Player One

Planetary Camera Manual V1.2

Player One

Product Design

Regular Hexagon

Scientific and technological, look luxurious and cool, highlighting the style of top players

Innovation

Focus on independent intellectual property rights and product innovation

High Quality

Use high quality electronic components

Various Product line

Covers all aspects of astrophotography

Planetary Camera Design

Planetary Camera is first product line we provided

DDR buffer

256MB DDR3 Buffer
It helps stabilize and secure data transmission, it effectively avoids frame dropping and greatly reduces readout noise.

DPS technology

Dead Pixel Suppression
Dead pixels (including both hot pixels and cold pixels) of the image are swept away.

Sensor Tilt Plate

To obtain a flatter image field
When do solar imaging with prominence telescope, the Newton ring is annoying. Smoother solar image without Newton ring could be taken by adjusting the sensor tilt plate. Besides, when you use a planetary camera for DSO lucky imaging, if you found the stars in corner are not perfect, you can adjust the sensor tilt plate to obtain a flatter image field. get a much smaller field curvature of the telescope.

Overvoltage and overcurrent protection mechanism

Camera hardware protection
Player One ensures the safety of your camera and other equipment through overvoltage and overcurrent protection mechanisms.

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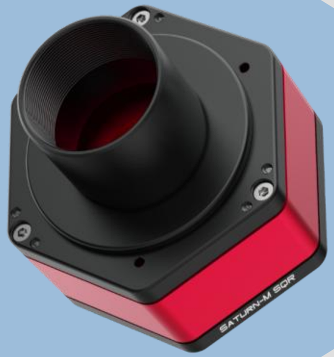
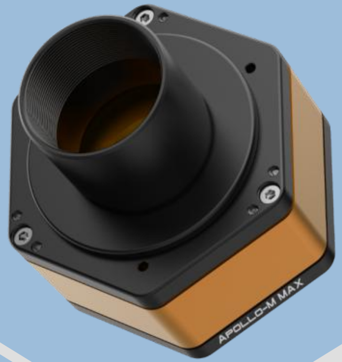




Catalog

Player One

» 01 How to setup your camera

Driver and software installation and setup

1.Driver and Software installation

Player One

1. Open Player One website to download:

https://player-one-astronomy.com/service/software/

For planetary imaging, Sharpcap 4 and upper is supported.

For DSO imaging, ASCOM 6.5 is supported.

Windows 7/8/10/11 is supported.

Linux and Mac OS is supported.

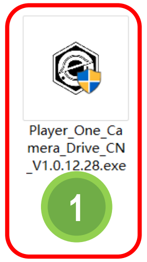
Home » Service » Software

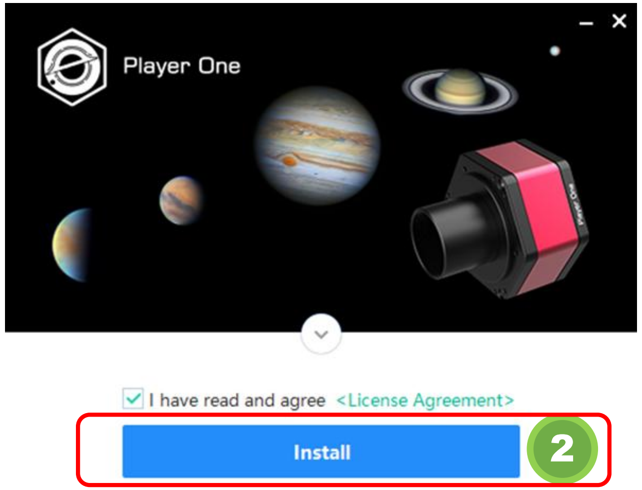
Native Driver				
Camera Driver	Windows users must install the native driver to use the camera.	V1.1.2.4	Released: 2021/02/04	Download
Camera SDK	SDK is provided for developers to do secondary development based on Player One cameras	V1.1.2.25	Released: 2021/02/25	Download

2. Driver installation （Don't connect the camera before installation）

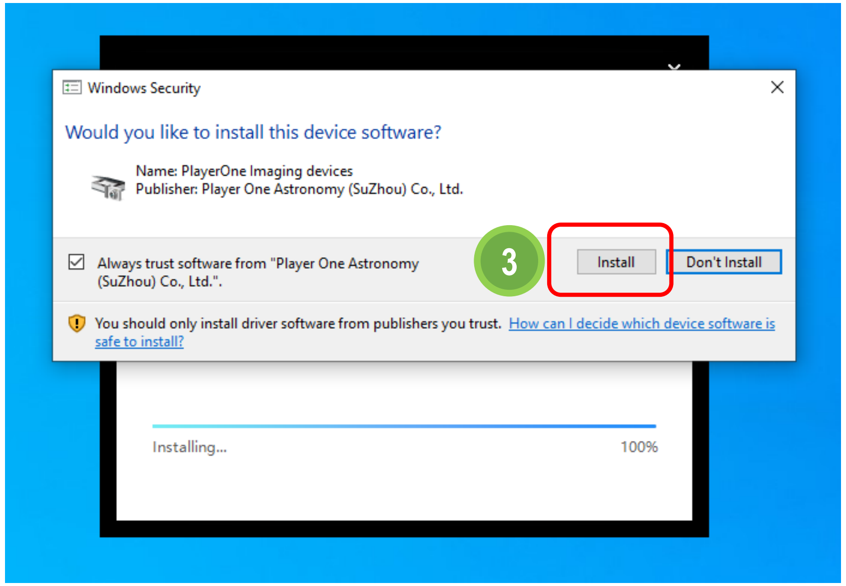
1) Double-click the driver installation package to enter the installation page

2) Click "Install" and wait for completion

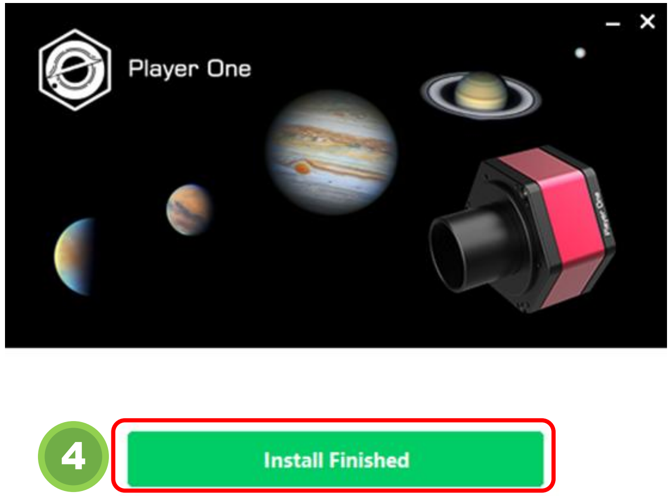




3)In first installation, your computer will show up Windows Security window, please click "Install".

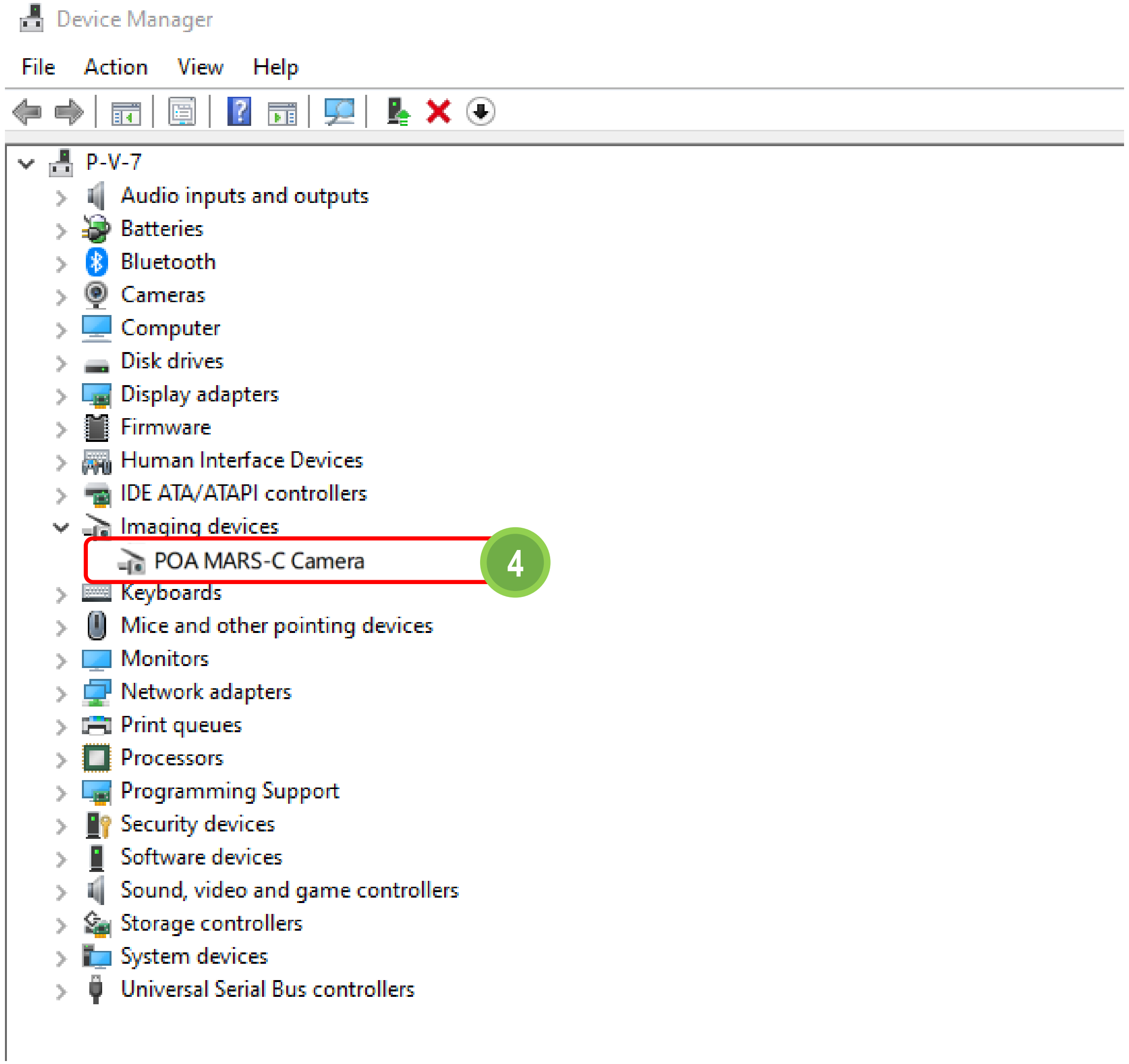


4)Click "Install Finished" to finish installation.



5) After installation, connect the camera to the computer USB3.0 port through USB cable, and the camera will be automatically recognized.

