User Guide to AEON programs on SOAR

Version Aug 2024

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Version Aug 2024

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Changes & Updates

New for 2024B:

- Please note that because of lingering consequences from the cyber-incident experienced by NOIRLab August 2023, as of the start of the 202BA semester, there is no VPN external access to SOAR computer systems. Therefore, services like the Goodman Live Pipeline (GSP Live) and the TSPec IDL pipeline hosted in our servers, are not available.
- We are now uploading to Las Cumbres the reduced data produced by the realtime Goodman pipeline. Therefore, users have now access to both the raw and reduced data (e.g., 1-D wavelength-calibrated spectra).
- We are in the process of implementing an astrometry and photometry module for the Goodman pipeline, that produces a WCS solution for each imaging frame, plus aperture photometry and a photometric zero point for all detected sources. We are working to roll out this feature will as soon as possible in the 2024B semester.
- For Tspec users we recommend downloading and installing the SpexTool package for Tspec at SOAR, that can be accessed in our Tspec Data Redcution web page:

  https://noirlab.edu/science/index.php/observing-noirlab/observing-ctio/observing-soar/data-reduction/triplespec-data

Introduction

First, congratulations of having your program approved and scheduled for being included in the queue we run at SOAR as part of the Astronomical Event Observatory Network (AEON).

Since the 2019B semester SOAR has been running a highly automated queue on select nights the first 4m-class facility available through AEON, offering a highly dynamical scheduling option ideally suited for Time Domain Astronomy, but also very useful for general programs that can benefit from having observing windows on many nights distributed along the semester. We encourage you to visit the SOAR AEON web pages for additional information and details on this new capability

The number of nights dedicated to AEON on SOAR each semester is based on demand. At the end of the TAC process, we receive a list of approved proposals, and we add up all the time from the programs requesting AEON mode; that determines how many nights we will schedule in AEON mode throught that semester. At the present time, all AEON programs have the same priority in our queue.
Currently, we offer in AEON mode at SOAR the Goodman Hight Throughput Spectrograph (GHTS), both in spectroscopic and imaging modes, and (since 2022B) the TSpec near-IR spectrograph. This opens the possibility of obtaining spectra from the UV atmospheric cutoff out to the near-IR K-band. Both spectrographs are available every AEON night.

The configurations we offer on the GHTS instrument each semester depend on the requirements of the approved AEON programs. The most popular are the 400M1 and 400M2 setups, with the 1 arcsec slit (which samples well the median seeing of 0.7 arcsec at Cerro Pachón), with 2x2 binning. This setup provides low resolution spectroscopy (R~400, or a 3pix FWHM~15 A), over the 300-705nm and 500-905nm wavelength ranges respectively, allowing full optical spectral coverage of targets down to magnitudes ~20 in ~1h. Science cases that need data in the U-band, down to the atmospheric UV cutoff are ideal for the Goodman Blue Camera, with its superb throughput in the UV. All other programs that do not need such sensitivity in the UV, are best done with the Red camera, with its high overall throughput, extended red sensitivity and minimal fringing in the extreme red.

TSpec is non-configurable, with a fixed resolution of R~3500 across the J, H and K bands.

In the following pages we will guide you through the steps needed to get the most out of the valuable time you have been allocated on the SOAR AEON queue, and offer some tips and suggestions that we hope will make your experience with AEON on SOAR a satisfying one, and most importantly, provide your with what you really care about, useful data for your science goals.

Before the start of the semester

1) The SOAR AEON Support Scientist will send each user an email before the start of the semester, with the general information of the AEON queue on SOAR, which includes this document and links to the SOAR-AEON web pages.

2) Register on the Las Cumbres Observation Portal. Go to https://observe.lco.global/ and click on the large green button that says "Register an Account". You need to be a registered user in order to submit observation requests for your targets, and manage your program throughout the semester, regardless of whether you submit your Observation Requests via the web, or via the API specifically set for submitting AEON observations to SOAR, and of course to download your data (including calibrations).

The AEON observation process at SOAR

The overall process of AEON observations on SOAR is shown at a glance in the diagram below.

