP

WiFSIP flat fielding is done with the sky background during dawn. No internal flat-field lamp or a screen are available as of 2010. “Darks” and “biases” are taken during daytime. A calibration data base is build up on a nightly basis. The reduction pipeline chooses frames from it for the automatic output. Again, as for the SES, the automatic pipeline requires a standardized scheme. The user will not usually “see” this but must stick to the standard (at least for the moment). A three-level calibration scheme for WiFSIP is implemented:

- Level-1: Reduction to uniform response across the CCD (bias+flat+extinction)
- Level-2: Extraction of instrument system magnitudes.
- Level-3: Transformation to standard system magnitudes.

All level data will be transferred to Potsdam.

There exist no good standard-star fields that work for all Bessel+SDSS+Strömgren filters at the same time. Therefore, we envision three choices of “standard” calibration procedures for WiFSIP, but only one will be picked after initial operations experience:

- Nights are dedicated to a specific filter system. Then we would observe standard-star frames also *before* science observations.
- Obtain standard-star frames in all filters in every night. This is the most unlikely version.

- Obtain standard frames only when needed, i.e., *after* a science observation.
- No calibration frames are taken at all (only if specifically requested by a PPI).

Non-standard calibration requests will be added to the target time and billed to the user.

3. Maintenance

3.1 Telescopes

A list of detailed telescope maintenance items with specific procedures is provided by the telescope manufacturer and is available on site as well as in the MCC.

Among these items are:
- Cleaning of the optics. Done with a commercial CO_2 spray.
- Aluminization. Annual aluminization of the primary mirror is foreseen but will depend on telescope behaviour, environment status and previous experience (*tbd*).
- Hydraulic oil change once per year per telescope.
- Checking the oil support system. Oil spills must be prevented, especially because the Teide is a protected natural habitat.
- Electronics. Among these items are encoder and motor services, renewal of electric connections, a.s.o., possibly under contract with the telescope manufacturer.

3.2 AG-units and Fibers

The AG units for both telescopes contain a guiding camera on an auxiliary telescope with a thermoelectrically cooled Kodak CCD. Both guider CCDs are operated with the same type of controller. The main difference between the two STELLA telescopes is that the STELLA-I AG unit overrides the auxiliary guiding because it views the stellar image on the fiber entrance. It is also directly flanged to the telescope's Nasmyth focus and requires special attention and continuing maintenance upon visual inspection.
No specific maintenance for the fiber train is foreseen unless the bundle as a whole will be damaged (as was already the case).

3.3 Instruments

SES- STELLA Echelle Spectrograph
No specific maintenance is required. Actually, the spectrograph is intended to be a "don't touch" instrument *and is not available for visitor presentation*. No unauthorized personnel is supposed to enter the spectrograph room because of the instrument's barometric pressure and temperature sensitivity. Dust accumulation in the room must be eventually removed though but will depend upon experience.

WiFSIP- Wide Field STELLA Imaging Photometer
It is permanently mounted on the image derotator in the first STELLA-I Nasmyth focus. Its 17 filters need a clean and possibly stable environment. Therefore, visual inspection and eventual cleaning is foreseen annually (*tbd*). Its off-axis guider system and focal reducer optics are also to be inspected frequently and possibly cleaned/serviced annually.

3.4 CCD cameras / cooling and vacuum system

For SES
At first light, the SES CCD camera has an E2V 2kx2k 13,5μm CCD. It will be replaced together with the Schmidt folding camera by a monolithic 4kx4k thinned back-illuminated STA chip with 15μm pixels in 2010. The system is currently run by the second-generation "Copenhagen"

controller (CCD-2) which will be upgraded to the Magellan controller. The operating system is Linux Debian. The science-CCD camera dewar is connected permanently to its own dedicated vacuum pump.

For WiFSIP
At first light, WiFSIP will have a monolithic 4kx4k thinned back-illuminated STA chip with 15μm pixels, identical to the upgraded SES device. It is also run under the Magellan controller. The operating system is again Linux Debian. Because for WiFSIP the vacuum pump must be connected to the dewar by hand, STELLA-I must have "engineering time outs" when the WiFSIP dewar is evacuated. Currently, we foresee to dismount the SES pump in the spectrograph room and use it at WiFSIP in the observing bay. Details are *tbd*.

