

Nighttime Imaging 'N' Astronomy





About Me



Stefan Berg, 37 years old



Lead Software Engineer



Creator and maintainer
of N.I.N.A.



Passionate
astrophotographer



Gamer



Cat person



N.I.N.A. in a nutshell



Versatile

N.I.N.A. offers a broad variety of capabilities. The toolset spans from framing, focusing, plate solving, sequencing, plugins and much more.



Equipment control

Control all common astrophotography equipment via ASCOM, Alpaca or native driver implementations



Approachable

Be it for beginners or for advanced astrophotographers, N.I.N.A. will keep configuration requirements to the minimum and will assist you through the process of imaging.

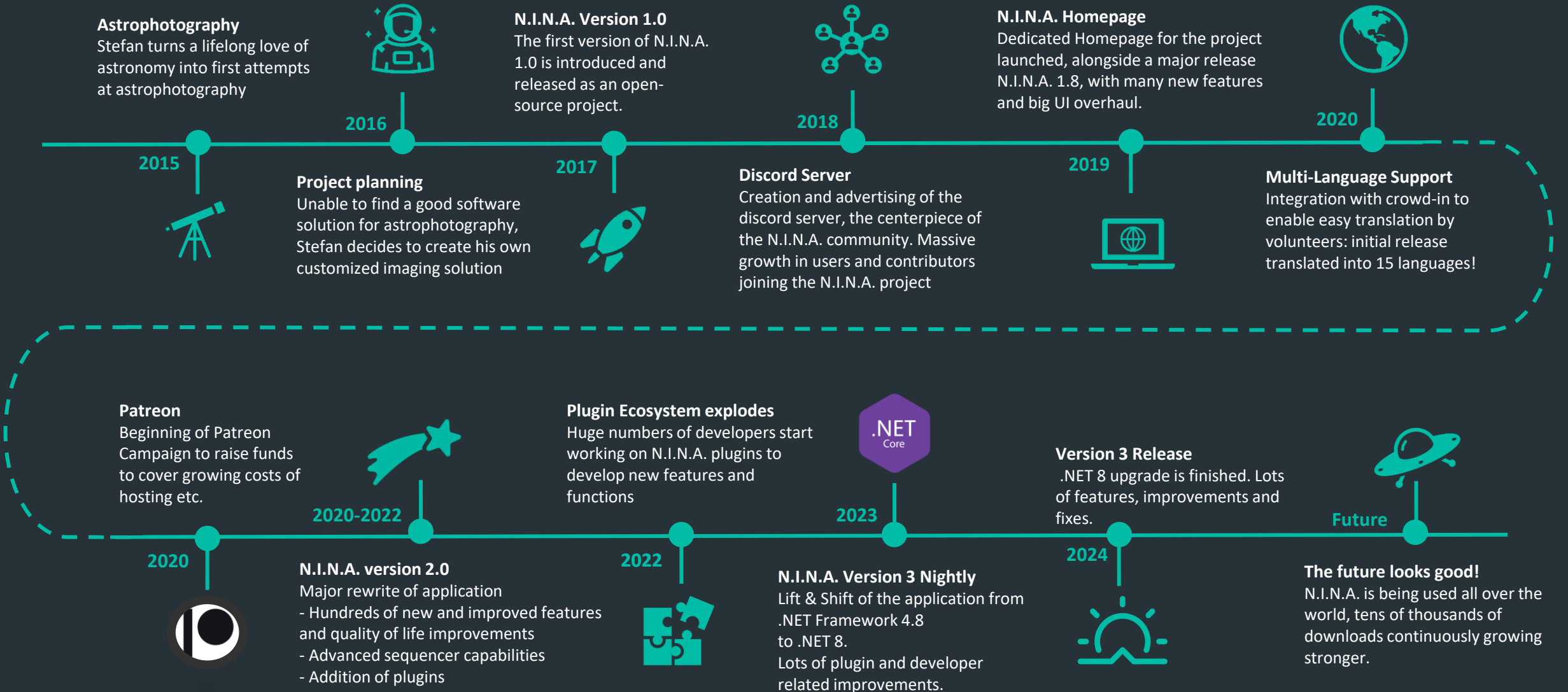


Open Source

This project is fully free and open source while welcoming every feedback and contributions. If you want to contribute, please refer to our contribution guidelines inside the repository.

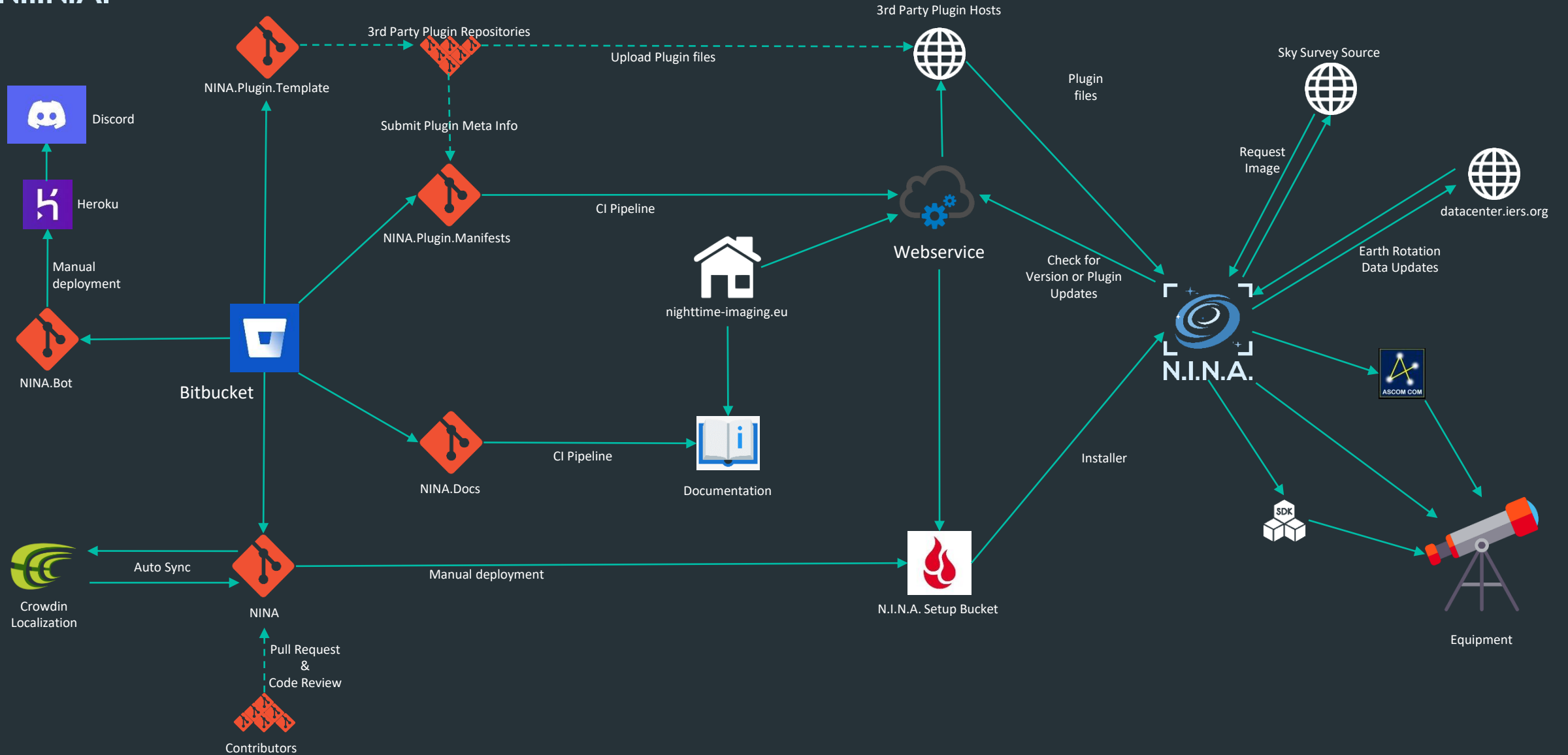


N.I.N.A. History - a timeline





N.I.N.A. Platform





Visit N.I.N.A.



Visit N.I.N.A.'s project homepage.

Feel free to look around. You can get lots of information and documentation about the project, as well as the latest setup builds to install and try out N.I.N.A.

Download the software at:

<https://nighttime-imaging.eu>



Question



Who of you have already
used N.I.N.A.?



Getting Started

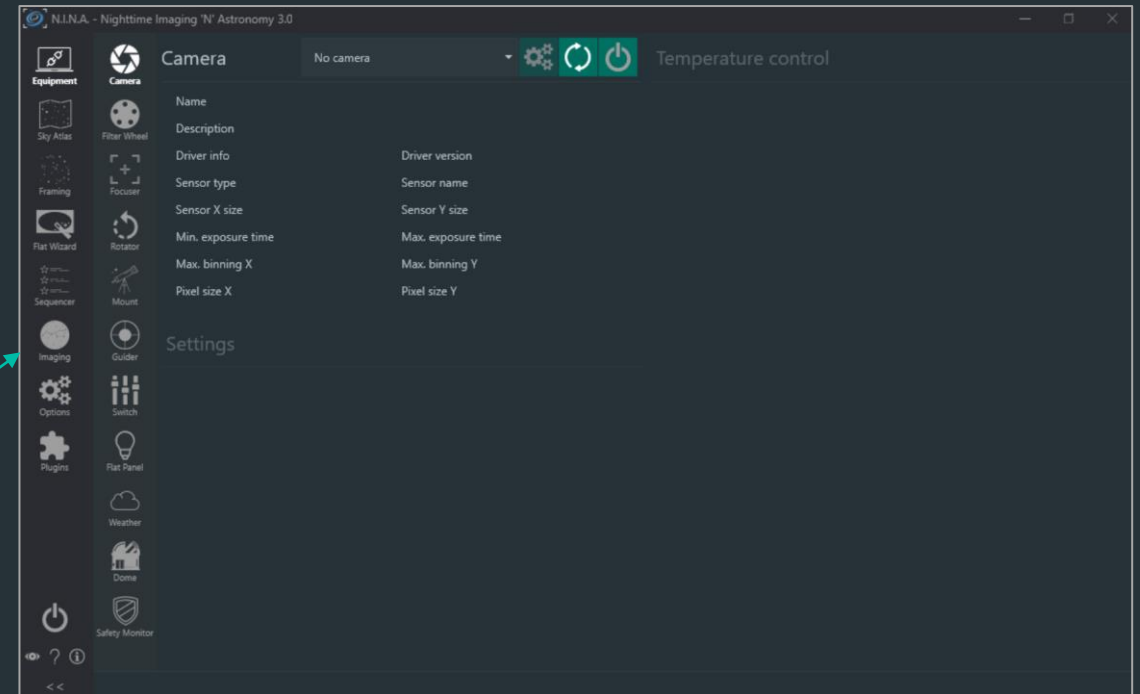
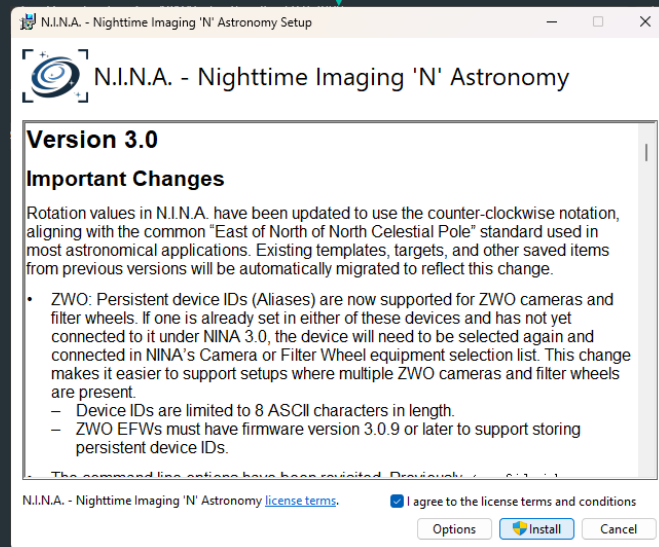


Releases

This is the latest stable released version of N.I.N.A.
The version did undergo testing and is stable to use for your imaging runs.

Version 3.0

[Download N.I.N.A. Setup x64 \[64 bit\]](#)





Supported Equipment



- Native Drivers
 - Shipped with N.I.N.A.
 - Utilize Vendor Software Development Kit (SDK) to interface directly with hardware
- Third Party Apps
 - Platesolving
 - Autoguiding
- ASCOM - <https://ascom-standards.org/>
 - Requires ASCOM Platform
 - Standard COM Drivers provided by vendors
 - Broad local compatibility across applications
- ASCOM Alpaca
 - Network drivers utilizing Alpaca standards
 - Enables remote device access





UNIVERSAL STANDARDS
FOR ASTRONOMY








- Choose relevant Device in Equipment Chooser
- Gears icon will show options or setup screen for selected device
- Hit refresh to rescan for devices
- Establish connection via power button


**Equipment**


Sky Atlas


Framing


Flat Wizard


Sequencer


Imaging


Options


Plugins


**Camera**


Filter Wheel


Focuser


Rotator


Mount

Guider

Switch

Flat Panel

Weather

Dome

Camera

N.I.N.A. Simulator Camera

Name

Description

Driver info

Sensor type




Sensor X size

Min. exposure time

Max. binning X

Pixel size X

Settings

No camera	
QHYCCD	QHY5LII-M (f33c7355)
Player One	Poseidon-C PRO (02109000)
ASCOM	Altair Astro Camera ASCOM Driver (ASCOM) Altair Astro Camera ASCOM Driver 2 (ASCOM) ASCOM Camera Driver for FLI (ASCOM) ASCOM Camera Driver for FLI Cobalt (ASCOM) ASCOM Camera Driver for FLI Kepler (ASCOM) Player One Camera 1 (ASCOM) Player One Camera 2 (ASCOM) Player One Camera 3 (ASCOM) QHYCCD-Cameras-Capture (ASCOM) QHYCCD-Cameras2-Capture (ASCOM) QHYCCD-Cameras-Guider (ASCOM) Camera V3 simulator (ASCOM) Sky Simulator (ASCOM) SVBONY Camera (ASCOM) Simulator (ASCOM)
ASCOM Alpaca	Alpaca Camera Sim @ 127.0.0.1 #0
Nikon	Nikon
N.I.N.A.	N.I.N.A. File Camera N.I.N.A. Simulator Camera



Target Planning



- Search a target for the night using N.I.N.A.'s built in deep sky object database
- 16857 objects are available
- Lots of filters to find a suitable target

Object name (e.g. M 31)

Observation

Date: 2024-03-14

Altitude: Above Horizon

from time: 20:22 (Astronomical Dusk)

through time: 04:58 (Astronomical Dawn)

visible for: 6h

Apparent size

Moon

Minimum distance: 60°

Object type

Constellation

Coordinates

Surface brightness

Apparent magnitude

Order by: Size

Descending

Items per page: 50

Search

Illumination: 23.02%

Moonrise: 08:52

Moonset: 00:35

Sunset: 18:36

Astronomical Dusk: 20:22

Astronomical Dawn: 04:58

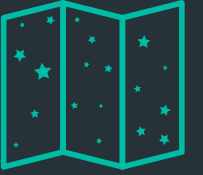
Sunrise: 06:44

Name	RA	Dec	Type	Constellation	Altitude
Dra dSph	17:20:14	57° 55' 16"	GALXY	DRA	81°
Draco Dwarf G					
Draco Dwarf Galaxy					
Draco Dwarf Spheroidal Galaxy	17:20:14	57° 55' 16"	GALXY	DRA	81°
Draco Galaxy	17:20:14	57° 55' 16"	GALXY	DRA	81°
Draco dSph Galaxy	17:20:14	57° 55' 16"	GALXY	DRA	81°
UGC 10822	17:20:14	57° 55' 16"	GALXY	DRA	81°
M 101	14:03:13	54° 20' 56"	GALXY	UMA	85°
Pinwheel					
Pinwheel Galaxy					
NGC 5457	14:03:13	54° 20' 56"	GALXY	UMA	85°
UMi	15:09:11	67° 12' 52"	GALXY	UMI	72°
UMi Dwarf Galaxy					
UMi Galaxy					
UMi dSph					
Ursa Minor					
Ursa Minor Dwarf Galaxy					
UGC 9749	15:09:11	67° 12' 52"	GALXY	UMI	72°
M 81	09:55:33	69° 03' 55"	GALXY	UMA	70°
Bode's Galaxy					
NGC 3031	09:55:33	69° 03' 55"	GALXY	UMA	70°
Caldwell 3	12:16:42	69° 27' 45"	GALXY	DRA	70°
NGC 4236					
UGC 7306	12:16:42	69° 27' 45"	GALXY	DRA	70°

Initial set of DSO data provided by: [Saguaro Astronomy Club Database version 8.1](#)



Target Planning



- Utilize powerful filters to sort out any target that is not available for the night
- Find targets that have enough distance from the moon for nights where moonlight is an issue

