ASI Cameras Software Manual

Windows Platform

Revision 1.3

Jan, 2017

Table of Contents

Instruction

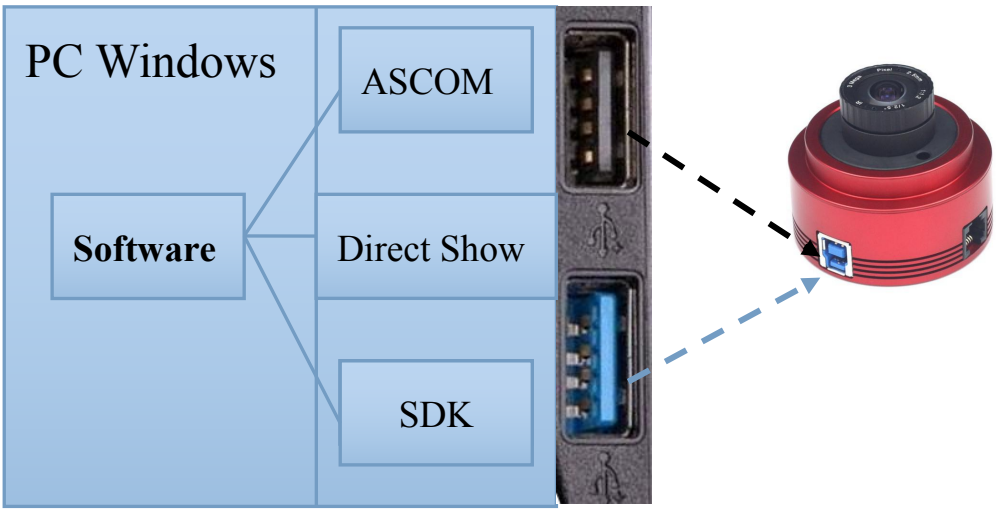
There are several ways to control our cameras through software on windows. You need to install the driver before operating the camera under various software.

ASCOM:
This is the standard platform for astronomy, so you just need to install the ASCOM platform 6.2 or newer, and our ASI Camera ASCOM driver.
Advantage: Almost all astronomy software support ASCOM.
Disadvantage: Performance is poor, suitable for DSO imaging or guiding.

DirectShow:
This is the standard media-streaming architecture for windows. There are lots of software support DirectShow devices under windows. Including Skype, QQ, HandyAvi etc..
Advantage: Fast transfer speed and many software support.
Disadvantage: RAW16 is not supported.

SDK:
This is Software Development Kit for developer, user don't need to install it.
Advantages: This is the most flexible way to control our camera and it can provide the fastest speed.
Disadvantage: the API is not standard, software developer need to integrate our SDK to their. Limited software supports, such like SharpCap, FireCapture Nebulosity, PHD2, etc..

Plug-in:
Currently we provide plug-in for TheSkyX and Micro-Manager.


PC Windows
ASCOM
Software
Direct Show
SDK

1. Camera Driver Installation

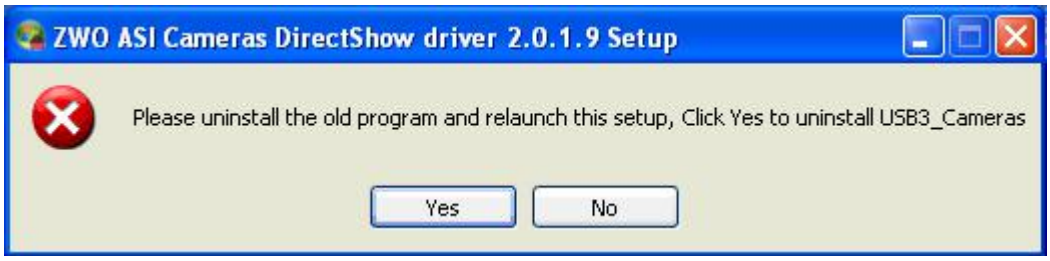
With several clicks, the super easy driver installation can be done in just one minute.

Supported OS: Windows XP 32bit/64bit, Windows 7 32bit/64bit, Windows 8 32bit/64bit, Windows 10 32bit/64bit

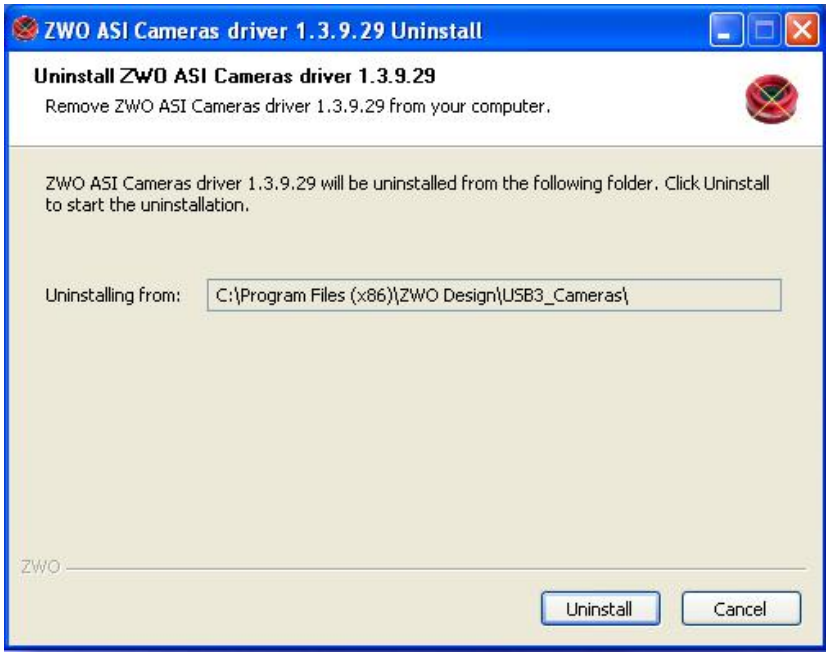
Installation steps:
1. download the latest driver from
https://astronomy-imaging-camera.com/software/

or run the CD-ROM.

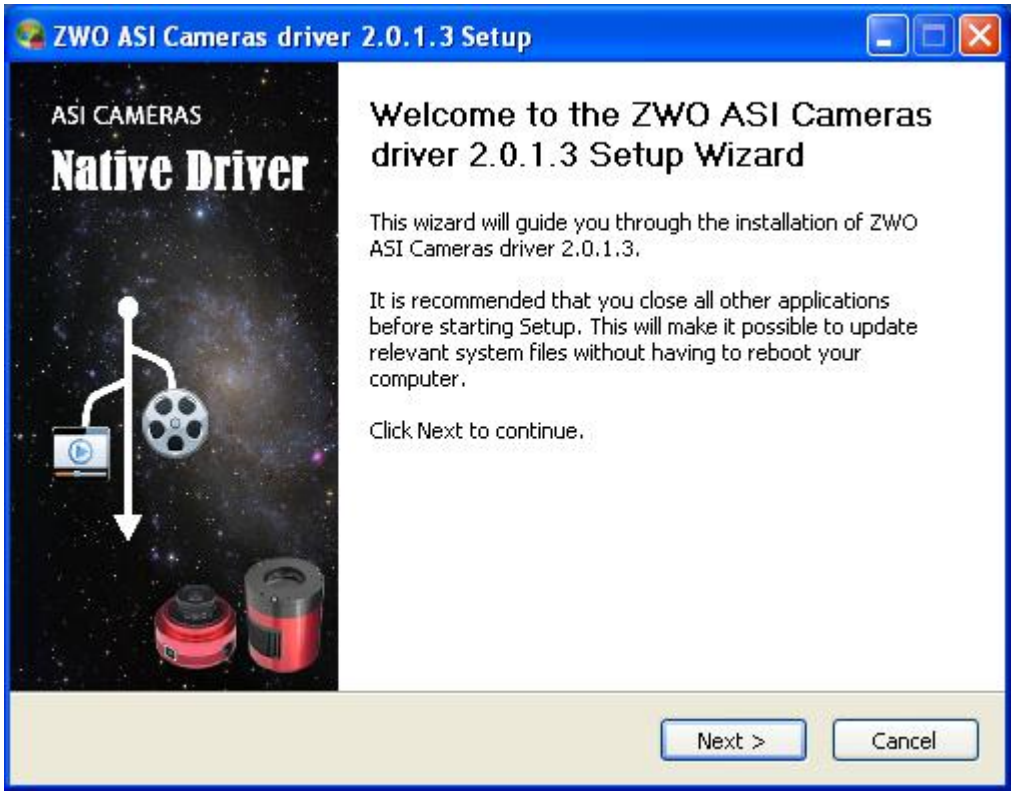
If driver of version 1.3.9.29 or older is installed, you're requested to uninstall it first.



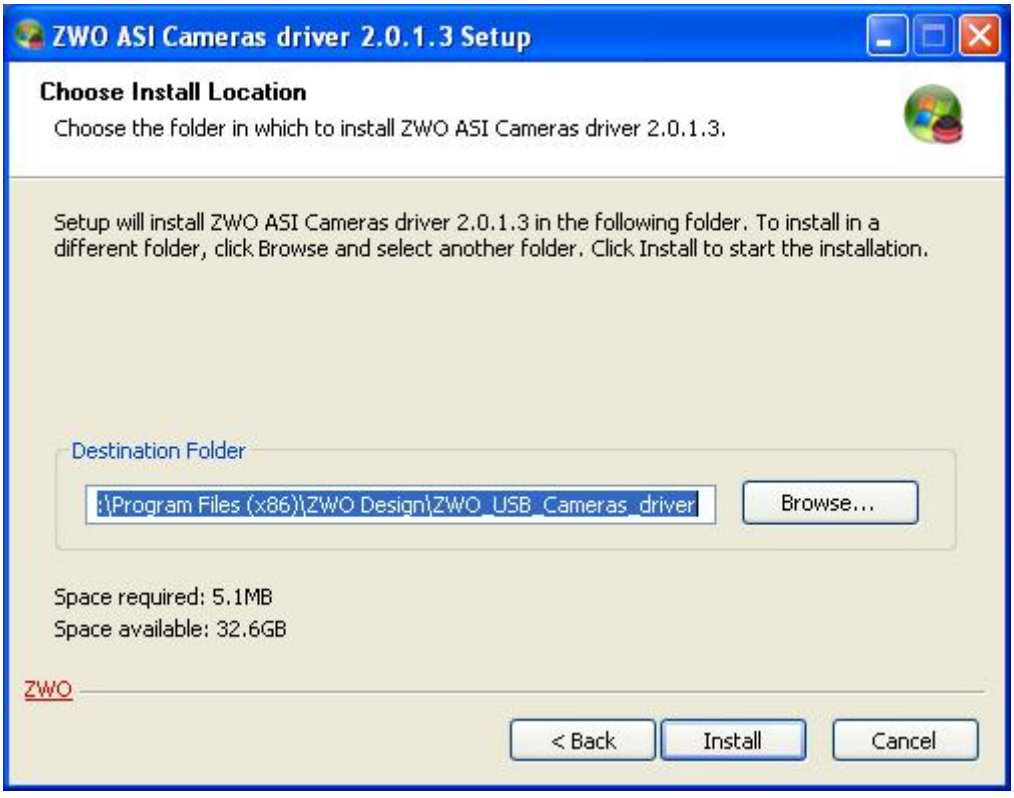
Press yes to start to uninstall.