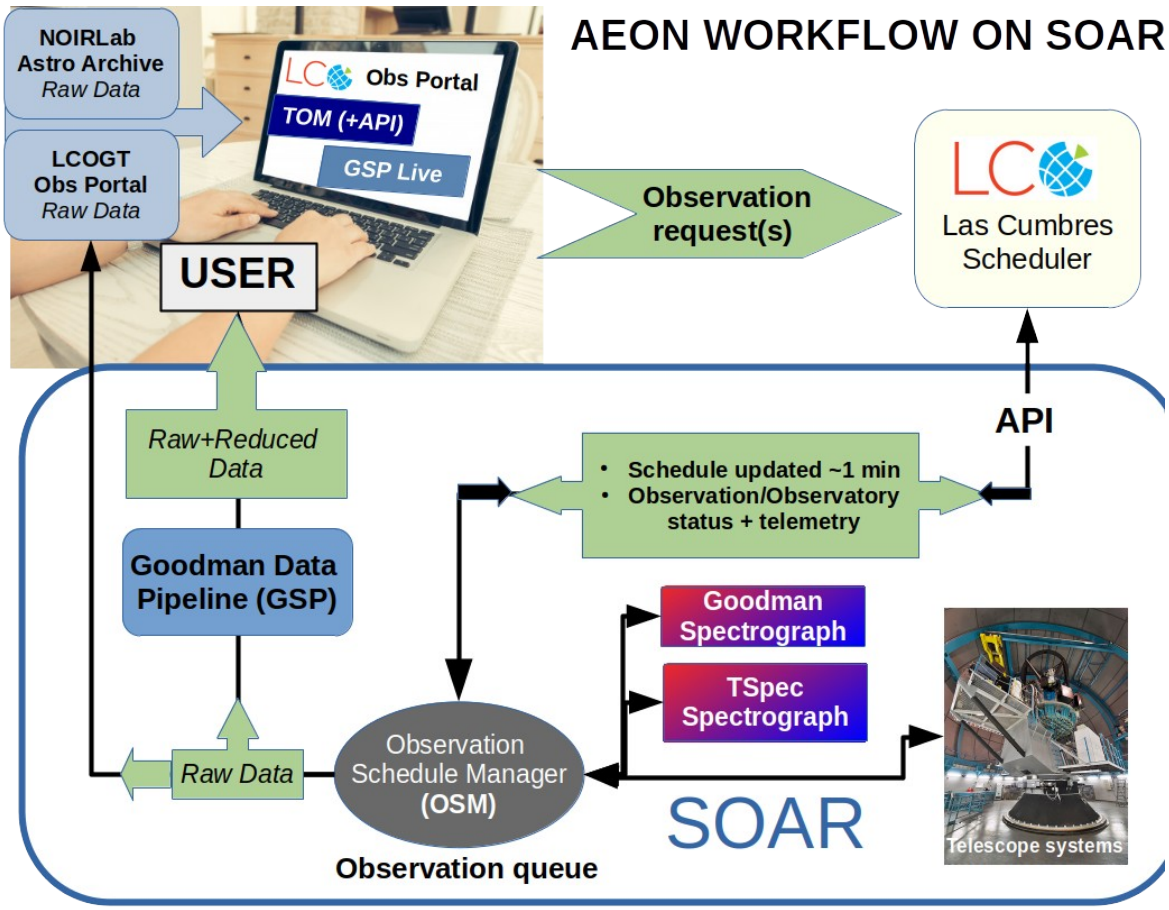

Figure 1: The AEON workflow on SOAR

The user prepares an observation request, most commonly using the Observation Portal at Las Cumbres website, or alternatively submit a request using the SOAR API. Details can be found in the Las Cumbres Documentation web page and in particular in the Las Cumbres Getting Started Guide.