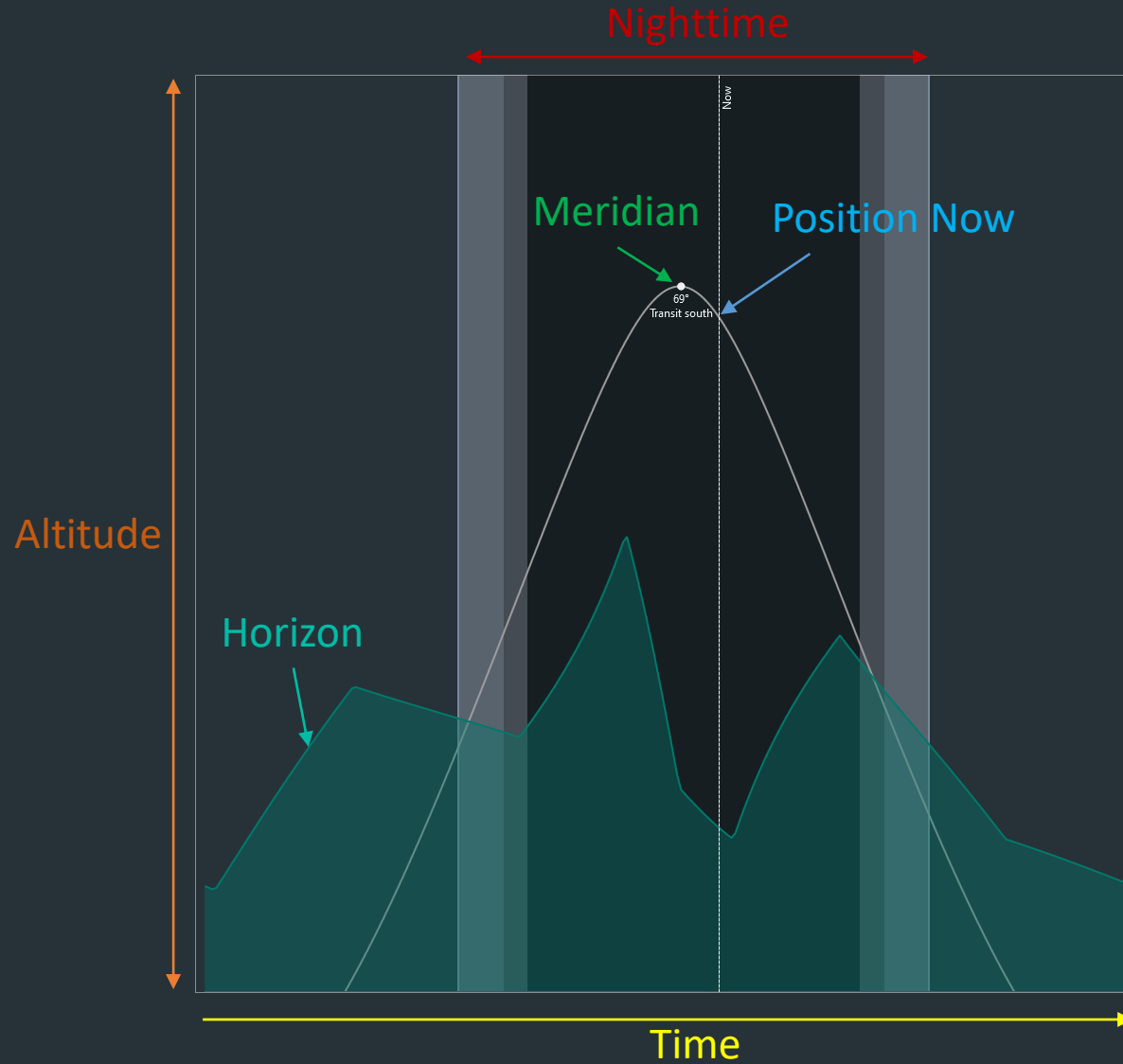
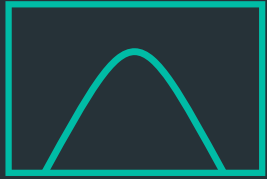
The screenshot displays a target planning interface with the following components:

- Filters Panel (Left):** A sidebar with a search bar and various filter options. The 'Observation' section is highlighted with a yellow box. It includes filters for Date (2024-03-14), Altitude (Above Horizon), from time (20:22), through time (04:58), visible for (6h), Apparent size, Moon, Object type, Constellation, Coordinates, Surface brightness, and Apparent magnitude. It also has 'Order by' (Size) and 'Descending' options, and 'Items per page' (50).
- Moon Information (Bottom Left):** A moon phase icon and a table of moon-related events:

Illumination	23.02%
Moonrise	08:52
Moonset	00:35
Sunset	18:36
Astronomical Dusk	20:22
Astronomical Dawn	04:58
Sunrise	06:44
- Target List (Center):** A table listing galaxies with their RA, Dec, Type, Constellation, and Altitude. Each entry includes a thumbnail image of the galaxy and a light bulb icon indicating its brightness.

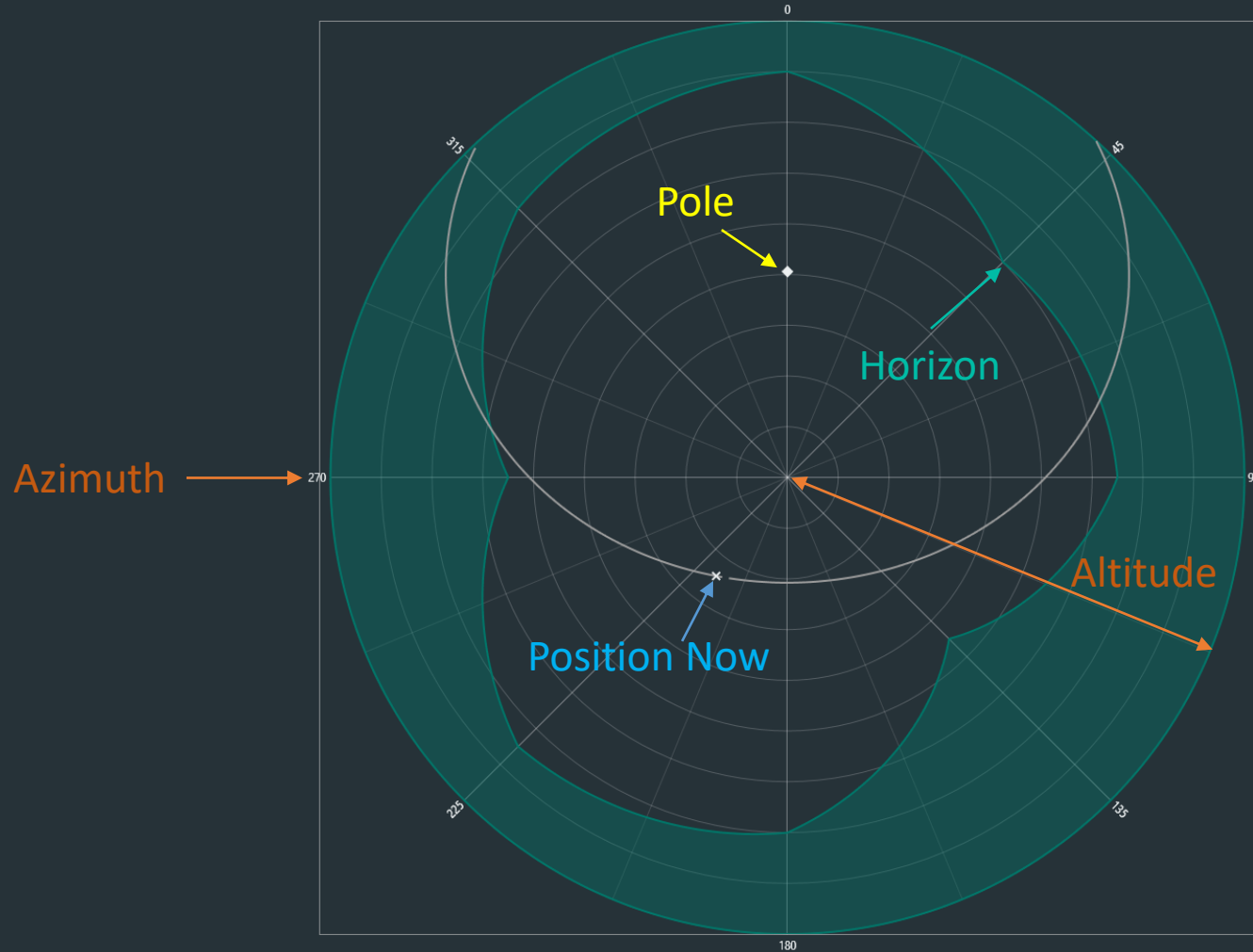
Name	RA	Dec	Type	Constellation	Altitude
Dra dSph	17:20:14	57° 55' 16"	GALXY	DRA	90
Draco Dwarf G					
Draco Dwarf Galaxy					
Draco Dwarf Spheroidal Galaxy	17:20:14	57° 55' 16"	GALXY	DRA	90
Draco Galaxy	17:20:14	57° 55' 16"	GALXY	DRA	90
Draco dSph Galaxy	17:20:14	57° 55' 16"	GALXY	DRA	90
UGC 10822	17:20:14	57° 55' 16"	GALXY	DRA	90
M 101	14:03:13	54° 20' 56"	GALXY	UMA	90
Pinwheel	14:03:13	54° 20' 56"	GALXY	UMA	90
Pinwheel Galaxy	14:03:13	54° 20' 56"	GALXY	UMA	90
NGC 5457	14:03:13	54° 20' 56"	GALXY	UMA	90
UMi	15:09:11	67° 12' 52"	GALXY	UMI	90
UMi Dwarf Galaxy	15:09:11	67° 12' 52"	GALXY	UMI	90
UMi Galaxy	15:09:11	67° 12' 52"	GALXY	UMI	90
UMi dSph	15:09:11	67° 12' 52"	GALXY	UMI	90
Ursa Minor	15:09:11	67° 12' 52"	GALXY	UMI	90
Ursa Minor Dwarf Galaxy	15:09:11	67° 12' 52"	GALXY	UMI	90
UGC 9749	15:09:11	67° 12' 52"	GALXY	UMI	90
M 81	09:55:33	69° 03' 55"	GALXY	UMA	90
Bode's Galaxy	09:55:33	69° 03' 55"	GALXY	UMA	90
NGC 3031	09:55:33	69° 03' 55"	GALXY	UMA	90
Caldwell 3	12:16:42	69° 27' 45"	GALXY	DRA	90
NGC 4236	12:16:42	69° 27' 45"	GALXY	DRA	90
UGC 7306	12:16:42	69° 27' 45"	GALXY	DRA	90
- Visibility Graphs (Right):** A series of graphs showing the altitude of each galaxy over time. The x-axis represents time from 12:00 to 12:00 the following day. The y-axis represents altitude in degrees (0 to 90). Each graph includes a moon phase indicator and a 'Transit north' label.
- Footer:** 'Initial set of DSO data provided by: [Saguaro Astronomy Club Database version 8.1](#)'

Understanding Altitude Charts





Understanding Azimuth Charts

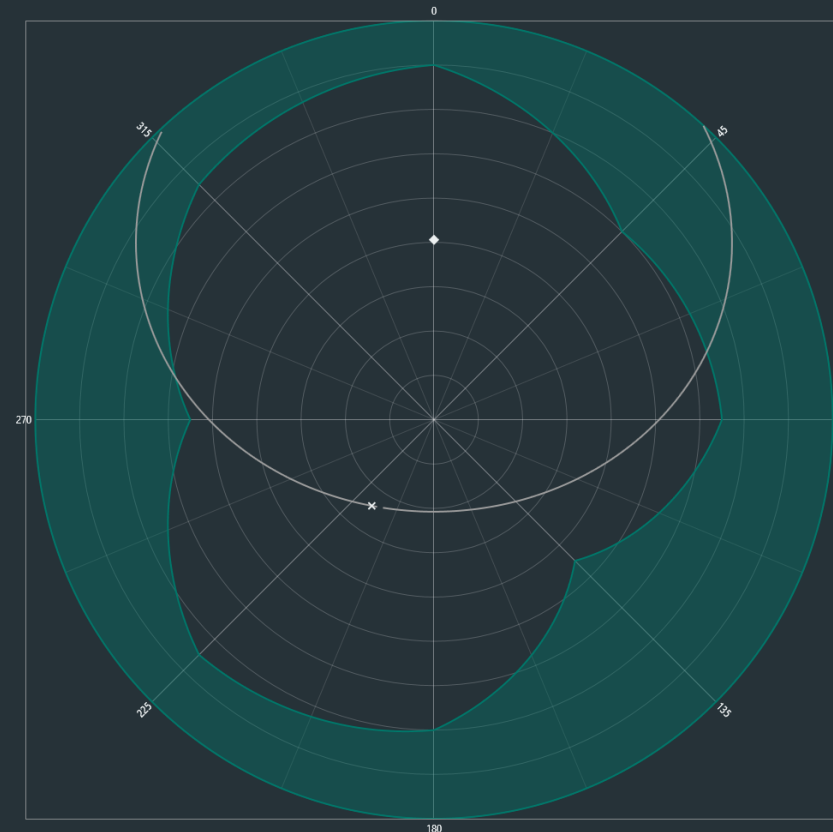
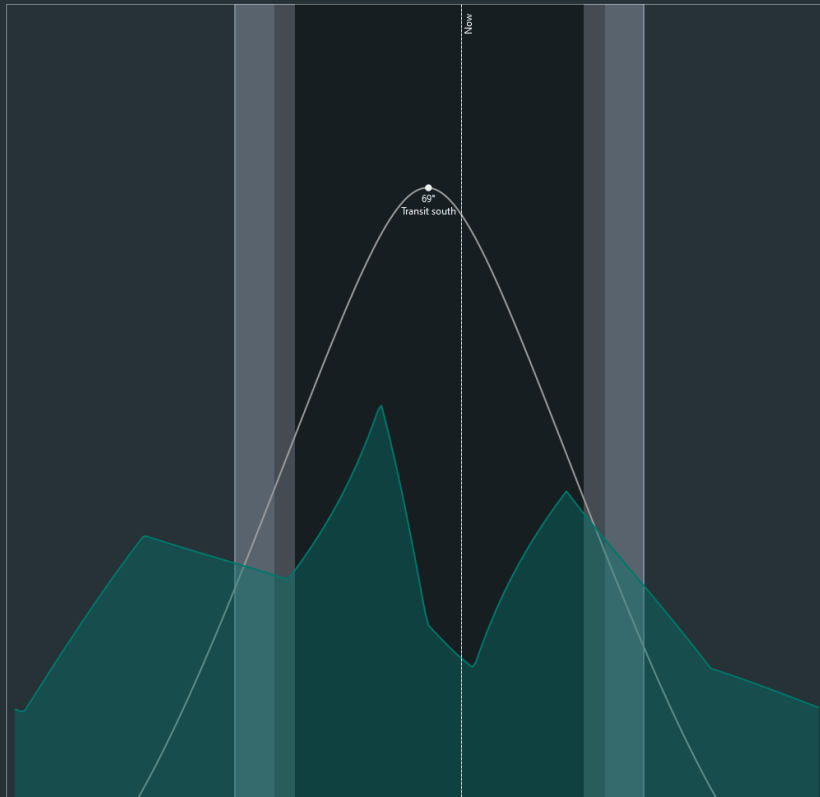




