

How to use the LCOGT On Sky Interface

[An Introduction to the LCOGT Network](#)

[Request an Observation](#)

[Booking a time slot](#)

[Time Windows](#)

[Choosing a Telescope Class](#)

[Selecting a Target to Observe](#)

[Choosing your Target by Object Type](#)

[Selecting a filter](#)

[Exposure Times](#)

[Number of observations](#)

[Observation Request Elements](#)

[Submitting your Observation Request](#)

[FITS images](#)

This guide will help you to plan and carry out your first observing session using the LCOGT network's "On Sky" interface. The interface is simple to use and this guide will provide plenty of assistance to ensure even the most inexperienced observers can produce amazing astronomical images.

An Introduction to the LCOGT Network

The LCOGT network of eleven 1-and 2-metre telescopes based at five observatories across the globe is scheduled as a single global entity. Observation Requests are made for a specific telescope class (2-metre, 1-metre and 0.4-metre), but do not identify specific sites or telescopes.

Requests are submitted, and the results of previous Requests found, on the [LCOGT Observatory Portal](#) [<https://lcogt.net/observe>]. If you do not have an account, you can submit an application by clicking 'need an account'.

Unfortunately, at this time LCOGT can only offer observing time to [official Education Partners](#). If you have not obtained this document from a partner list on the LCOGT Education Partners page, we are sorry but you cannot use our network at present.

Home page

When you have logged in to the Observatory Portal (at <http://lcogt.net/observe>) a list of projects you are a member of will appear. Along side each of these is the amount of observing time available to you in 2 categories: Bookable and Queue time.

Booking a time slot

If you want to experience the real-time observing experience you will need to book a slot. You may only book time if you have “Bookable” observing credit.

Click on the option to ‘Book a slot’. This allows you to specify an exact time and observing location for your observations. The available dates will be highlighted on the calendar. Choose one which suits you best.

Request an Observation

Click on ‘Request Observations’ to begin. If you have booked a slot you can request these observations be made at the site and date on the following page.

Before submitting a Request it is important to have all the information the system is going to ask for ready. You will need to have thought about the following:

- Time Window within which you need your observation (only if you have not booked a slot)
- Telescope size to use (2-metre and 1-metre)
- Object name, catalogue name/designation or Right Ascension and Declination (the object’s coordinates on the sky).
- Filter type
- Exposure time per filter (in seconds)

It is particularly important to plan ahead when working with a pre-booked time slot. Make sure that you have all the information needed to submit your Observation Request no less than one hour before your time slot. Do not submit your Request any later than this or it is unlikely to be scheduled and your observations will be cancelled.

Time Windows

For each Request you must first choose one or more Time Window; 24 hours, 1 week or 2 weeks. These are intervals of time during which the target is eligible for observation. For example, a Window of one week that begins immediately constrains the observation to be scheduled within the next week, or not at all.

Within the user-specified window, the scheduler automatically handles target observability (darkness and sky position), considering all times where the target can be observed anywhere across the network. A number of factors could limit the possibility of your observations being completed within this Window, such as bad weather or technical problems; therefore, if you are

willing to wait longer for your observation there is a higher chance they will be completed successfully.

Choosing a Telescope Class

This option is only available if you have credit on both sizes of telescope

The next step is to select a class of telescope, either 1-metre or 2-metre. The LCOGT network includes nine 1-metre telescopes and just two 2-metre telescopes, therefore your observations are more likely to be scheduled on the 1-metre class telescopes due to less demand.

Both classes of telescope will produce very similar images for most astronomical objects. However, the 2-metre telescopes may be necessary if you are hoping to observe an extremely faint object (magnitude 19-21).

Selecting a Target to Observe

When submitting a Request, you must first to determine a target to observe.

We provide suggestions which are appropriate for either your booked slot or the time window of your observations. You can either choose one of these or enter your own target information.

If you would like to observe a target not in the suggestions list, you will need either the object designation (e.g. M51, The Crab Nebula, 3C397) or Right Ascension and Declination (the object's celestial coordinates). Each Request can have a single target and you may make multiple Requests.

There are a number of LCOGT guides that can help you select an object to observe, including [How to find asteroids and comets to observe](#) and [How to plan an observing session using Stellarium](#). More experienced observers can directly enter the object coordinates into their request form.