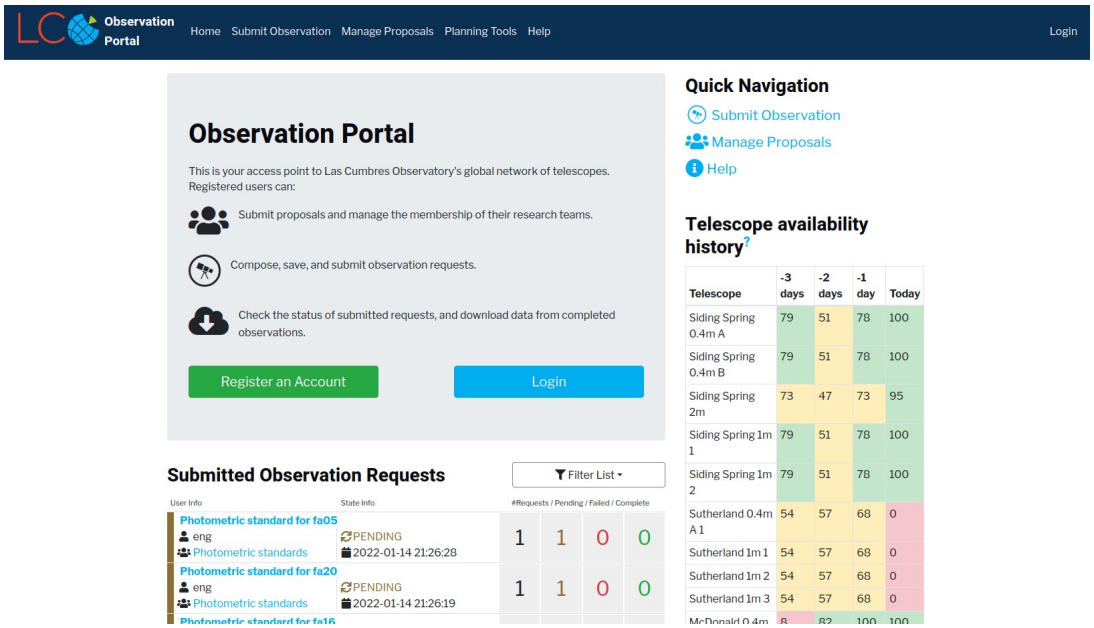

Figure 2: Las Cumbres Observation Portal login page

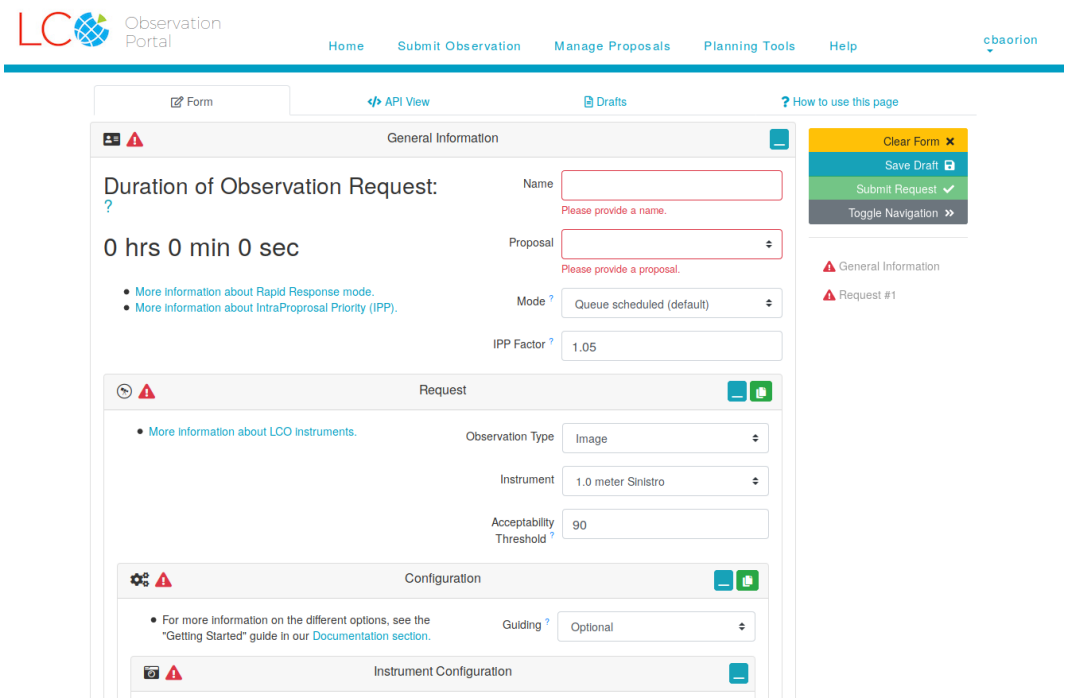

Figure 3: Las Cumbres Observation Portal Observation Request form

Las Cumbres Observation Portal (LCO-OP)

Here we will go through each of the fields found in the LCO-OP web form, which must be filled in order to submit an Observation Request (OR) to SOAR. *Firstly, an OR can be submitted at any time during the semester, even during an observing night. There is no limitation to this beyond the time your program has been allocated.*

Las Cumbres Observation Request Form

The LCO-OP OR web form is divided into the following main sections:

- General Information
- Request
  - Configuration
  - Instrument Configuration
  - Target
  - Constraints
  - Window

As we will see, there can be several Configurations within the same OR, each Configuration block containing equal or differing Instrument Configurations and/or Targets.

General Information.

Contains the overall information about the OR, including proposal ID, what mode is requested and the priority given to the observation.

I. **Name:** provide a name for your OR. Can be the same as your target name or whatever you like.

II. **Proposal:** select your proposal from the list.

III. **Mode:** Select from the menu. The default is "Queue scheduled", which will suit almost all programs. However, you can also chose "Time Critical" and "Rapid Response". For the meaning of these two modes please refer to the LCO Special Scheduling Modes web page.

IV. **IPP Factor (Intra-Proposal Priority):** if you want to give higher (or lower) priority to a given target among your sample, you can increase (or lower) the IPP factor, in the range 0.5 – 2.0. Note however that this will change how the Las Cumbres does the accounting against your total time allocation, for the time used up on that target. Most users don't need to change the default of 1.05, but if you want to, please read carefully the corresponding documentation.

Request.

This section contains all the details about the OR.

I. **Acceptability Threshold:** The percentage of the observation that must be completed to mark the request as complete and avert rescheduling. The percentage should be set to the lowest value for which the amount of data is acceptable to meet the science goal of the request. Default value is 90%.