Run installer again

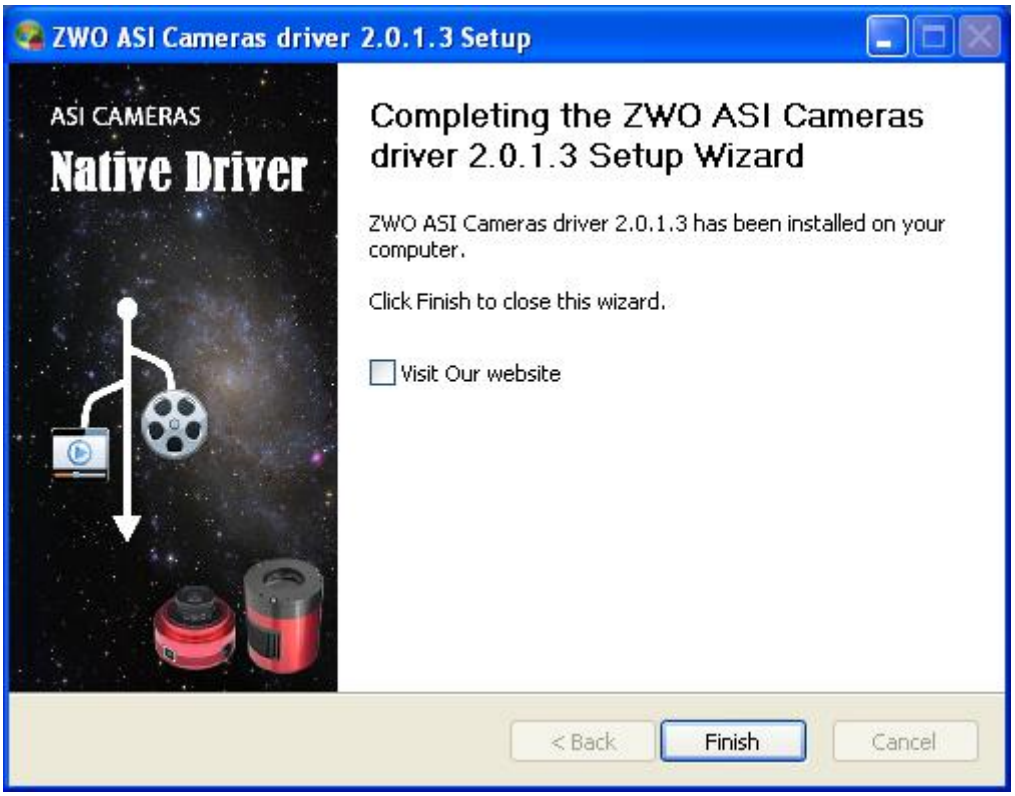


Choose a folder to install the driver.



Windows will show the confirmation of the driver installation and you need to choose “trust” and install it.

When “Completed”, you are welcome to visit our website!



1.1 Connect camera to USB port

You can use USB2.0 or USB3.0 cable to connect the camera to USB2.0 or USB3.0 port of your desktop or laptop. All our USB3.0 cameras are compatible with USB2.0, just slower output fps.

And we do not recommend using a USB extension cable or USB hub which may affect the speed and stability of fast image transfer.

Wait for a while, Windows will prompt "Found New Hardware"

Windows 7 and newest OS will install the driver automatically.

Now you should see the camera listed in the Device Manager, under “Imaging devices” category

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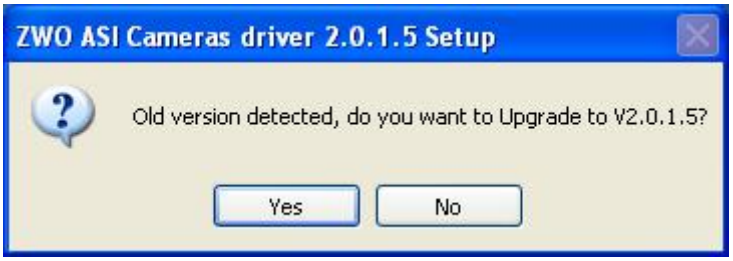
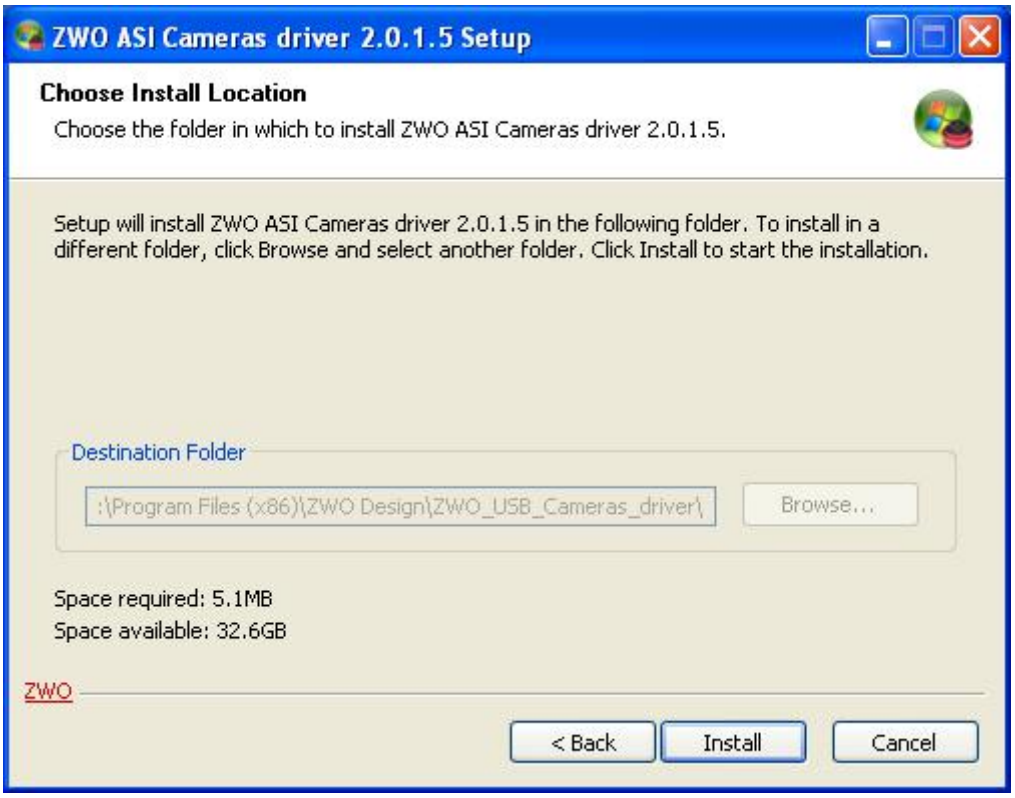
1.2 Driver Update

You don't need to uninstall the old driver when there is a new one.

Just run the new downloaded driver, it will automatically detect and prompt you to update.

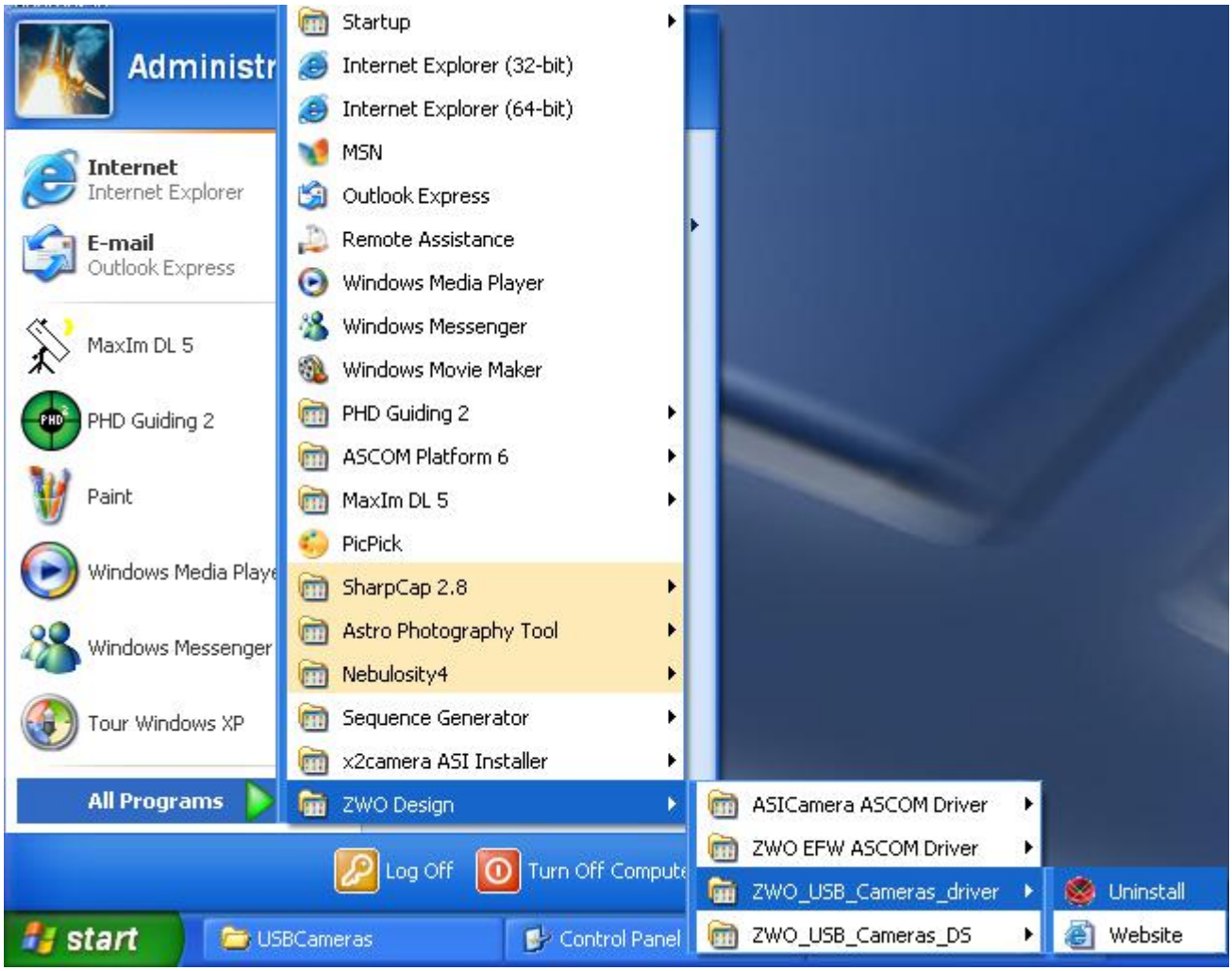


New driver will be installed to the old path.