Local Horizon



- Setup your local horizon to utilize them in altitude and azimuth charts

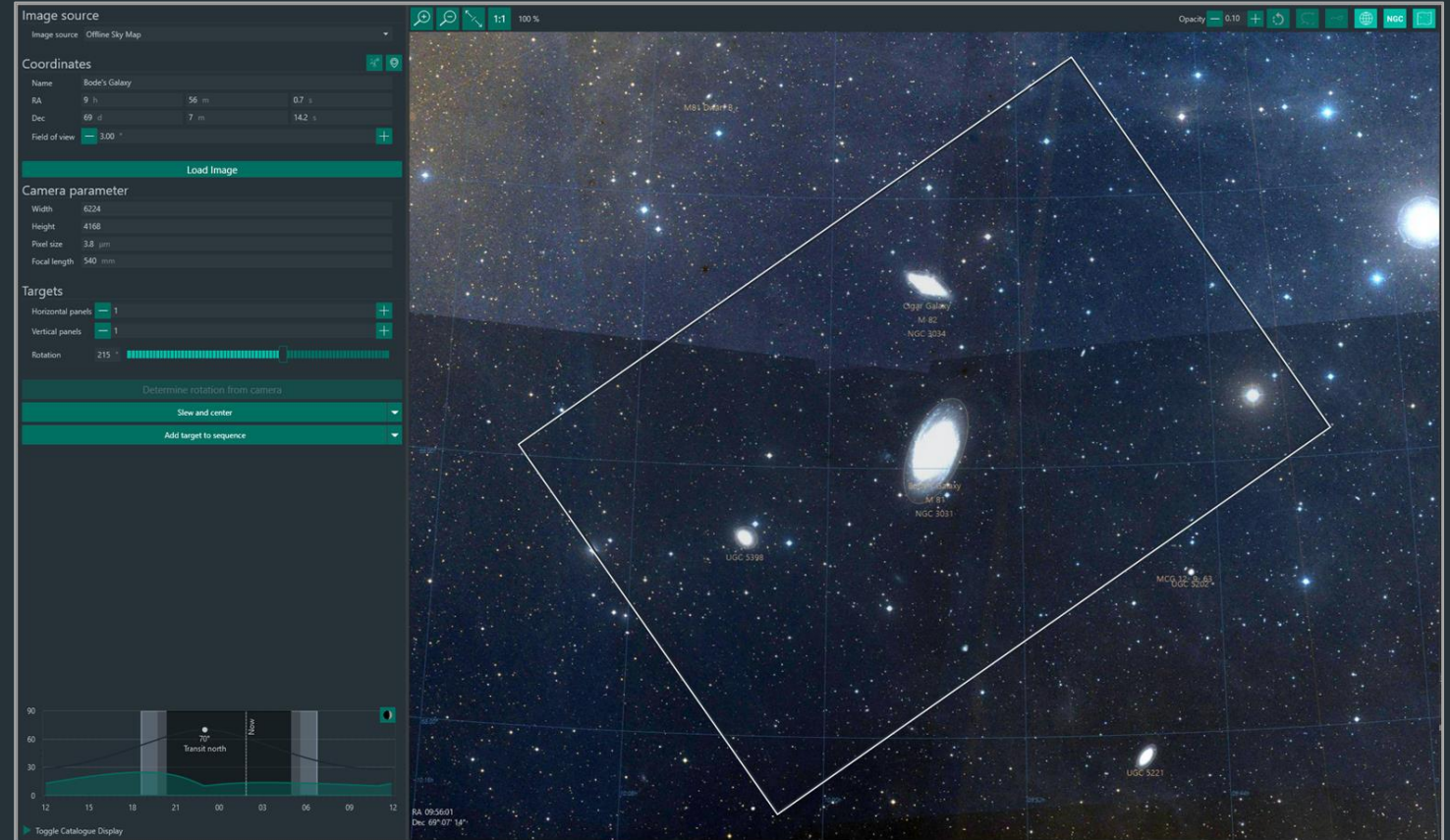


#Az	Alt
0	10
45	30
90	25
135	45
180	20
225	15
270	35
315	15

Target Framing



- Perfectly plan and frame your target
- Export the target to a sequence
- Plan multiple panels using the mosaic function



The screenshot displays a software interface for target framing. On the left, there are several control panels:

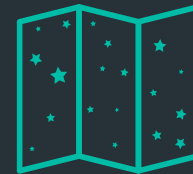
- Image source:** Offline Sky Map
- Coordinates:** Name: Bode's Galaxy, RA: 9 h 56 m 07 s, Dec: 69 d 07 m 14 s, Field of view: 3.00 °
- Camera parameter:** Width: 6224, Height: 4168, Pixel size: 3.8 µm, Focal length: 540 mm
- Targets:** Horizontal panels: 1, Vertical panels: 1, Rotation: 215 °

Below these panels are buttons for "Load Image", "Determine rotation from camera", "Slew and center", and "Add target to sequence". At the bottom left, there is a graph showing a light curve with a peak labeled "70° Transit north" and a "Now" marker. A "Toggle Catalogue Display" button is at the bottom left.

The main window shows a star field with a white frame around a target galaxy. The frame is tilted. The background is a dark blue sky with many stars. Labels for various objects are visible, including "M81 Bode's Galaxy", "Orion Galaxy M82 NGC 3034", "NGC 3031", "UGC 5398", "MCG 1-25-63 UGC 5202", and "UGC 5221". The bottom right corner shows the coordinates: RA 09:56:01, Dec 69:07:14. The top right corner shows "Opacity 0.10" and "NGC".



Target Framing



Load in an image for framing using various sources:

- Online Sky Surveys
- Offline Sky Map with optional Sky Map Cache
- Load in a file from disk

The screenshot displays a software interface for target framing. The left panel contains the following settings:

- Image source:** Offline Sky Map
- Coordinates:** Name: Bode's Galaxy, RA: 9 h 56 m 07 s, Dec: 69 d 07 m 14.2 s, Field of view: 3.00 arcmin
- Camera parameter:** Width: 6224, Height: 4168, Pixel size: 3.8 micrometers, Focal length: 540 mm
- Targets:** Horizontal panels: 1, Vertical panels: 1, Rotation: 215 degrees

The right panel shows a star field with a white rectangular frame around a target galaxy (NGC 3031). The bottom graph shows a light curve with a peak labeled "Transit north" at 70 degrees. The bottom right corner shows coordinates: RA 09:56:01, Dec 69:07:14.



Target Framing



Ensure that the camera parameters match your equipment

Image source: Offline Sky Map

Coordinates:
Name: Bode's Galaxy
RA: 9 h 56 m 07 s
Dec: 69 d 7 m 14.2 s
Field of view: 3.00 °

Load Image

Camera parameter:
Width: 624
Height: 4168
Pixel size: 3.8 µm
Focal length: 540 mm

targets:
Horizontal panels: 1
Vertical panels: 1
Rotation: 215 °

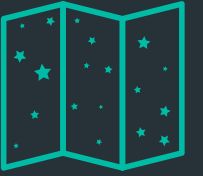
Determine rotation from camera
Slew and center
Add target to sequence

Toggle Catalogue Display

RA 09:56:01
Dec 69°07' 14"



Target Framing



Set the target rotation as well as how many panels you want to plan for (mosaics)



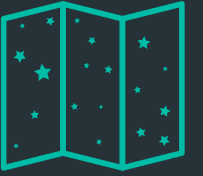
Target Framing




Various actions based on the current framing

- Import the current rotation your camera is pointing at
- Slew to the framed target
- Export it to the sequencer

Target Framing



Get a preview of the altitude of the object



The screenshot displays a software interface for target framing. On the left is a control panel with the following sections:

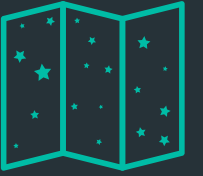
- Image source:** Offline Sky Map
- Coordinates:**
 - Name: Bode's Galaxy
 - RA: 9 h 56 m 07 s
 - Dec: 69 d 07 m 14.2 s
 - Field of view: 3.00 °
- Camera parameter:**
 - Width: 6224
 - Height: 4168
 - Pixel size: 3.8 µm
 - Focal length: 540 mm
- Targets:**
 - Horizontal panels: 1
 - Vertical panels: 1
 - Rotation: 215 °
- Buttons: "Load Image", "Determine rotation from camera", "Slew and center", "Add target to sequence"

The main window shows a star field with a white frame around a target galaxy (Bode's Galaxy). The frame is tilted. A yellow box highlights a small graph at the bottom left of the control panel, showing altitude (0 to 90 degrees) over time (12 to 12). The graph shows a peak at 70° labeled "Transit north".

Bottom right corner of the main window shows coordinates: RA 09:56:01, Dec 69°07' 14".



Target Framing

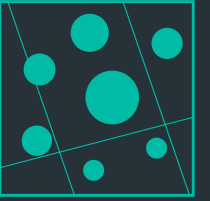


Tip: Offline Framing with the prepared offline cache available as a download gives you a full dynamic framing guide.

You can scroll and zoom when using the offline sky map!



Platesolving



What is platesolving used for?

- Align telescopes accurately
- Precise pointing to celestial coordinates

Which applications are supported?

- ASTAP, the Astrometric STacking Program
- Platesolve 2
- Platesolve 3
- TheSkyX Imagelink
- PinPoint
- Astrometry.NET
- ASPS - All Sky Plate Solver

Plate Solving

Plate solver	ASTAP	Exposure time	2 s
Blind solver	Platesolve3	Filter	Luminance
Use Blind Solver for Failures	OFF	Binning	1
		Gain	100
		Pointing tolerance	1 arcmin
		Rotation tolerance	1 °
		Number of attempts	10
		Delay between attempts	2 min

Plate solver settings

Astrometry.Net	Platesolve3 Location	D:\Astro\Platesolve3.80\PlateSolve3.80.exe
Local plate solver		
Platesolve2		
Platesolve3		
All Sky Plate Solver		
ASTAP		
TheSkyX Imagelink		
PinPoint		

Platesolving

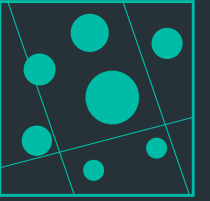



Image - Plate Solving

Center RA 0.708
 Center RA HMS 00:42:29
 Center Dec 41.302
 Center Dec DMS 41° 18' 08"
 Radius 1.487 deg
 Pixel scale 1.43 arcsec/pixel
 Rotation 340.31
 Epoch J2000
 Error distance 00° 03' 33"
 RA error 00:00:16
 RA error (px) 164.17
 Dec error -00° 02' 01"
 Dec error (px) -84.61



Time	Succ	RA	Dec	Error distance	RA error	Dec error	RA error (px)	Dec error (px)	Rotation
03:54:09	☑	00:42:29	41° 18' 08"	00° 03' 33"	00:00:16	-00° 02' 01"	164.17	-84.61	340.31



Autofocus



- Requires Motorized Focuser
- Most important settings:
 - Exposure Time
 - Step Size
 - Backlash Compensation
 - Filter Offsets

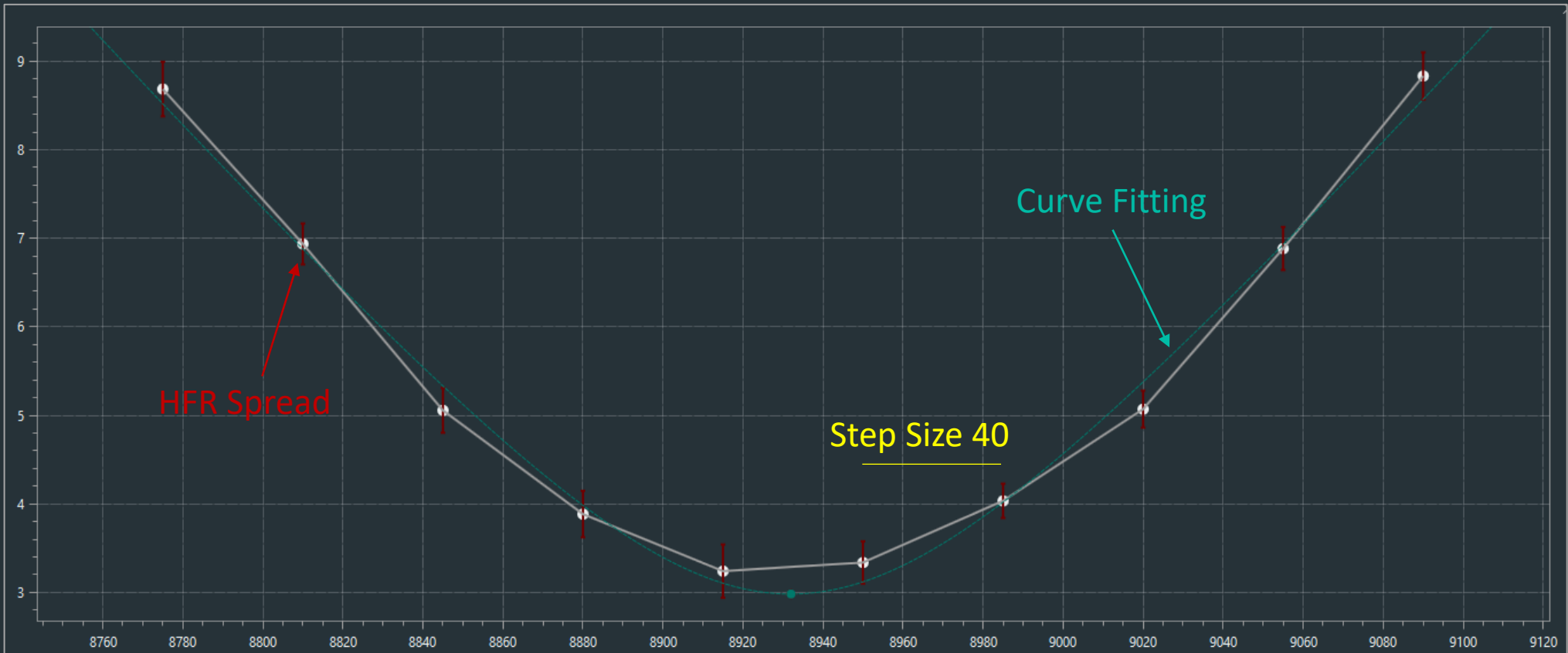
Use filter offsets	<input checked="" type="checkbox"/> ON	Autofocus step size	25
Autofocus initial offset steps	3	Default autofocus exposure time	2 s
Autofocus method	Star HFR	Disable guiding during AF	<input type="checkbox"/> OFF
Curve fitting strategy	Hyperbolic	Focuser settle time	1 s
Number of attempts	1	Number of exposures per point	1
Use brightest n stars	0	Inner crop ratio	1
Outer crop ratio	1	Backlash compensation method	Overshoot
Binning	1	Backlash IN/OUT	0 100
R ² threshold	0.8		



Autofocus



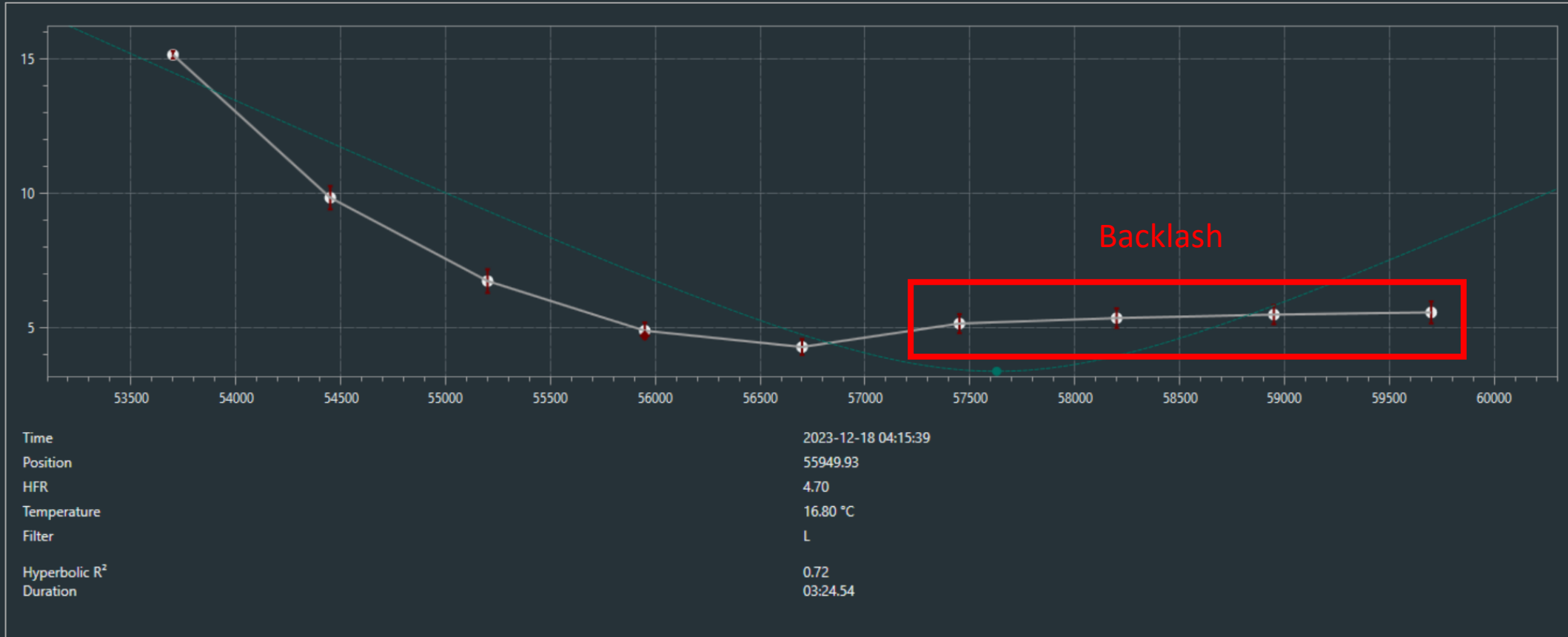
4 Initial Offset Steps



Time	2023-09-07 21:51:33
Position	8932.00
HFR	2.98
Temperature	18.50 °C
Filter	L
Hyperbolic R ²	0.99
Duration	01:38.71