II. **Mosaic:** Used only for imaging ("Image" selected in *Observation Type* below). Ignore, this parameter is not currently used with SOAR.

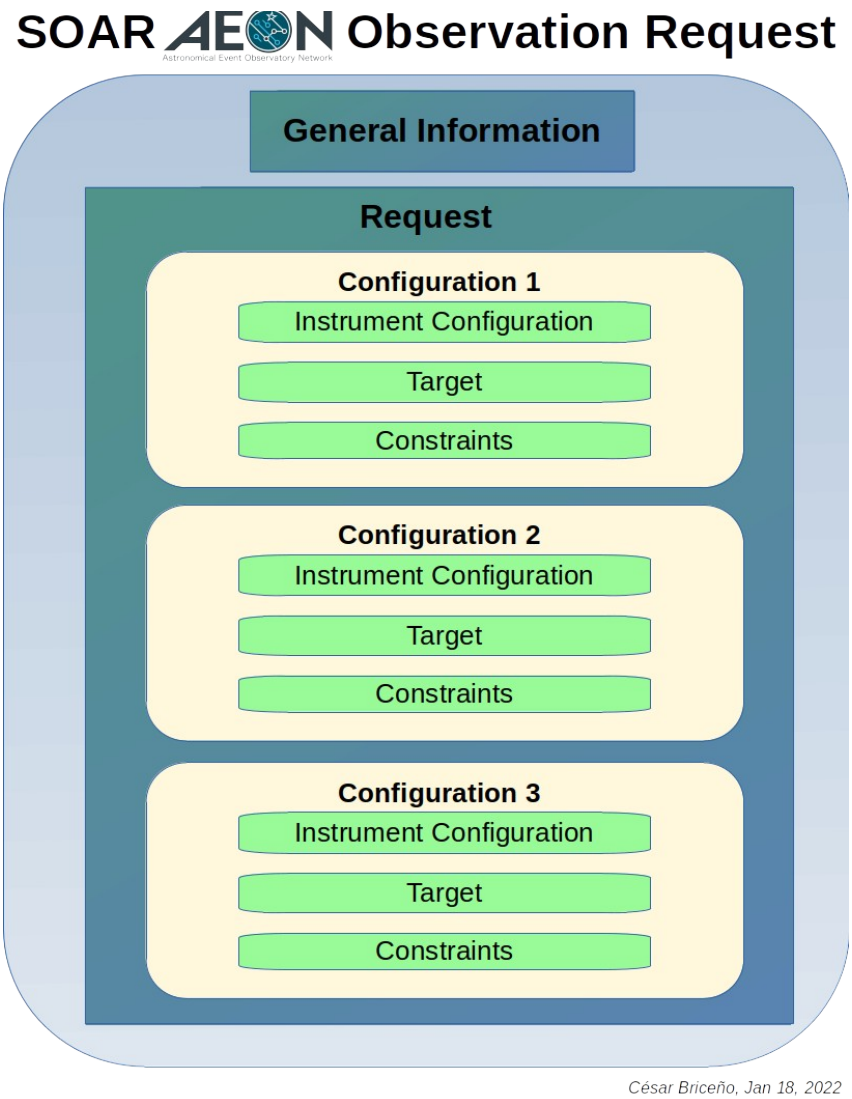

Figure 4: Schematic of the main elements of a Las Cumbres Observation Request

III. **Configuration.** The configuration section contains the specifics of the OR: type of observation(s) (imaging or spectra), instrument, position angle (called rotator angle), filters for imaging, gratings/slits for spectra, target details (object name, RA, DEC, type of target – sidereal or non-sidereal-, proper motion, epoch of coordinates, instrument configuration and constraints. You can have many configurations, for example, a series of 3 lampflats, followed by an arc, 3 exposures for the science target, an arc, and another set of 3 lampflats. Or alternatively, if you are imaging, you could have a several sets of SDSS-g, SDSS-r and SDSS-i frames, either of a fixed sidereal target, or a moving object (non-sidereal target).