Cooling for both CCD cameras is provided by two independent closed-loop CryoTiger systems, no liquid nitrogen is on site. "Holding time" is, according to current experience, almost a year but very much dependent on general power failures. Therefore, UPS power of approximately 2 kW peak is provided for the CryoTiger systems.

3.5 Network, computers, software

This is the most time-consuming maintenance item despite that telescopes, AG-units, and instrument motors/encoder-electronics are based on the same standards. The communication is done via RS485 serial bus and 100-Mbit Ethernet sockets that brake from time to time or are being wiped out by residual lightning. Some spare cards are kept on site. The network switch for STELLA is located in the IAC maintenance building. It needs regular updates in case the IAC changes hardware, fibers a.s.o..

Software maintenance is a permanent process. It includes driver adaptations after hardware changes, updates and upgrades, and eventual debugging, and failure documentation. We have avoided licenced software in the SCS but not in the entire data pipeline process.

3.6 Building and site

The entire building undergoes a thorough visual inspection at each visit by STELLA staff, a maintenance trip is scheduled approximately four times a year (this is currently done in personnel union with GREGOR installation and VTT observations). A web-based protocol is to be followed and signed by the inspectors. In principle, the following items must be checked.

- UPS 1 & 2 status?
- Computers (Any unusual fan noise? Any blinking alarm lights? Smell?)
- Car-batteries for the roof winches (Power status? Leakages or erosions visible)
- Status of CCD camera vacuum?
- Telescopes (are the mirror covers correctly closed? Anywhere oil leaking? Position of the support cables on the floor? Position of the fibres of STELLA-II? Position of CryoTiger cables of STELLA-I?)
- Status of dehumifiers in the telescope bay?
- Worms or any other organic visitors?
- Light off in the telescope bay? Now remotely controlled (note there is a time delay of max. 200 msec)!
- Light off in the spectrograph room?
- Status of the air condition in the electronics and spectrograph rooms (Is it too warm, too cool?)
- Status of the self-cleaning filters in the A/C boxes?
- Status of electrical fuses and RCCBs?
- Status power of the emergency hand lamps?
- Telephone link up?
- Telescope oilpumps (Oil temperature? Oil leaks? Any unusual noise of the motors?)

- Inspection of the observatory roof from outside (any damages? Is the emergency ladder useable? Anywhere ice on roller bearings in winter months?)
- Lightning poll and protection system (were there any hits?)
- Inspection of the observatory roof from inside (any damages from condensed water?)

The 3-monthly technical inspections will additionally include:

  - Inspect the telescope's mirror reflectivity.
  - If needed, CO_2-cleaning of M1-3 mirrors.
  - If needed, basic cleaning of the telescope mount.
  - If needed, bring vacuum of CCD cameras to nominal.
  - Status of roof motors and gear. Replace gear oil every 3 years.
  - Status of telescope hydraulic oil. If needed, replace oil every year.

3.7 On site emergency procedure

A detailed emergency plan is posted in every room in the STELLA building (in Spanish and in English). We consider three levels of emergency reactions proportional to the seriousness of the incidence:

- The problem did not or will not immediately damage equipment. *Action:* issue e-mail report with a detailed description of the problem to the STELLA operator in Potsdam.
- The problem did or likely will damage equipment. *Action*: possibly emergency stop with "panic button". Inspect damage and send SMS message and/or e-mail with a brief description of the problem to the operator-in-charge. Determine or estimate the effort to repair the damage and arrange Video link with AIP operator (in the STELLA electronics room) if needed.
- The problem is not under control (e.g. fire, serious water or oil spill). *Action*: call local authorities and follow general OT emergency plan. Send SMS to operator at AIP. Operator in Potsdam will arrange AIP personnel for next available flight to Tenerife.

A detailed emergency plan with signs throughout the building in English and Spanish is in place.