6) View the camera status in Device Manager

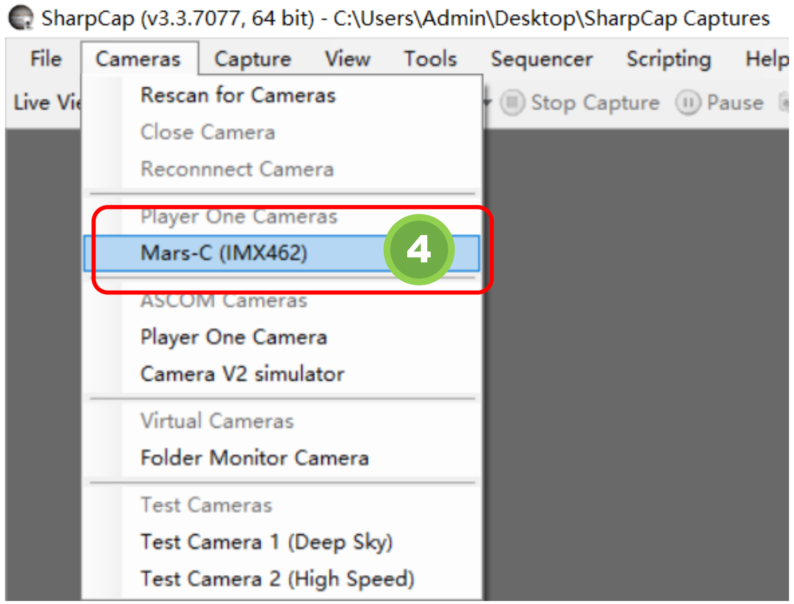


1.Driver and Software installation

Player One

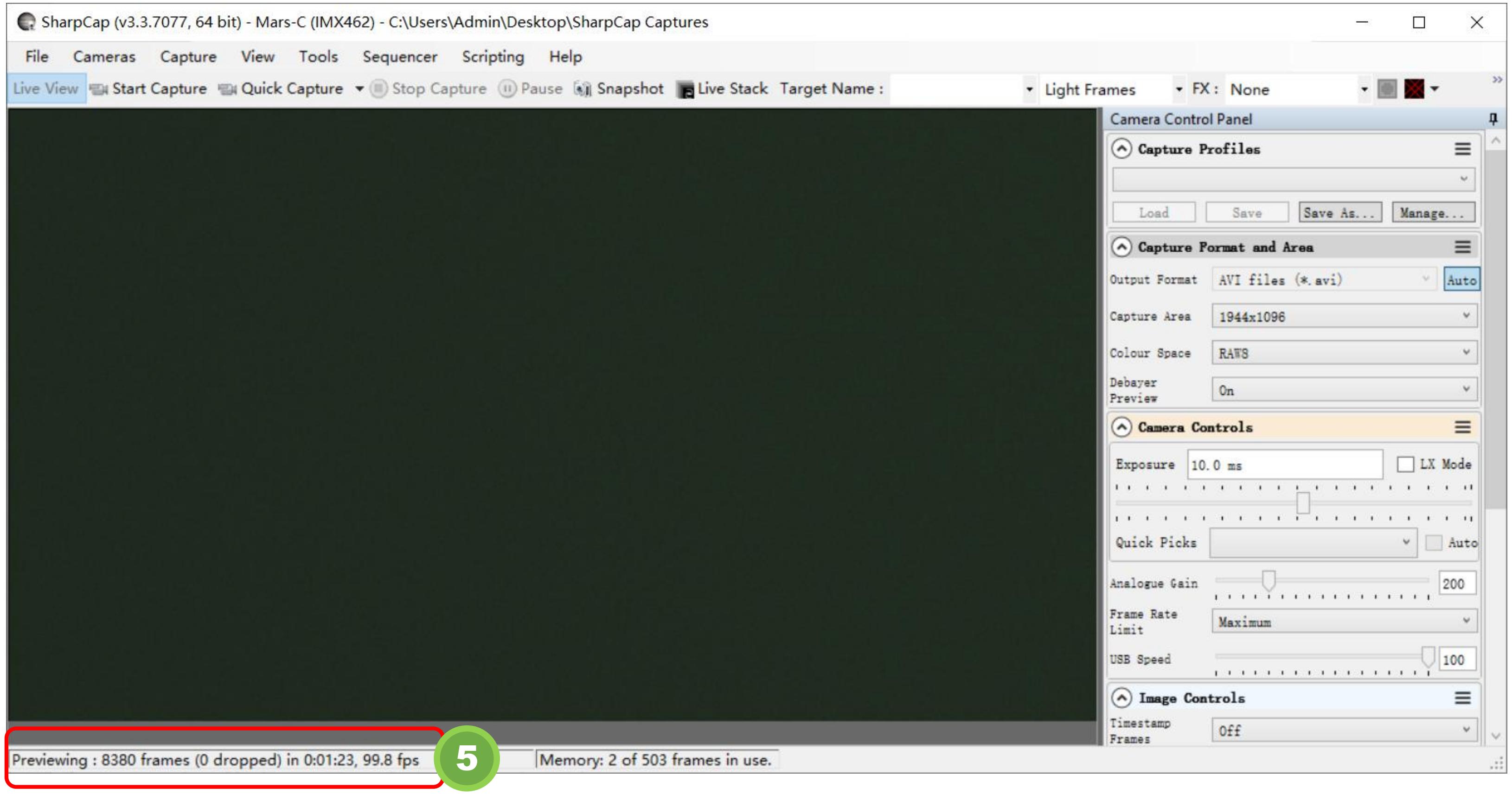
3. Install capture software

1) After the installation of the driver, you will need to install a capture software such as SharpCap.
2) Select the installation path (the default path is generally recommended).
3) After the installation is completed, open the software.
4) Open Camera: under the Cameras menu, go to Player One Cameras and select the available camera models.



5) Check FPS

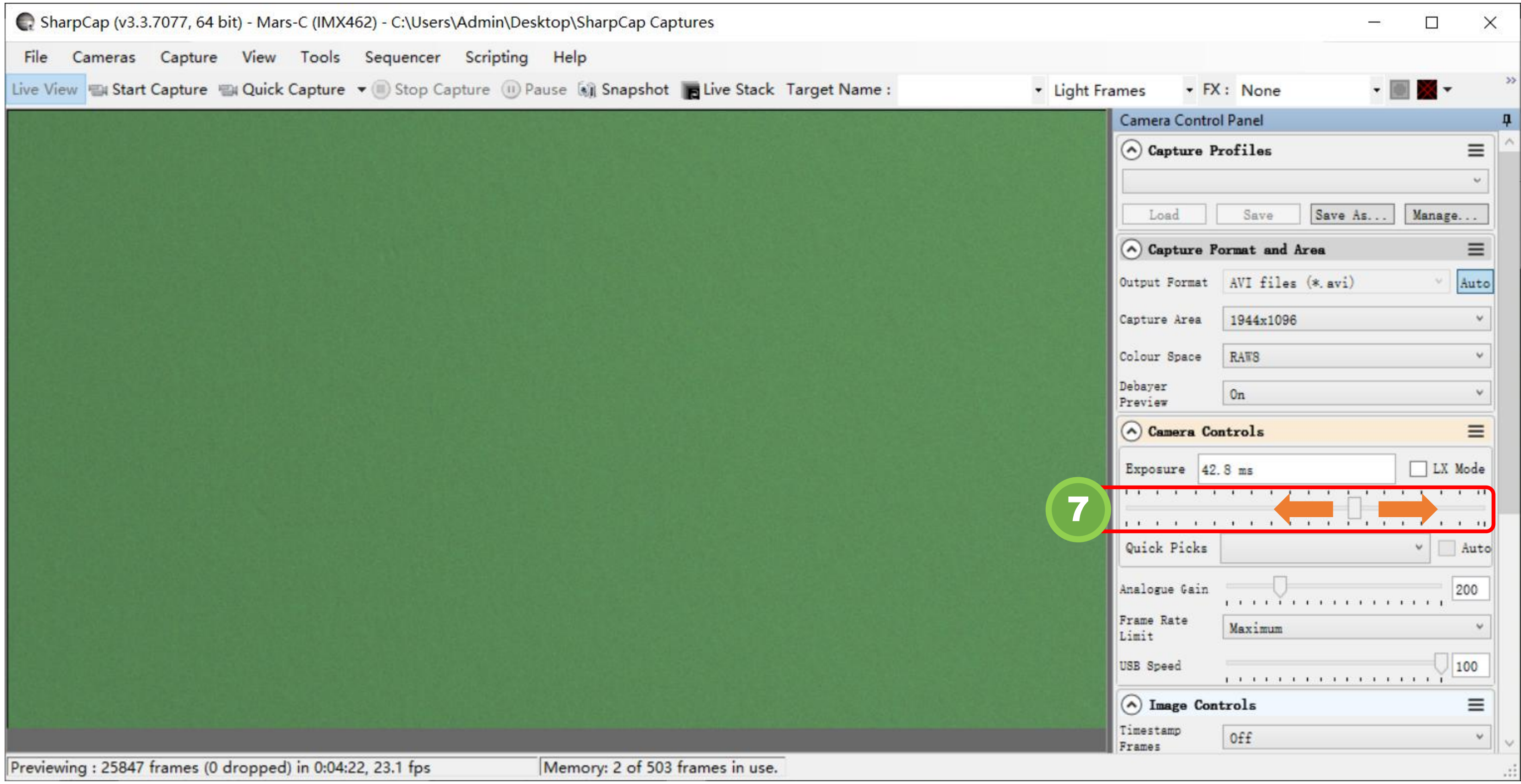
FPS is a very important parameter, if FPS show a normal value such like 99.8fps, means the camera can transmit data to your computer normally.



1.Driver and Software installation

6) Remove the camera cover

7) Check the preview. Adjust the exposure, ~~watch the preview,~~ you will see the change of brightness from the preview. That means the camera is working normally.



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»02 Level 1 - How to preview image

Familiar with capture through a telescope

2. Level 1 How to preview image

At the beginning, it was very hard to handle planetary imaging. We can start with an object 20 meters away and practice using telescope and camera.

2. Level 1 How to preview image

2-1 Connect camera to telescope

1. First find a target through the eyepiece.

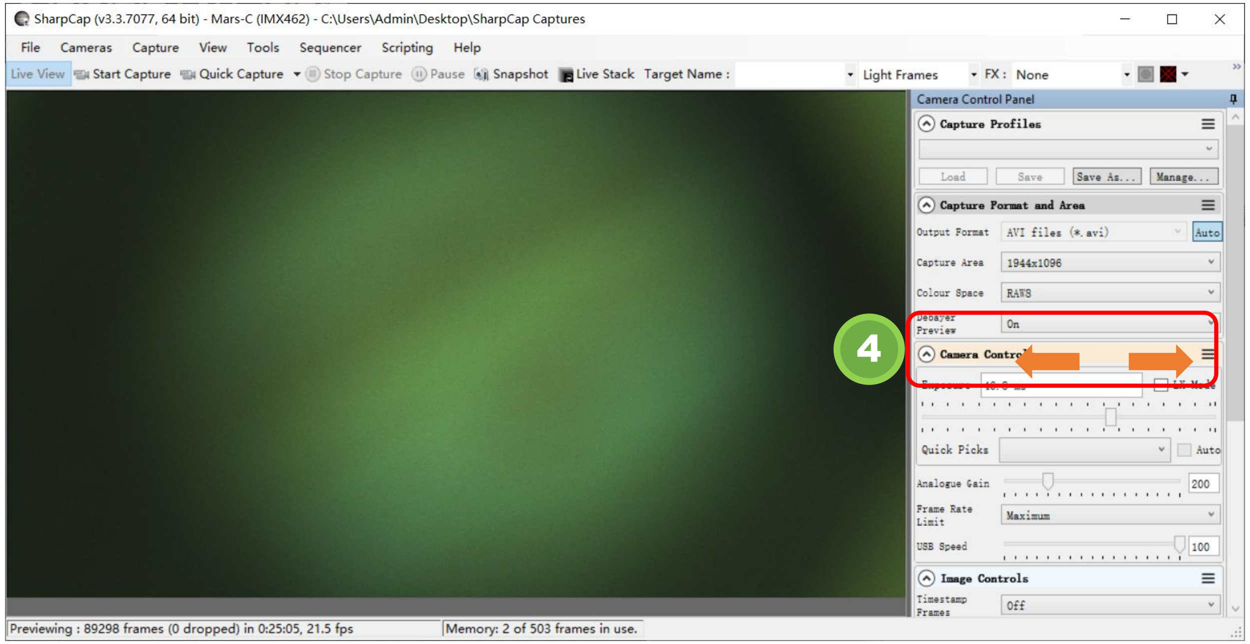
2. Remove the eyepiece and Diagonal of the telescope and install the camera
(A refractor may need an extender to reach focus point better.)