i. **Observation Type:** select either “Image” or “Spectrum from the drop down menu.
ii. **Instrument:**
   - Select “Goodman Spectrograph BlueCam”or “Goodman Spectrograph RedCam”, if Observation Type=”Image”.
   - Select “Goodman Spectrograph BlueCam”, “Goodman Spectrograph RedCam” or “Soar TripleSpec” if Observation Type=”Spectrum”
iii. **Guiding:** Ignore. Guiding is always managed at the SOAR end, by the SOAR Operator-Observer.
iv. **Type:**
   - If “Image” was selected in “Observation Type” (i), then the only option here is “Exposure”.
   - If “Spectrum” was selected in (i) AND “Instrument” set to either of the options of the Goodman Spectrograph, the drop down menu gives options “Arc”, “Lampflat” or “Spectrum”. With this option you are also presented with a blue button ”Create Calibration Frames” within the *Configuration* section. Clicking on it adds four calibration configuration frames in the “Instrument Configuration” section, one each for an ARC and a FLAT *before* your science spectrum, and one each for an ARC and a FLAT *after* your science spectrum. You can delete any of the calibration blocks to suit your needs (use the red trash bin button), e.g., if you only want a arc(s) and lampflat(s) before the science spectrum, or just one arc and no lampflats.
   - If “Spectrum” was selected in (i) AND “Instrument” set to “TripleSpec” then the drop doen menu will give you the options “Arc”, “STANDARD” and “Spectrum”. Select either “Spectrum” for your science target or “STANDARD” to add the telluric standard. Ignore the “Arc” option; we do not take Arc lamps during observations with TripleSpec, as these are not needed. The instrument is stable enough that we routinely use the Arcs obtained during afternoon calibrations. *In practice you can simply select “Spectrum”;* because the system will automatically add the “STANDARD” telluric observation even if none was requested.

III.a Instrument Configuration

- **Exposure Count:**
   - **For the Goodman** instrument this means the actual number of exposures
   - **For TSpec** this means the number of ABBA dither pattern repeats.
- **Exposure Time:** Exposure time in seconds.
   - **For the Goodman instrument** exposure times for comparison lamps (*arc*) and quartz flats (*lampflats*) are fixed and hard-coded into the software that runs the AEON queue at SOAR, so for these types of exposures, the *Exposure Time* parameter is ignored.
   - **For TSpec,** this is the exposure time at each of the ABBA dither positions. Every TSpec observation is done with an ABBA dither pattern. Therefore, if you were to set the exposure time=120s and Exposure count=3, you will obtain 4 x 3 x 120s = 12 x 120s integrations, i.e, 12 files. As mentioned above, telluric standards are automatically added to any science observation, with their corresponding exposure time set by the system, which is why we recommend you just let the system automatically add the telluric standard to your TSPec observation request. For tellurics we obtain a single ABBA dither sequence. The separation between each A and B dither positions is 50 pixels = 13 arcsec.

- **Readout Mode:**
  - **Goodman:** select the spectroscopic mode from the pull-down menu. ***Important note:*** as of the end of the 2021B semester, the setup selected from this menu overrides any selection done in the Grating and Slit boxes. This will updated in the near future.
  - **TSpec:** select the appropriate Fowler sampling. We recommend you follow the Fowler sampling and Coadds according to the following table:

Table 1. Image acquisition parameters adopted for TS4.1 AEON mode operation

J Magnitude	Exposure Time (s)	Coadds	Fowler Sampling	SNR(*)
5.0	2	2	1	360
6.0	3	2	1	280
7.0	5	2	1	280
8.0	7	1	1	120
9.0	11	1	1	90
10.0	17	1	1	75
11.0	25	1	4	55
12.0	38	1	4	40
13.0	58	1	8	30
14.0	88	1	8	20
15.0	134	1	16	15
>16.0	205	1	16	9

* Signal-to-Noise Ratio per resolution element in the middle of the H-band for an A0V star.

- **Grating:** grating from the pull-down menu. Goodman can hold at maximum, three gratings. (Goodman only)
- **Slit:** The spectrograph slit (Goodman only)
- **Rotator Mode:** Slit position angle on the sky.
- **Rotator Angle:** Instrument position angle (PA), in decimal degrees, east of north.
  - **Goodman: default = 0 deg**
  - **TSpec: default = 90 deg**

III.b Target. Details of the target

- **Name:** object name. The LCO-OP form will look up the target name. If a match is found, it will automatically fill-in all the fields below.
- **Type:** object type – sidereal, or non-sidereal for targets like Solar System objects.
- **Right Ascension:** RA in decimal or sexagesimal formats
- **Declination:** DEC in decimal or sexagesimal formats
- **Proper Motion RA:** proper motion in RA (milliarcsec/yr)
- **Proper Motion DEC:** proper motion in DEC (milliarcsec/yr)
- **Epoch:** epoch of coordinates. Maximum is year 2100.
- **Parallax:** target parallax in milli-arcseconds (if known)

Note on non-sidereal targets: For non-sidereal targets, a set of orbital elements must be specified, so the Target parameters section changes. The "Scheme" parameter is used to identify the target as either a Minor Planet, a Major Planet, or a Comet. The required orbital elements are: "Epoch of Elements", "Orbital Inclination", "Longitude of Ascending Node", "Argument of Perihelion", "Eccentricity", "Semimajor Axis", "Mean anomaly". **However, the LCO-O supports lookup of the Minor Planet Center (MPC) and JPL Horizons databases, so just by typing the target "Name", if it is featured in any of these databases, all the information for the orbital elements will be automatically filled in.**
Also please note that the limit of the telescope for non-sidereal tracking is 2700 arcsec/h in DEC and 2700*cos(DEC) (arcsec/h) in RA. We are evaluating increasing this limit to enable the telescope to track faster targets, but as of the writing of this document, please make sure your target RA and DEC rates are below this limit, otherwise the observation will fail.