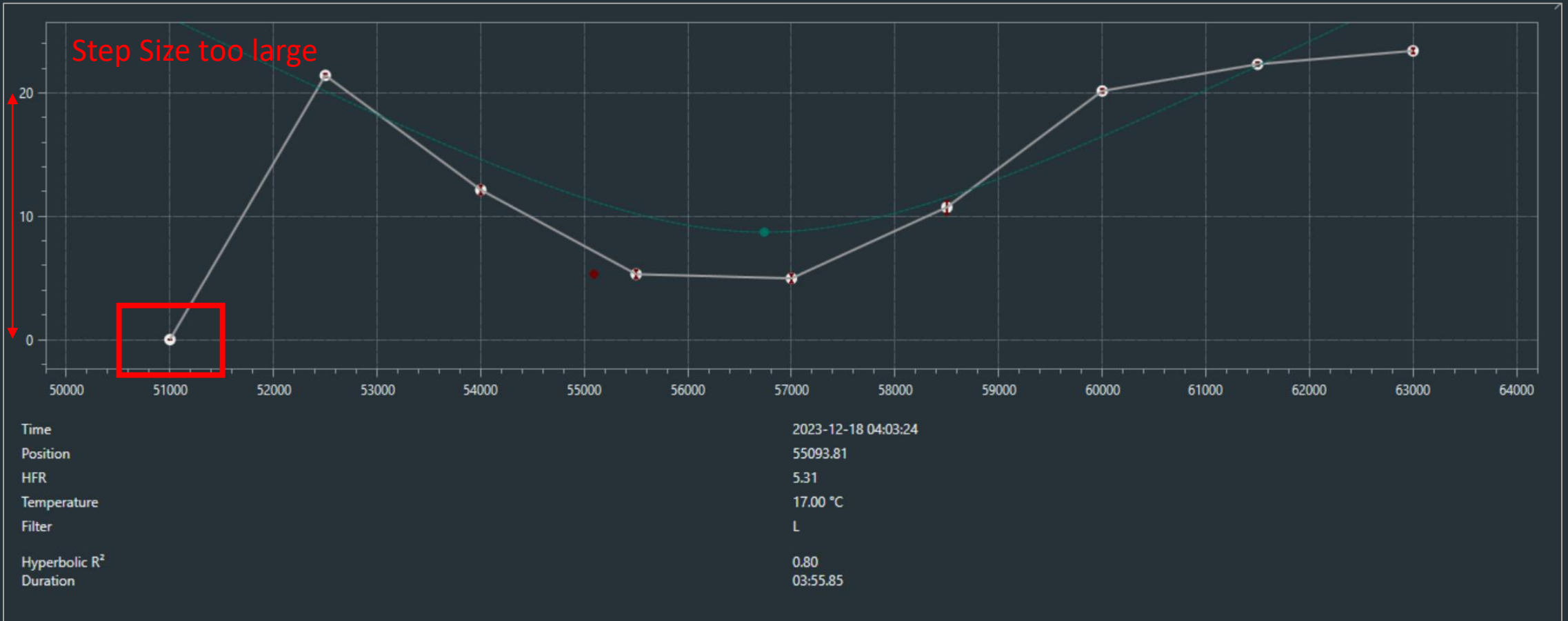


Identify Autofocus Problems



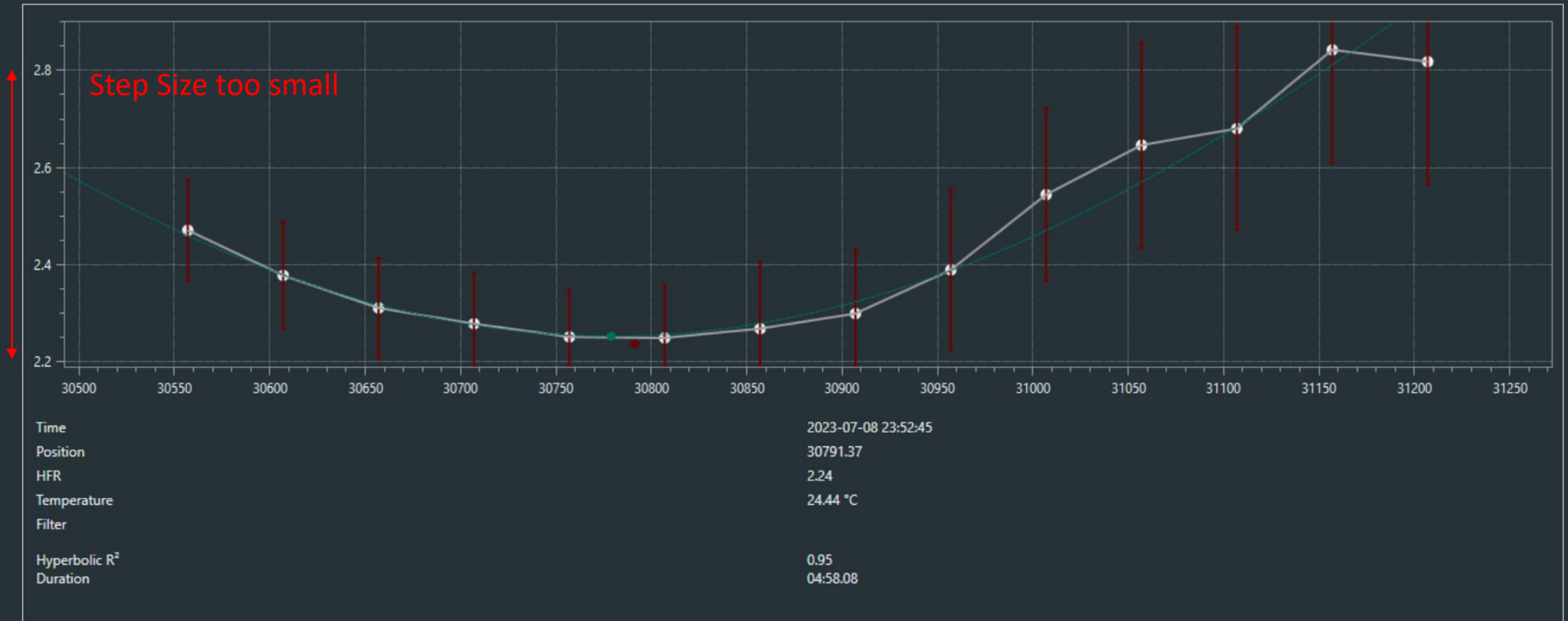


Identify Autofocus Problems





Identify Autofocus Problems





Filter Offsets



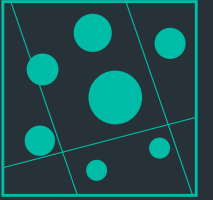
- Offsets are RELATIVE focus positions between each other
- Switching between filters without losing focus
- Able to set Autofocus filter for maximum time savings

Autofocus filter settings

Position	Name	Focus offset	Autofocus exposure time	Autofocus filter	Binning	Gain	Offset
1	Red	30	(2)		1x1	(182)	(10)
2	Green	-5	(2)		1x1	(182)	(10)
3	Blue	-10	(2)		1x1	(182)	(10)
4	Luminance	0	(2)	☑	1x1	(182)	(10)
5	Ha	15	(2)		1x1	(182)	(10)
6	OIII	-20	(2)		1x1	(182)	(10)
7	SII	10	(2)		1x1	(182)	(10)



Guiding



- Requires guide camera with guide scope or off axis guider
- Most important settings:
 - Dither Pixels
 - Settle Pixels Tolerance
 - Settle Timeout
 - Settle Time

Guider PHD2 Settings

Connected	<input checked="" type="checkbox"/>	Dither pixels	5 px	Dither in RA only	<input type="checkbox"/>
State	Guiding	Settle pixel tolerance	1.5 px	Minimum settle time	10 s
Guider Pixel Scale	3.44 arcsec/px	Settle timeout	40 s	Guiding start retry	<input type="checkbox"/>
Guider Dither Pixels	5.00 px	Guiding start timeout	300 s	ROI percentage to find guide star	100 %
Camera Pixel Scale	1.45 arcsec/px	PHD2 profile	Simulator		
Camera Dither Pixels	11.84 px				
Guide Graph Show Corrections	<input checked="" type="checkbox"/>				

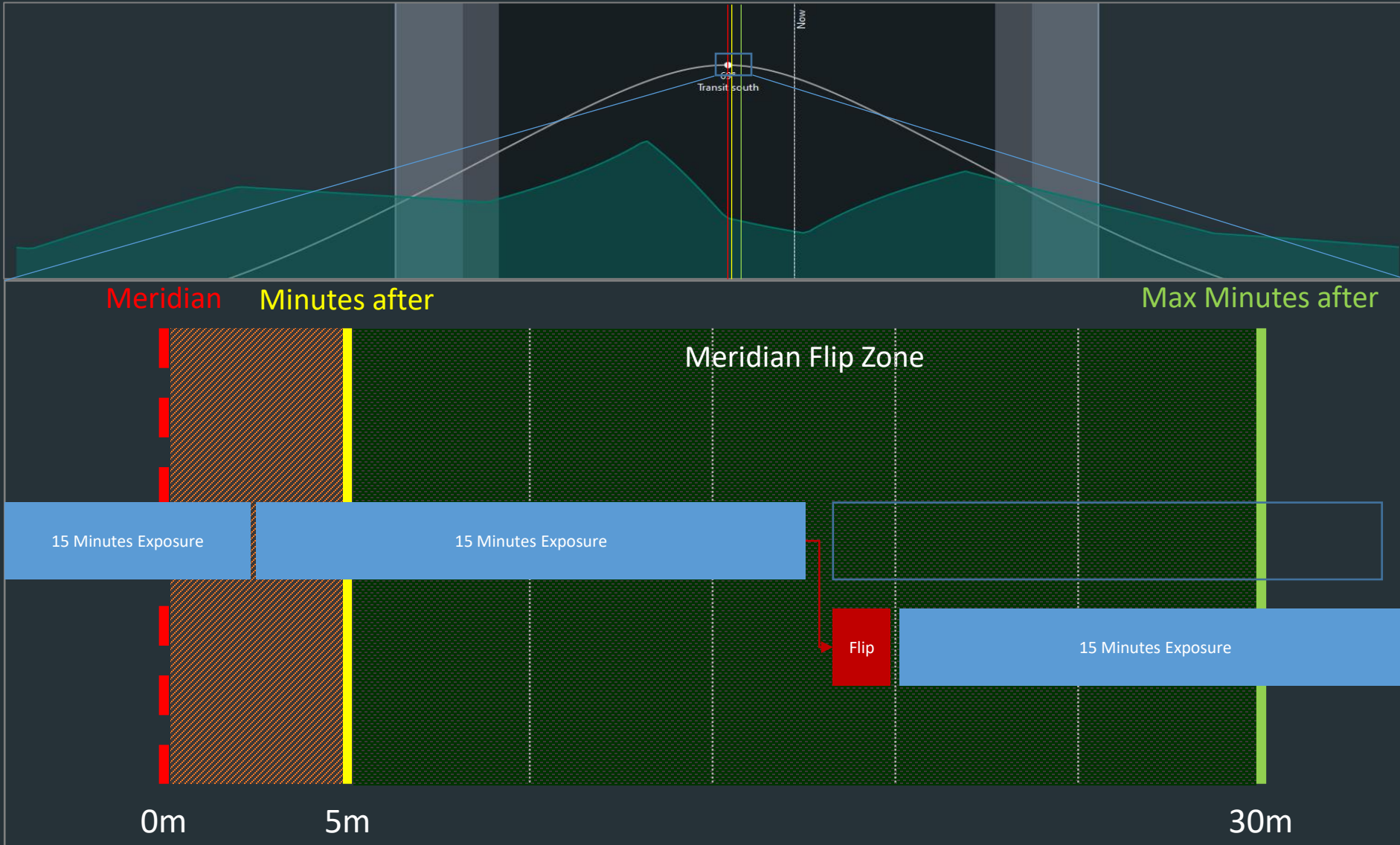
y: +/-4" x: 100 unit: ARCSECOND
RA: 0.11 (0.37")
Dec: 0.11 (0.36")
Tot: 0.15 (0.52")

Legend:
■ RA corrections
■ Dec corrections
— RA
— Dec
▲ Dither

Clear



Meridian Flip



Meridian flip settings

Minutes after meridian	<input type="text" value="5 min"/>
Max. minutes after meridian	<input type="text" value="30 min"/>
Use telescope side of pier	<input checked="" type="checkbox"/>
Recenter after flip	<input checked="" type="checkbox"/>
Scope settle time after flip	<input type="text" value="30 s"/>
Pause before meridian	<input type="text" value="0 min"/>
Autofocus after flip	<input type="checkbox" value="OFF"/>



Legacy Sequencing



- Traditional approach like an intervalometer
- Restricted set of capabilities, targeted for beginners
- A fixed set of parameters that can be turned on or off

The screenshot shows the Legacy Sequencing software interface for a target set named "Bode's Galaxy". The interface is divided into several sections:

- Target Set Start Options:** Cool Camera (ON), Unpark Mount (ON), Meridian Flip (ON).
- Target Set End Options:** Warm Camera (OFF), Park Mount (OFF).
- Target Information:** Name: Bode's Galaxy, RA: 9 h 57 m 14.4 s, Dec: 69 d 15 m 57.5 s, Rotation: 215 °.
- Timing and Duration:** Delay start: 0 s, Sequence mode: One after another, Estimated download time: 00:00:00, Estimated finish time: From 01:45:20 To 04:45:20, Duration: 03h 00m 00s.
- Target Options:** Slew to target (ON), Center target (ON), Rotate Target (OFF), Start guiding (ON).
- Autofocus:** On start (ON), On filter change (OFF), After elapsed time (OFF, Time: 30 min), After # exposures (OFF, # exposures: 10), After temperature change (ON, Temperature amount: 5 °), After HFR increase (OFF, HFR amount: 10 %).
- Graph:** A graph showing the target's position over time, with a vertical line indicating the current time (Now) and a peak labeled "70° Transit north".
- Table:** A table showing the sequence of exposures.

Enabled	Progress	Total #	Time	Type	Filter	Binning	Dither	Dither every #	Gain	Offset
ON	0 / 30	30	120 s	LIGHT	Red	1x1	ON	1	100	200
ON	0 / 30	30	120 s	LIGHT	Green	1x1	ON	1	100	200
ON	0 / 30	30	120 s	LIGHT	Blue	1x1	ON	1	100	200



Legacy Sequencing



Start Options

- Get Executed before all targets
- Meridian Flip is active for all targets

The screenshot shows the Legacy Sequencing software interface for a target set named "Bode's Galaxy". The interface is divided into several sections:

- Target Set Start Options:** A yellow box highlights this section, which includes "Cool Camera" (ON), "Unpark Mount" (ON), and "Meridian Flip" (ON).
- Target Set End Options:** Includes "Warm Camera" (OFF) and "Park Mount" (OFF).
- Target Information:** Shows the target name "Bode's Galaxy", RA (9 h 57 m 14.4 s), Dec (69 d 15 m 57.5 s), and Rotation (215 °).
- Graph:** A graph showing the target's altitude over time, with a peak at 70° labeled "Transit north". A vertical dashed line indicates the "Now" position.
- Table:** A table with columns: Enabled, Progress, Total #, Time, Type, Filter, Binning, Dither, Dither every #, Gain, and Offset. It lists three filter configurations: Red, Green, and Blue.
- Bottom Bar:** Contains navigation icons (back, forward, home, etc.) and a large play button.

Enabled	Progress	Total #	Time	Type	Filter	Binning	Dither	Dither every #	Gain	Offset
ON	0 / 30	30	120 s	LIGHT	Red	1x1	ON	1	100	200
ON	0 / 30	30	120 s	LIGHT	Green	1x1	ON	1	100	200
ON	0 / 30	30	120 s	LIGHT	Blue	1x1	ON	1	100	200



Legacy Sequencing



End Options

- Get Executed after all targets

Target Set

Target Set Start Options | Cool Camera | Unpark Mount | Meridian Flip
Cool Camera Unpark Mount Meridian Flip

Target Set End Options
Warm Camera Park Mount

Bode's Galaxy

Delay start 0 s
Sequence mode One after another
Estimated download time 00:00:00
Estimated finish time From 01:45:20 To 04:45:20 Duration 03h 00m 00s
Est. finish time (this target) From 01:45:20 To 04:45:20 Duration 03h 00m 00s

Target Options | Slew to target | Center target | Start guiding
Slew to target Center target
Rotate Target Start guiding

Autofocus | On start | 5"
On start On filter change
After elapsed time Time 30 min
After # exposures # exposures 10
After temperature change Temperature amount 5 °
After HFR increase HFR amount 10 %

Name Bode's Galaxy
RA 9 h 57 m 14.4 s
Dec 69 d 15 m 57.5 s Rotation 215 °

Enabled	Progress	Total #	Time	Type	Filter	Binning	Dither	Dither every #	Gain	Offset
<input checked="" type="checkbox"/>	0 / 30	30	120 s	LIGHT	Red	1x1	<input checked="" type="checkbox"/>	1	100	200
<input checked="" type="checkbox"/>	0 / 30	30	120 s	LIGHT	Green	1x1	<input checked="" type="checkbox"/>	1	100	200
<input checked="" type="checkbox"/>	0 / 30	30	120 s	LIGHT	Blue	1x1	<input checked="" type="checkbox"/>	1	100	200



Legacy Sequencing



Target Tabs

- Each target will have a separate tab arrow
- Click on each target arrow to open its target options

The screenshot displays the 'Target Set' configuration window for 'Bode's Galaxy'. The interface includes various control panels and a data table.