Selecting a filter

The default option is take 3 individual exposures in red, green and blue. Once these have been observed you can combine them into a colour image (See [How make colour astronomical images photoshop for a guide on how to create a colour image](#)).

If you are more experienced or feeling adventurous, you can select 'Use single filter'. You will then see a dropdown list with all available filters. Details of the filter sets are available below to assist your decision.

Add a target

Target name: (e.g. "M82" or "Eagle Nebula")

Open (galactic) Cluster according to Simbad

Right Ascension: (e.g. "05:34:31.940")

Declination: (e.g. "+22:00:52.200")

Advanced filters:

- Bessell-B
- Bessell-I
- Bessell-R
- Bessell-U
- Bessell-V
- Clear
- H Alpha
- H Beta
- PanSTARRS-w
- PanSTARRS-Y
- PanSTARRS-Z
- SDSS-g'
- SDSS-i'
- SDSS-r'
- SDSS-u'

Filters are used on telescopes in order to select light of particular range of wavelengths, rather than collecting light of all the wavelengths that make up the optical part of the electromagnetic spectrum.

The filters available to you are listed below along with the peak wavelength (in nanometres) that is let through by the filter.

1-metre telescope filter set

Portion of	Filter Name	Peak Wavelength
------------	-------------	-----------------

Spectrum		
Blue	Astrodon Photometrics Bu	426
Near-IR	Astrodon Photometrics Ic	807
Red	Astrodon Photometrics Rs	641
UV	Astrodon Photometrics UV	369
Green	Astrodon Photometrics V	538
Blue	Pan-STARRS w	382
Near-IR	Pan-STARRS Y	1004
Near-IR	Pan-STARRS Z	870
Blue	SDSS g'	477
Near-IR	SDSS i'	754
Red	SDSS r'	621
Ultraviolet	SDSS u'	354

2-metre telescope filter set

Portion of Spectrum	Filter Name	Peak Wavelength
Blue	Bessel B	436
Near-IR	Bessel I	798
Red	Bessel R	640
UV	Bessel U	350
Green	Bessel V	544
UV	D51	150
Red	H alpha	656
Blue	H beta	486
Green	Hale-Bopp C2	512
Blue	Hale-Bopp C3	406
Blue	Hale-Bopp CN	387
Red	Hale-Bopp CR	684
Red	Hale-Bopp NH2	663
Blue	Hale-Bopp OH	308
Green	OIII	500
Near-IR	Pan-STARRS Y	1004
Near-IR	Pan-STARRS Z	870
Blue	SDSS g'	477
Near-IR	SDSS i'	754
Red	SDSS r'	621
Ultraviolet	SDSS u'	354
Red	SkyMap v	583
Red	Solar	600

The image below shows a comparison of what the same object looks like in colour and then in seven of the individual filters. The image is M16 (The Eagle Nebula) taken using an LCOGT 1-metre telescope.



Exposure Times

Pointing the telescope at the object you want to image is only the first part of getting a successful image. You also need to know how much light to collect from your object.

Many of the objects you will image are actually very faint, meaning they give off very little light (in the form of photons) and hence, we have to use long exposures to ensure enough photons are received by the telescope camera to form a useable image.

Using the On Sky interface, you can see that exposure times for your astronomical images can range from as short as one second up to 300 seconds. Simply use the wheel to set the exposure time that you want. You can also type in the exposure time you want (in seconds) or use the 'up' and 'down' arrows to adjust the time.

Add a target

Target name: (e.g. "M82" or "Eagle Nebula")

Right Ascension:

Declination:

3 color images?

Use single filter?

Exposure time (s) **How many times?**

×

Or select a target

NGC1555	Herbig-Haro Object?
NGC772	Barred Galaxy?
HCG18	Interacting Galaxies?
IC349	Reflection Nebula?
M74	Galaxy?
HCG20	Group of Galaxies?
HCG17	Compact Group of Galaxies?
M33	Spiral Galaxy?
NGC1514	Planetary Nebula?
Pal2	Globular Cluster?
NGC925	HII Galaxy?
NGC959	Spiral Galaxy?
NGC949	Galaxy in Group of Galaxies?
NGC1023	Barred Galaxy?
HCG15	Group of Galaxies?
NGC1589	Spiral Galaxy?
NGC1587	Elliptical Galaxy?
NGC1642	Spiral Galaxy?
NGC1003	Galaxy in Group of Galaxies?
M77	Seyfert 2 Galaxy?