III.c Constraints. Minimum elevation and distance from Moon under which your observation can still be scheduled.

- **Maximum airmass:** Maximum acceptable airmass at which the observation can be scheduled. A plane-parallel atmosphere is assumed.
- **Minimum Lunar separation:** Minimum acceptable angular separation (degrees) between the target and the moon.
- **Maximum Lunar Phase:** maximum lunar phase tolerated. Default=1.

III.d Window. Time window within which your observation can be scheduled. The larger the time window, the more flexibility you give the scheduler software, within the Constraints, to fit your OR in the queue.

- **Start:** UT time when the observing window opens. *Defaults to current UT time.*
- **End:** UT time when the observing window closes. *Defaults to current UT+24h.*
- **Cadence:** if you set this parameter, it will replace your current observing window with a set of windows, one for each cycle of the cadence. The default is "None", which results in a single observation executed within the specified time window.
  A cadence is defined by two parameters: **Period**, which is the time interval between individual observations, i.e. how often the observation should be rescheduled. **Jitter:** The dispersion (in decimal hours) around the period during which it's acceptable to schedule the observation. The jitter must be long enough to contain one OR, including overheads.

API View

The OR form contains a tab **</>API View** at its top (Fig. 3). Clicking on it shows the text formatted as a JSON file, as it needs to be submitted via the API. The **</>API View** web page also provides a “Download as JSON” button that will download the JSON file.

In the following sample, the OR is for 3x300s spectra of the galaxy NGC 1566, preceded by a series of 5 lampflats, 1 arc, and followed by 1 arc.


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```

```
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                        }
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            "min_lunar_distance": "30"
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                    "offset_dec": 0,
                    "rotator_angle": 0
                },
                "optical_elements": {



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                    "slit": "slit_1.0as"
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            "extra_params": {}
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        "guiding_config": {
            "mode": "ON",
            "optional": false,
            "extra_params": {}
        },
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            "type": "ICRS",
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            "dec": -54.9379383622613,
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            "proper_motion_dec": -2.109,
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            "longascnode": null,
            "argofperih": null,
            "eccentricity": null,
            "perihdist": null,
            "meandist": null,
            "meananom": null,
            "dailymot": null
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            "min_lunar_distance": "30"
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```

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                }
            ],
            "location": {
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            }
        }
    ]
}
```

Important aspects of AEON queue observations on SOAR.

- **Instruments offered: both Goodman and TSpec are available, every AEON night.** Therefore, submitting requests for both optical and IR spectra of the same object is possible. Note that all the details of configurations below correspond to Goodman.

- **Tspec near-IR spectrograph:** non-configurable. Fixed resolution R~3500 across five science orders, roughly from ~0.9 to 2.4 microns. Slit is 1" wide, 26.3" long. Slit-viewing (SV) camera FOV=4.4 arcmin in the J-band.

  - **Position Angle. Default PA=90deg.** This PA results in the standard East to the left and North up orientation on the SV camera. However, users can specify any PA they need if their science case so requires.

- **Goodman High Throughput Spectrograph (GHTS).** Many possible configurations, but only a limited set are supported in AEON mode.

  - **RED or BLUE camera.** Regardless of what you specified in your proposal, you can use either RED or BLUE camera with Goodman, restricted to the one offered each night. Only one of the cameras can be used on a given night, because this is a daytime switch operation. The information on what camera is available each night is published in the AEON on SOAR semester calendar.

  - **Imaging or Spectroscopy.** Even if your program is spectroscopy, with Goodman you can always choose to do imaging and viceversa, limited to the gratings/filters offered each night, which depends on whether it is a RED or BLUE camera night. The configurations offered for each camera are published in the SOAR AEON Features web page, and are sent with every reminder email.

  - **Slits:** For spectroscopy with Goodman in AEON mode, at present we offer the following slits, 1" and 1.5" wide slit for the 400 and 600 gratings, and the 0.45" wide slit paired with one of the higher resolution gratings: 930, 1200, 1800, or 2100 lines/mm. The 1" is the standard AEON slit, well matched to the median 0.7" seeing at Pachon. All Goodman spectrograph slits are 3.5 arcmin long.

  - **Binning, Gain and Readout Noise:** 1.48 e/ADU gain and 3.89 e- readout noise for the RED camera, 1.4 e-/ADU gain and 4.74e- readout noise with the BLUE camera. We use 2x2 binning for spectroscopy with the 400 and 600 gratings coupled with 1" or 1.5" slits, and for all imaging; spectroscopic configurations with the 0.45" slit and high resolution gratings, use 1x2 binning (unbinned in the spectral direction, binned x2 in the spatial direction).