3. Connect camera and PC through USB3.0 cable.

2-2 Preview on your screen

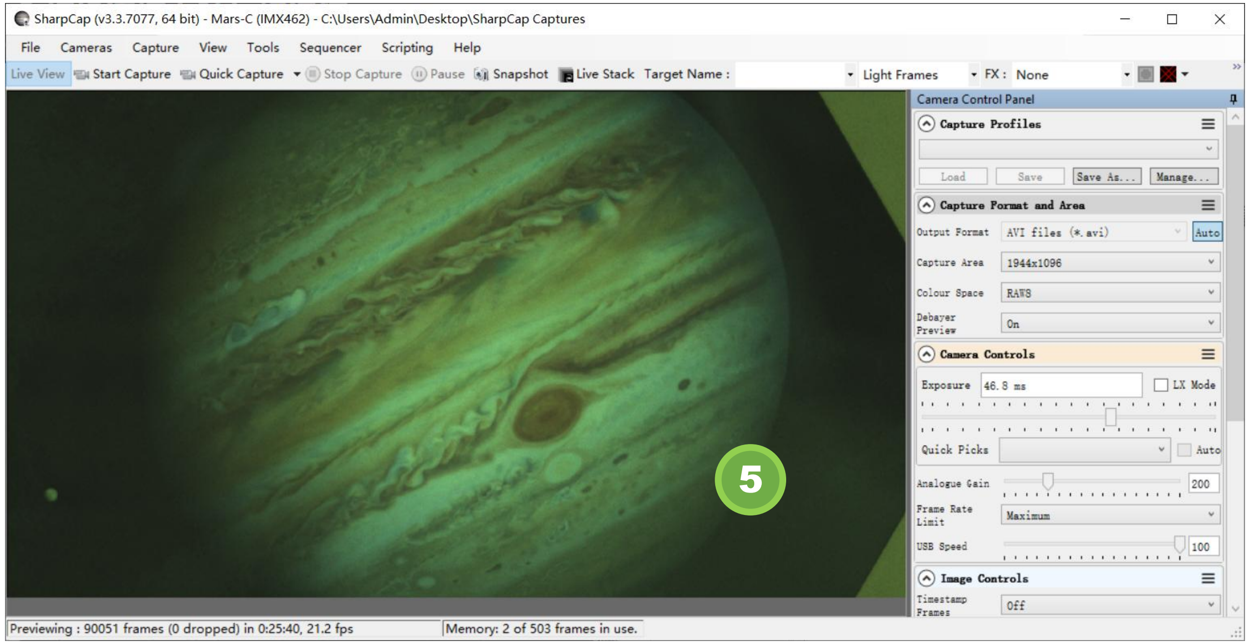
1. Adjust exposure

Open SharpCap and adjust the exposure to bright the image and avoid overexposure

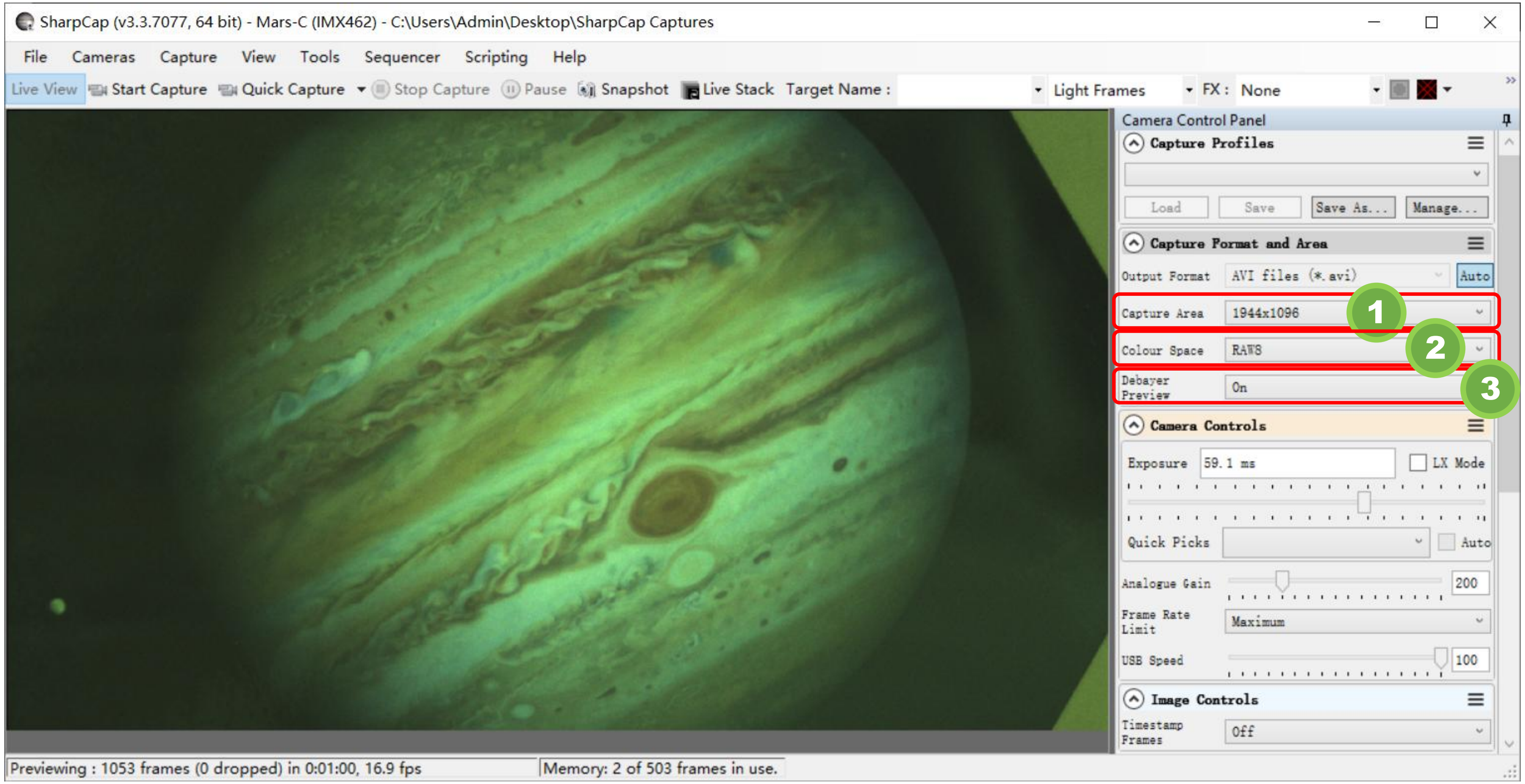


2. Refocus

Adjust the focusing wheel of the telescope to focus until get sharp previews.



2-3 Detailed explanation of camera shooting parameters



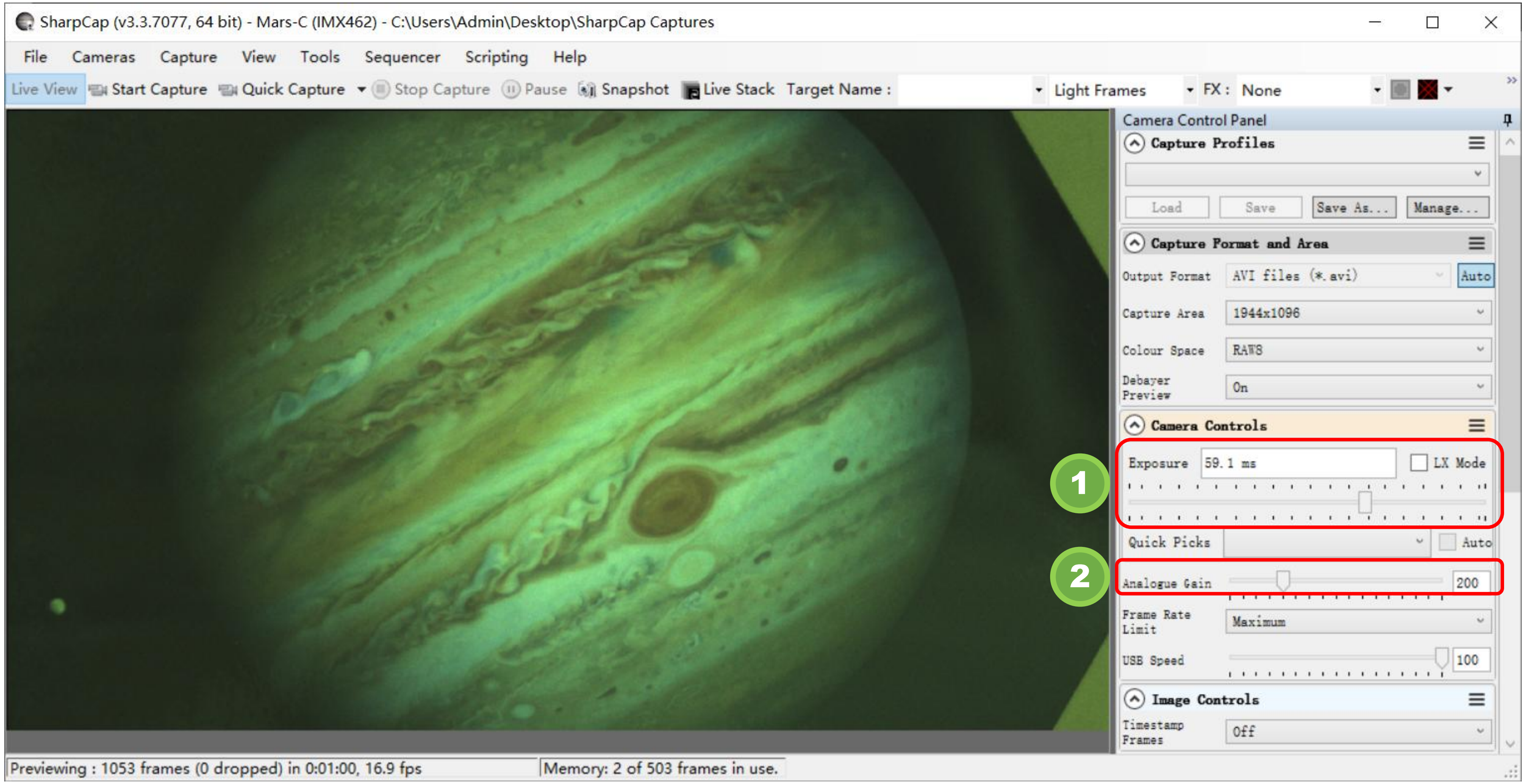
1. Capture Format

1） Capture Area (Resolution): There are several preset options and you can also customize the resolution. For the first use, it is recommended to shoot at the default highest resolution. The lower resolution means that only part of the area is read out (ROI mode), and the field of view becomes narrower.

2） Color Space： RAW8, RGB24, RAW16, etc.
RAW8 and RAW16 output raw black and white data (need to be converted to color via Debayer later), RGB24 can directly output color data, but the amount of data will be three times than RAW8.

3) Debayer Preview: Set “On”, you can see the color preview on the left side.