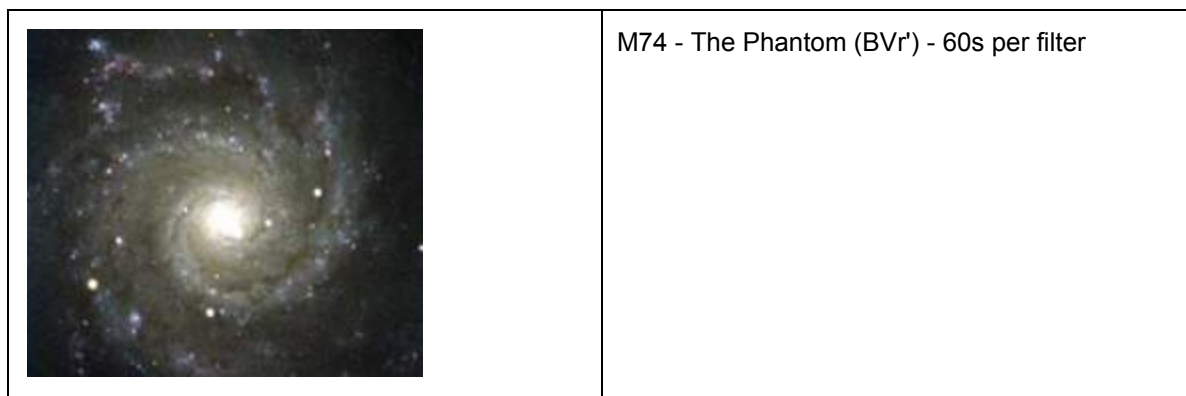
The table below shows some typical exposures (per filter) for astronomical objects:

Object Type	Typical Visual Magnitude (brightness; lower numbers mean a brighter object)	Lower Limit (seconds)	Usual Exposure Range (seconds)	Better Images (seconds)
Galaxy	13	30s	60s	at least 120s
Nebula	13	30s	60s	at least 120s
Globular Cluster	13	30s	60s	at least 120s

Open Cluster	6	2-5s	5-30s	-
Planetary Nebula	9	10-20s	30-40s	-
Asteroids	11		1-60s	
Planets	-2	-	0.01	-
Bright Stars		Do not image very bright stars.		
The Moon		The Moon is too large and too bright to be imaged with an LCOGT telescope.		
The Sun		The Sun is much too bright to be imaged with an LCOGT telescope. The telescope will not allow this to happen.		

As you can see, the exposure ranges used are very broad. These suggested exposure times are only guidelines and are dependent on the magnitude (brightness) of the object. Saturation of the images may occur with these exposure times; the 'best' exposure time will depend on the atmospheric conditions as well as the magnitude of the object.

The images below show how exposure time affects the image of the galaxy M74. Each successive exposure is half the length of time than the one before it. Each image is a composite colour image using red (r'), green (V) and blue (B) filters.





M74 - The Phantom (BVR') - 30s per filter



M74 - The Phantom (BVR') - 15s per filter



M74 - The Phantom (BVR') - 8s per filter



M74 - The Phantom (BVR') - 4s per filter

It is quite obvious that as the exposure time is shortened there is less detail visible and more noise visible in the images. However, the first two are similar and it may be that you will need to consider whether an exposure that is half the length of another is sufficient for your purposes. The obvious benefit being that you are using less of your observing time in this way and can image more objects with your allocated time.

The following images show another object imaged by an LCOGT telescope with various exposure times.



Exposure time of 10 seconds



Exposure time of 20 seconds

The two images above are colour images of globular cluster, M72. You can see that the second image is brighter and offers more details in the outer regions of the cluster. However, the first image has more detail in the centre of the cluster where in the second it is over-exposed. It is up to you to decide how you want your image to look and where you want the detail.

Number of observations

The final step before submitting your Observation Request is to decide how many images you want to take with the parameters you have chosen. If you want to take multiple images of this object using different filters, for example, you will need to submit a separate Observation Request for each filter. To change the number of observations simply use the 'up' and 'down' arrows.

