LCO Robotic Telescope Observation Planning Steps

Summary

Short Description: This document explains the steps that should be taken when planning an observing session on the LCO robotic telescopes. This guide is based on material on LCO's page: https://lco.global/education/activities/preparing-an-observation-request-on-lco/

Language: English

Suitable for age: 7-18 years

Key words: Robotic telescopes; Planning; Observing

Format: .doc

Link: https://observe.lco.global/

Background

Las Cumbres Observatory (LCO) is a global telescope network consisting of two 2-meter telescopes, thirteen 1-meter telescopes, and ten 0.4m telescopes.

Requests on the LCO network do not identify specific sites or telescopes – instead, you choose which telescope aperture class or size (e.g. 0.4m telescope) to use. LCO's scheduling software assigns each observation request to the best telescope available, and reassigns it to the next available telescope if the initial attempt fails (due to weather or technical problems).

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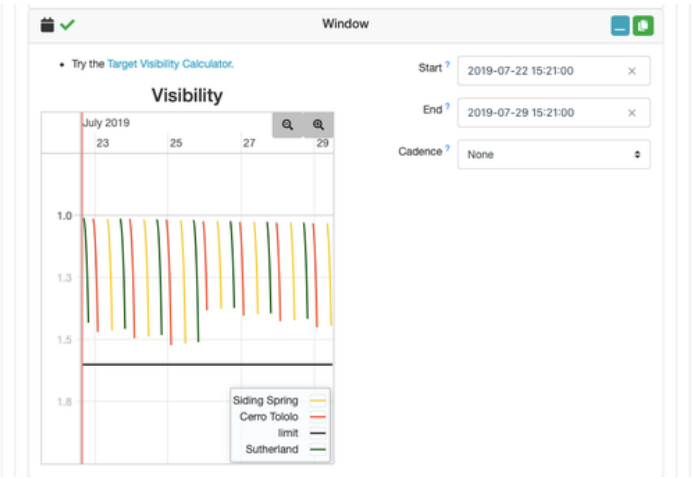
The LCO network is used by thousands of astronomers, communicators, educators and students around the world. To ensure telescope time is used efficiently, it's essential that users take the time to adequately prepare before scheduling observations. The steps below will help you do this:

Steps

Step 1: Define your Observation Window – Select the time period within which you'd like your observations taken. We recommend a minimum length of one week. Enter the time window on your **Observation Planning Sheet** if you are using one.

Step 2: Select a visible object – In Stellarium, set the date and time to when your Observation window will start. Set the location to match the location of one of your potential chosen telescopes (e.g. if you wanted to use a 1m telescope, choose one of the locations where there is a 1m telescope).



Stellarium will now display the sky that will be visible from your chosen observatory location during your time window. Search for a selection of deep sky objects, ideally, that are located at least 30 degrees above the horizon. To see ore information on each object, click on it in Stellarium. This will pop up information such as its angular size, magnitude, name, type and coordinates. Enter any relevant information for each potential object on your Observation Planning Sheet if you are using one.

(LCO Visibility Plot: When scheduling your observations on the LCO queue, after you have defined your time window, a plot will appear showing the visibility of your target object at each observatory location during this period. Each site is coded with a different colour and visibility is shown as the change in airmass (essentially, the amount of atmosphere through which light from the object must travel) of the object over time.)

Step 3: Check object dimensions – The area of sky visible through a telescope at any one time is called its 'Field of View' (FOV). When choosing your object, keep in mind the field of view of the camera aboard your selected LCO telescopes. Information about the cameras and telescope size can be found in the table below.

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Telescope class (size)	Camera (instrument) name	Field of View (arcmin)
2 metre	MuSCAT3	9.1 x 9.1
2 metre	Spectral	10 x 10
1 metre	Sinistro	26 x 26
0.4 metre	SBIG 6303	29 x 19

The dimensions of your object(s) can be found by clicking on the object in Stellarium.

Step 4: Select a suitable exposure time - The exposure time is how long the telescope shutters stay open to collect light from your object. A suitable exposure time must be selected: if the exposure time is not long enough, the object will appear too faint, while over-exposure leads to saturation and loss of detail.

Suitable exposure times can be found by looking at previous observations of your object in the LCO archive and seeing which ones gave good results:

- Go to https://archive.lco.global/
- Enter the name of your object in the **Point** field.
- Set the date range to "**All time**" using the calendar at the top of the left menu.
- Set the **Telescope** field to match the size of the telescope you will be using.
- You will see the exposure times (**Exp. Time**) for any listed observations and can look at the images to see which are under/overexposed or just right.

Step 5: Select suitable filters – Each telescope class has different filter sets available – these are detailed in the table below. If you are just interested in making a colour image then we recommend you take an image with the red, green and blue filters (N.B. the MuSCAT3 camera on FTN has fixed filters and takes an image using all filters at the same time, so on this telescope you cannot choose a filter).

Telescope class (size)	Camera (instrument) name	Filters options
2 metre	MuSCAT3	SDSS g,r,i,z (fixed)
2 metre	Spectral	18
1 metre	Sinistro	21
0.4 metre	SBIG 6303	9

Step 6: Schedule your observations – once you know what telescope size, object, exposure time and filter you plan to use, you are ready to go onto the LCO observing portal and schedule your observations – good luck and happy observing!

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