2-3 Detailed explanation of camera shooting parameters



2. Camera Control

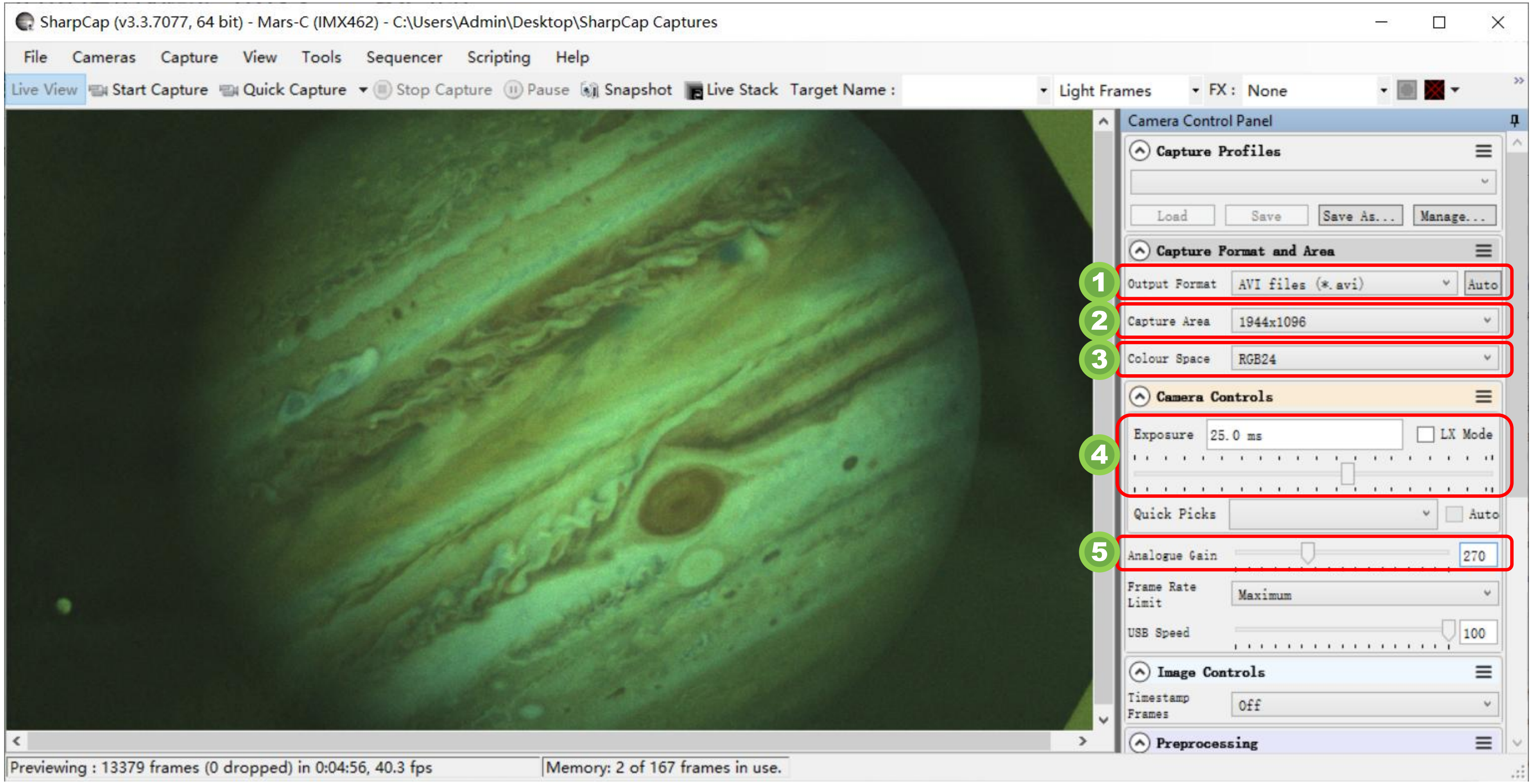
1) Exposure: the exposure time of a single frame of the camera can be controlled (32us-2000s).Exposure for planetary photography is usually around 10-50ms.

2) Gain: similar to ISO of DSLR, the lower the gain, the more delicate the image looks and the larger the dynamic range; The higher the gain, the more snow spots the image looks, the lower the signal-to-noise ratio, but the lower the readout noise.

2. Level 1 How to preview image

Player One

2-4 Camera indoor test （Take Mars-C for example）



1. Setup suitable parameters

1) The output is set to AVI video

2) Select the maximum resolution of 1944*1096

3) Color video shooting in RGB24 mode

4) Set the exposure to 25ms

(can be appropriately reduced according to the image brightness)

5) Gain set to 270

(can be appropriately reduced according to the image brightness)

2. Level 1 How to preview image

Player One

2-4 Camera indoor testing（use Mars-C as example）

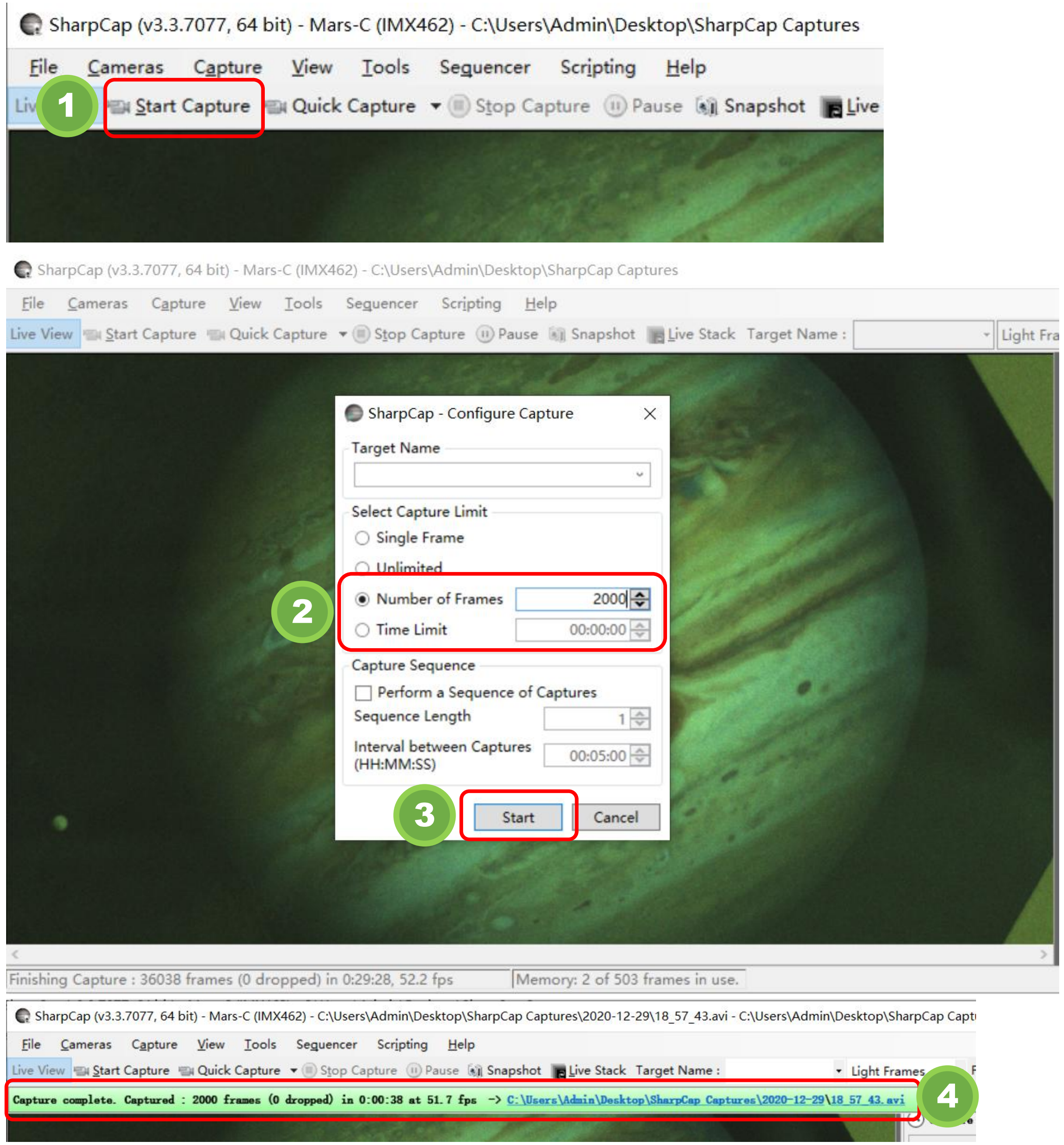
2. Start capture a video

1) Find the shooting button in the top bar of SharpCap and click the “Start Capture” button to pop up the dialog box.

2) Set the number of frames or the capture time limit.

3) Click to “Start” to capture a video.

4) The video will be saved on your computer after shooting



»03 Level 2 - How to do real astrophotography

Start from Lunar imaging

3-1 Aim to the moon

Install astronomical equipment and aim at to the moon

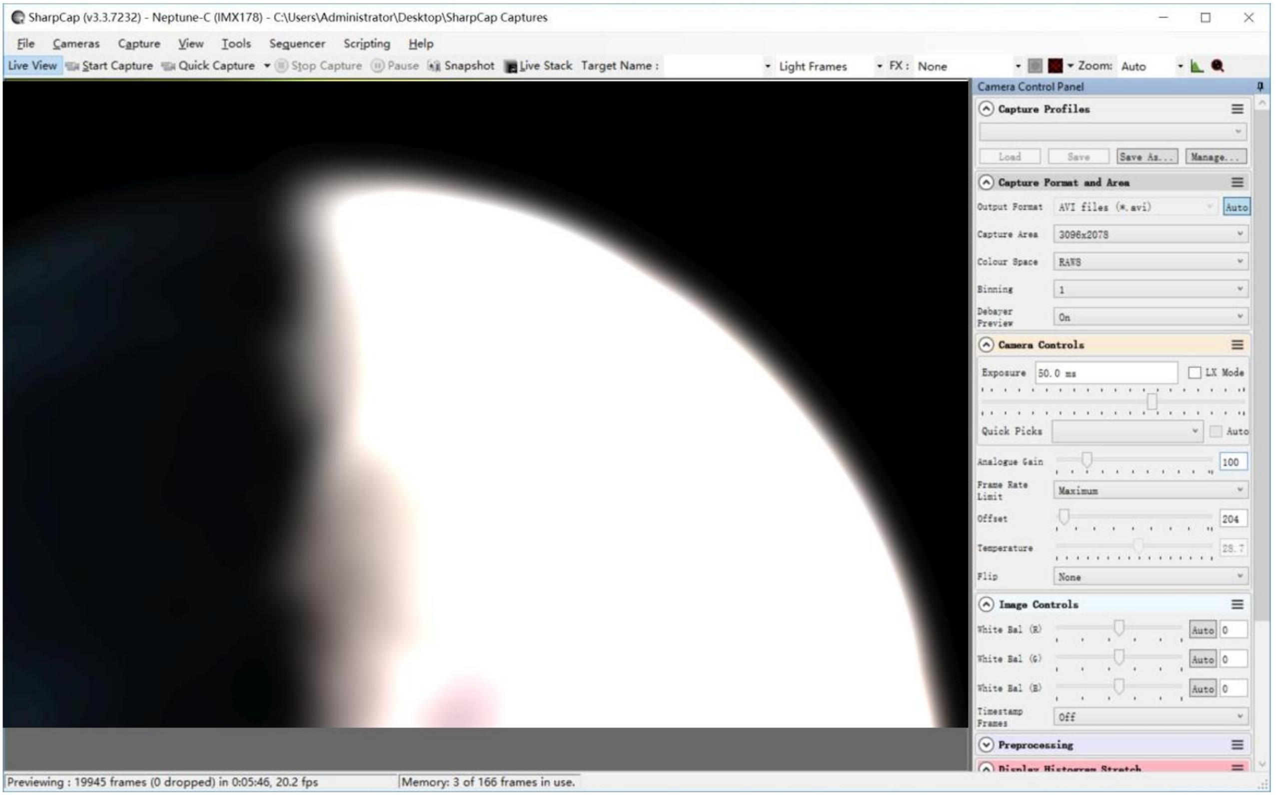
1) I believe you have some experience in astronomical observation, now the first step is to install the telescope according to your habits, aim ~~it at~~ to the moon, and turn on the automatic tracking function.
2) 2) Use the eyepiece to observe and focus your telescope to get a sharp view of the moon.