Target Set

Target Set Start Options: Cool Camera | Unpark Mount | Meridian Flip
Cool Camera: ON | Unpark Mount: ON | Meridian Flip: ON

Target Set End Options: Warm Camera: OFF | Park Mount: OFF

Bode's Galaxy (highlighted with a yellow box)

Sequence mode: One after another

Estimated download time: 00:00:00

Estimated finish time: From 01:45:20 To 04:45:20 Duration 03h 00m 00s

Est. finish time (this target): From 01:45:20 To 04:45:20 Duration 03h 00m 00s

Target Options | Slew to target | Center target | Start guiding

Slew to target: ON | Center target: ON

Rotate Target: OFF | Start guiding: ON

Autofocus | On start | 5"

On start: ON | On filter change: OFF

After elapsed time: OFF | Time: 30 min

After # exposures: OFF | # exposures: 10

After temperature change: ON | Temperature amount: 5 °

After HFR increase: OFF | HFR amount: 10 %

Name: Bode's Galaxy

RA: 9 h 57 m 14.4 s

Dec: 69 d 15 m 57.5 s | Rotation: 215 °

Graph showing altitude vs. time with a peak at 70° labeled 'Transit north'.

Enabled	Progress	Total #	Time	Type	Filter	Binning	Dither	Dither every #	Gain	Offset
ON	0 / 30	30	120 s	LIGHT	Red	1x1	ON	1	100	200
ON	0 / 30	30	120 s	LIGHT	Green	1x1	ON	1	100	200
ON	0 / 30	30	120 s	LIGHT	Blue	1x1	ON	1	100	200



Legacy Sequencing



Target Specific Options

- Actions that will be done before each target starts
- Slew, center and rotate will be based on the target info set on the right side

The screenshot shows the Legacy Sequencing software interface for a target set named "Bode's Galaxy". The interface is divided into several sections:

- Target Set Start Options:** Cool Camera (ON), Unpark Mount (ON), Meridian Flip (ON).
- Target Set End Options:** Warm Camera (OFF), Park Mount (OFF).
- Target Options:** Slew to target (ON), Center target (ON), Rotate Target (OFF), Start guiding (ON). This section is highlighted with a yellow box.
- Target Info:** Name: Bode's Galaxy, RA: 9 h 57 m 14.4 s, Dec: 69 d 15 m 57.5 s, Rotation: 215 °.
- Graph:** A graph showing the target's position (RA/Dec) over time. The x-axis represents time in hours (12, 15, 18, 21, 00, 03, 06, 09, 12). The y-axis represents position in degrees (0, 30, 60, 90). A vertical dashed line labeled "Now" is positioned at approximately 03:00. A peak in the graph is labeled "70° Transit north".
- Table:** A table showing the sequence of exposures for the target set.

Enabled	Progress	Total #	Time	Type	Filter	Binning	Dither	Dither every #	Gain	Offset
ON	0 / 30	30	120 s	LIGHT	Red	1x1	ON	1	100	200
ON	0 / 30	30	120 s	LIGHT	Green	1x1	ON	1	100	200
ON	0 / 30	30	120 s	LIGHT	Blue	1x1	ON	1	100	200



Legacy Sequencing



Target Specific Triggers

- Various Autofocus options with different parameters on when to do an autofocus

The screenshot shows the Legacy Sequencing software interface for a target set named "Bode's Galaxy". The interface is divided into several sections:

- Target Set Start Options:** Cool Camera (ON), Unpark Mount (ON), Meridian Flip (ON).
- Target Set End Options:** Warm Camera (OFF), Park Mount (OFF).
- Target Information:** Name: Bode's Galaxy, RA: 9 h 57 m 14.4 s, Dec: 69 d 15 m 57.5 s, Rotation: 215 °.
- Graph:** A graph showing the target's position over time, with a peak at 70° labeled "Transit north".
- Autofocus Options (highlighted in yellow):**
 - Autofocus | On start | 5"
 - On start: ON, On filter change: OFF
 - After elapsed time: OFF, Time: 30 min
 - After # exposures: OFF, # exposures: 10
 - After temperature change: ON, Temperature amount: 5 °
 - After HFR increase: OFF, HFR amount: 10 %
- Exposure Table:**

Enabled	Progress	Total #	Time	Type	Filter	Binning	Dither	Dither every #	Gain	Offset
ON	0 / 30	30	120 s	LIGHT	Red	1x1	ON	1	100	200
ON	0 / 30	30	120 s	LIGHT	Green	1x1	ON	1	100	200
ON	0 / 30	30	120 s	LIGHT	Blue	1x1	ON	1	100	200



Legacy Sequencing



Target Specific Exposures

- Each row specifies an exposure type
- Set all exposure parameters that you need

Target Set

Target Set Start Options | Cool Camera | Unpark Mount | Meridian Flip
Cool Camera **ON** | Unpark Mount **ON** | Meridian Flip **ON**

Target Set End Options
Warm Camera **OFF** | Park Mount **OFF**

Bode's Galaxy

Delay start: 0 s
Sequence mode: One after another
Estimated download time: 00:00:00
Estimated finish time: From 01:45:20 To 04:45:20 Duration 03h 00m 00s
Est. finish time (this target): From 01:45:20 To 04:45:20 Duration 03h 00m 00s

Target Options | Slew to target | Center target | Start guiding
Slew to target **ON** | Center target **ON**
Rotate Target **OFF** | Start guiding **ON**

Autofocus | On start | 5"
On start **ON** | On filter change **OFF**
After elapsed time **OFF** | Time 30 min
After # exposures **OFF** | # exposures 10
After temperature change **ON** | Temperature amount 5 °
After HFR increase **OFF** | HFR amount 10 %

Name: Bode's Galaxy
RA: 9 h 57 m 14.4 s
Dec: 69 d 15 m 57.5 s | Rotation 215 °

Graph showing altitude vs. time with a peak at 70° labeled 'Transit north'.

Enabled	Progress	Total #	Time	Type	Filter	Binning	Dither	Dither every #	Gain	Offset
ON	0 / 30	30	120 s	LIGHT	Red	1x1	ON	1	100	200
ON	0 / 30	30	120 s	LIGHT	Green	1x1	ON	1	100	200
ON	0 / 30	30	120 s	LIGHT	Blue	1x1	ON	1	100	200



Question



What challenges have you
faced with automation in
astrophotography?



Lots of Automation Requirements



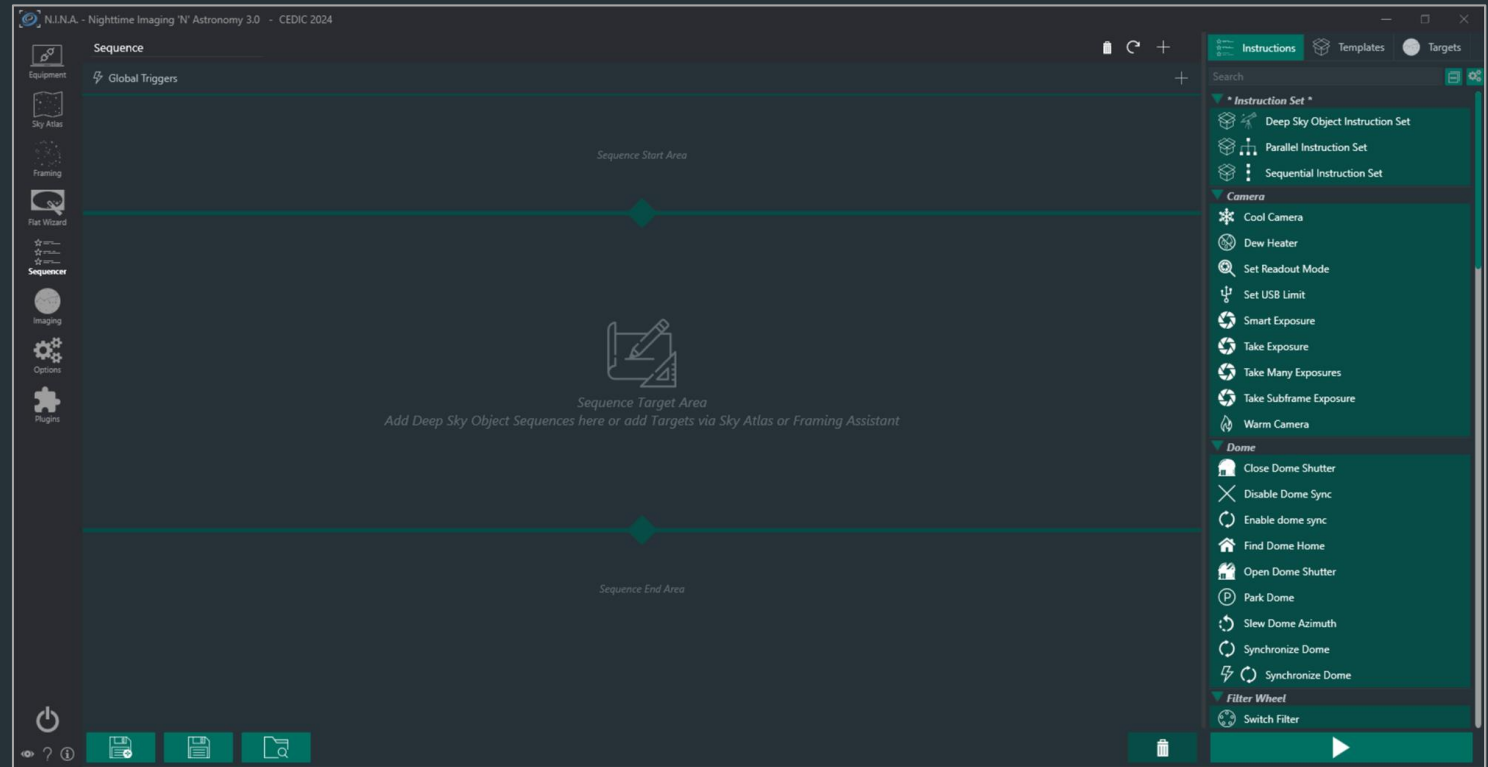
- "Re-centre every x frames" trigger
- Sequence start and end time
- Custom horizon map: Loop and Utility condition
- Control?
- Manual pause line item for sequence
- Support for running external scripts of
- Feature Request - Pop-up Reminder
- Addition
- Box
- only in between integrations
- Add Moonrise and Moonset to the Time Line
- Add Ability to Invoke the Flats Wizard from the Advanced Sequencer
- flatpanel features
- set focuser positions



Advanced Sequencer



- A flexible sequencing solution
- Shape up your sequence from scratch
- Be in full control of what gets executed in which order

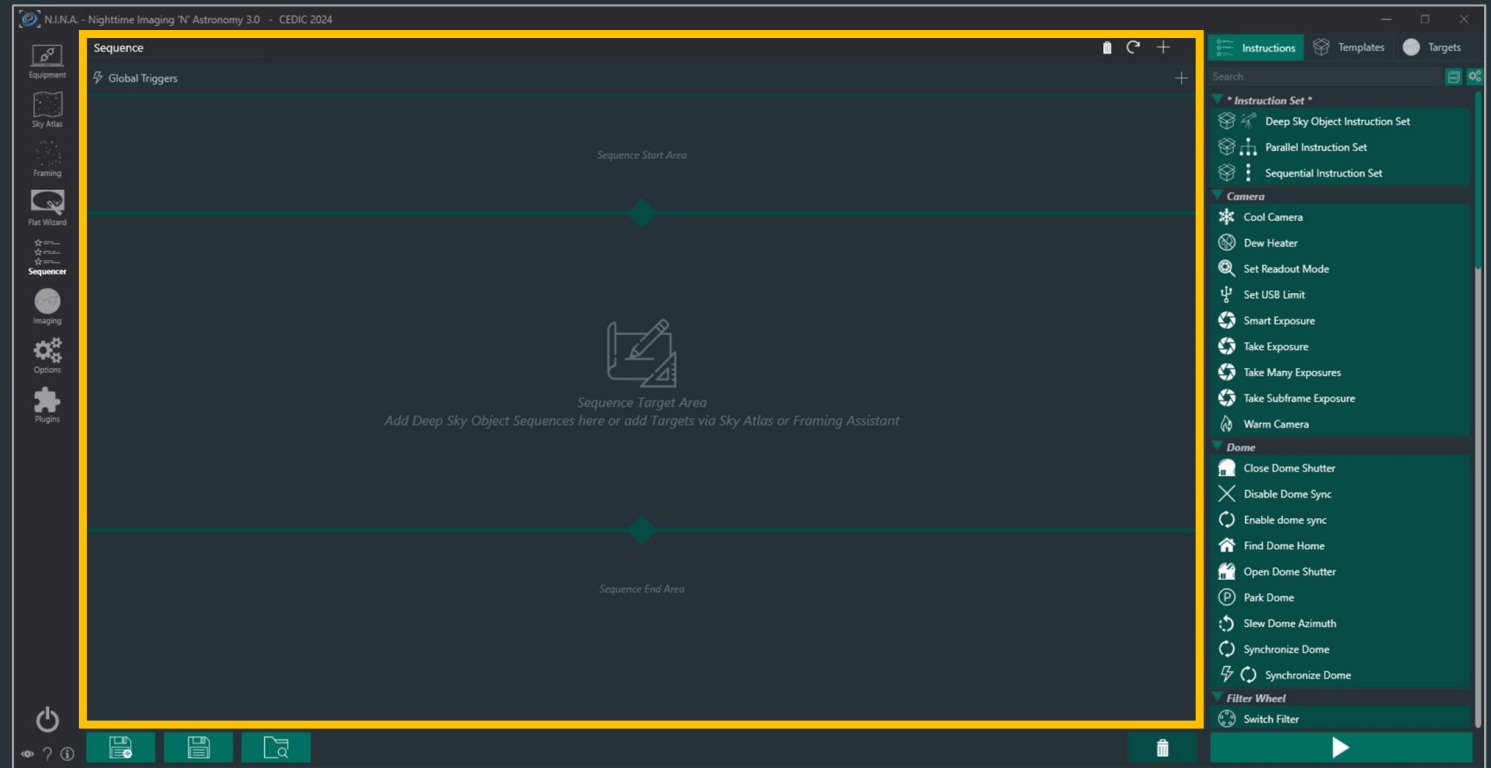




The Toolkit



- The main area holds the current sequence with all its instructions
- Read it from top to bottom
- Each line will be an instruction

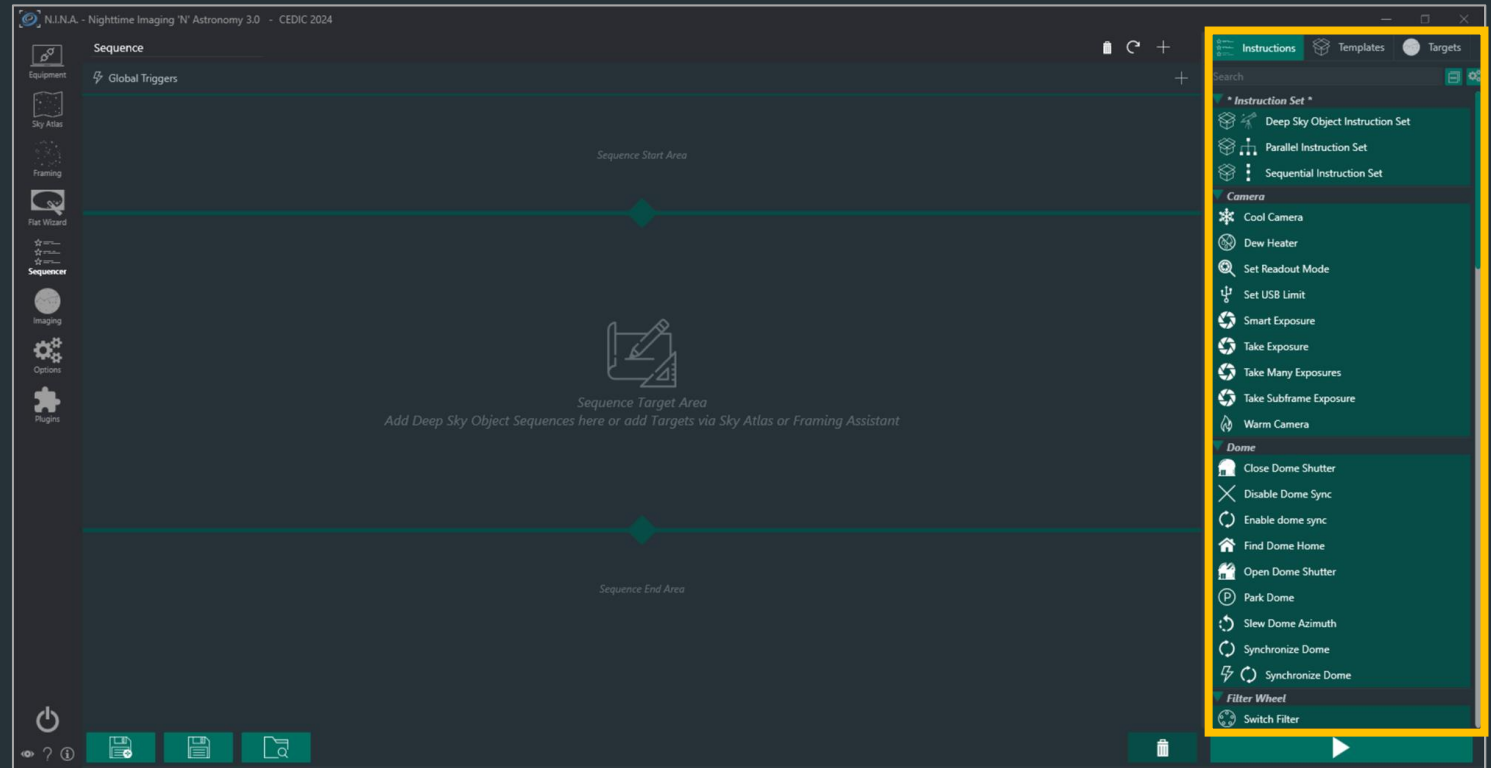




The Toolkit



- The Sidebar will show up all available instructions, triggers and loop conditions
- Furthermore there are tabs for Templates and Targets (more on this later)