1.3 Driver Uninstall

You can uninstall the driver from the “Start Menu”.



2. Directshow Driver

Because it is using one of the most popular driver types in the world (Windows DirectShow), the camera can be used on a variety of image/video grabbing software.

You can run “ASI Cameras DirectShow driver Setup.exe ” to install the camera’s DirectShow driver, so more windows app such like Skype or HandyAvi etc. can control the camera through DirectShow interface.

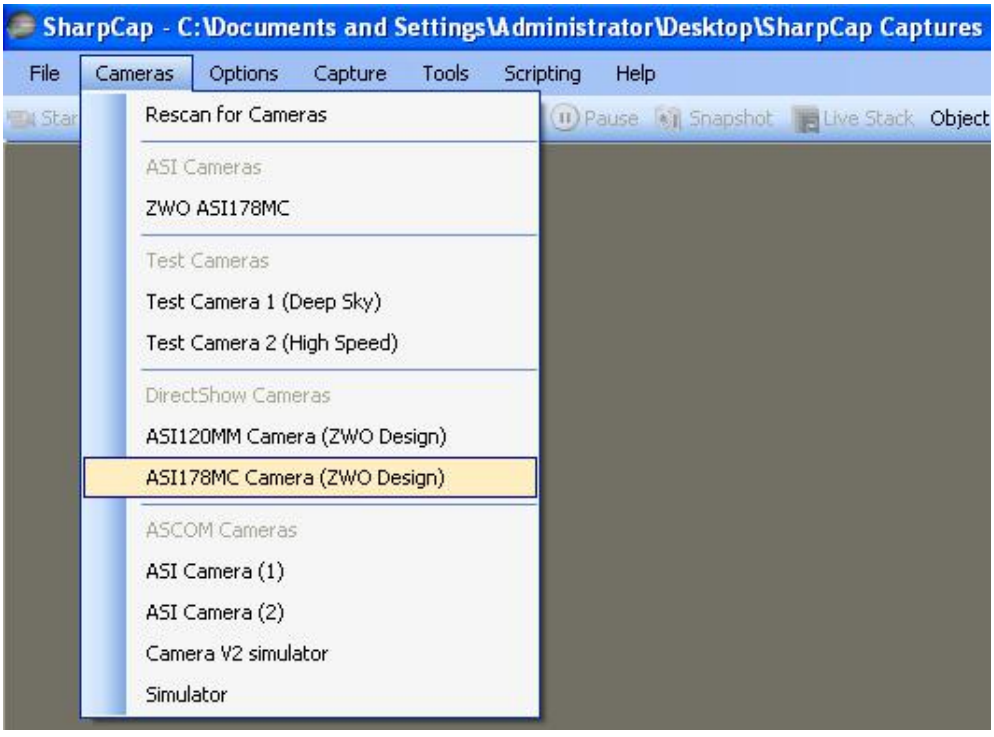
Run the installer

Select your camera model

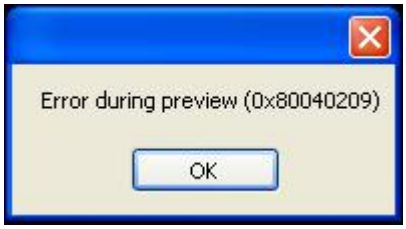
Other step is similar with camera driver installing.

Here is the way to test the camera with SharpCap software if you install the DirectShow driver.

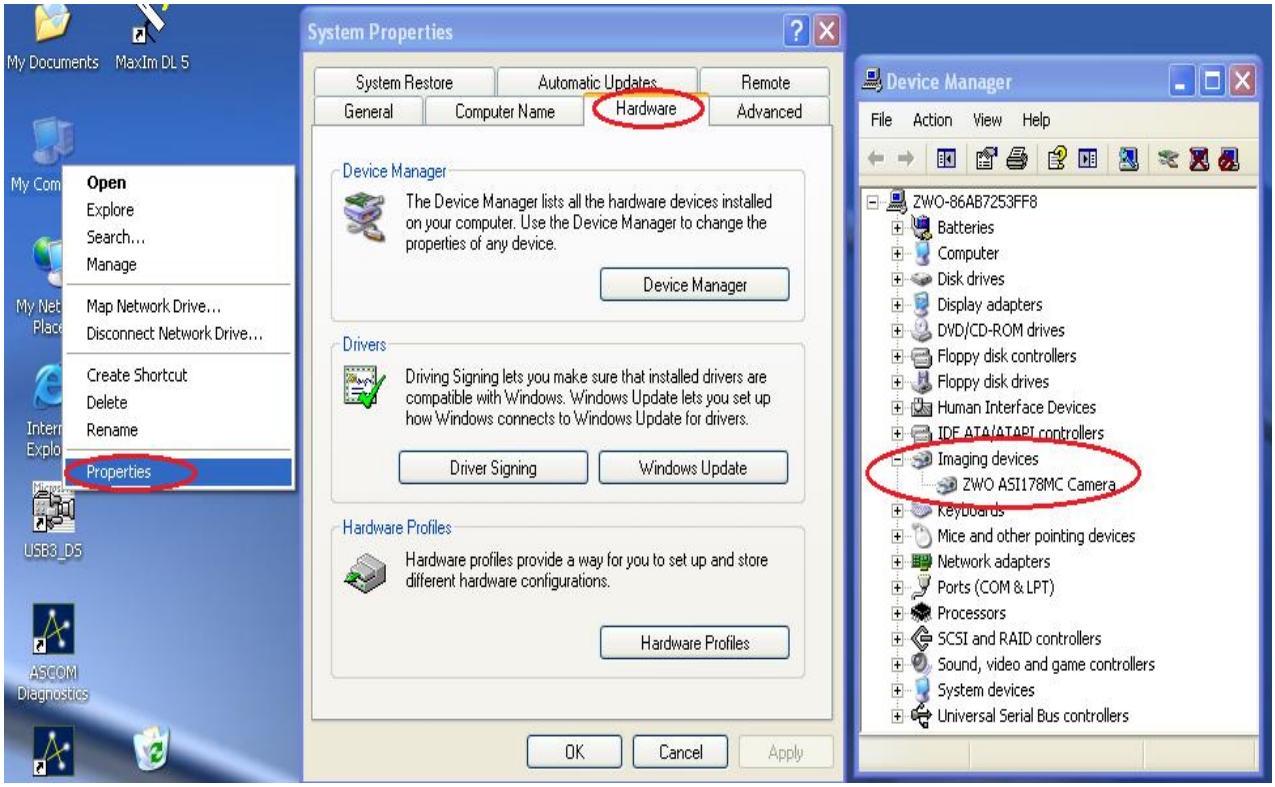
Select the camera from Cameras menu.



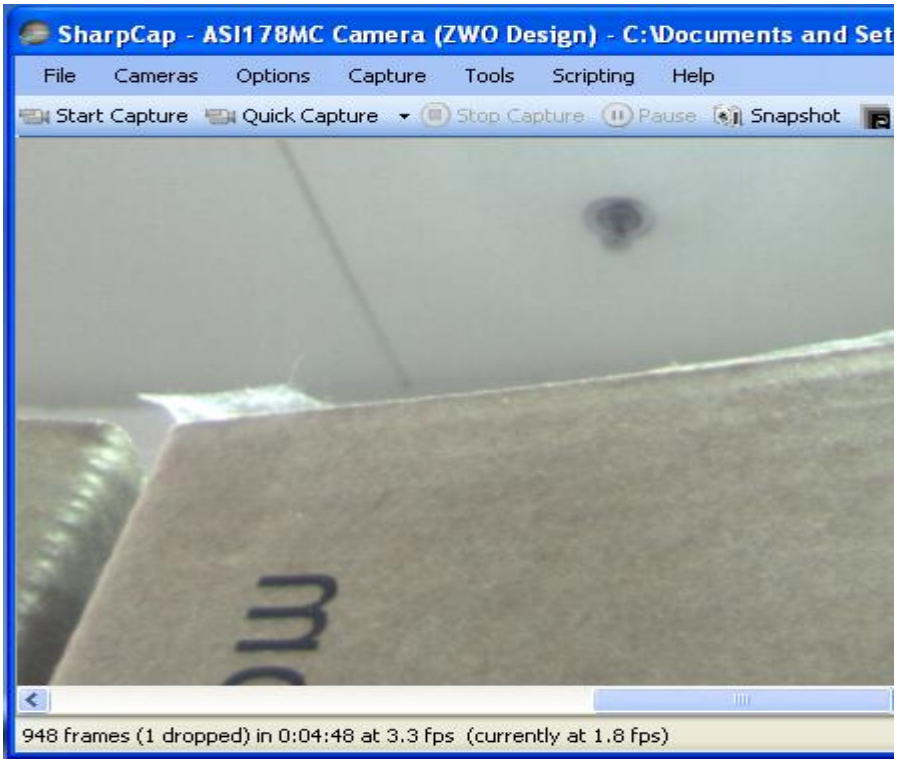
If this dialog shows up, it means the camera is not connected or not recognized by windows.



Please check the driver installation and verify that the camera driver is listed under Device Manager.



You should see an image or some brightness if everything is fine.

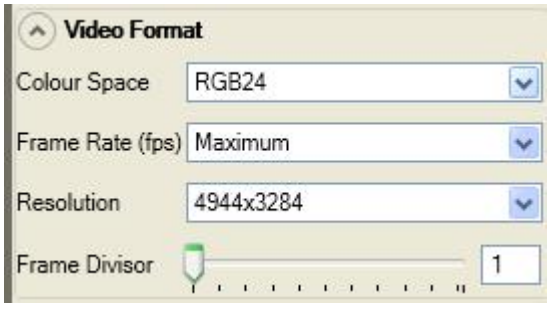


Color Space has two variants: RGB24 and MONO8.