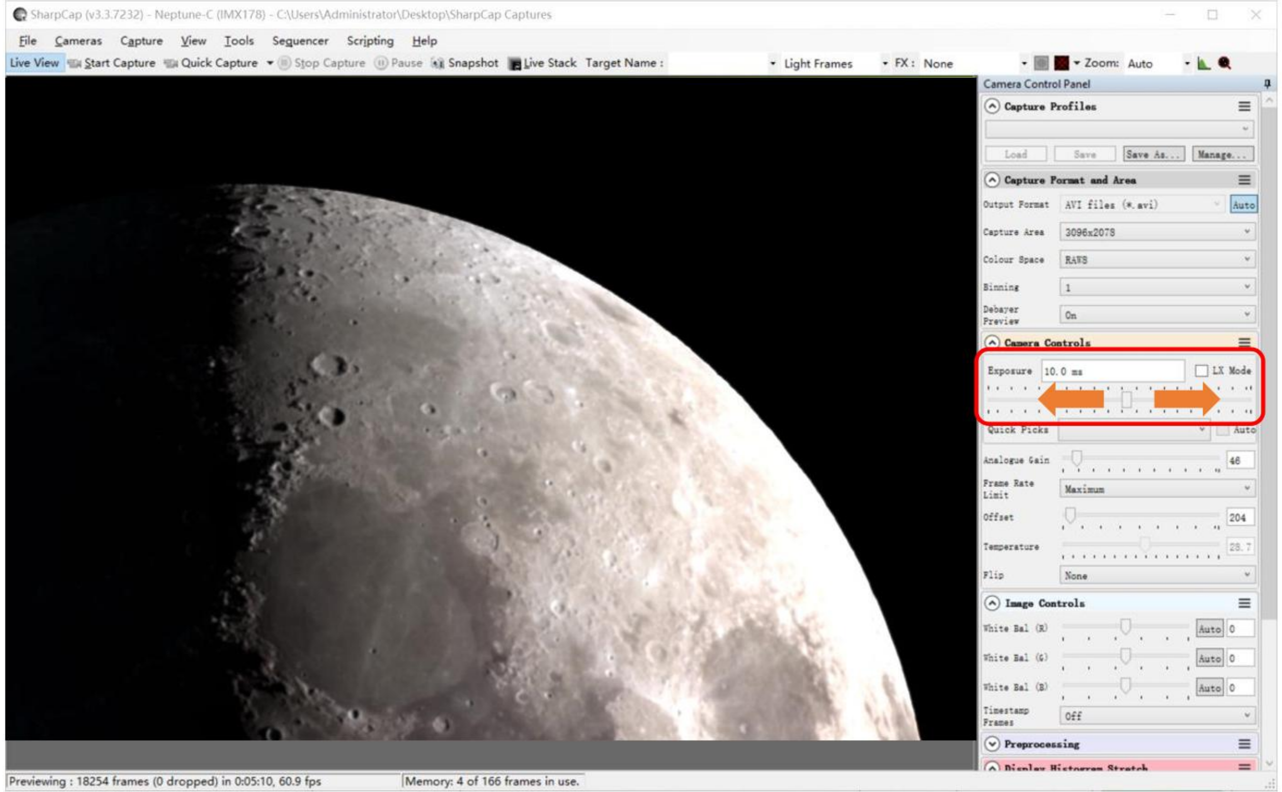
3-2 Shooting the moon

The basic process of lunar photography

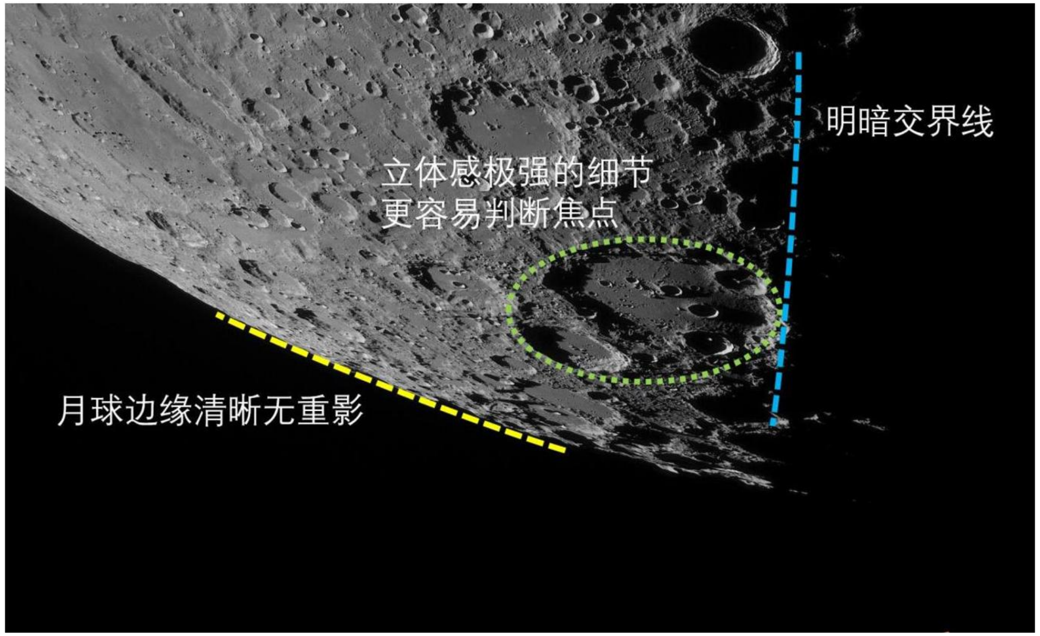
1) Connect the camera to your PC, open the Sharpcap and you will get the preview.

2) Adjust the exposure and do coarse focusing. Only requires a rough view of the lunar surface.

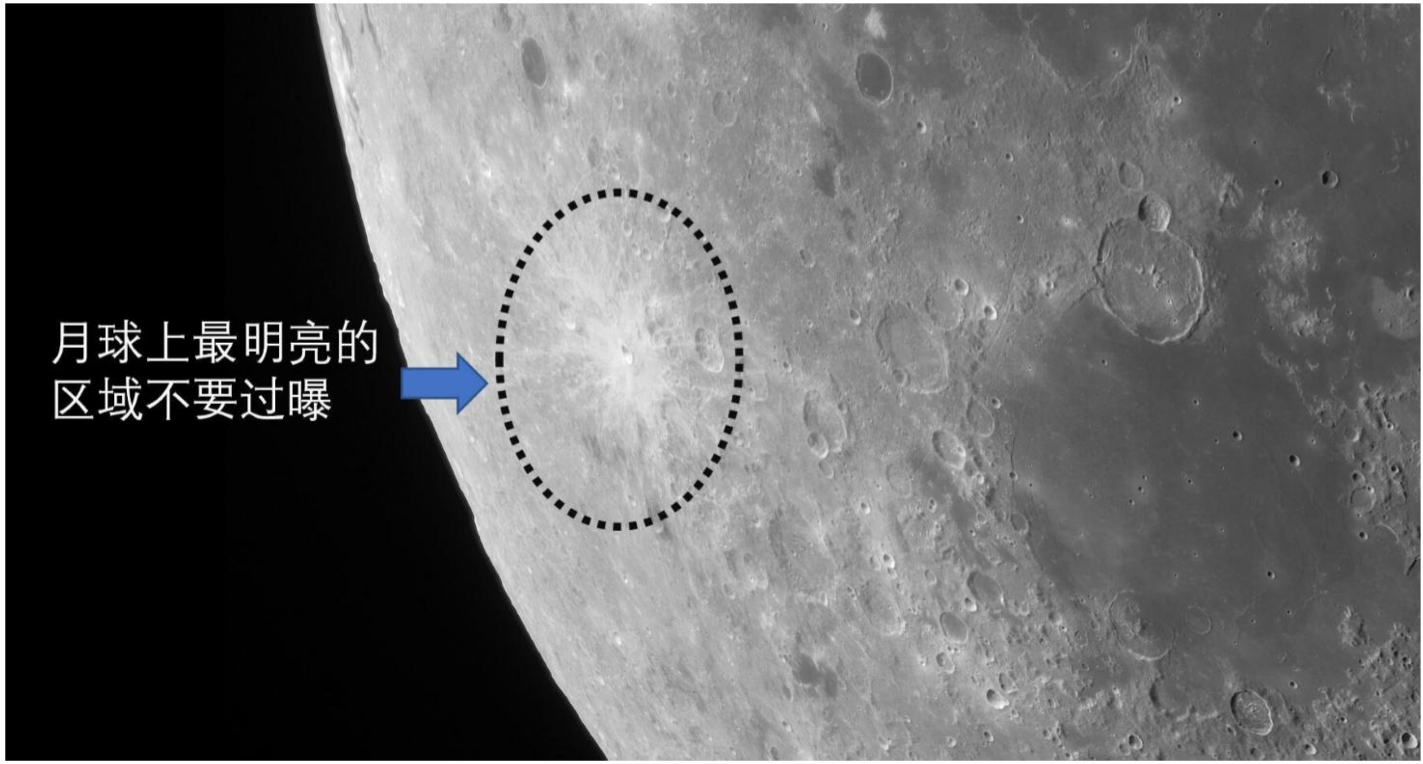




3) Accurate focusing: You can choose the light and shadow boundary, or the edge of the moon, to do accurate focusing, where the details are more contrasted and easier to determine the focus.



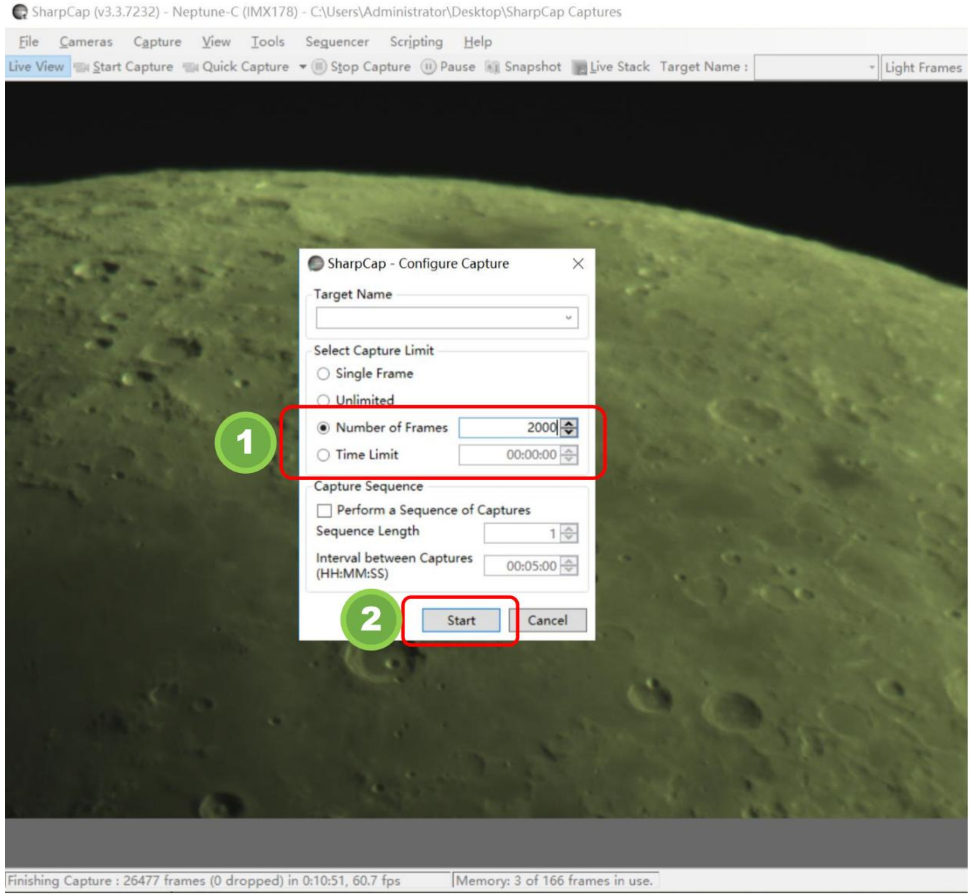
4) Adjustment of Exposure and Gain: it needs to be determined according to the brightness of the moon surface, and is not constant. The moon's brightness depends on its phase, the altitude of the moon , the focal ratio of the telescope, and the haze. As a rule of thumb, on main focus point, exposures are around 5ms-10ms, or even shorter, with a gain of 100. After With a Barlow lens, exposure and gain can be properly bigger, exposure is recommended not over 20ms, gain could be set a higher value until you can see bright lunar surface. Pay attention to the bright area of lunar surface~~, do not~~ to avoid overexposure.