  - **Position Angle.** All AEON observations with Goodman are carried out with the Atmospheric Dispersion Corrector (ADC) deployed in the optical path. This enables the user to select any Position Angle they need for the Goodman slit orientation, not limited to the parallactic angle. **For Goodman the default PA=0 deg.** For imaging the ADC provides better images at low telescope elevations, by correcting atmospheric dispersion. The minimum elevation at which the ADC still provides 100% full correction is 30 deg.

- **SOAR elevations limits.** Because SOAR is an alt-azimutal mounted telescope, it has a blind spot close to zenith. **The maximum elevation is 88 degrees. The minimum elevation is 20 degrees.** The Las Cumbres scheduler takes into account these elevation limits when scheduling observations, in addition to the constraints set in the OR. Also see our SOAR Overheads and Efficiency web page.

- **Daytime calibrations:** these are obtained every AEON date. Users do not need to request daytime calibrations, and these are available to all users of the AEON queue. They are not charged to any program.
    - **Goodman:** 21 bias frames in each binning mode, 21 for spectra and 21 for imaging; 15 dome flats in each spectroscopic configuration (high-res gratings with 0.45" slit use quartz lamp flats); 15 dome flats in each filter in imaging mode.
    - **TSpec:** 51 dome flats with lamps ON, 51 dome flats with lights OFF, HgArNe hollow cathode ARC lamps spectra.

- **Night time calibrations:**
    - **Goodman:**
        - **Spectrophotometric Standard.** Every clear night we obtain spectra of a spectrophotometric standard from the list of Hamuy et al. , in each of the spectroscopic configurations used with the particular camera in use that night. These spectra are available as calibration files in the Las Cumbres web portal, for all SOAR AEON users. These spectra are not charged to any program.
        - **Comparison and flat lamps:** through the LCO-OP the user can specify ARC lamps, or quartz flats, to go with their science target. These can be requested before and/or after the science frame(s). The user does not need to worry about exposure times, type of ARC, etc. These parameters are selected automatically by the control software at the SOAR end. Low resolution gratings use HgArNe comparison lamps, the higher resolution setups use HgArNe at visual to red wavelengths, and the CuHeAr lam for bluer setups. These calibrations are added to the duration of the particular OR, and therefore are charged to that program.
    - **TSPec:** after every science spectrum we take a single ABBA dither observation of a telluric standard selected from among a list of roughly 4500 A0V stars distributed all over the southern sky. We aim to obtain a telluric within ~<0.1 of the airmass at which the science spectrum was obtained. The telluric standard is considered proprietary of that particular program, and is **added** to the time charged to that particular OR. *It is possible for the user to use the same telluric for more than one target*, therefore saving some observation time. For example, in the same OR, you can specify two science targets, as two Configurations within the same OR, and then add only one telluric calibration. However, it is your responsibility to make sure the two targets are close on the sky, at similar airmass, so that the telluric is suitable for both.

- **Finding charts.** You need to provide finding charts for your targets. If we do not have a suitable finding chart and cannot determine unambiguously which is your target, we may abort or skip the observation. Every semester we create a shared Google Drive for finding charts. If your program has the same targets for all the semester, you can simply create a folder with your name and put the finding charts there. Otherwise put them in the folder for the appropriate date. Charts should be 3x3 arcmin. **Please provide J-band charts for TSpec targets.**

- **Back-to-back observations with Goodman & TSpec.** You can submit an OR to obtain back-to-back spectra of the same target with Goodman and TSpec, thus obtaining spectra from the UV cutoff to 2.4 microns. To do this you need to set up different configurations for the same target within the OR. For example, set up 400M1 and 400M2 configurations with Goodman, and then a configuration with TSPec. This OR will get you the entire optical wavelength range, and the near-IR. The corresponding API view is in the Appendix.

- **Goodman Data Reduction:** SOAR provides a data reduction pipeline for all observations obtained with Goodman High Throughput Spectrograph (GHTS), both spectroscopy and imaging. This fully automated, Python-based pipeline can be downloaded here: https://github.com/soar-telescope/goodman_pipeline/releases and has extensive documentation: https://soardocs.readthedocs.io/projects/goodman-pipeline/en/latest/

- **TSPec Data Reduction.** TSPec data are reduced with a dedicated pipeline built in IDL. We recommend you follow the instructive YouTube videos created by Dr. Katelyn Allers, which provide a step-by-step guide on reducing TSPec data, which you can find in our SOAR TSPec Data Reduction page, together with the links to download the software: https://noirlab.edu/science/observing-noirlab/observing-ctio/observing-soar/data-reduction/triplespec-data

- **Data access and download.** There are several ways to access the data obtained through the AEON queue on SOAR. Use whichever option best suits your needs and preference.
  - **Las Cumbres Observation Portal.** See the documentation in their help page. Generally, you will login with your account credentials and then you monitor the progress of your ORs, and access/download all your data, including calibrations.
  - **NOIRLab Astro Data Archive:** Raw data of programs granted time through NOIRLab Open Access are currently stored in the **NOIRLab Astro Data Archive,** which you can access via a web form or programmatically through its API.