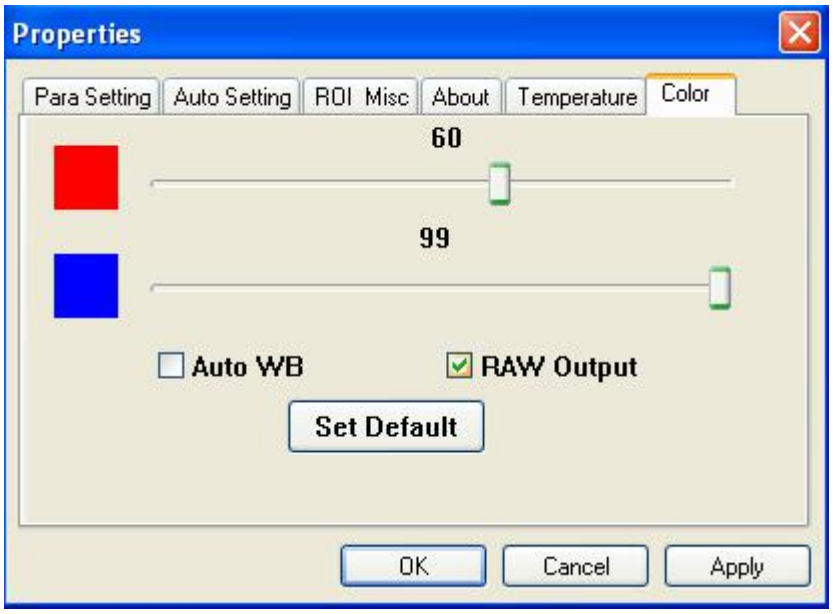
Image type is transformed as:

Color camera: RAW8 =interpolation=> RGB24 =Y8_convertion=>Y8

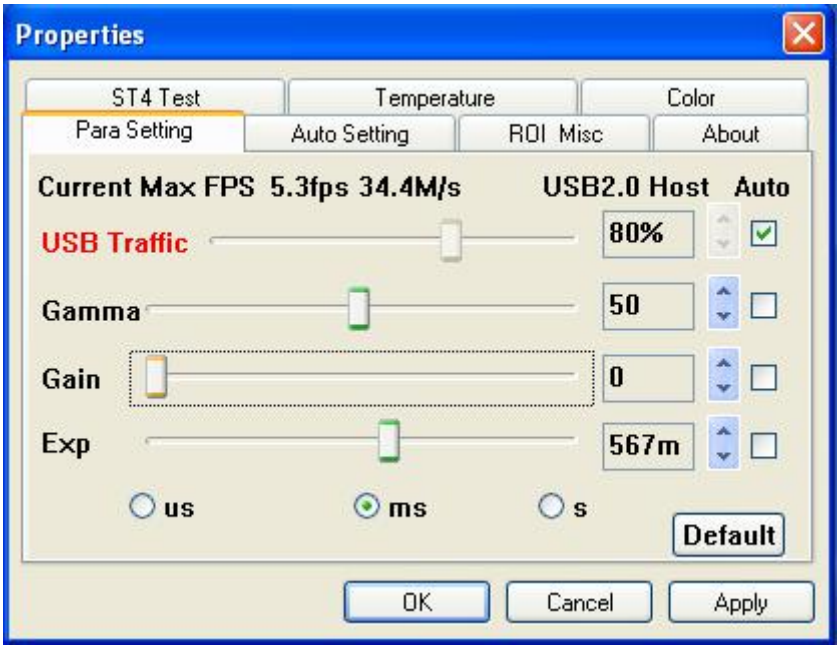
Mono camera only has RAW8 type



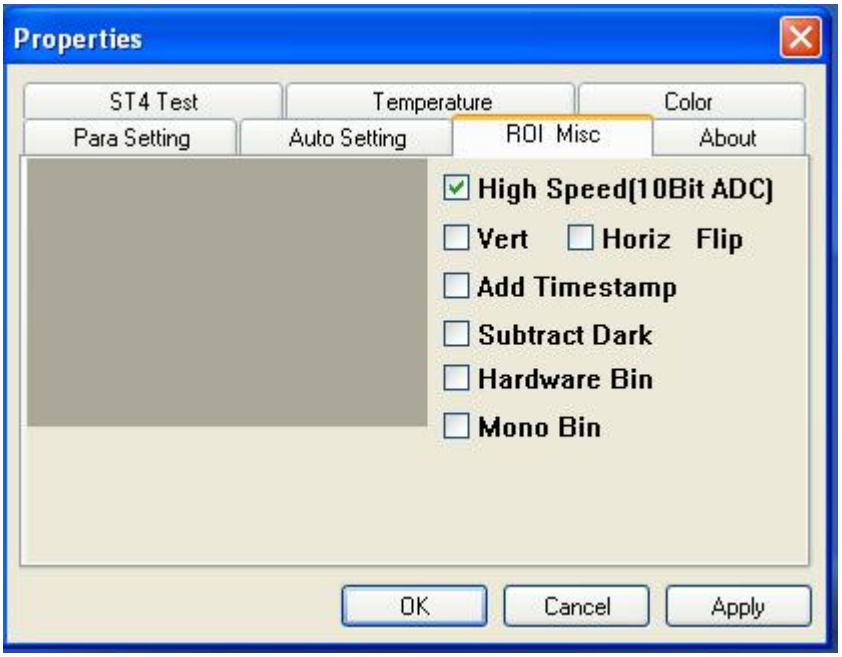
For color camera, when MONO8 is selected, enabling RAW Output corresponds to RAW8, otherwise is Y8 output.



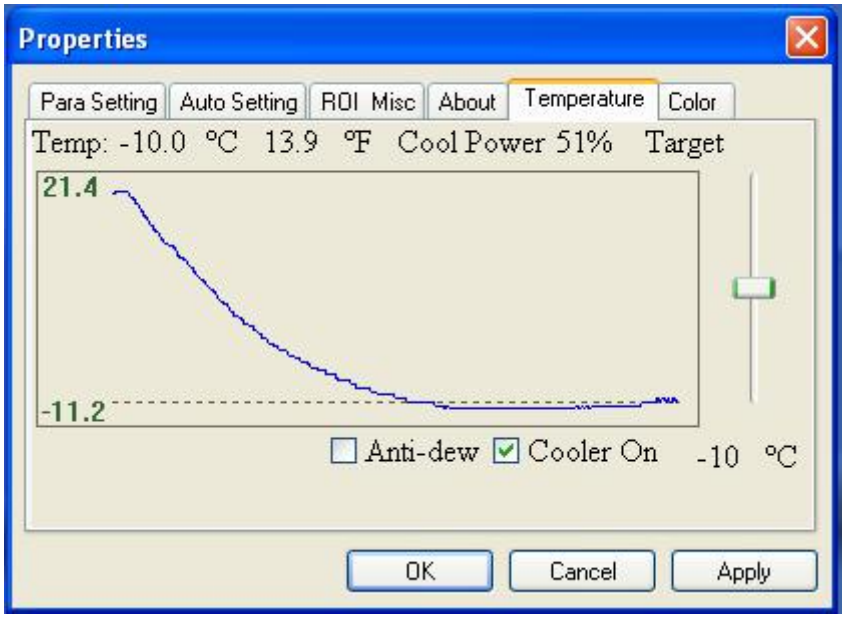
Click "Video Capture Filter" under “Options” menu to change camera settings.



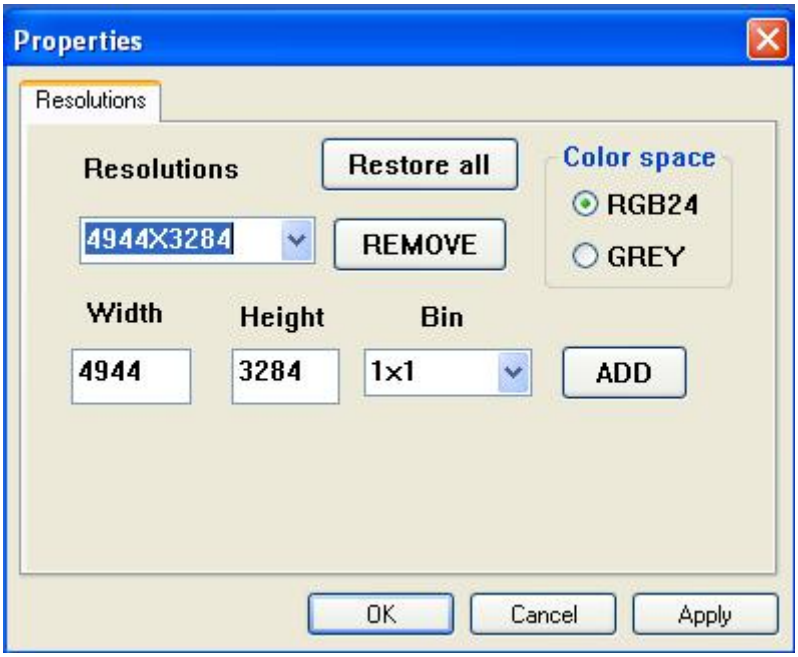
This is very important to adjust “USB Traffic” to a suitable value to match your PC, this depends on the USB controller. And you may need to adjust it lower if there is other device to share USB bandwidth with your camera.



You can test the cooler here if it's a cooled camera. Check Anti-dew to turn on the window heater.



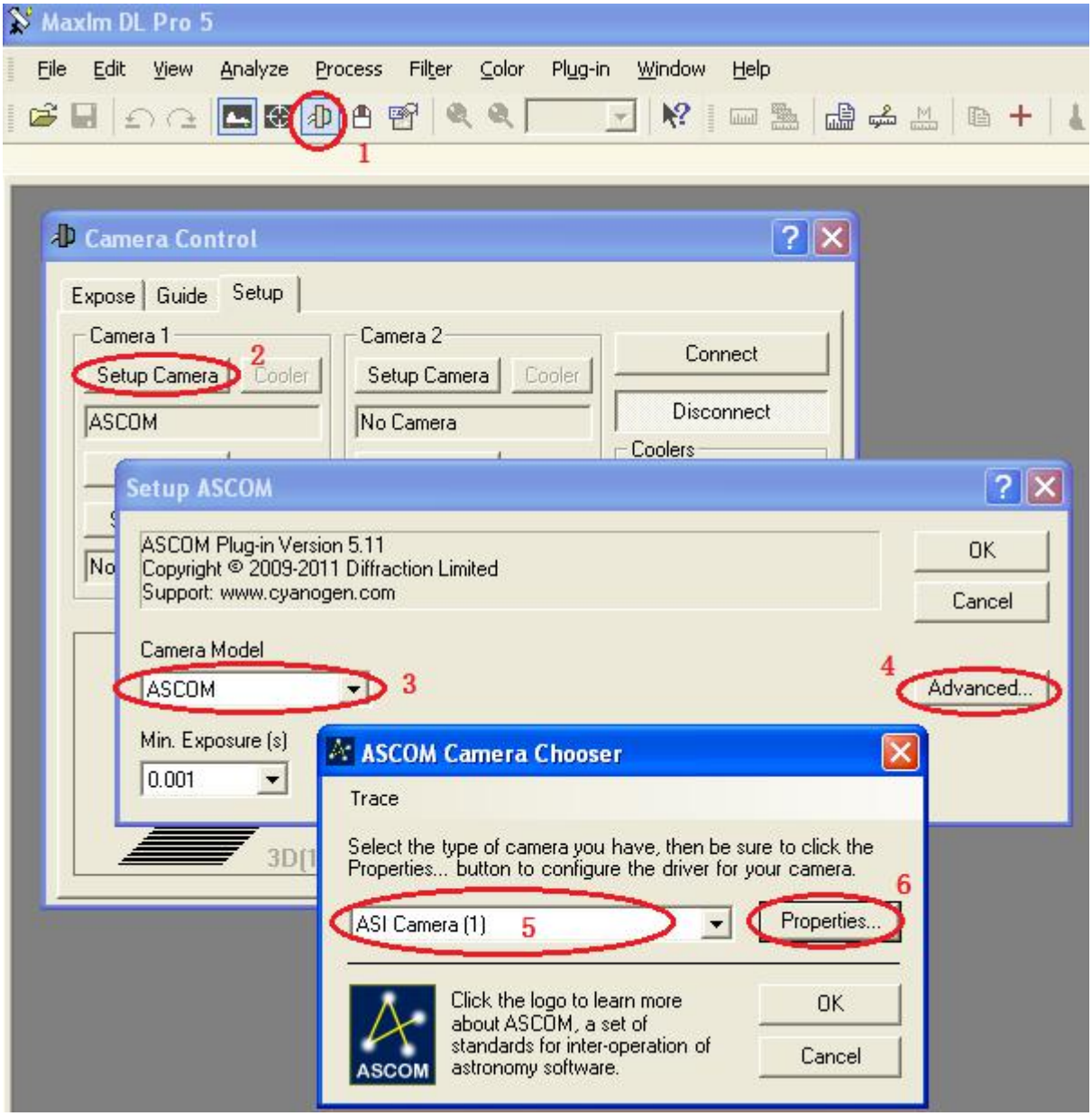
Click "Video Capture Pin" to change Resolutions (You can edit the resolutions you like).


