Maxim DL

Maxim DL is currently the main interface for controlling the observatory and cameras as well as for performing the observations.

Interface und grundlegende Bedienung

Maxim DL can be started most easily by double-clicking on the icon Maxim DL 6 on the desktop or via the taskbar.

Main window

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Observatory Panel

The **Observatory** control window has different tabs to control the different parts of the observatory. You can move to objects by entering their coordinates, selecting them from a catalog or marking them on an all-sky map. The dome can be opened, closed, and if necessary moved manually. Furthermore, the telescope can be moved manually via this control window and parked again after the observations are finished.

Setup tab

The setup tab is used to establish the connection to the telescope, the dome, and the focuser. You



can click on the **Connect** button behind the respective entry or on **Connect All** to establish the connection to all components simultaneously. All other entries like **Rotator** are not relevant for us.

Observatory ? X	Observatory ? X
All Sky Zoom Catalog Telescope Dome Focus Status Weather Webcam Setup	All Sky Zoom Catalog Telescope Dome Focus Status Weather Webcam Setup
Options Connect All	Options Connect All
Telescope Connect Disconnect • 10Micron Mount	Telescope Disconnect • 10Micron Mount
Focuser 1 Connect Disconnect PlaneWave Focuser (PWI3)	Focuser 1 Disconnect • PlaneWave Focuser (PWI3)
Focuser 2 Connect Disconnect No Device Selected	Focuser 2 Connect Disconnect No Device Selected
Dome Connect Disconnect Generic Driver for Baader Dome	Dome Disconnect Generic Driver for Baader Dome
Rotator Connect Disconnect No Device Selected	Rotator Connect Disconnect No Device Selected
Webcam Connect Disconnect SKYRIS 445C	Webcam Disconnect SKYRIS 445C
Switch Connect Disconnect No Device Selected	Switch Connect Disconnect No Device Selected
Botwood CS Connect Disconnect Unavailable	Botwood CS Connect Disconnect Unavailable
Davis Connect Disconnect Not Connected	Davis Connect Disconnect Not Connected
Conditions Connect Disconnect No Device Selected	Conditions Connect Disconnect No Device Selected
Atto Shuddown IF Enable Shuddown Options	Auto Shutdown Frable Shutdown Gottons



Setup tab - Telescope, dome, and focuser connected

In order to disconnect the devices after the observation, you can click on the individual **Disconnect** buttons or on **Disconnect All**.

Dome tab

The **Open** and **Close** buttons can be used to open and close the dome. The dome always opens or closes completely. It must be ensured that the **Slave Dome To Scope** option is activated, otherwise the dome will not follow the telescope. Unfortunately, this option turns off every time the dome is opened, closed, or the telescope is parked.



Dome closed

Dome open

The dome can be moved manually via the functions in the **Position** box. This is especially useful when the telescope and the slit are not correctly aligned and the dome needs to be recalibrated. On the example shown above, the alignment is not optimal but still so good that the telescope does not look at the dome.

Telescope tab

The telescope tab shows in the upper left area where the telescope is currently looking and which action it is currently performing. The right ascension and declination are displayed for the current date as well as for the standard epoch J2000. Furthermore, the altitude above the horizon and the azimuth are displayed. In the example shown below, the telescope is tracking and apart from that is

inactive.

Observatory

All Sky Zoom Cata	log Telescope Dome Focus Status Weather Webcam Setup
Connected, Tracking RA 18h 51m 55s, Dec RA 18h 50m 52s, Dec Alt 1.77°, Az 275.56° Idle	+04° 47' 40'' (JNow) +04° 46' 06'' (J2000) Abort
Nudge	
NE N NW	
E W	Dec +59:08:59 Sync
SE S SW	Angle 0 🚊 0n C JNow © J2000
	Center on Image
<u> </u>	Select Center (or use image Calibrate
Mount	
Park Unpark	
Sidereal Tracking	Site and Optics
Stop Start	
	Limits and Hip Setup Auto Exposure

The buttons in the **Nudge** section can be used to move the telescope manually, with the step size selected via the drop-down menus. Each movement can again be aborted via the **Abort** button.

In the **Target Coordinates** area you can enter the right ascension and declination of an object and slew to it via the **Go To** button. The **Zoom To** button switches to the Zoom tab, which displays a map of the sky at the respective coordinates.