- **Monitoring the progress of observations.** You can look up whether your observation has been executed, or failed, and even look at your reduced data, by connecting to the LCO-OP ~~and the GSP~~.

  Observation requests can be submitted at any time during the semester, or during the night, and in particular, if your observation failed, or you want to repeat the observation for any reason, you can submit a new OR at any time during the night, or for the next date.

- **Can I modify, or request a modification to a submitted OR?** No. AEON on SOAR is a highly automated queue system, driven by the Las Cumbres scheduler software. At the SOAR end we have a software, the Observation Schedule Manager (Fig. 1), that communicates with the Las Cumbres scheduler, downloading an update schedule every ~1min, and parses as commands to our Telescope Control System and the Goodman instrument, the instruction to slew to target, set target name, exposure times, configuration and every other relevant parameter specified in the OR. Though we have a human operator at SOAR, they are in charge of starting/stopping the OSM (depending on weather/technical conditions), selecting a guide star for each target, and centering the target on-slit, in the case of spectroscopic observations.

  This means *the Operator/Observer at SOAR cannot intervene the queue as downloaded from Las Cumbres*, nor modify any parameter of a given observation. This is by design. If you realize you need to modify an observation request (OR), cancel it at the LCO-OP. Then create a new observation or make your changes/modifications to a saved observation form, and submit the new request. Next time the scheduler updates, the canceled OR will have disappeared and the new OR will show up in the queue.

Target of Opportunity (ToO) programs in AEON mode

All approved ToO programs are enabled in the Las Cumbres observing portal, and allocated as **"Time Critical".** Time critical observations are assigned higher priority than other queue programs, and are scheduled as soon as the observation window is available during the night, once the OR is submitted. *Observations may be submitted through the Las Cumbres portal at any time.* However, only currently supported instruments and configurations can be used – programs using the Spartan near-IR imager cannot be done in AEON queue mode. Please limit the total time to ~2.5 hours (the queue portal is conservative in estimating overheads, so your request can exceed 2.5 hours somewhat).
If AEON won't support the observations you want, or for any other reason, you can interrupt the AEON queue in the standard way, triggering a ToO Interrupt, following the rules in the SOAR ToO Policy document.
The automatic scheduler does not check for duplicate observations or multiple OR of the same target, so it is possible to have more than one AEON OR during the same night.

So that regular AEON queue programs are not unfairly affected by ToO targets, we will add nights to the initial AEON schedule, from a pool of ToO compensation nights, depending on the actual usage of AEON queue time by the ToO programs.

Tips and recommendations

1. If you have a large target list, submit all (or most of) your targets at the start of the semester, with the entire semester as the observing window. This means all targets are available to the scheduler every AEON night.

2. Note that the scheduler will include your target in the queue as soon as its visible and fulfills the airmass constraint (and Moon distance). This means that if you set the airmass constraint at 2.0, and your target is rising when first available, it is likely to be observed at airmass=2, unless other targets have priority at that moment. However, if the target is past the meridian when the observation can first be done, it will likely be done at a high elevation (low airmass). That is, the scheduler does not try to optimize the observation by doing it at the highest possible elevation. So if you want your target to be observed at a higher airmass, make that constraint value smaller. Of course, also be aware that by doing so you have also reduced the available window to observe your target, which may make it harder to schedule, depending on the demand of other programs for that same part of the sky. So its a compromise, but just be aware how the system works.

Where to get help

For assistance with composing observation requests, or for information on AEON-SOAR operations, users can contact Las Cumbres' Science Support team by emailing science-support@lco.global. For questions about the SOAR telescope, the Goodman or TSPec spectrographs, Goodman or TSpec data reduction pipelines, please contact Cesár Briceño (cesar.briceno@noirlab.edu) or Mark Everett (mark.everett@noirlab.edu)

References and Useful Links

Observing with SOAR web page

Goodman High Throughput Spectrograph web page

Goodman Live Data Pipeline Documentation

TripleSpec (Tspec) Near-IR Spectrograph web page

Reducing TSPec spectra web page

AEON web page at SOAR

AEON web page at Las Cumbres Observatory

Getting Started on the LCO Global Telescope Network guide

Las Cumbres Observatory help page

NOIRLab Astro Data Archive

Arizona–NOIRLab Temporal Analysis and Response to Events System (ANTARES) broker

NOIRLab Astro Data Lab

Appendix I.

API view of a Goodman-TSpec observation. First, 400M1 and 400M2 comparison lamps, then the 400M1and 400M2 science spectra (900s), and then the TSPec observation, 4 x ABBA dither sequences, with 120s exposures in each A and B position, and the telluric standard.


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