Properties
Resolutions
Resolutions
Restore all
Color space
RGB24
GREY
4944X3284
REMOVE
Width
Height
Bin
4944
3284
1x1
ADD
OK
Cancel
Apply

3. ASCOM Driver

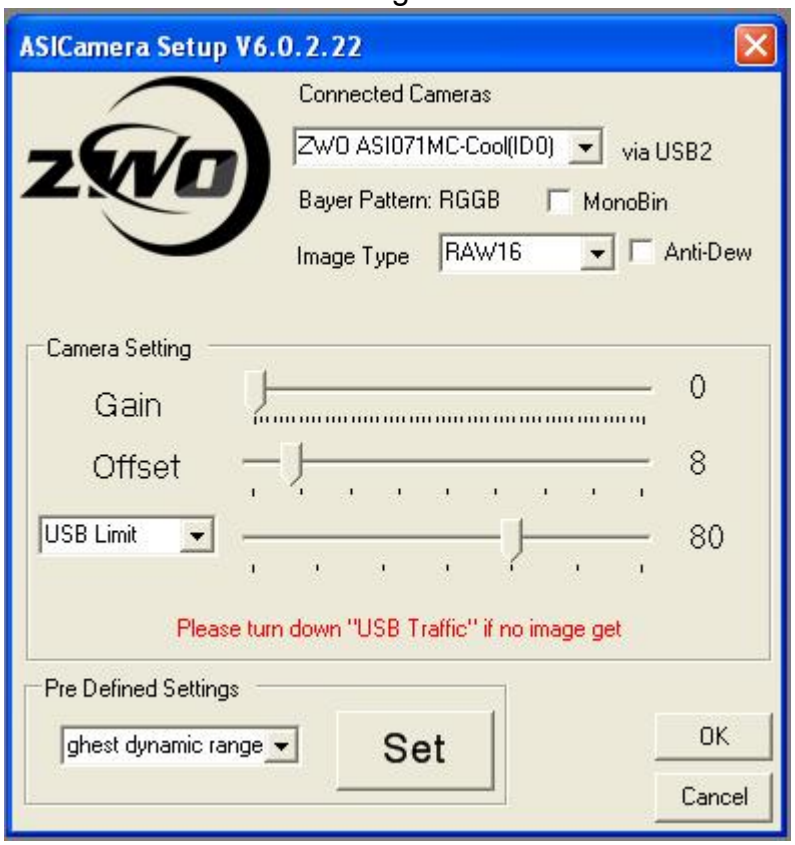
ASCOM is standard for astronomy, download ASCOM Platform installer from their official website :http://ascom-standards.org/index.htm or our website.
Install “ASCOM Platform 6.2”, then install “ASICamera ASCOM Setup”. We use MaxIm DL 5 to show its usage.

Select our ASCOM camera driver with step1-5 , then you can connect camera.
Open setup dialog with step6.



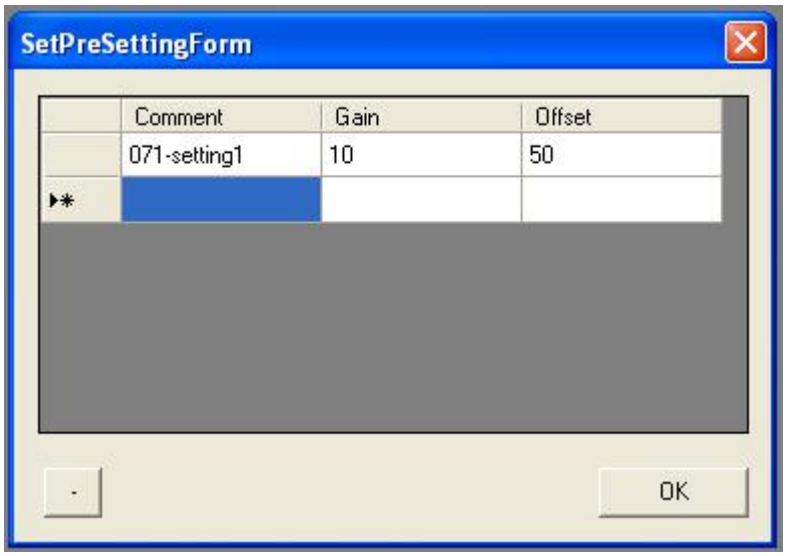
In setup dialog you can select which ASI camera you want to use if you have more than one camera.
Pre Defined Settings contain some hard coded setting like "highest dynamic

range", "unity gain" and "lowest read noise", press Set to make it effective. Press OK to save the setting

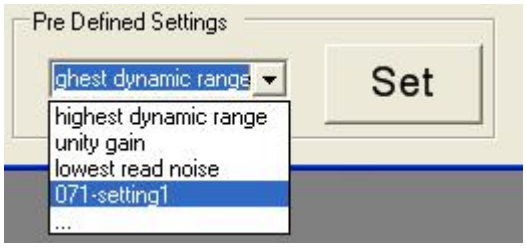


It also supports user editable setting, select "…" in combo box and press Edit

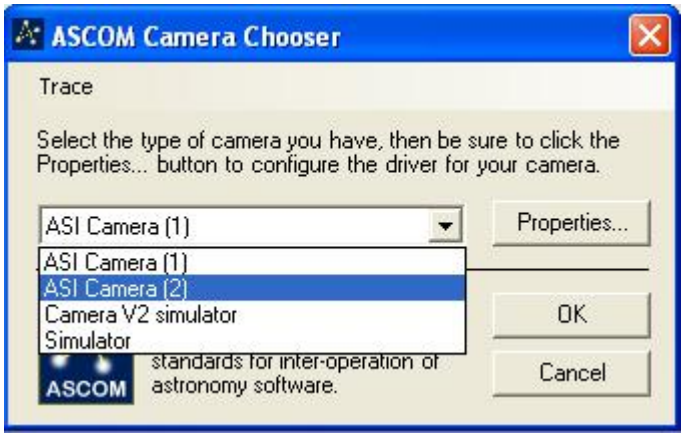
Press OK to save



New item is added to the list.



If you want to operate two cameras in one software to capture and guide respectively, please select “ASI Camera(1)” and select one camera in setup dialog and do the same with “ASI Camera(2)” for the other camera.

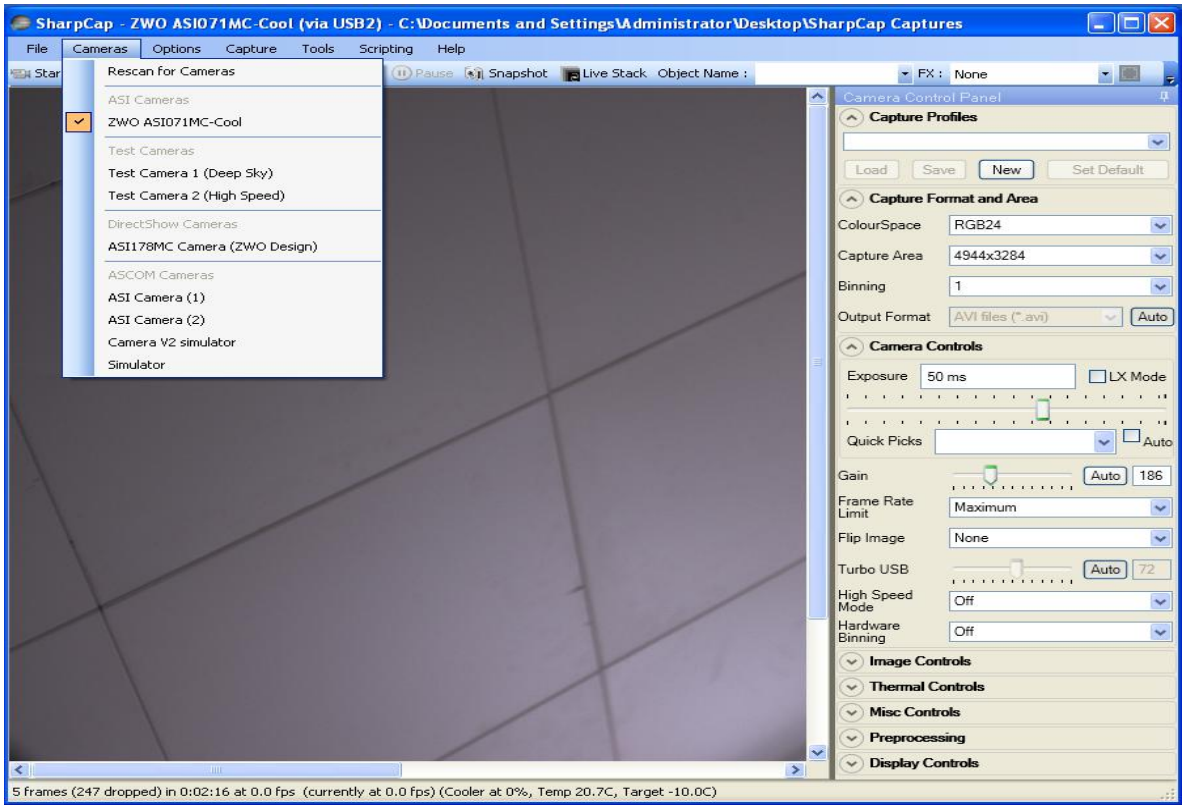


4. Planetary Imaging software

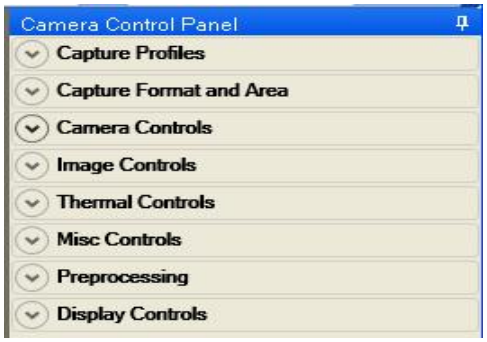
SharpCap and FireCapture are suggested as the Capture Software for astronomy image capturing.
You can find them in the CD-ROM or download from our official website.
Both are easy to use and very compatible with the ASI Cameras.