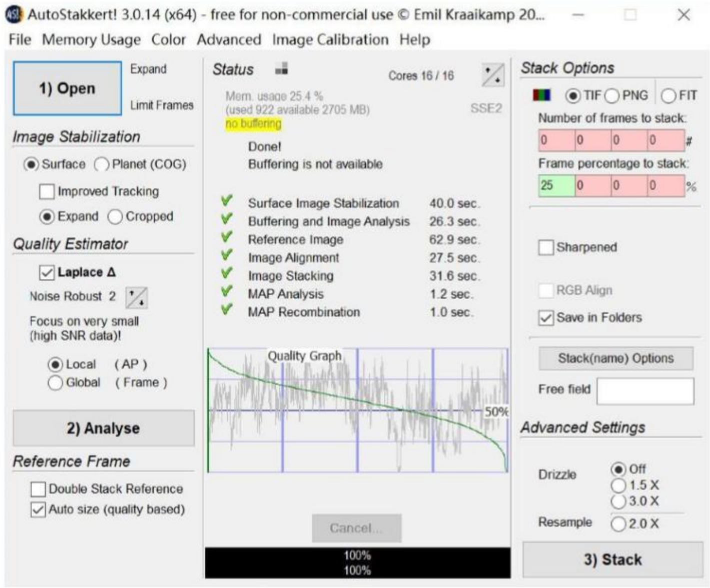
3. Level 2 - How to do real astrophotography

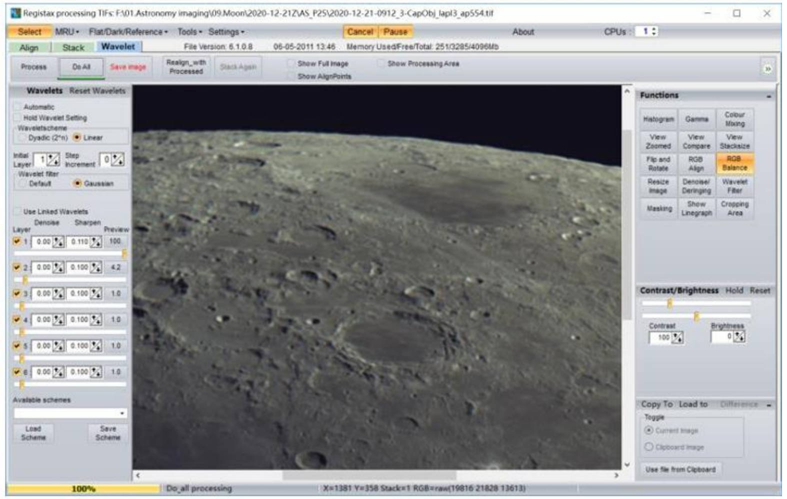
Player One

5) Capture: Record a 2000 frames video in RAW8 format



6) Post-processing: Use AS!3 open the video to generate a single image with high signal-to-noise ratio, and Registax6 was used for sharpening and other processing.





AS!3 and Registax6 download page：
https://player-one-astronomy.com/service/software/

A detailed tutorial about stacking and sharpening can be found here:
https://player-one-astronomy.com/explore/post-processing/

» 04

How to use ASCOM

ASCOM platform and camera driver installation

4. Camera ASCOM driver installation

Many DSO imaging software (such as SGP and Maxim dl) require ASCOM platform and camera ASCOM driver to control the camera for DSO imaging.

The ASCOM driver of Player One camera is developed based on ASCOM 6.5, so you need to download the latest ASCOM6.5 platform and camera ASCOM driver from the official website to control the camera normally.

https://player-one-astronomy.com/service/software/

4-1. Download ASCOM platform and camera driver

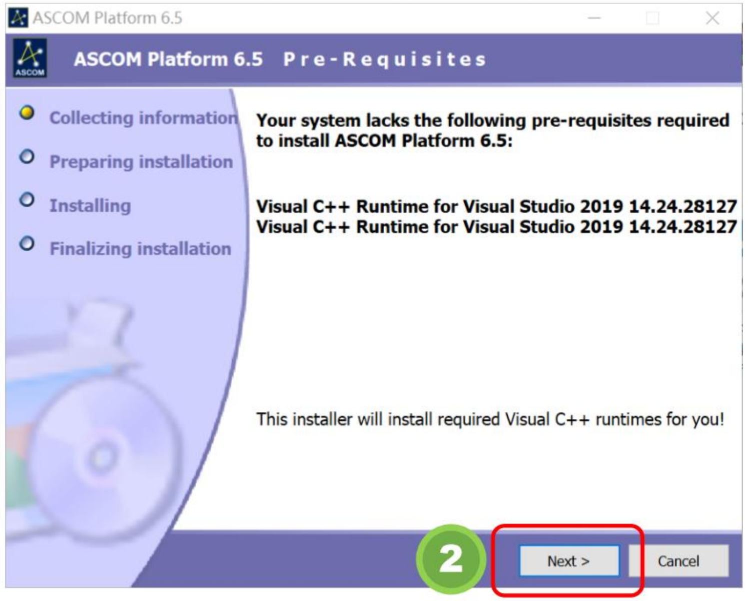
Click the download button to download the driver.
And wait for the download to complete.

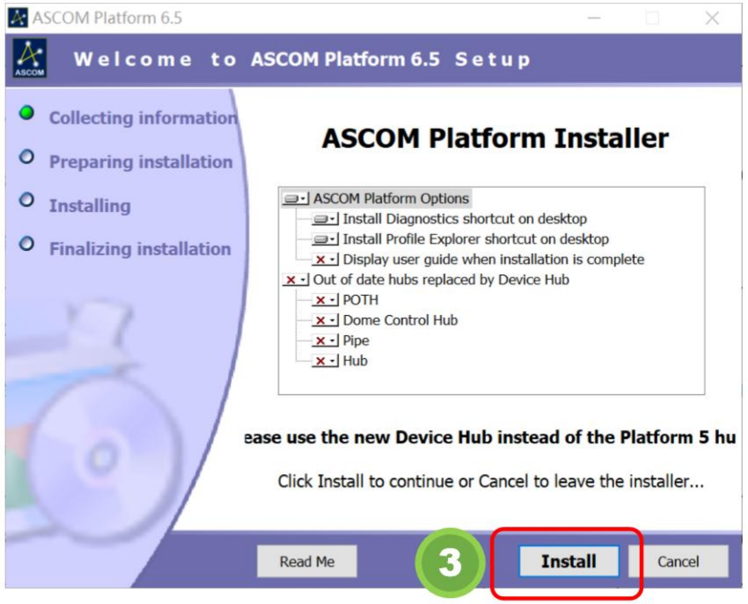
ASCOM Driver				
ASCOM platform	The ASCOM platform is an astronomical standard protocol set running on the windows system. Many astronomy software need to be installed after the ASCOM platform can be used. You can log on to the ASCOM platform official website for more information.	V6.5	Released: 2020/5/20	Official Download 1 ASCOM6.5 Download
Camera ASCOM Driver (base on ASCOM6.5)	Software using ASCOM interface，need to be installed to control the camera. **ASCOM6.5 platform is required.**	V6.5.1.0225	Released: 2021	2 Download

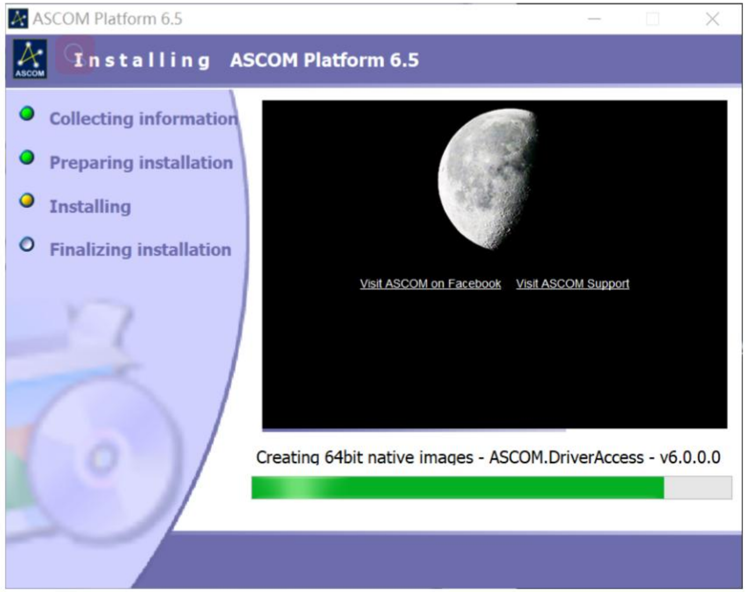
4. Camera ASCOM driver installation

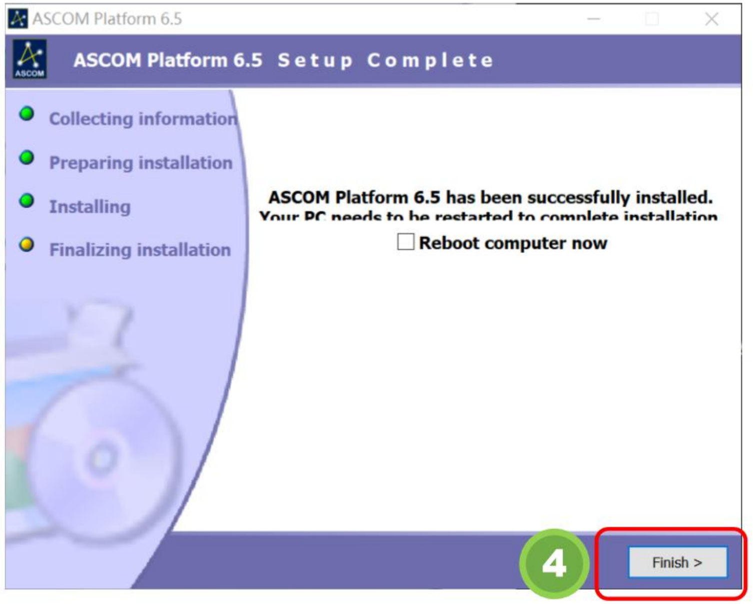
4-2. install ASCOM platform

1) Double-click the driver installation package to enter the installation page
2) Automatically detect necessary files and click "Next" to continue.
3) Click "Install" to Install the platform
4) Installation completed





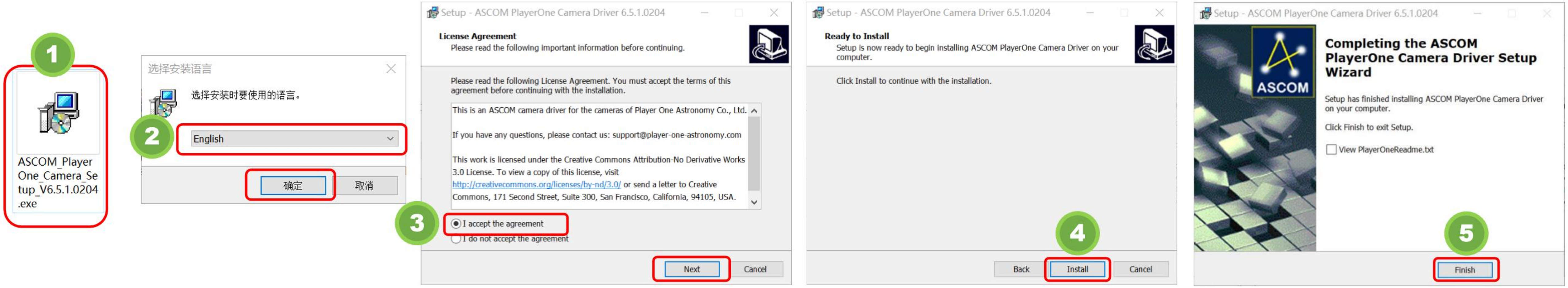




4. Camera ASCOM driver installation

4-3. install camera ASCOM driver

1) Double-click the driver installation package to enter the installation page.
2) Select the language, it is recommended to choose Chinese, and then click "OK" button.
3) Select "I Accept the Agreement" and click the "Next" button.
4) Click the "Install" button to Install and wait for completion.
5) Click "Finish" to complete the installation.