The **Park** button in the **Mount** area can be used to park the telescope after the observation.

Catalog tab

Using the Catalog tab, the built-in catalogs can be searched for objects. To do this, first select a category from the **Category** drop-down menu. You can choose between Stars, Deep Space and Solar System. From the drop-down menu **Object ID** either the object directly or a catalog can be selected. In the latter case the catalog number of the object, or only a part of it, can be entered (see example below). After a click on **Search** a list of possible objects is displayed. The desired object can be selected from this list. With a click on **Go To** the object is approached.

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Observatory												?	×
All Sky Zoom	Catalog	Telescope	Dome Focus St	atus Weather	Webo	am Set	tup						
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-Object ID Sea	Object ID Search - Review Search - Options - Decision Search - Options												
			1 10		_								
Category		Criterion	Min	Ma	x								
Deep Space	-												
Object ID													
NGC 381	-												
		ļ											
		Add E	dit Remove										
Search	Cancel										Zoom To	Syn	с
Search Results:	found 11	objects									Go To	Abe	ort
ID1	ID2	Туре	RA	Dec	Mag	Size	HA	Alt	Az	Sle			^
NGC381		Open Cluster	01h 08m 18s	61° 35' 00"	9.3	7'	01h 51m 17s	72.5°	312.8°	77.6°			
NGC3810	PGC3	Galaxy	11h 40m 59s	11° 28' 11"	11.3	4' x 3'	15h 18m 52s	-13.3°	50.2°	126.9°			
NGC3812	PGC3	Galaxy	11h 41m 08s	24° 49' 19"	13.6	2' x 2'	15h 18m 42s	-1.6°	43.9°	122.4°			
NGC3811	PGC3	Galaxy	11h 41m 17s	47° 41' 26"	12.9	2' x 2'	15h 18m 32s	18.6°	32.8°	111.2°			
NGC3813	PGC3	Galaxy	11h 41m 18s	36° 32' 46"	12.3	2' x 1'	15h 18m 31s	8.8°	38.3°	117.1°			
NGC3814	PGC3	Galaxy	11h 41m 28s	24° 48' 18"	15.7	0' x 0'	15h 18m 22s	-1.6°	43.8°	122.4°			
NGC3815	PGC3	Galaxy	11h 41m 39s	24° 47' 59"	14.1	2' x 1'	15h 18m 10s	-1.6°	43.8°	122.3°			
NGC3816	PGC3	Galaxy	11h 41m 48s	20° 06' 11"	13.5	2' x 1'	15h 18m 02s	-5.8°	45.9°	124.1°			
NGC3817	PGC3	Galaxy	11h 41m 53s	10° 18' 14"	14.2	1' x 1'	15h 17m 58s	-14.5°	50.6°	127.0°			b.d
INGC3818	PGC3	Galaxv	11h 41m 57s	-06° 09' 22"	12.7	2' x 1'	15h 17m 54s	-28.7°	59.5°	129.2°			~

Zoom tab

In the zoom tab, the sky map around the selected object is displayed. Via the option button (arrow) on the right and via the context menu, many options are accessible, such as the zoom level. If one clicks with the right mouse button on any point of the map, one can slew the telescope to this point via Slew to Mouse Position. If you click on an object, it can be selected directly. In the example below the corresponding option is Slew tp 119 Tau.



All Sky tab

The All Sky tab shows the current sky. By right-clicking, you can zoom into any area. When you do that you will be redirected to the zoom tab. The option button (arrow) on the right provides access to many setting options.

2025/03/26 20:04	5/11	Maxim DL
Observatory		? ×
All Sky Zoom Catalog Telescope Dome Focus Status Mouse RA: 04h 43m 03s Mouse Dec: -33° 45' 07" Mouse At: 03° 40' 47" Mouse Az: 175° 00' 43"	Weather Webcam Setup	Options 🕨
	Mison Mars	

Camera Panel

The **Camera Control** window can be used to control the cameras and take the images.