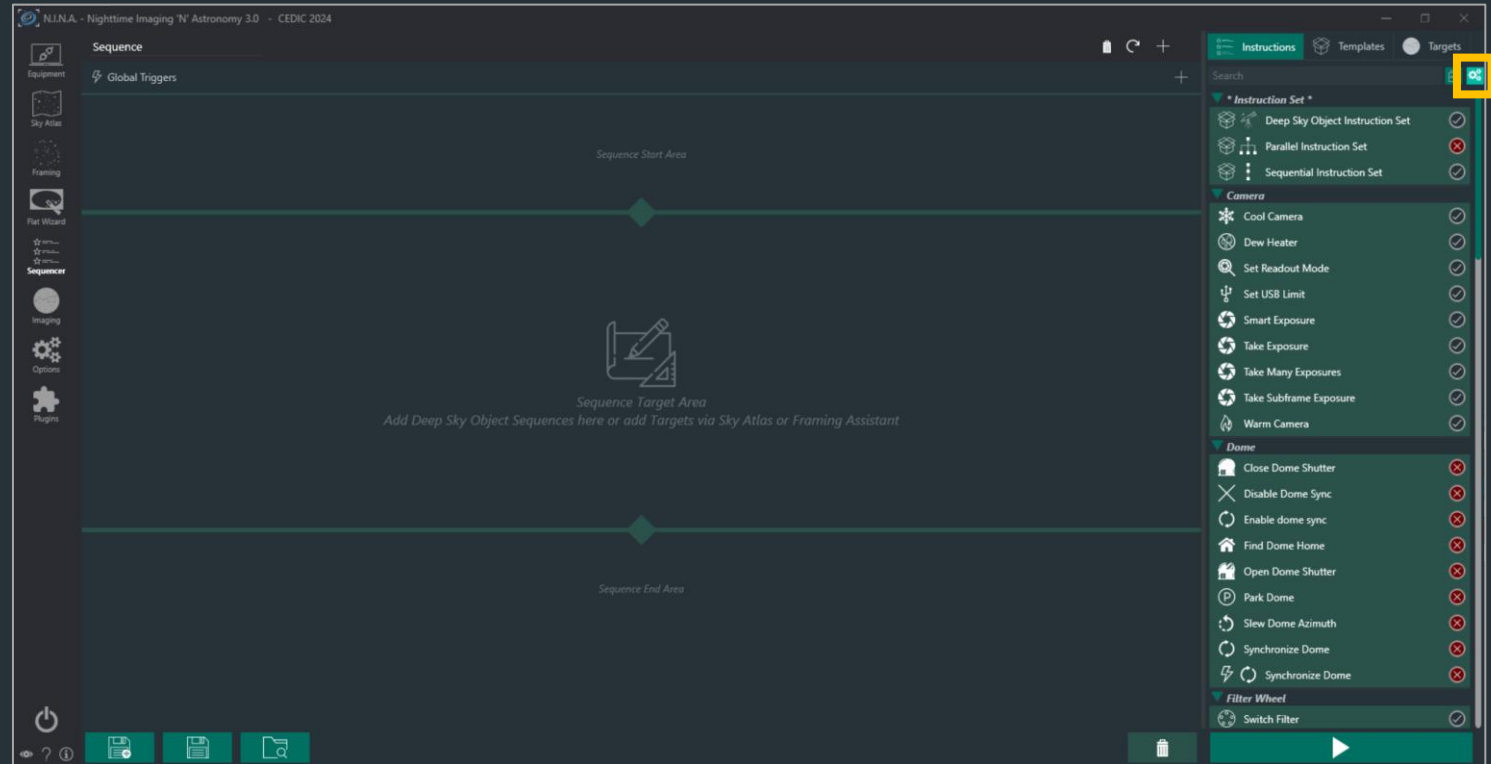




The Toolkit



- Click on the gears icon to manage your toolkit
- Disable instructions in your toolbar that you will never use to focus your view to contain only what you need

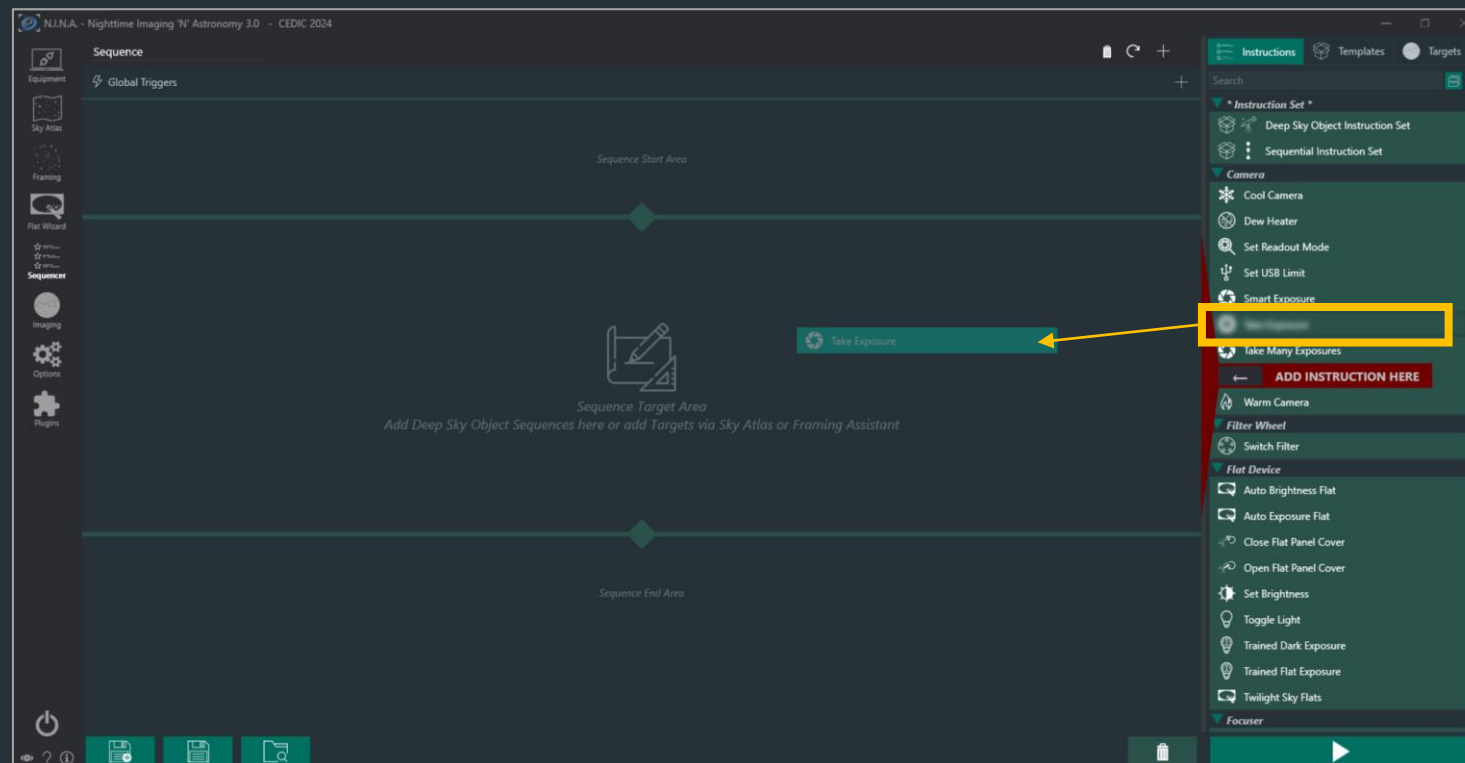




The Toolkit



- Drag and drop an instruction into the sequencer area

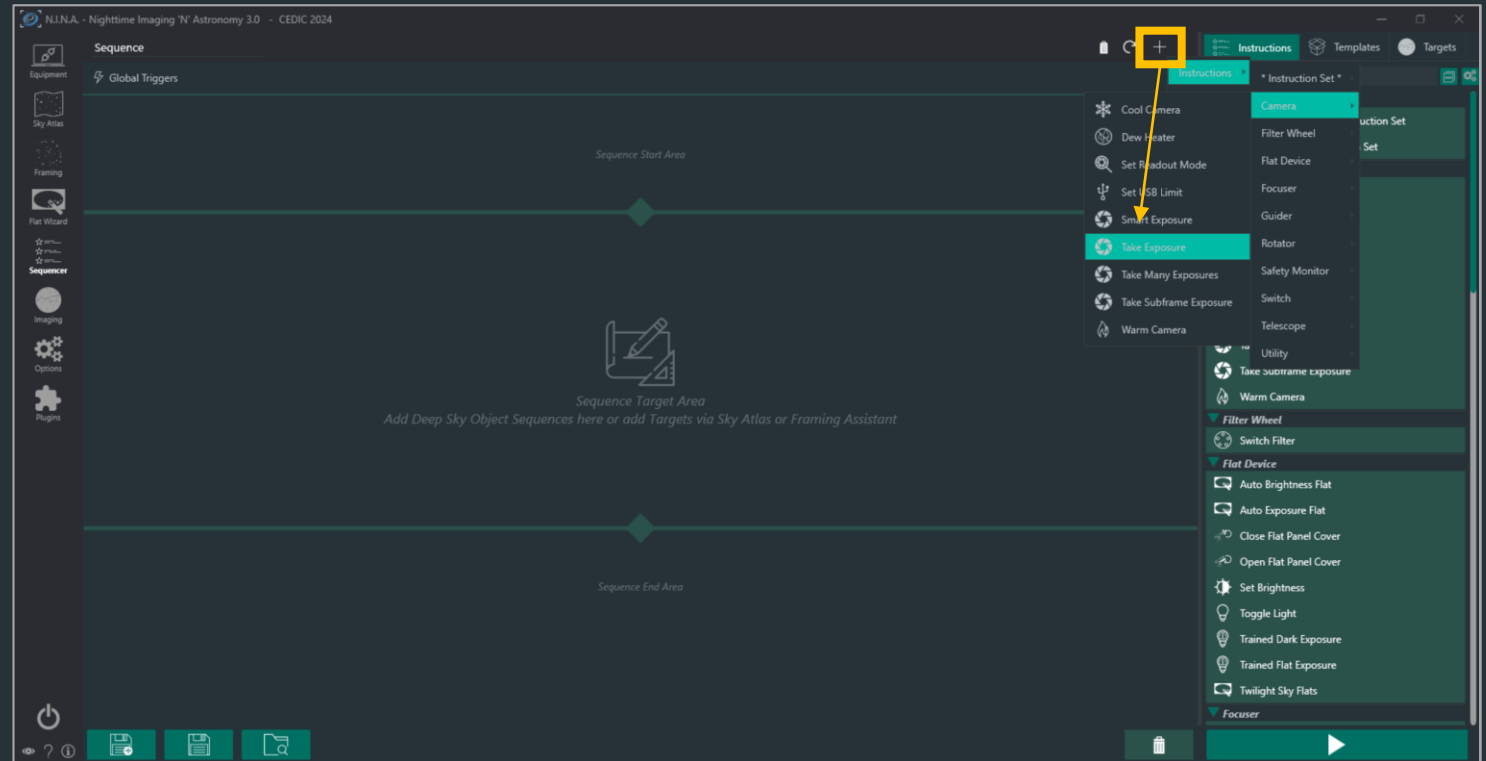




The Toolkit



- Instead of Drag and Drop you can use the “+” Icons to add an instruction to the sequence area using the context menu

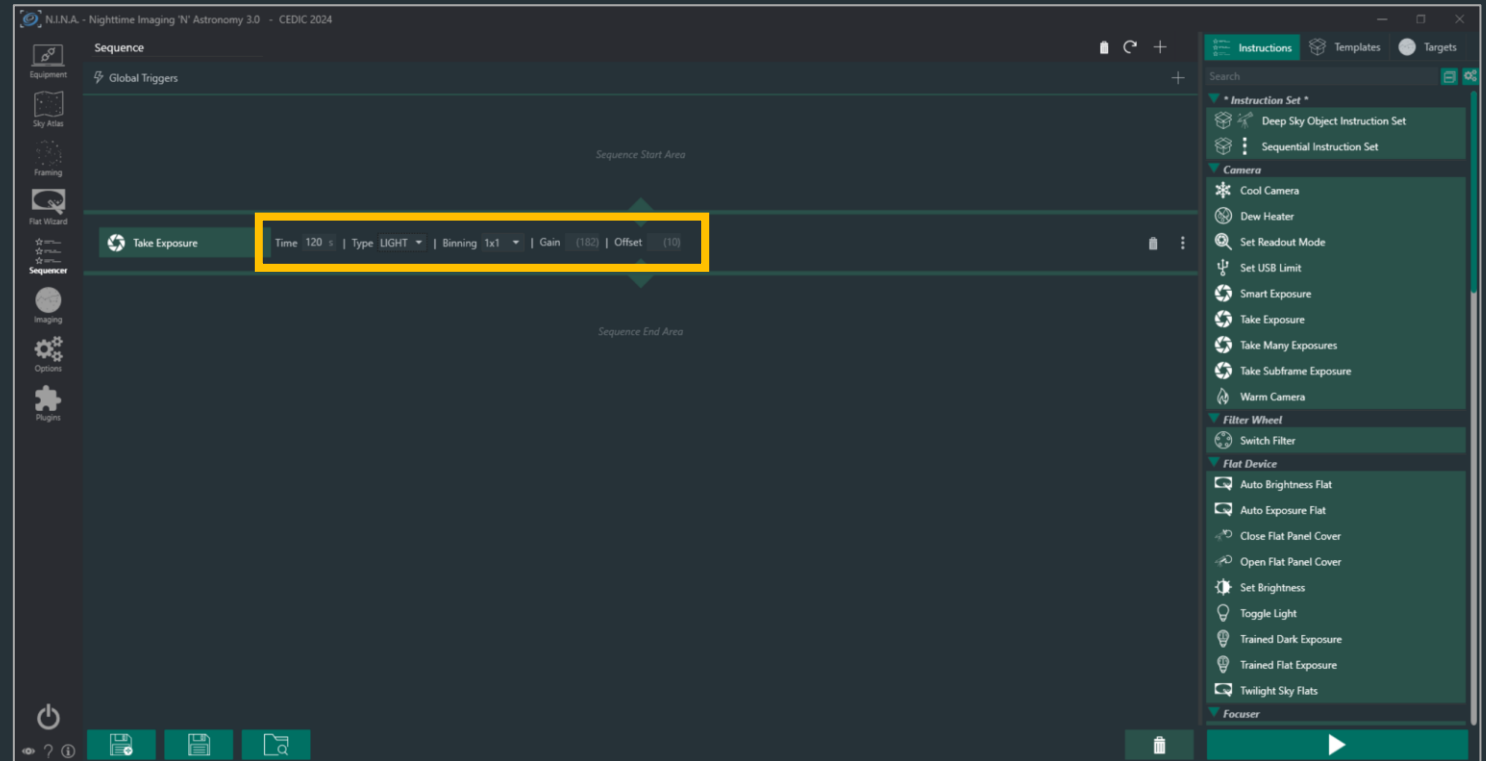




The Toolkit



- Once an instruction is part of the sequencer area, you will be presented with options for each instruction
- In this example you can adjust all the exposure parameters that you need