Observation Request Elements

You may want to submit an Observation Request for more than one object. To do this simply click "Add extra target" (indicated by the red circle in the image below), and click 'Add a Target'. This will take you back to the Observation Request form and you will need to fill in each field for your new target object.

You can add as many objects as you like with the following constraints:

1. If you have booked a slot, the totally observing time cannot exceed the length of the slot
2. You cannot go over your credit allocation

The screenshot shows the LCOGT Observatory On Sky LIVE interface. At the top, there is a navigation bar with the logo and links for Home, Submitted, Management, Feedback, and Help. Below this, the project name 'Test Project: On Sky galaxies' is displayed, along with 'Submit', 'Refresh', and 'Trash' buttons. A star chart shows the field of view with targets NGC772, NGC859, and IC1747 marked. The 'Observation Plan' section is highlighted with a blue border and contains two target entries:

Target	RA	Dec	Telescope	Filter	Binning	Duration	Exposures	Time Slot	Status
NGC772	29.8315917	19.0075389	2m0	B	2	2m	1	2014-08-28 15:00:00 → 2014-08-28 15:20:00	✓
IC1747	29.3988917	63.3217583	2m0	H-Alpha	2	3m	1	2014-08-28 15:00:00 → 2014-08-28 15:20:00	✓

An 'Add extra target' button is circled in red in the top right corner of the observation plan section.

Submitting your Observation Request

When you have completed your Observation Request and added all target objects, the next step is to check that all of your requests are suitable. On the right side of each of your request elements there will be a symbol; a green tick signifies that you can go ahead and submit your proposal. If your request is unsuitable there will be a small red symbol, hover over this for further explanation. All of your targets must be deemed suitable before your Request can be submitted.

*If you cannot submit your proposal and do not understand why, return to your home page and select 'Contact <your project> support'.

Observation Request Status

From the home page, click “Check on your observations” to view the status of your observations. You will see ‘request status’ e.g. Unscheduleable/ Cancelled/ Pending. From this page you can also cancel any Observation Requests. If you click on the title of your Observation Request you will see a list of all the target objects you submitted with the status of each object.

On Sky Viewer

This is the “live” or “real-time” experience of On Sky. If you requested observations in a slot, clicking on the title of your Observation Request will open it in the On Sky Viewer. This page will automatically refresh with new information about your requests, including the images when they are taken.

Recent Observations

To view your previous observations log in and go to your home page at lcogt.net/observe. Scrolling down you will see the section named ‘Your Recent Observations’ followed by all your previous observations in chronological order. For a quick view of the details of these observations, including the object name, filter and exposure time, simply toggle over the blue box in the right hand corner of the image.

LCOGT

Your quota:
430 mins of queue credit on the 1-meter network
300 mins of queue credit on the 2-meter network



[Request observations](#) [Check on your observations](#)

[Contact LCOGT Education support](#)

Proposal: LCOEPO2
Object: M16
Filter: zs
Exposure time: 45 sec
Date: 25 hours ago

25 hours ago 37 hours ago 2 days ago 7 days ago 9 days ago 9 days ago 9 days ago

9 days ago 10 days ago 14 days ago

On this page you can also choose to duplicate an observation request by selecting the  icon to the left of the request. To cancel a request simple select the  icon next to the request, the status of the request will then change to '**Cancelled**'.

FITS images

A FITS file is a raw data file for astronomical image. One is created from each observation which can then be used to do your own image processing and for scientific research. Each of these files is quite large.

To access the FITS file for your observation, go to 'check your observations' from your home page and finding the correct observing session. The FITS images for all completed requests will be presented on this page. Click on the image you'd like to download and it will open on a new page. From here, simple click 'Download'. The FITS files can be used to do your own image processing and for scientific research.

LCOGT.net **Observatory** Home Submitted Feedback Help

Browse Save **cpt1m012-kb75-20140721-0151-e00.fits** Reduction Level: REDUCED Send Link...

Home
Return to LCOEPO2
cpt1m012-kb75-20140721-0183-e00.fits
cpt1m012-kb75-20140721-0151-e00.fits
cpt1m012-kb75-20140721-0099-e00.fits

X:0 Y:0 Value:0 RA: 0:00:00.00 DEC: 0:00:00.00 To center:0" ? Version: 0.4.2.0
Move Line Cross Circle Source Data Cross-Hair Header Download...