4-4. Download and install capture and guiding software

There are many software that support ASCOM platform, you can choose the software you are familiar with to shoot and guide the star, all the commonly used software download links are as follows:

https://player-one-astronomy.com/service/software/

4. Camera ASCOM driver installation

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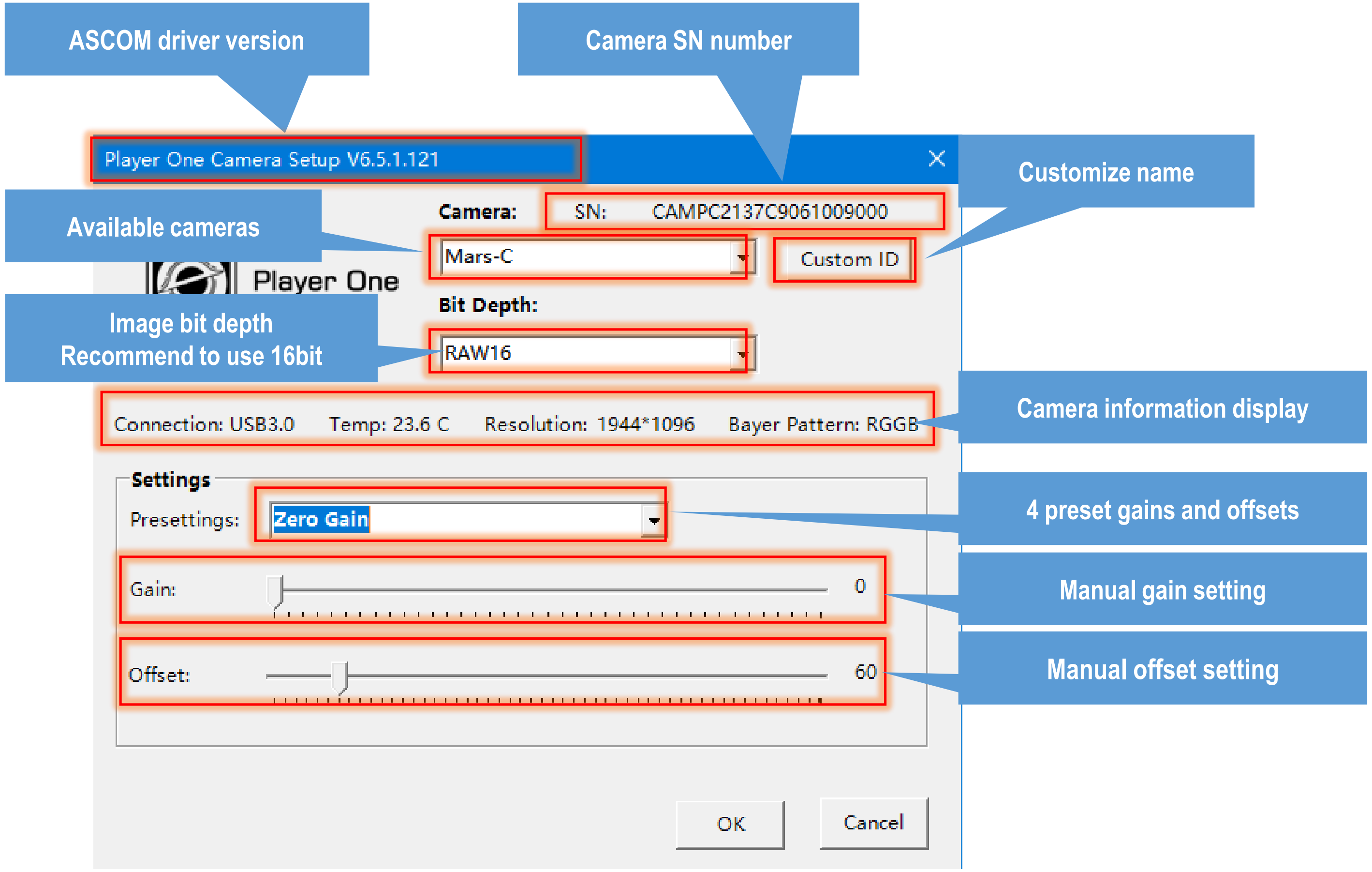
4-5. ASCOM setup window

1. ASCOM window introduction



2. Detailed explanation of Gain preset values

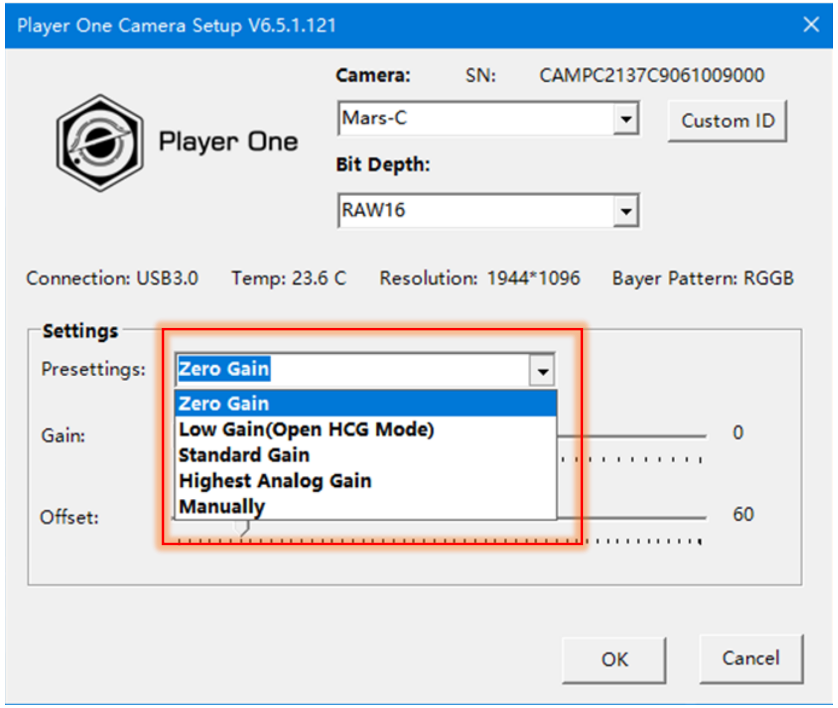
1) Zero Gain: Maximum dynamic range can be obtained, suitable for long exposures.

2) Low Gain (Open HCG Mode) : it is the lowest trigger gain to start the HCG mode of camera, and can obtain high dynamic and low readout noise.

3) Standard Gain: 1e /ADU can be obtained and minimize quantization error.

4) Highest Analog Gain: obtain the lowest readout noise, suitable for short exposures.

5) Manually: Manual setting of gain and offset.



4. Camera ASCOM Settings for DSO imaging

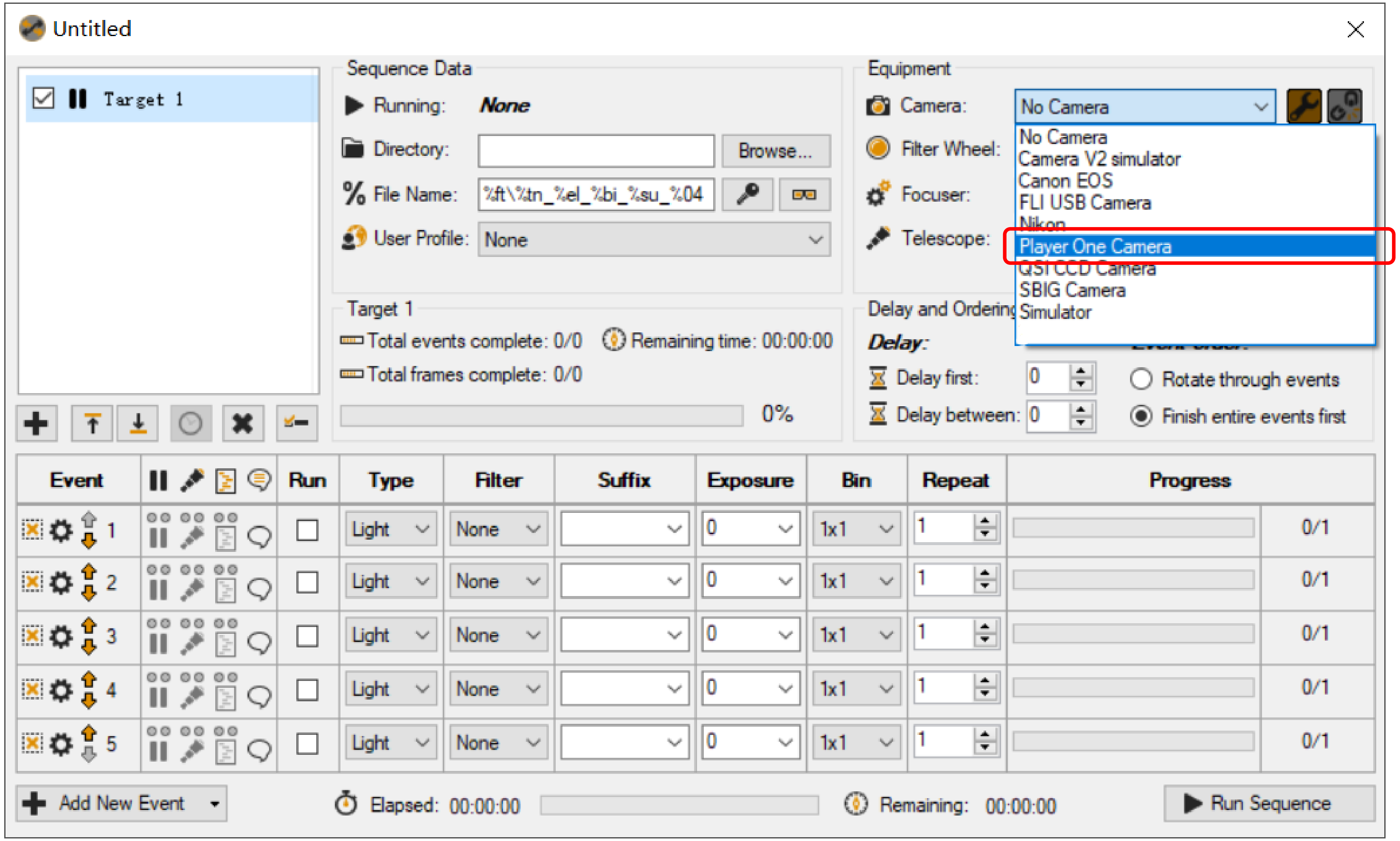
Player One

3. Preset value and option table

Model	Sensor	Zero Gain		HCG Gain		Standard Gain		High Gain mode		Dual Sensor Mode
		Gain	Offset	Gain	Offset	Gain	Offset	Gain	Offset	
Apollo 428M MAX	IMX428 mono	0	0	70	15	158	35	310	150	NO
Apollo-M MAX	IMX432 mono	0	12	145	13	280	45	385	130	NO
Apollo-M MINI	IMX429 mono	0	12	70	15	160	35	310	150	NO
Apollo-M	IMX174 mono	0	10	0	10	181	35	240	60	NO
Saturn-M SQR	IMX533 mono	0	35	125	50	130	50	600	1000	Support
Saturn-C SQR	IMX533 color	0	35	125	50	130	50	600	1000	Support
Uranus-M	IMX585 color	0	3	210	6	210	6	498	120	NO
Uranus-C	IMX585 color	0	3	210	6	210	6	498	120	NO
Neptune 664C	IMX664 color	0	3	180	5	195	5	453	60	NO
Neptune-C II	IMX464 color	0	3	83	4	95	4	383	80	NO
Neptune-M	IMX178 mono	0	50	30	60	0	50	270	750	NO
Neptune-C	IMX178 color	0	50	30	60	0	50	270	750	NO
Mars 662M	IMX662 mono	0	2	210	5	224	5	520	100	NO
Mars-M II	IMX462 mono	0	12	80	17	96	20	380	350	NO
Mars-C II	IMX662 color	0	2	210	5	224	5	520	100	NO
Mars-M	IMX290 mono	0	10	60	15	111	20	360	250	NO
Mars-C	IMX462 color	0	12	80	17	96	20	380	350	NO
Ceres-M	AR0130 mono	0	20	0	20	130	70	200	120	NO
Ceres-C	IMX224 color	0	10	60	12	135	20	360	200	NO
Sedna-M	IMX178 mono	0	50	30	60	0	50	270	750	NO
Xena-M	IMX249 mono	0	10	0	10	181	35	240	60	NO