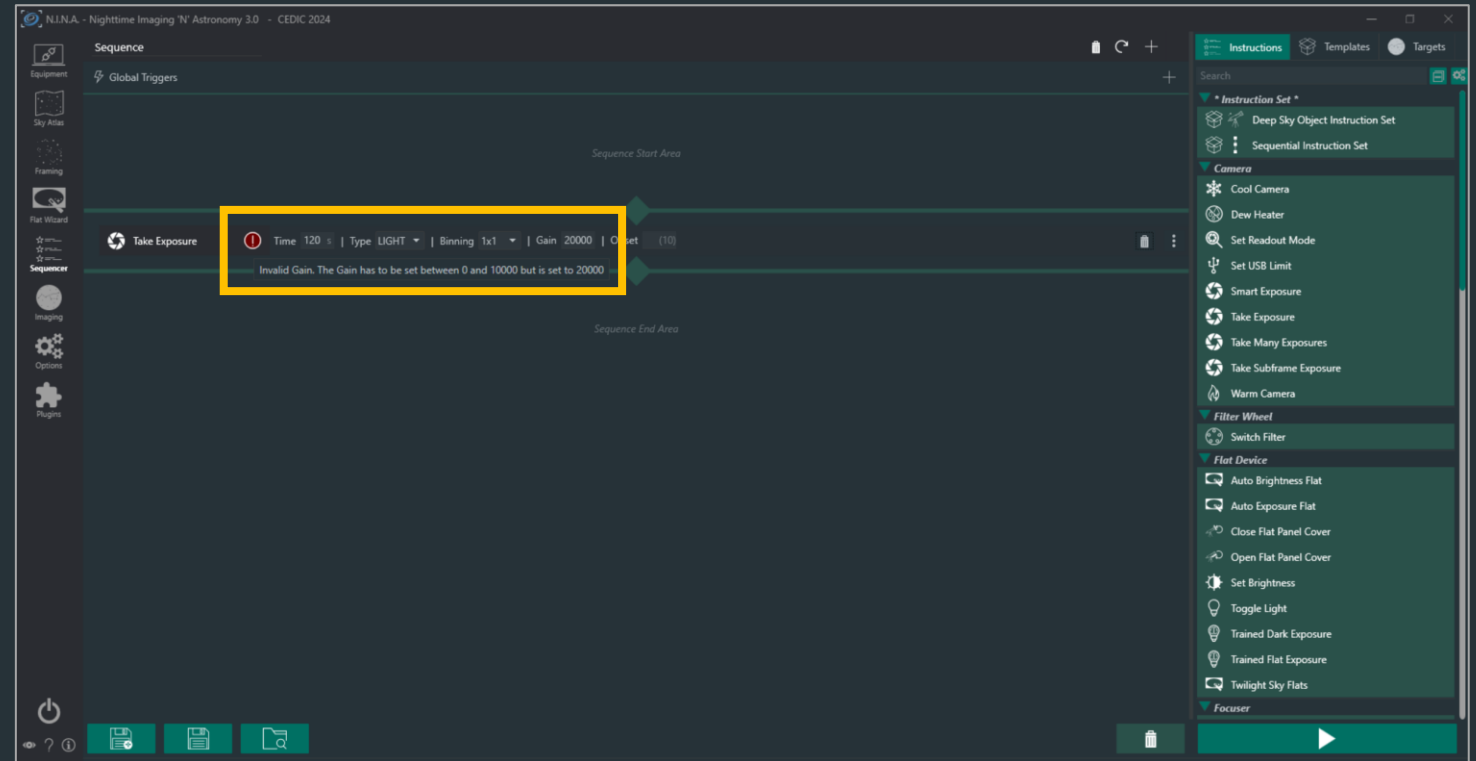




The Toolkit



- A red exclamation mark will be shown when some prerequisites to run the instruction are not met or if some of the input is incorrect

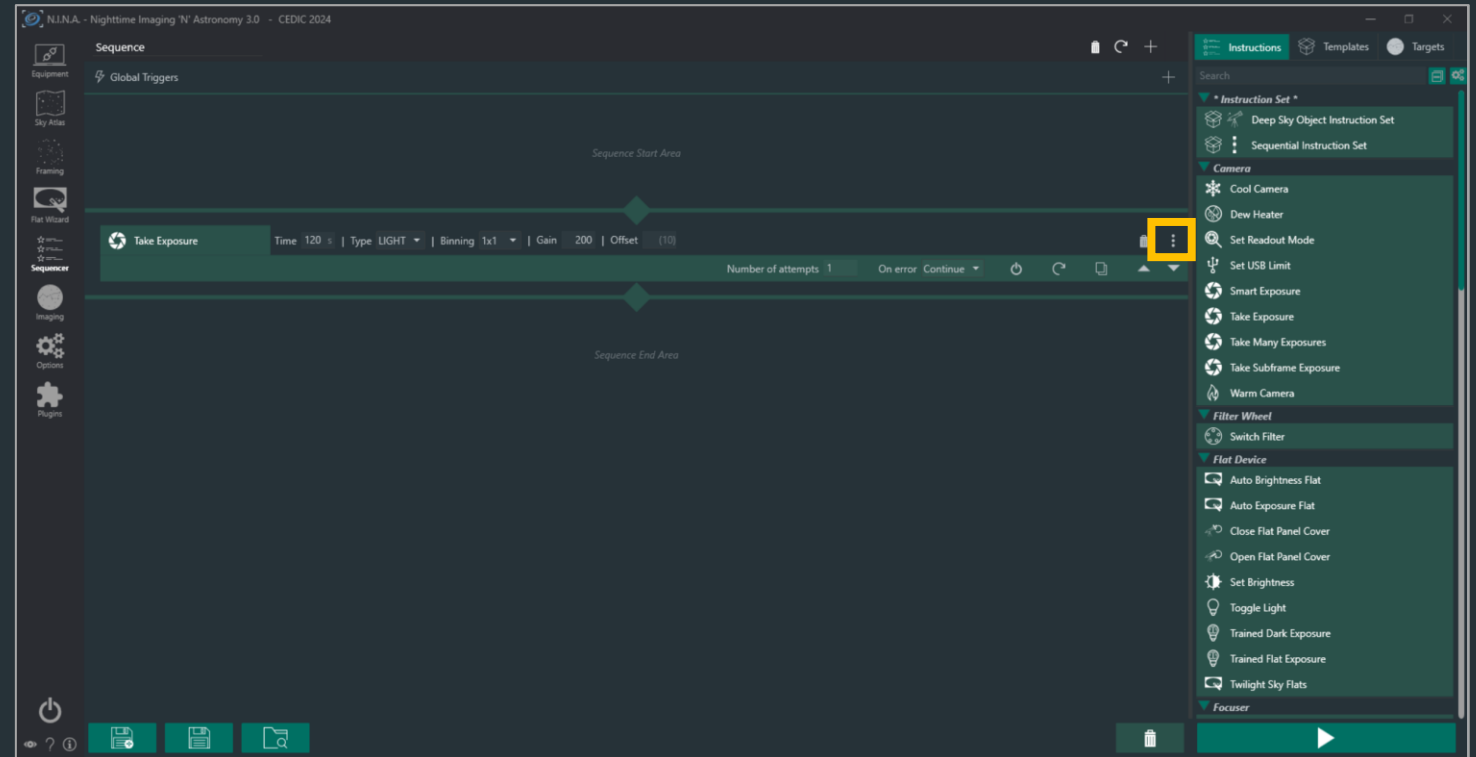




The Toolkit



- Click on the three vertical dots to get more options for the instructions
- Number of attempts: When the instruction fails to execute it will do as many retries as specified here
- On error: This specifies what to do when all attempts have failed.
- Furthermore, you can disable, reset, copy or move the instructions with these buttons

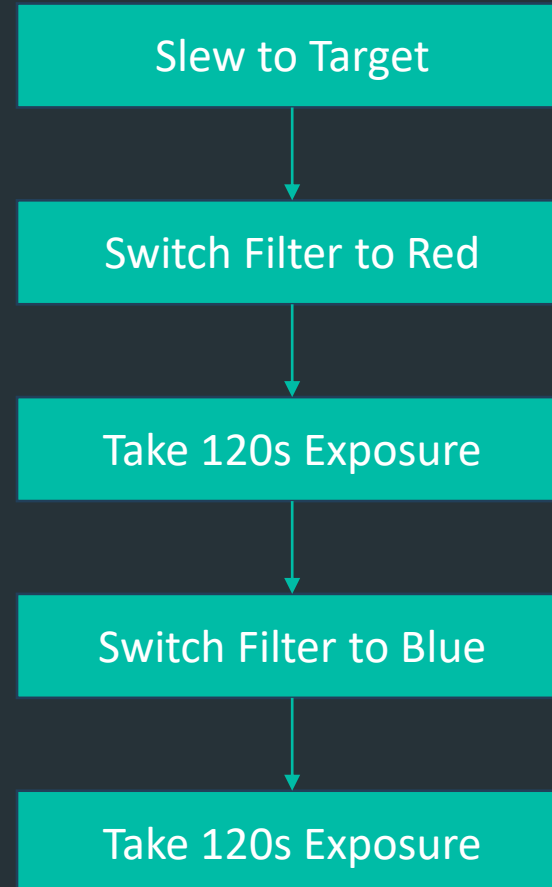




Instructions - DO



- A single building block to perform an action
- Instructions are executed from top to bottom
- Each instruction has its own set of options





Instructions - DO



- Instructions as part of the Sequencer

Sequence

Global Triggers

Sequence Start Area

Slew To Ra/Dec	RA	5 h	35 m	17.3 s		Dec	-5 d	23 m	28.0 s							
Switch Filter	Filter	Red														
Take Exposure	Time	120 s		Type	LIGHT		Binning	1x1		Gain	(182)		Offset	(10)		
Switch Filter	Filter	Blue														
Take Exposure	Time	120 s		Type	LIGHT		Binning	1x1		Gain	(182)		Offset	(10)		

Sequence End Area

Sequence

- Start
- Targets
- Slew to RA/Dec
- Switch Filter Red
- Take Exposure 120s
- Switch Filter Blue
- Take Exposure 120s
- End

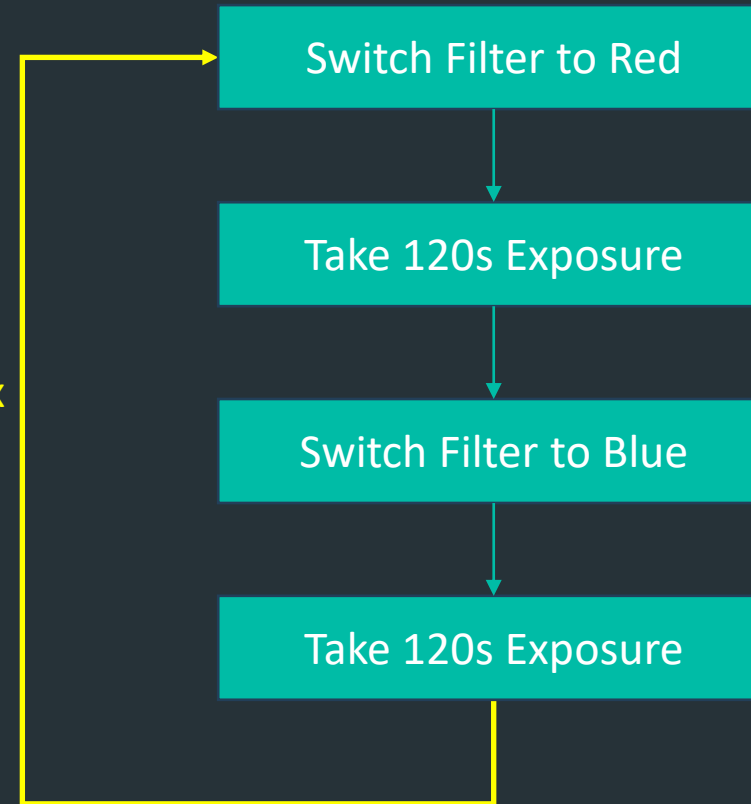


Loop Conditions - REPEAT



- Repeat one or multiple instructions
- Interrupt a block of instructions when condition is no longer fulfilled
- When multiple conditions are set, all conditions must be met

Repeat 10x



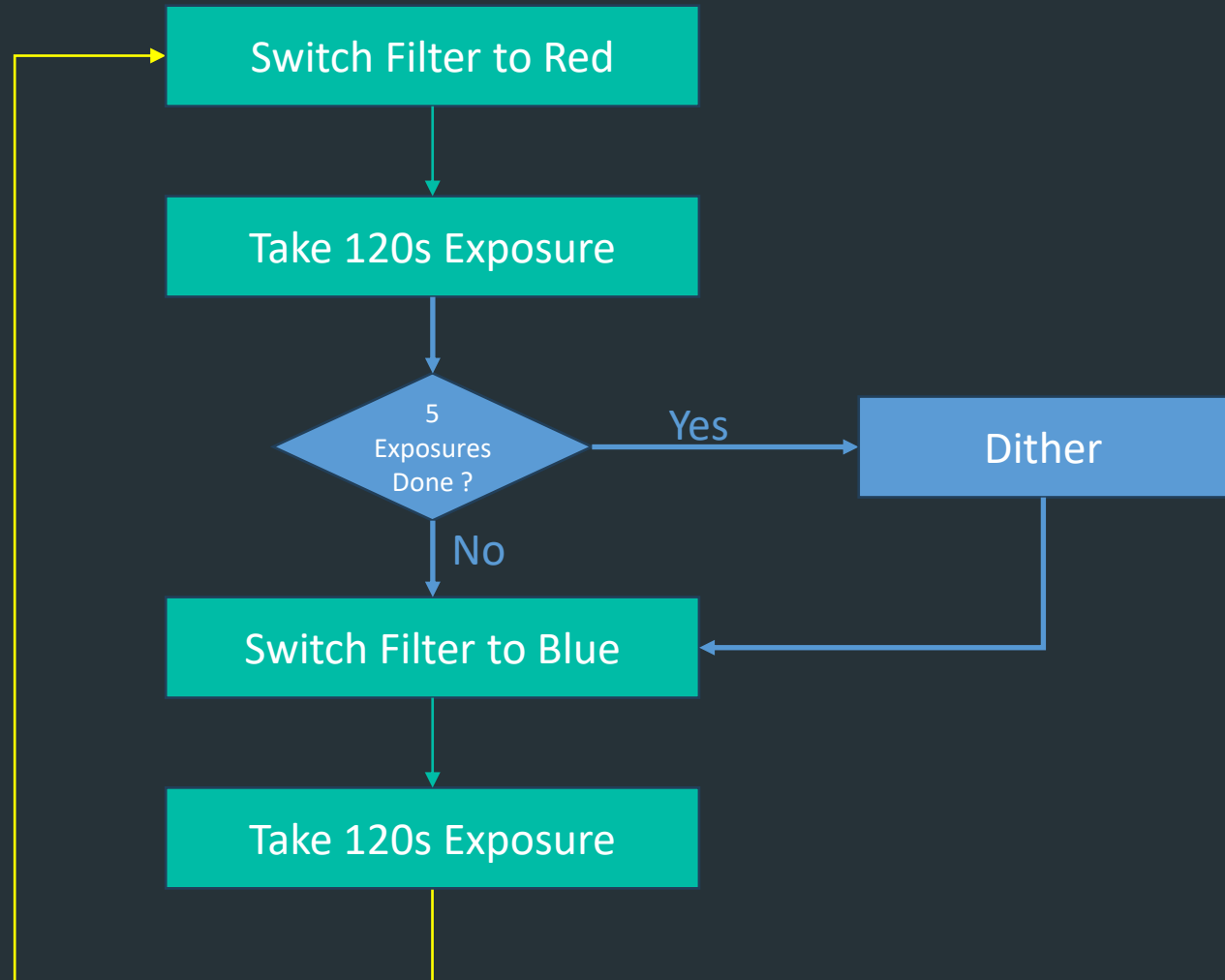


Triggers - REACT



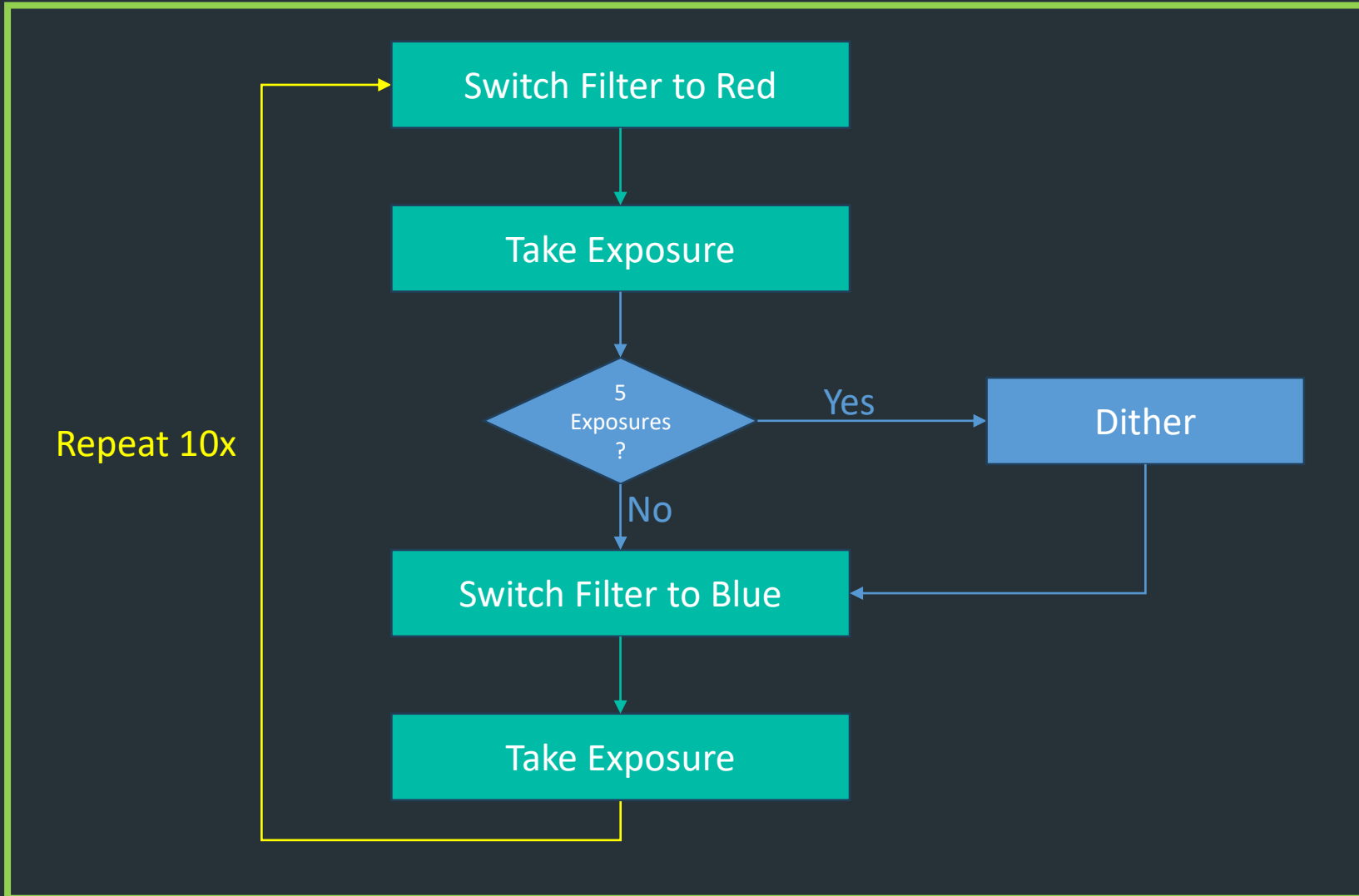
- React on predefined parameters
- Perform an action when parameters are fulfilled
- Parameters are evaluated after each instruction