You will need to download software that will allow you to view your FITS file once it has been downloaded. There are several applications available for free online, including FITS Liberator or SAOImage DS9. Both of these applications have the added benefit of allowing you to convert your FITS files to image formats such as JPEG or TIFF.

Download FITS liberator from:

http://www.spacetelescope.org/projects/fits_liberator/download_v301/

Download SAOImage DS9 from:

http://www.spacetelescope.org/projects/fits_liberator/download_v301/

Additional Information

The LCOGT network includes 11 telescopes in five different global locations, offering users a larger chance of successfully scheduling an observation, there is more telescope time available and while factors such as bad weather are always an issue, if one telescope is out of action,

your observation may be scheduled to an alternate telescope. However, once you've submitted your observation proposal you can track its progress by going to your home page (<http://lcogt.net/observe/>) and selecting 'check on your observations'. You will see a list of all your previous and current observations and their status. Select your 'Pending' project and find out what the current status is.



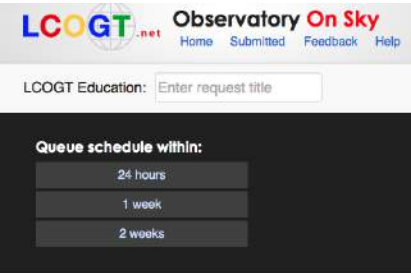
Check the status of all LCOGT sites - <http://telops.lcogt.net>

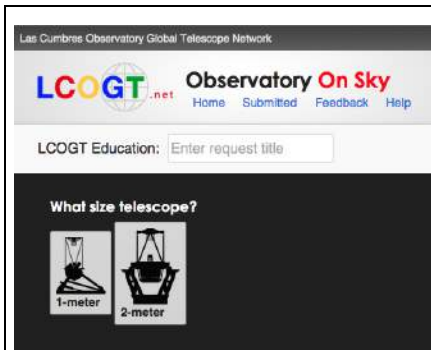
Check the recent weather at LCOGT network sites - <http://lcogt.net/weather/>

Look at all the webcams at LCOGT sites - <http://lcogt.net/network/webcams>

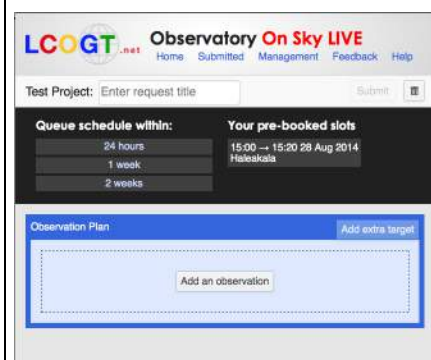
Using On Sky (quick reference)

When you have been issued a username and password you can log in to the restricted area of the website and book an observation using the telescopes. Details of the process that you will go through to request an observation are shown below.

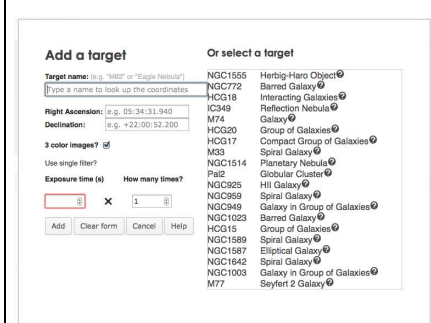
	<p>On Sky Projects:</p> <p>The first page you are directed to upon logging in to On Sky is your observation homepage. On this page you will see a list of your projects. To the right of each project will be your available observing quota in minutes (per telescope class). Once you have selected the project with available observing time, select 'Book a Slot' or 'Request Observations'.</p>
	<p>Book a Slot:</p> <p>You can use this option to specify an exact time for your observations. The available dates will be highlighted on the calendar.</p>
	<p>Request Observations:</p> <p>This option is suitable if you have not been allocated a specific time slot for your observation. First you will need to select the time period within which you need your observations; '24-hours', '1 week' or '2 weeks'.</p>



Once you have chosen a time period to schedule your observation, you will be asked to select a class of telescope to perform your observation. Select either the '1-metre' class or '2-metre' class.