Setup tab

As the name suggests, this window is used to connect the cameras to Maxim DL. This is done slightly differently for each camera manufacturer. Here, we will discuss the procedure for QHYCCD cameras and for SBIG cameras, since these are the cameras we primarily use. For each camera model, the appropriate driver must be selected. This must be done for the actual camera as well as for the filter wheel. If a guiding camera is to be used, it must also be connected here. Normally the guiding camera is connected as **Camera 2**, while the main camera is connected as **Camera 1**.

Camera Control		? ×
Expose Guide Setup		
Camera 1 Setup Camera Cooler	Camera 2 Setup Camera Cooler	Connect
ASCOM	No Camera	Disconnect
Options Dual	Options	On Off
Setup Filter Mode	Setup Filter	Warm Up
ASCOM	No Filters	Less <<
	Camera 1 Information G	uider Information
3D(1)		

The first thing to do, regardless of the manufacturer, is to click on **Setup Camera**.

Connecting QHYCCD cameras:

In the window that opens, select ASCOM from the **Camera Model** drop-down menu and then click **Advanced...** (step 1). After that another window will open. In this window, select QHYCCD-Cameras-Capture from the dropdown menu and click on **Properties...** (step 2). After that, the settings menu for the **ASCOM** driver for the QHYCCD cameras opens. **ASCOM** is the basic interface through which many of the observatory's operations are controlled.

Setup ASCOM	? ×	😽 ASCOM Camera Chooser	×	ASCOM.QHVCCD.Camera SETUP (Any CPU)	×
ASCOM Plug in Version 6.21.3 Copyright © 2009-2020 Diffraction Limited Support: www.cyanogen.com	OK Cancel	Trace		Camera: OHY600M-3eda8b4698898cbfd	
Camera Model	Advanced	Select the type of camera you have, then be sure to click th Properties button to configure the driver for your camera.	e	Gain/Offset Setting	Advanced Remove OverScan Area
Min. Exposure (s) Exp. Start Time 0.001 • Maxim DL •		QHYCCD-Cameras-Capture Properties		Presets: DSO	
Connecting the QHY600M	1 -	Click the logo to learn more OK	_	Binning Setting	
Step 1		about ASCOM, a set of standards for inter-operation of astronomy software		Bin Mode: O BIN 1*1 O BIN 2*2	ReadMode: PhotoGraphic DSO 16B
		ASCOM databasi solundic.		Readout Speed	Firmware Version:20-6-28 OK
		Connecting the QHY600M -		USBTraffic: 50	SDK Version 20.6 26.0 Ascom Driver Version 20.6 26.1 Cancel
		Step 2		Connecting the (QHY600M -
				Step 3	

In the last step (3) all important settings for the **ASCOM** driver can now be configured. These include the readout mode, which can be selected from the **ReadMode** drop-down menu. The following can be selected: PhotoGraphic DSO 16bit, High Gain Mode 16bit, Extend Fullwell Mode and Extend Fullwell 2CMS. Under **Gain/Offset Setting** the **Gain** and **Offset** can then be set. These settings can be saved as **Preset**. In addition, the **Remove Overscan Area** option should also be activated for scientific images. Afterwards, all three windows can be closed by clicking **OK**.

Connecting QHYCCD filter wheels:

To connect a filter wheel, first click on **Setup Filter**.



Connecting SBIG cameras:

Still to come ...

Connecting SBIG filter wheels:

Still to come...

Final Step:

Now **Connect** has to be clicked. Then the cooling can be activated under **Coolers** and the target temperature can be set under **Cooler**.

🜗 Camera Control		? ×
Expose Guide Setup		
Camera 1 Setup Camera Cooler	Camera 2 Setup Camera Cooler	Connect
ASCOM	No Camera	Disconnect
Options Dual Setup Filter Mode	Options Setup Filter	Coolers
ASCOM	No Filters	Less <<
	Camera 1 Information Gu	uider Information
3D(1)		

Expose tab

In this tab you will find, on a small space, the most important settings regarding the recording of the images. Predefined setting sets can be found under **Exposure Preset**, where new ones can also be created. The most important setting is the exposure time (**Seconds**). To the right of this is the status information line, which shows what the camera is currently doing. In the example below the camera is idle.