4.1 SharpCap

Connect camera through SDK



Most of the control is in the Camera Control Panel

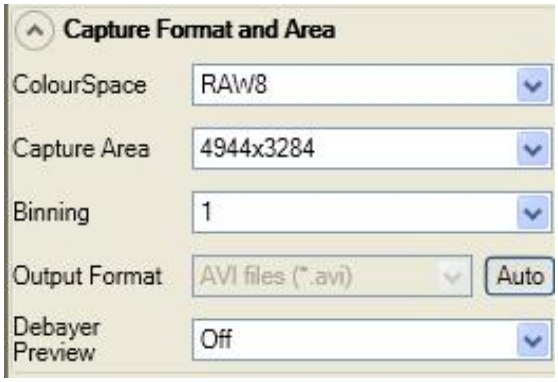


Color space:

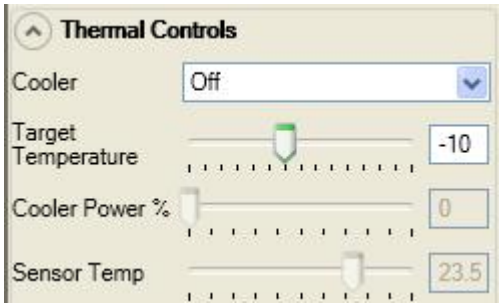
Color camera have four variant: RAW8/RAW16/RGB24/MONO8, and mono camera only have RAW8/RAW16. RAW8 is 8bit original data, length of a image buffer is width*height, width and height is the resolution of sensor, RGB24 is generated by interpolation of RAW8 data, its length is 3*width*height, every pixel corresponds to three byte Red Green Blue, and cost more CPU utilization, MONO8 is converted from RGB24, so it cost the most CPU utilization in these color spaces.

Binning:

"2" means merging 2x2 pixels to one, and so on.

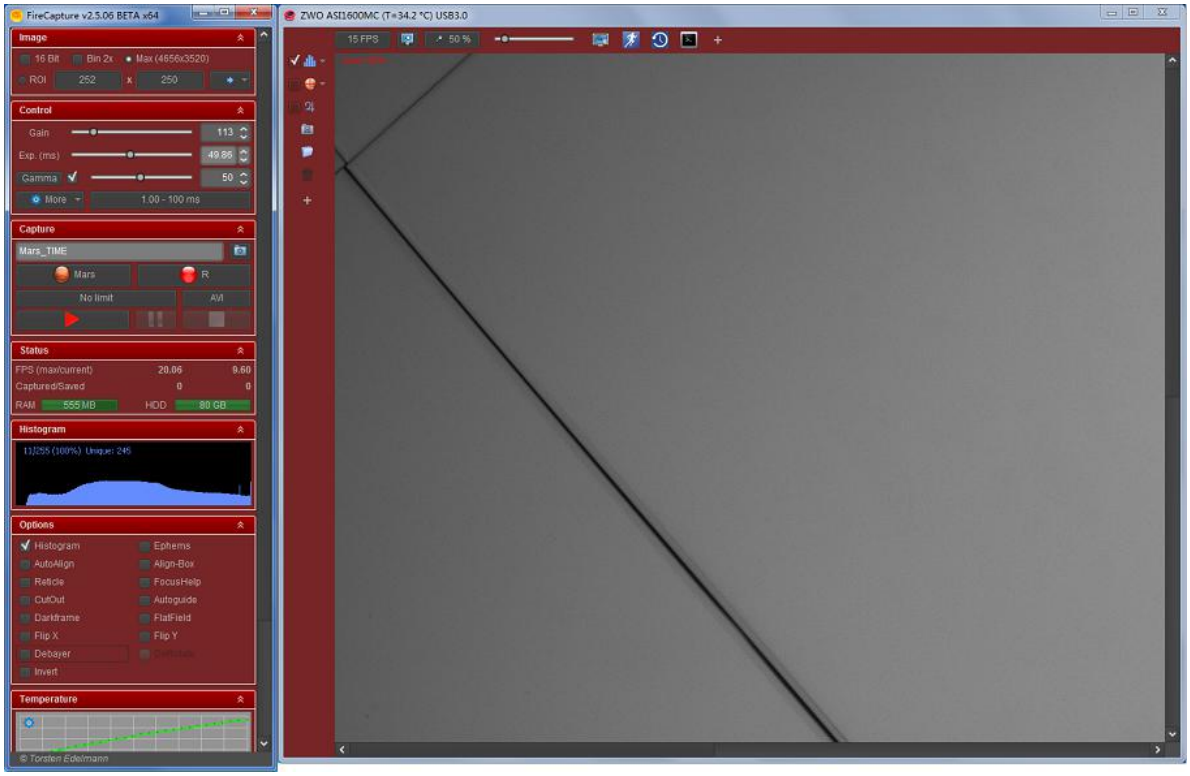


Thermal Controls provides the control of cooling

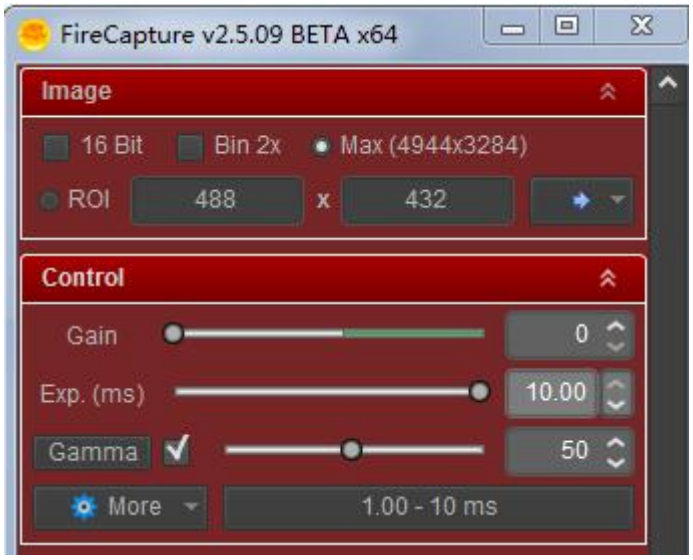


4.2 FireCapture

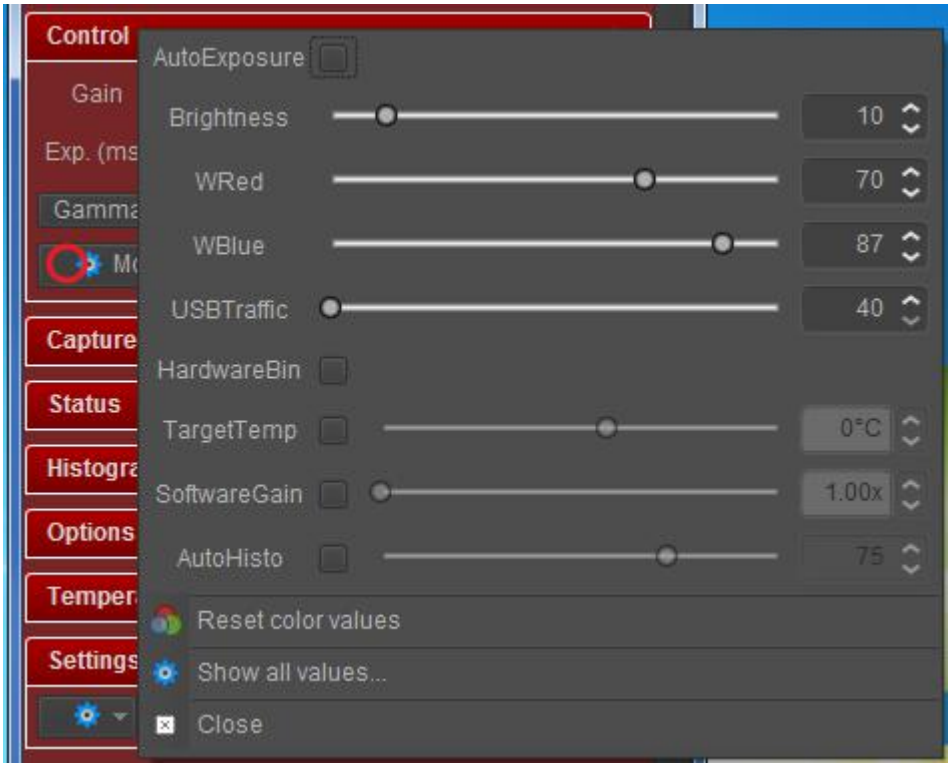
FireCapture is more effective due to a wider variety of options it offers.



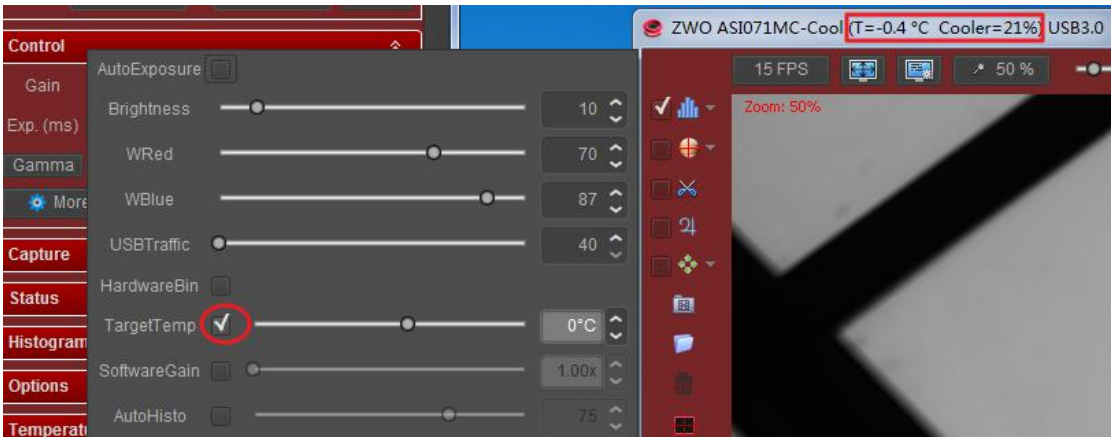
General setting of camera is in Image and Control panel



Click more to show other controls



For cooled camera, enable the check box in control “TargetTemp” to turn on auto cooling, sensor temperature and cooler power is shown on title bar of image display panel.