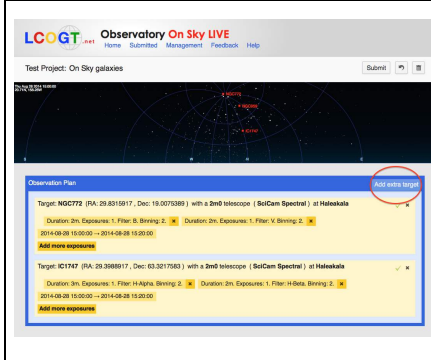


On the next page enter a request title as indicated at the top of the page and select the option 'Add an Observation'. The first information you will be asked for is the object you wish to observe.



You now need to select your target (either from the suggestions or by entering the name). Then set the telescope exposure settings. Next, select which filter(s) you wish to use. Then you need to choose an exposure time and number of observations.

Once you have chosen your parameters click 'Add'.



The next page shows each of the observations you wish to request. If you would like to request any additional observation click "Add extra target" at the top right of the page and set the parameters for your new observation.



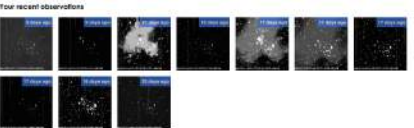
Once all of your targets have been added and you are ready to submit your observation request, click '**Submit**'.

Title	Project	Submitted at (UTC)	Request State
On Sky pipeline	LOOGT/Hello/Hello	2011-02-08 13:07:03	PENDING
Multi-Frame 11	LOOGT/Hello/Hello	2011-07-08 13:08:07	UNSCHEDULABLE
Multi-Frame 2	LOOGT/Hello/Hello	2011-07-08 13:08:08	UNSCHEDULABLE
VISOR	LOOGT/Hello/Hello	2011-07-08 13:08:09	UNSCHEDULABLE
Multi-Frame 3	LOOGT/Hello/Hello	2011-07-08 13:08:14	UNSCHEDULABLE
Multi-Frame 4	LOOGT/Hello/Hello	2011-07-08 13:08:14	UNSCHEDULABLE
Multi-Frame 5	LOOGT/Hello/Hello	2011-07-08 13:08:14	UNSCHEDULABLE
Multi-Frame 6	LOOGT/Hello/Hello	2011-07-08 13:08:14	UNSCHEDULABLE
Multi-Frame 7	LOOGT/Hello/Hello	2011-07-08 13:08:14	UNSCHEDULABLE
Multi-Frame 8	LOOGT/Hello/Hello	2011-07-08 13:08:14	UNSCHEDULABLE
Multi-Frame 9	LOOGT/Hello/Hello	2011-07-08 13:08:14	UNSCHEDULABLE
Multi-Frame 10	LOOGT/Hello/Hello	2011-07-08 13:08:14	UNSCHEDULABLE
Multi-Frame 11	LOOGT/Hello/Hello	2011-07-08 13:08:14	UNSCHEDULABLE
Multi-Frame 12	LOOGT/Hello/Hello	2011-07-08 13:08:14	UNSCHEDULABLE
Multi-Frame 13	LOOGT/Hello/Hello	2011-07-08 13:08:14	UNSCHEDULABLE
Multi-Frame 14	LOOGT/Hello/Hello	2011-07-08 13:08:14	UNSCHEDULABLE
Multi-Frame 15	LOOGT/Hello/Hello	2011-07-08 13:08:14	UNSCHEDULABLE
Multi-Frame 16	LOOGT/Hello/Hello	2011-07-08 13:08:14	UNSCHEDULABLE
Multi-Frame 17	LOOGT/Hello/Hello	2011-07-08 13:08:14	UNSCHEDULABLE
Multi-Frame 18	LOOGT/Hello/Hello	2011-07-08 13:08:14	UNSCHEDULABLE
Multi-Frame 19	LOOGT/Hello/Hello	2011-07-08 13:08:14	UNSCHEDULABLE
Multi-Frame 20	LOOGT/Hello/Hello	2011-07-08 13:08:14	UNSCHEDULABLE

You will be taken to your **Submitted** page listing all of your observation requests, with the status of each observation including whether the request was **cancelled** or **completed** and if the observation is **pending** or was **unschedulable**.



When your observation is completed you can access the images by clicking on your chosen project. On the next page, select '**toggle thumbnails**' and click on the image that appears.



Your image will appear in a new window. You can save the image as a FITS file by clicking **Download**.

All of your observations can also be viewed by going back to your **Observation Homepage** and scrolling to the bottom of the page.