The filters can be found under **Filter Wheel**. The binning options are accessible via the two dropdown menus **X Binning** and **Y Binning**. Furthermore, the readout mode (**Readout Mode**) can be selected, which is important for the QHY600M. The basic operation modes are **Single**, **Continuous**, and **Autosave**. In the first mode only a single exposure is made, whereas in the last one entire exposure series can be made. In the **Continuous** mode, images are created and displayed one after the other. This mode is particularly suitable for focusing. In the corresponding article, we also go into more detail about the lower three panels. Further options are accessible via **Options** (arrow button).

Exposure Preset Seconds Start *Grap default Idle Idle Start Stop Stop Single Continuous Autosave Options Iters Wheel V Same Camera 1 Start Start Stop Single Continuous Autosave Options Less < Camera 1 Camera 1 Camera 1 Camera 1 Start Start Start Stop Start Stop Continuous Autosave Options Less < Max Pixel = 33098 WHM = 8.43 Haif Flux Dia. = 113.95 SNR = 53.33 SNR = 53.33 SNR = 53.33 SNR = 53.33 Sont Sont Sont Sont Sont Sont Sont Sont	Camera Control		? ×
Readout Mode Normal Image: Subframe Stop Speed Frame Type Image: On Mouse Image: On Single ISO Image: Ight Image: On Mouse Image: On Autosave Filter Wheel X Binning Y Binning Options Image: Options U Image: Options Image: Options Image: Options Image: Options Image: Options Image: Options Image: Options Image: Options Image: Options Image: Options Image: Options Image: Options Image: Options Image: Options Image: Options Image: Options Image: Options Image: Options Image: Options I	Exposure Preset	Seconds	Start
Filter Wheel X Binning Y Binning Options U Image: Comparison of the second secon	Readout Mode Normal Speed Frame Type USO The light	Subframe □ On ☑ Mouse X: 0 Y: 0 W:4788 H:3	Stop Single C Continuous Autosave
Camera 1 Information Camera Idle Cooler power 93% Sensor Temp -12.9 Setpoint: -13.0 Camera 1 Statistics Camera 1 Statistics Max Y = 1518 Max Pixel = 33098 FWHM = 8.43 Half Flux Dia. = 113.95 SNR = 53.33	Filter Wheel	X Binning Y Binning 2 V Same V	Camera 1 Camera 2 Camera 2
		Camera 1 Information Camera Idle Cooler power 93% Sensor Temp -12.9 Setpoint: -13.0	Camera 1 Statistics Camera Idle Max X = 2259 Max Y = 1518 Max Pixel = 33098 FWHM = 8.43 Half Flux Dia. = 113.95 SNR = 53.33

Guide tab

The Guide tab contains the most important settings for guiding the telescope. We will go into details in a guiding how-to.

Camera Control		? ×
Expose Guide Setup		
Seconds Filter Wheel	Scope Dec. Expose	Start
Auto Scope Dec. Guide		Stop
Auto Pier Flip Aggre Watch Star X 8	ssiveness	Ontions
C Camera 1 ⓒ Camera 2 Se	tings Move Alarms	Less <<
Å.,	Camera 1 Information Camera 2 In Camera Idle Camera Idle	formation
	Cooler power 92% Sensor Temp -12.9 Setpoint: -13.0	
3D(1)		

Screen Stretch Panel

Via the Screen Stretch Panel the scaling of the images can be influenced. In the first image below,

which shows M42, the scaling is set to Low. By increasing the scaling to Medium you will see much more details of M42. Many other helpful predefined scalings can be selected from the corresponding dropdown menu.



creen Stretch - Low scaling

Screen Stretch - Medium scaling Screen Stretch - Histogram zoom

Clicking on the plus symbol in the upper right section of the panel zooms into the histogram shown in the upper left section. This allows you to fine-tune the scaling via the red and green triangles, where the red triangle defines the black level and the green triangle the white level. The same can be achieved using the **Minimum** and **Maximum** fields.

Information Panel

The **Information Panel** is especially helpful to check if the image is overexposed and to find out which stars this may be due to. Here the values **Pixel** and **Maximum** are especially interesting for us. In the default Aperture mode the information is read from the cyan aperture shown on the image, which can be shifted e.g. to a bright star. If this is done, the signal-to-noise ratio (**SNR**) and the full-width-half-maximum (**FWHM**) are of interest as well. For our mostly uncalibrated images, values like the **Magnitude** are not relevant.



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