4.3 capture settings

Gamma: 50 is the default linear output data. This is the recommended setting. But you can use lower value to help focus when previewing. Always remember to return it to “50” before starting capture! Otherwise onion ring may be there after stacking and processing.

Gain: The higher the value, the more noise there will be. But it is often needed to be set high to achieve short exposures/faster frame-rates which can help to freeze seeing. Remember that faster FPS will result in more frames to stack which will dramatically reduce noise problems associated with High Gain.

Exposure: The shorter the value, the faster the fps achieved. Fps is usually calculated like this: fps = 1000 ÷ exposure time (in milliseconds, ms). For example, 20ms provides 1000 ÷ 20 = 50FPS.

But there are limits to USB bandwidth and the sensor's capability. Usually 30-40 fps is a good choose for dim object like Saturn and you can achieve higher fps when capturing bright objects like Jupiter and Mars, Venus.

Brightness or Offset: This is an offset value added to the output data to avoid any data negative. You may need to turn it up for DSO imaging.

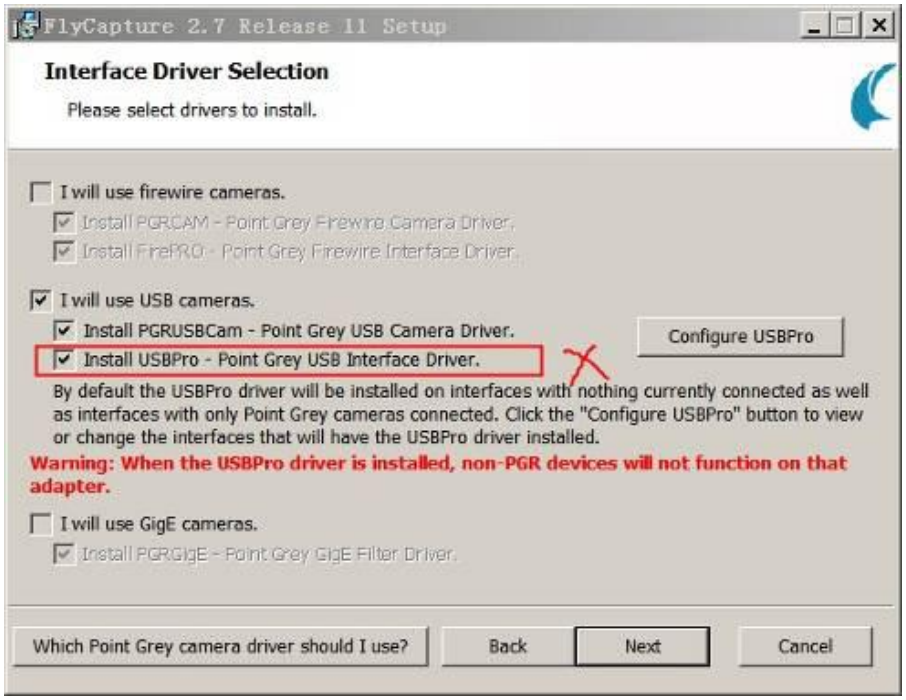
4.4 Get the best performance of the camera.

1. Connect the camera to USB 3.0 port.

ASI USB 3.0 cameras can run at its fastest speed when connected to USB 3.0 port. USB 3.0 has 10X faster speed than USB 2.0. So please make sure your camera is recognized as USB 3.0 device.

You can see if the camera is recognized as USB 3.0 device from the software title. You may need to update the host USB Controller driver if it always shows as USB 2.0, but actually you connect it to a USB 3.0 socket and through one USB3.0 cable.

And for PointGrey's camera user who use ASI camera, please make sure you didn't select "install USBPro" when install FlyCapture, otherwise other USB3.0 cameras won't function on that port.



2. Adjust “USB Bandwidth” and “High Speed”.

80% is the default value and would be very stable for most computers. This control is called “USB Traffic” in DirectShow and FireCapture, “Turbo USB” in SharpCap.

You can try to turn it up to 100% gradually to reach the max speed. No drop frames and No bad frames, then it’s a good value.

Smaller resolution can run at the fastest speeds depending upon the exposure time you set (within certain resolution limits – you can also lower the resolution size if the image still fits in the screen window, and choose a faster fps by reducing exposure time).

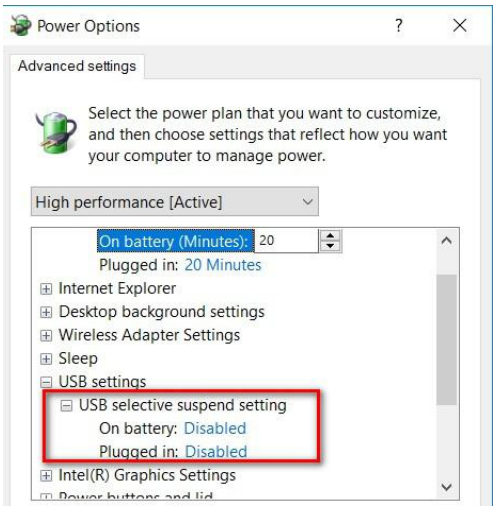
High Speed: the camera will use 10bit ADC output data if enable "High speed", otherwise 12bit ADC is used. The read noise of 10bit ADC is much higher than 12bit ADC, so you should NERVER check it for astronomy imaging.

*ASI120 & ASI120S cameras still use 12bit ADC when you turn on “high speed”

3. Use SSD hard driver

The capture speed depends on your hard driver, usually Mechanical hard drive can only provide 50-70MB/s write speed, but our USB3.0 camera may need 300-400MB/s write speed, so SSD hard driver is the only choose.

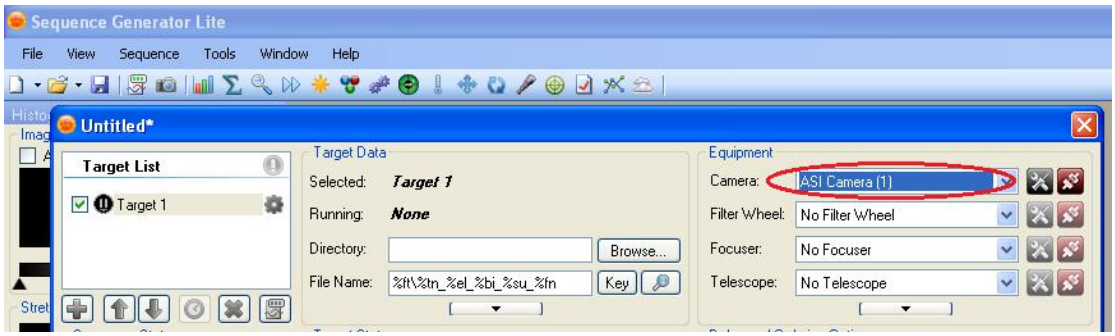
And DO NOT use any USB extension cable or USB hub which will affect the speed of fast image transfer. Please also turn off power save of USB controller if you use a laptop.



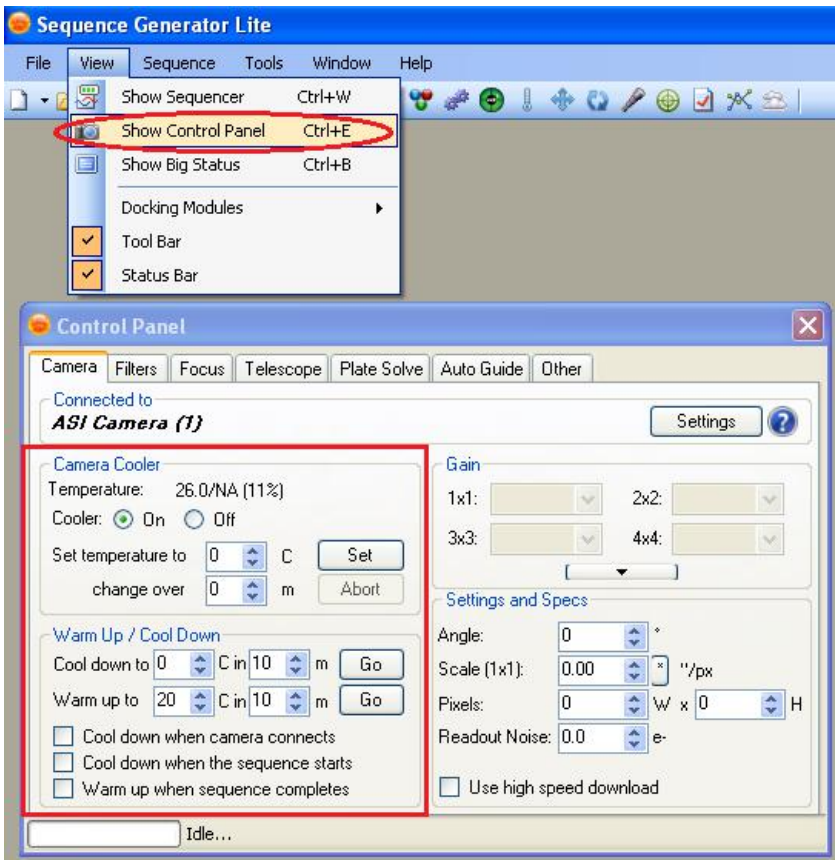
5. DSO imaging software

5.1 Sequence Generator Pro(SGP)

Connects camera through ASCOM driver.

