INO phase 2

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This documentation is for understanding the phase 2 concept and the principles of the preparation of the INO phase 2.

1. Phase 2 Observing Material

1.1. Basic concepts

Phase two is an interface between the user, who has proposed an observation, and INO observatory. Users can give the descriptions of their observations via phase 2 program. The center of this program is an OB (observation block). Users can specify their request for a single observation through an OB, such as the target position, the instrument and exposure setup parameters, special scheduling requirements, the time constraints, the finding charts, and possibly also ephemerides lists. A single observation may have one or more exposure times. An observation block also may have some tools for astronomers to use to obtain the data they need to provide in the OB.

1.2. Science Observation Blocks (OBs)

Science Observation Blocks (OBs) are utilized to gather scientific observations of astronomical targets, as well as reference data that necessitates observing specific targets, such as photometric standards. At a minimum, they encompass an acquisition template, a science template, and target information. OBs have sections for providing the data required for observation which I'm going to examine:

1.2.1. Obs. Description

Obs. Description is the core content of an OB, It provides the description of how observation needs to be performed. For this, the Obs. Description is included with templates to provide information about how the user wants the observation to be conducted. Our template sections are:

1.2.1.1. Science Template (Exposure time)

For this template, users are required to give the following inputs:

1. Filter magnitude of the target (\vega system)
2. Exposure time
3. Number of exposure times
4. Observation filter
5. Binning
6. Object type (Point or Extended)

1.2.1.2 Science Template (SNR)

For this template, users are required to give the following inputs:

1. Filter magnitude of the target (In the filter using vega system)
2. Their preferred SNR
3. Number of exposure times
4. Observation filter
5. Binnig
6. Object type

The observing time will get calculated automatically after completing the Constraint set section. Please note that the SNR is an assumption and might be different in real-time observation due to observation conditions.

Users also can use their previous OBs template data by selecting them.

Note: Observation time including overheads cannot pass 1 hour. For more time users are required to create a new OB.

Note: There is a comment section where users can write their requests. These requests will be reviewed and answered within 24 hours.

1.2.2. Target

In this section, the user is required to provide the data of the target they want to observe, including the target's coordinates, general movement. Users can give the name of the object and get it's data. If users want a differential movement they can provide it in Target.

1.2.3. Constraint Set

Users are required to provide the sky condition they want their observation to be in. In Constraint Set section they can input their preferred airmass, sky transparency, lunar illumination, image quality, moon angular distance, twilight, and PWV.

Users also can use their previous OBs template data by selecting them.

1.2.4. Time Intervals

The user can also set their preferred dates when they want their target to be observed.

Note: These dates are your preferred dates and may change due to technical difficulties.

1.2.5. Ephemeris

For moving objects, users are required to provide an ephemeris chart with INO's standard chart format.

1.2.6. ObsPep

ObsPrep allows for interactive planning of the observation. Users can select their preferred pointing, blind offset, observing offset, and guide star.

1.2.6.1. Pointing

In this section, users can see the coordinates for their target and they can change it differentially in favor of their preferences. Users also may input their preferred position angle in this section.

1.2.6.2. Blind Offset

In this section, users need to input the right-ascension, declination, and the magnitude of a star as the acquisition star. Also, for users there is a graph in this section which shows the candidates for the acquisition star and their description. After selecting the acquisition stars, users are required to input the blind offset.

1.2.6.3. Observing Offsets

In this section, we can add observing offsets by their declination, right ascension, rotation, and the type of the observing offset (‘O’ Object or ‘S’ sky).

1.2.6.4. Guide Star

This section is often optional. You can choose a guide star with its declination, right ascension, and magnitude. Also, like the blind offset section, there is a graph which shows the description of the candidate stars.

Note: Blind offsets and Guide stars are optional and may not be used in real observation.

1.2.7. Finding Chart

The user can also include the OB with a finding chart or it can ask the OB to generate a finding chart.

1.3. Calibration Blocks (CBs)

Calibration Blocks (CBs) are used to obtain reference data, such as lamp flat fields, biases, and comparison lamps, which do not require observing an astronomical target. Each CB contains of of calibration frames (Bias, Flat, Dark).

1.3.1. Bias

Bias CBonly contains the number of Bias exposures.

1.3.2. Flat

Flat CB contains the number of flats, filter, and the fixed exposure of flat frame.

1.3.3. Dark

Dark CB contains the number of darks, and exposure

1.4. Output

The output of the program will be a CSV file containing all OBs information, and CBs. CSV file contains all flat and dark CBs which correspond to all filters and exposure times.