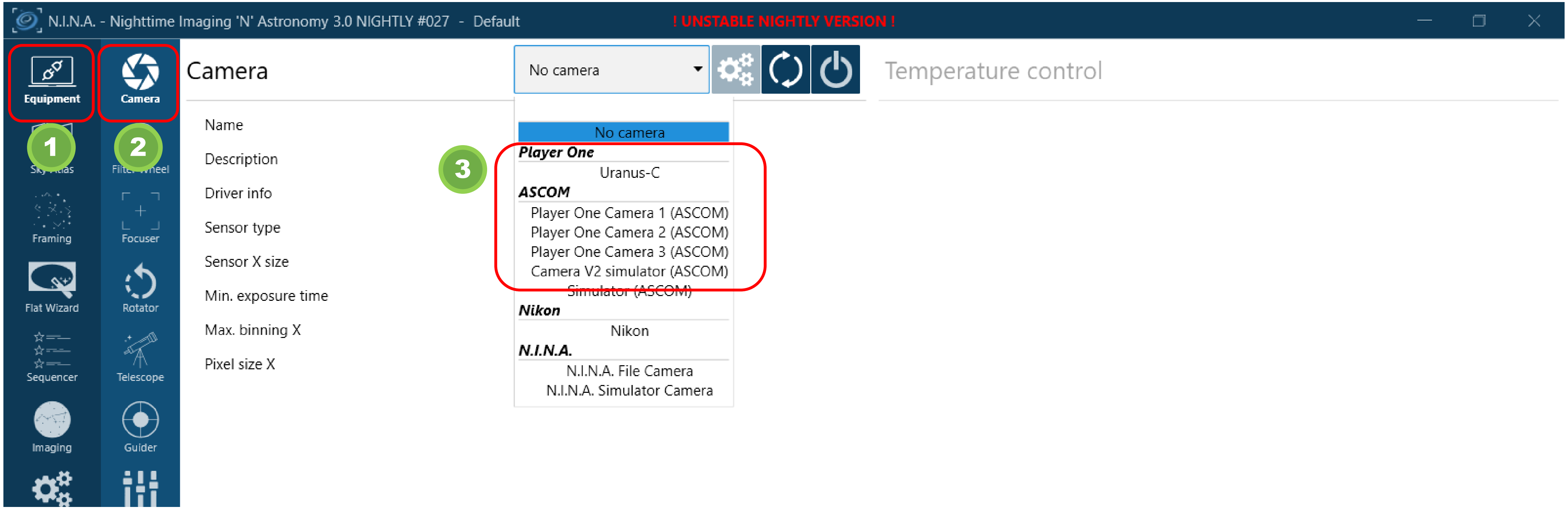
4-6 Setup in SGP

Open the SGP Schedule Planner and go to the Camera section. Select Player One Camera from the dropdown list.



4-7 Setup in NINA

1) Open the Equipment Bar
2) Open the Camera bar
3) Select Camera from combo box.
   a) Select camera below “Player One”, means control the camera via native driver.
   b) Select camera below “ASCOM”, means control camera via ASCOM driver. We provide 3 ASCOM camera option, users could setup at most 3 cameras for imaging and guiding.

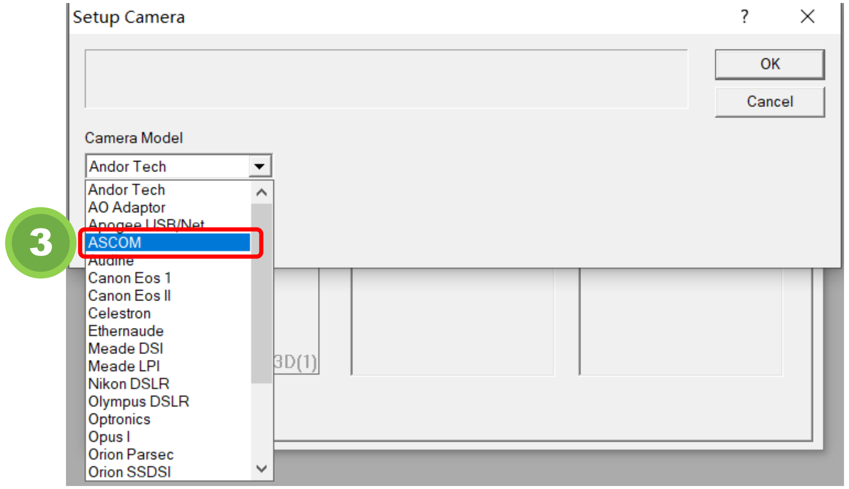


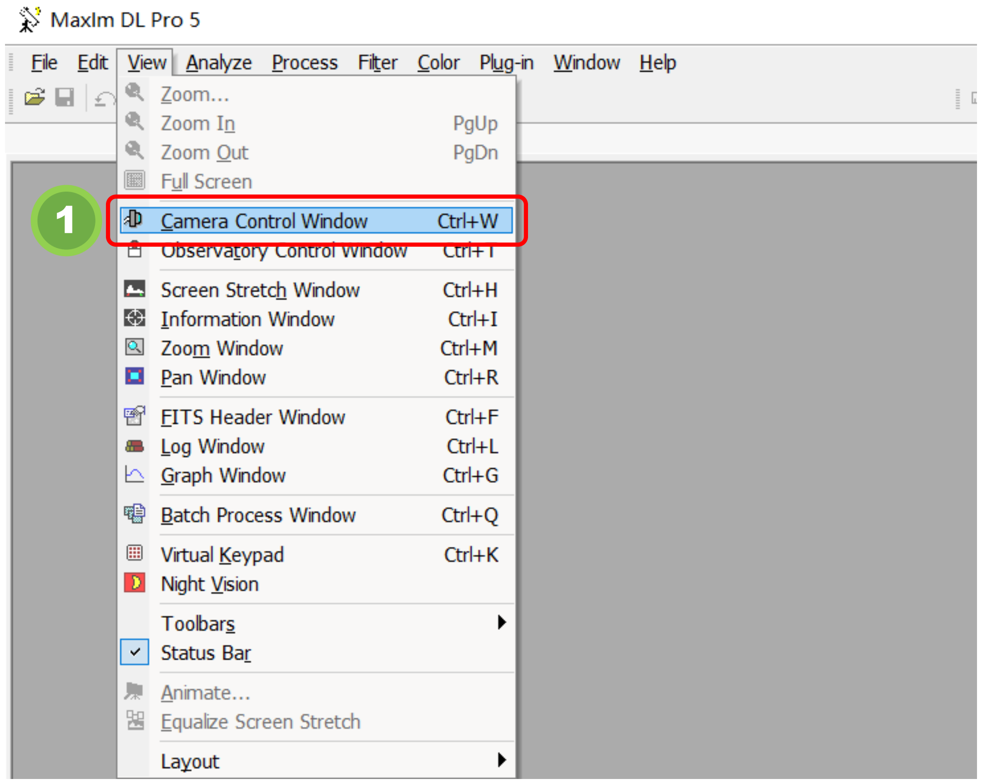
4. Camera ASCOM driver installation

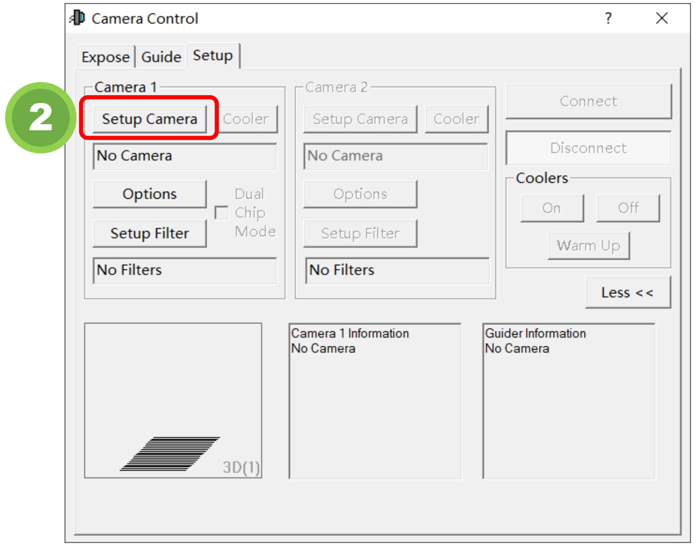
Player One

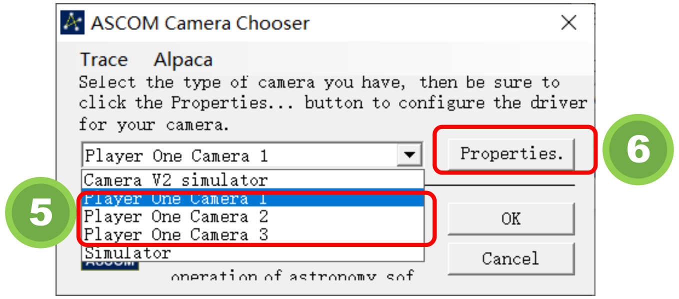
4-8 Setup in MDL

1) Open the Camera Control Window.
2) Select Camera1 or Camera2 as required and click Setup Camera.
3) Select the ASCOM option in Camera Model.
4) Click Advanced, Pop up the ASCOM Camera Chooser.
5) Select Player One Camera from the dropdown list. We provide 3 ASCOM camera option, users could setup at most 3 cameras for imaging and guiding.
6) Click Properties to set ASCOM camera parameters



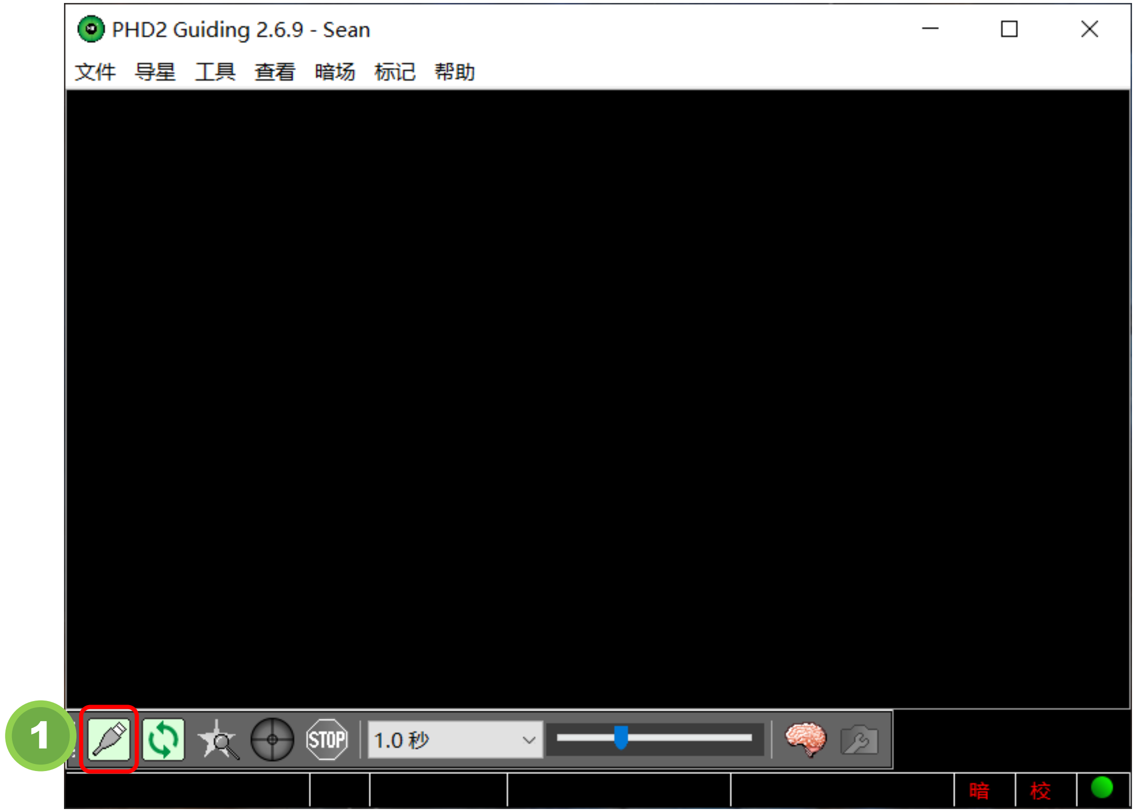






4-9 Setup in PHD2

1) Click the button to open the page of connected device.
2) Select "Player One Camera(ASCOM)" from the Camera dropdown list.
3) Click the button to set ASCOM parameters of the camera.
4) Click the "Connect" button to turn on the camera.



Thanks

Choose Player One, to be Player One!

Company website:
https://player-one-astronomy.com/

Share your work and feedback
https://www.facebook.com/PlayerOneAstronomy