Repeat 10x





Instruction Sets - GROUP





Instruction Sets - GROUP



- Instructions, Loops and Triggers as part of the Sequencer

Sequential Instruction Set

Triggers

- Dither after Exposures After exposures 5 Exposures 0/5

Loop Conditions

- Loop For Iterations 10 Iterations Iterations 0/10

Instructions

- Switch Filter Filter Red
- Take Exposure Time 120 s | Type LIGHT | Binning 1x1 | Gain (182) | Offset (10)
- Switch Filter Filter Blue
- Take Exposure Time 120 s | Type LIGHT | Binning 1x1 | Gain (182) | Offset (10)

Sequence

- Start
- Targets
 - Sequential Instruction Set
 - Iterations 0/10
 - Exposures 0/5
 - Switch Filter Red
 - Take Exposure 120s
 - Switch Filter Blue
 - Take Exposure 120s
- End



Hierarchies - PRIORITIZE



Slew and center -> Take Exposure -> Take Exposure -> Slew and Center -> Take Exposure -> Take Exposure

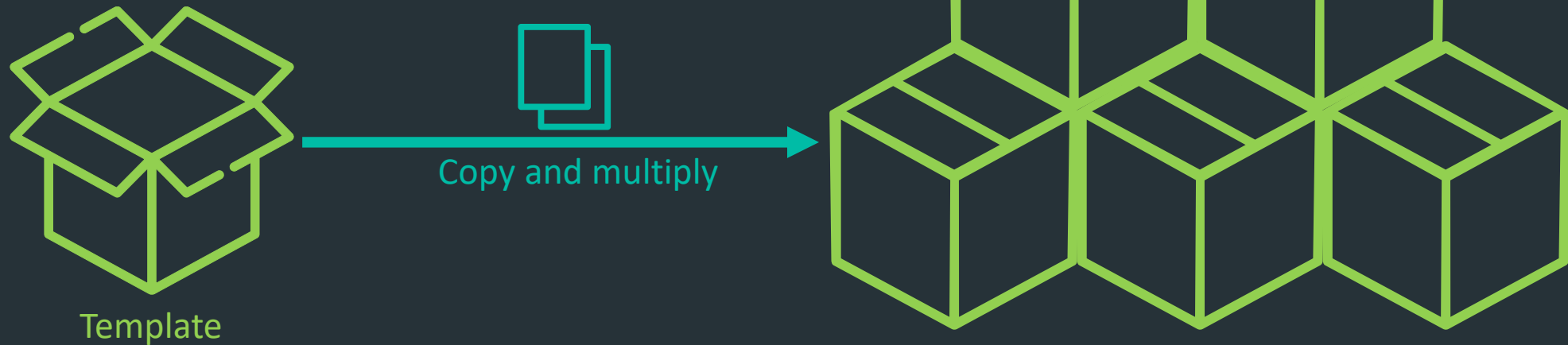




Templates - REUSE



- Create a template from an instruction set
- Copy and multiply the template with all stored settings

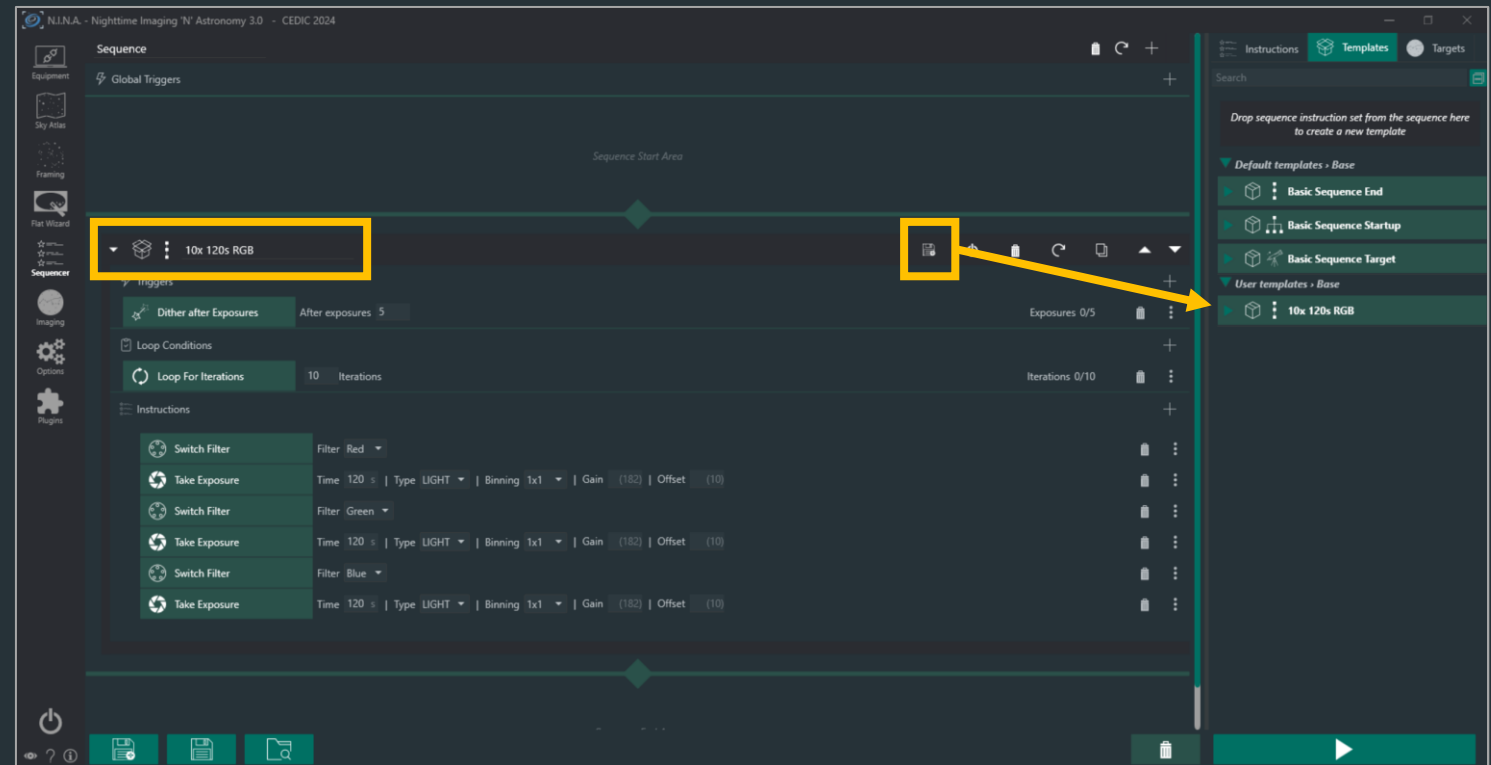




Templates - REUSE



- Choose a name for your instruction set
- Click on the save as template button
- The template will show up in the sidebar
- Once saved as a template it can be easily re-used





Deep Sky Object Instruction Set



- A specialized sequential instruction set
- Contains target information that is automatically inherited by instructions inside the set
- Gathers exposure info
- DSO Templates can be used from framing tab to add targets based on the template

The screenshot displays the N.I.N.A. software interface for configuring a Deep Sky Object (DSO) instruction set. The main window title is 'M 42'. The interface is organized into several sections:

- Target Information:** Target M 42 | 05:35:17 | -05° 23' 28" | 215°
- Exposure Info:** A section for exposure parameters.
- Triggers:** A section for triggering events.
- Loop Conditions:** A section for defining loop parameters.
- Instructions:** A list of instructions to be executed sequentially:
 - Slew To Ra/Dec:** A green button for slewing to the target coordinates.
 - Sequential Instruction Set:** A dropdown menu that is expanded to show a sub-interface with its own Triggers, Loop Conditions, and Instructions sections.
 - Triggers:** Includes a 'Dither after Exposures' trigger set to 'After exposures 1'.
 - Loop Conditions:** Includes a 'Loop For Iterations' condition set to '10 Iterations'.
 - Instructions:** A list of four instructions:
 - Switch Filter: Filter Red
 - Take Exposure: Time 120 s | Type LIGHT | Binning 1x1 | Gain (182) | Offset (10)
 - Switch Filter: Filter Blue
 - Take Exposure: Time 120 s | Type LIGHT | Binning 1x1 | Gain (182) | Offset (10)



Deep Sky Object Instruction Set



Target

Name M 42

RA	5 h	35 m	17.3 s
Dec	-5 d	23 m	28.0 s
Rotation	215°		

Coordinate reference for children

Exposure Info

Triggers +

Loop Conditions +

Instructions +

- Slew To Ra/Dec

Sequential Instruction Set

The interface also features a graph on the right showing the object's path over a 24-hour period. The x-axis represents time in hours (12, 15, 18, 21, 00, 03, 06, 09, 12). The y-axis represents altitude. A vertical dashed line labeled 'Now' is positioned at approximately 03:00. A point on the path is labeled '36° Transit south'.



Deep Sky Object Instruction Set



▼ M 42 ○ ● 📄 ⏻ 🗑️ ↺ 📄 ▲ ▼

▶ Target M 42 | 05:35:17 | -05° 23' 28" | 215°

▼ Exposure Info

Filter	Total #	Total	Time	Type	Binning	Gain	Offset	ROI	
Red	2	0:04:00	120 s	LIGHT	1x1	182	10	100%	
Blue	1	0:02:00	120 s	LIGHT	1x1	182	10	100%	

Triggers +

Loop Conditions +

Instructions +

▶ Sequential Instruction Set ○ 📄 ⏻ 🗑️ ↺ 📄 ▲ ▼



Still Lots of Specialized Requirements



- RTSP Player
- Add Moon angle
- Connect and disconnect Equipment
- Improved Autofocus
- Add telescope control keys to tel
- Weather alerting so
- Allow variables in Search
- GoodNightSystem or so
- Lucky Imaging with NINA
- Citizen Science
- Notification System
- Planner module
- Integ
- Live Stacking



Plugins



But Wait... THERE'S MORE!



Image generated by OpenAI's DALL·E.



Plugins



- Dive into the ever-growing list of available plugins
- Each plugin tries to solve specific problems
- More customization and flexibility
- Easy entry point for third party developers to drive innovation
- Keep application clean by only installing what you need

The screenshot displays the N.I.N.A. software interface. On the left, a sidebar contains various tool icons, with 'Plugins' highlighted. The main window shows a list of installed and available plugins. The 'Three Point Polar Alignment' plugin is selected, showing its settings and description.

Plugins

- Installed
 - Astromechanics Aperture Control
 - Autofocus Report Analysis
 - Connector
 - Device Actions and Commands
 - Discord Alert
 - DIYTrigger
 - ExoPlanets
 - Exposure Calculator
 - Filter Offset Calculator
 - Flexure Correction
 - GNS Plugin
 - Ground Station
 - Hocus Focus
 - Horizon Creator
 - Interrupts
 - Lightbucket
 - LuckyImaging
 - MyPlugin3
 - NEOCP Helper
 - Orbitals
 - Orbuculum
 - Phd2 Tools
- Available
 - Three Point Polar Alignment

Three Point Polar Alignment

Author: **Stefan Berg**
Version: **2.0.0.3**
Homepage: <https://www.patreon.com/stefanberg/>
Change log: <https://bitbucket.org/lsbeorn/nina.plugin.polaralignment/src/master/PolarAlignment/Changelog.md>

Three Point Polar Alignment almost anywhere in the sky

Options

- Default Move Rate: 3
- Default East Direction: ON
- Default Target Distance: 10 °
- Default Search Radius: 10 °
- Axis move timeout factor: 2 s
- Default azimuth offset from pole: 1 °
- Default altitude offset from pole: 2 °
- Polar Alignment Tolerance: 0 arcmin
- Altitude Error Color:
- Azimuth Error Color:
- Total Error Color:
- Target Circle Color:
- Successful Step Color:
- Log polar alignment error adjustments?: OFF
- Adjust for refraction?: OFF
- Stop Tracking when done?: ON

[Reset All Settings](#)

Description

Three Point Polar Alignment almost anywhere in the sky

A new instruction will be available for the advanced sequencer as well as a new tool pane inside the imaging tab that will assist in polar alignment.

When the instruction is called from within the sequencer, a new window will be visible, that will guide you through the process. Inside the imaging tab there will be a button inside the tool pane to show the polar alignment assistant with parameters and a button to start the process.

[Frequently Asked Questions](#)



Explore the App

The screenshot displays the N.I.N.A. software interface, which is used for controlling astronomical equipment and managing imaging sequences. The interface is divided into several panels:

- Left Panel:** Contains control panels for Focuser, Camera, Rotator, Filter Wheel, Telescope, and Weather. The Focuser panel shows settings like "Is moving", "Is setting", "Position", "Temperature", and "Target position". The Camera panel shows "Active filter" and "Change". The Telescope panel shows tracking and position data. The Weather panel shows environmental conditions like temperature, humidity, and wind speed.
- Center Panel:** Displays a large image of a nebula, currently at 1.1x magnification and 11% zoom.
- Top Right Panel:** Shows a "Statistics" window with data for Width, Mean, Median, Min, #Stars, Bit depth, Gain, Height, SD, MAD, Max, HFR, and HFR SD.
- Bottom Right Panel:** Contains a "Sequence" panel with a list of tasks (e.g., "Wait for Time", "Connect All Equipment", "Send to Pushover", "Open Flat Panel Cover", "Unpark Scope", "Set Switch Valve", "Move Focuser", "Cool Camera", "Dew Heater", "Set Tracking", "Slew To Alt/Az", "Switch Filter L", "Run Autofocus", "Start Guiding", "Solve and sync") and a "Targets" panel with a list of targets (e.g., "Crescent Nebula", "Wait until Above horizon", "Switch Filter L", "Slew, center and rotate", "Stop Guiding", "RGB Flats", "Trained Flat Exposure", "Slew and center", "Start Guiding").
- Bottom Left Panel:** Shows a "Guide" panel with a "State" field and a "Guide" chart displaying RA corrections, Dec corrections, RA, Dec, and Dither over time.
- Bottom Center Panel:** Displays an "HFR history" chart showing HFR, Autofocus, and Stars over time.
- Bottom Right Panel:** Shows an "Altitude Chart" and "Scope Control" panel with a graph of altitude over time and a "Transit south" marker.



Question



If you could add one feature to N.I.N.A., what would that be?



The community



Discord

Join the growing N.I.N.A. community on my discord server. Get attached, share knowledge and good practice or just talk about your hobby in our community. You can find the link to discord on the homepage or via

<https://discord.gg/nighttime-imaging>



Contributing

Do you need to be able to code to contribute? Absolutely not.

We have many areas where you can contribute, ranging from improving the documentation, supporting other users, writing tutorials, testing out new features or directly writing code for N.I.N.A. itself.



Localization

Due to all the amazing people wanting to help and contribute in localizing N.I.N.A. I have set up a project inside a translation management software called **Crowdin** where people can easily add new translations for labels without having to know how to code.




Support me



I love working on this project with all my heart, but maintaining it is becoming increasingly difficult and I really want to keep N.I.N.A. as free and open source software. Working on N.I.N.A. **takes a lot of time and effort** to be done right. With the help of backers however, I can keep the project alive and healthy and also invest even more time and resources into it.

So – If N.I.N.A. helps you in your journey for amazing deep sky images, please consider becoming a patron. Each backer will help!
Additionally you will get access to special discord roles and a special discord channel!



PATREON | Support through one-time donations or by becoming a patron!
More details at <https://nighttime-imaging.eu/donate/>



Thank you!

I'm forever thankful for all the people who have contributed to the project! It is highly appreciated.

Furthermore, a special thanks to all financial supporters!



Icons made by

- Freepik
- Monkik
- Icongeek26
- Surang
- Smashicons
- Mavadee

from www.flaticon.com