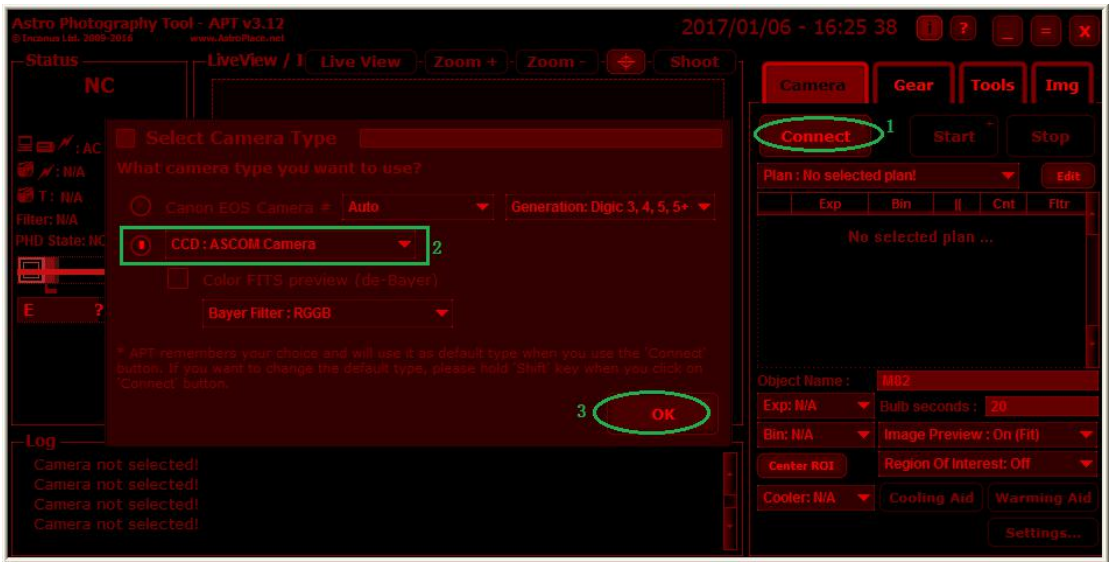


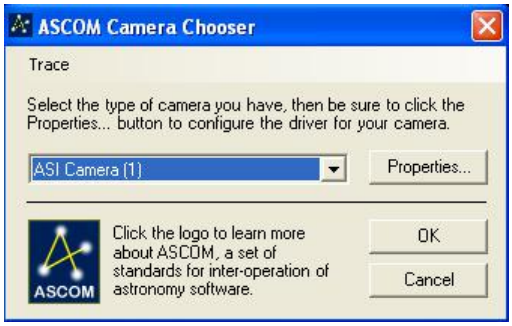
Cooling configure



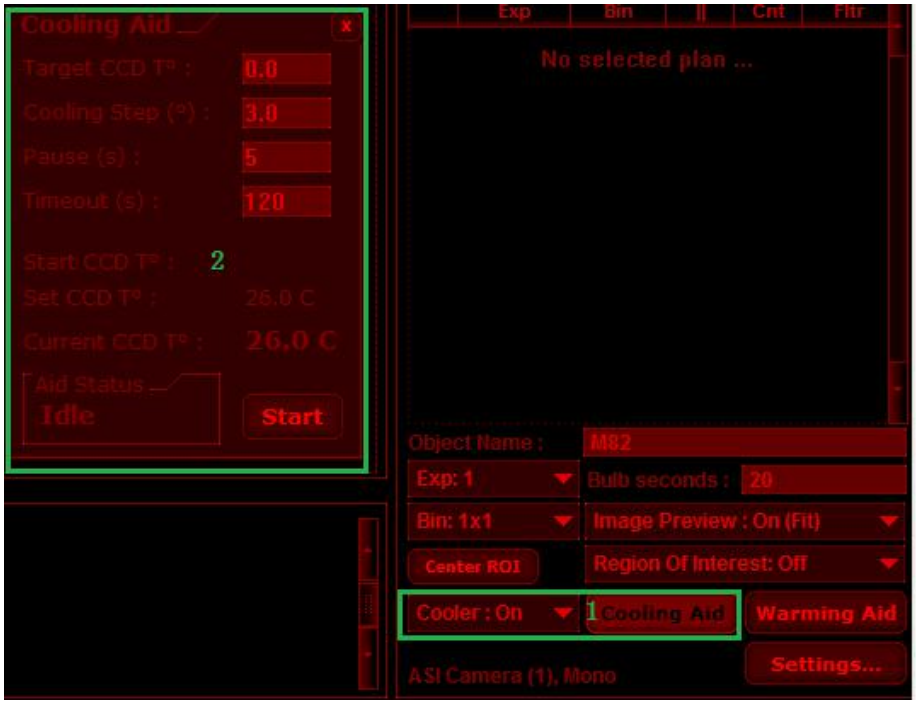
5.2 Astro Photography Tool(APT)

Connect camera through ASCOM driver



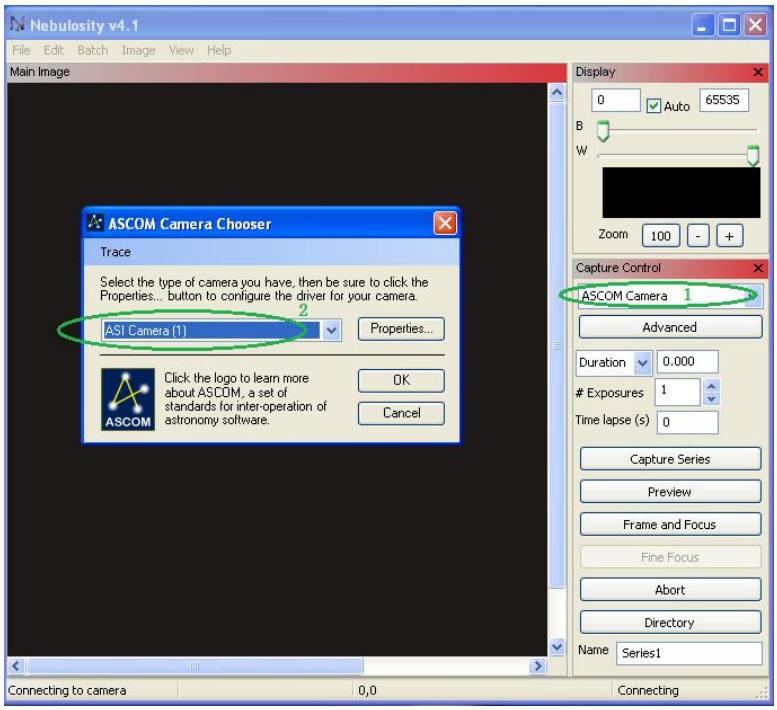


Cooling configure

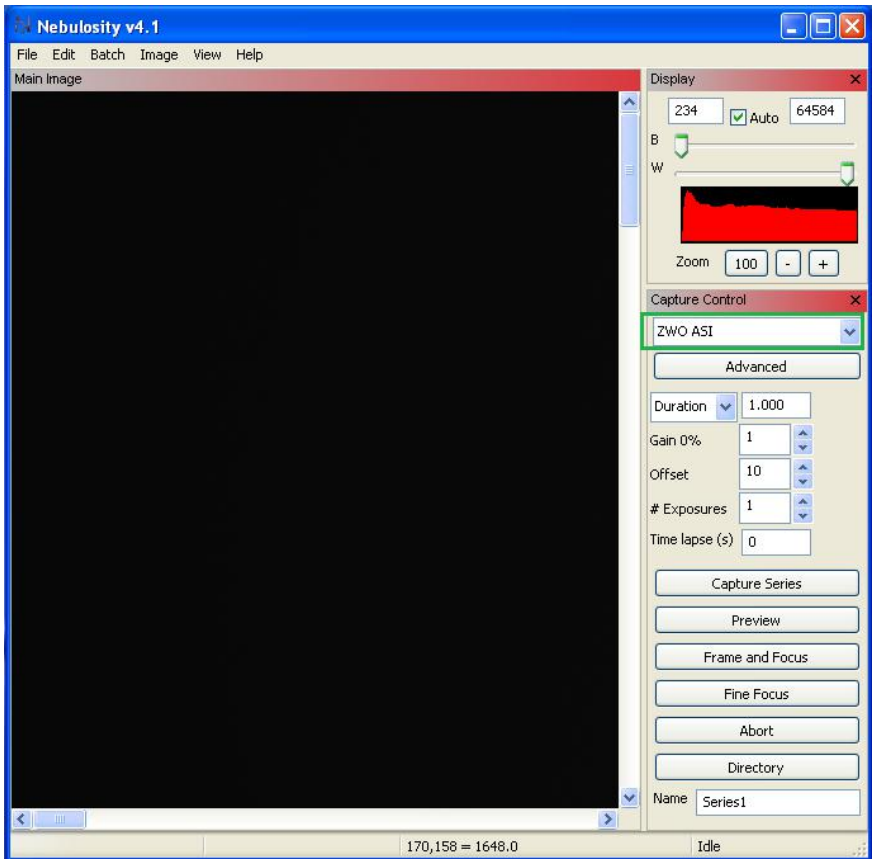


5.3 Nebulosity

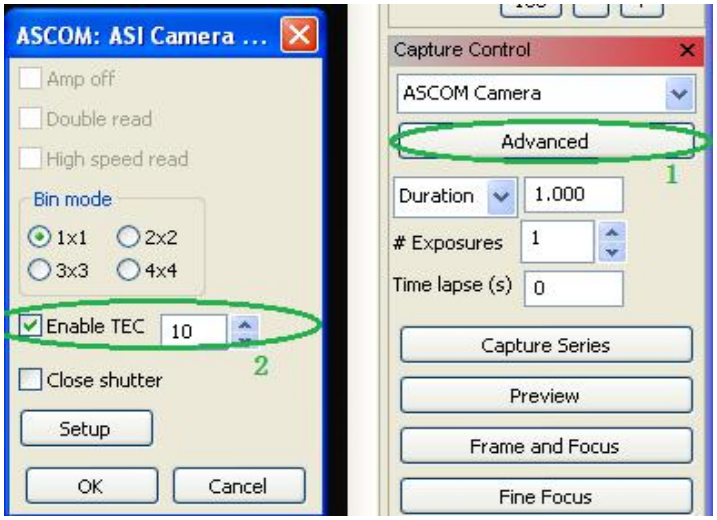
Connect camera through ASCOM driver

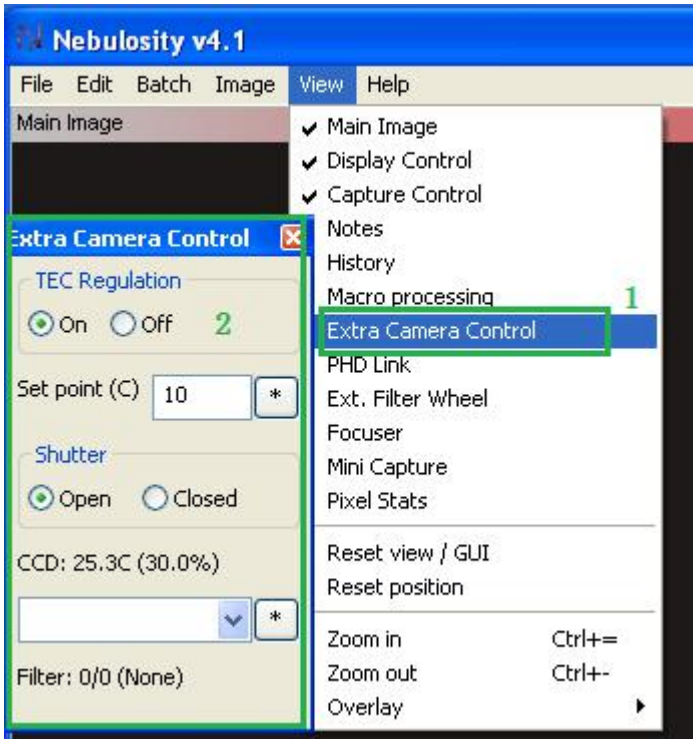


Connect camera through SDK



Cooling configure

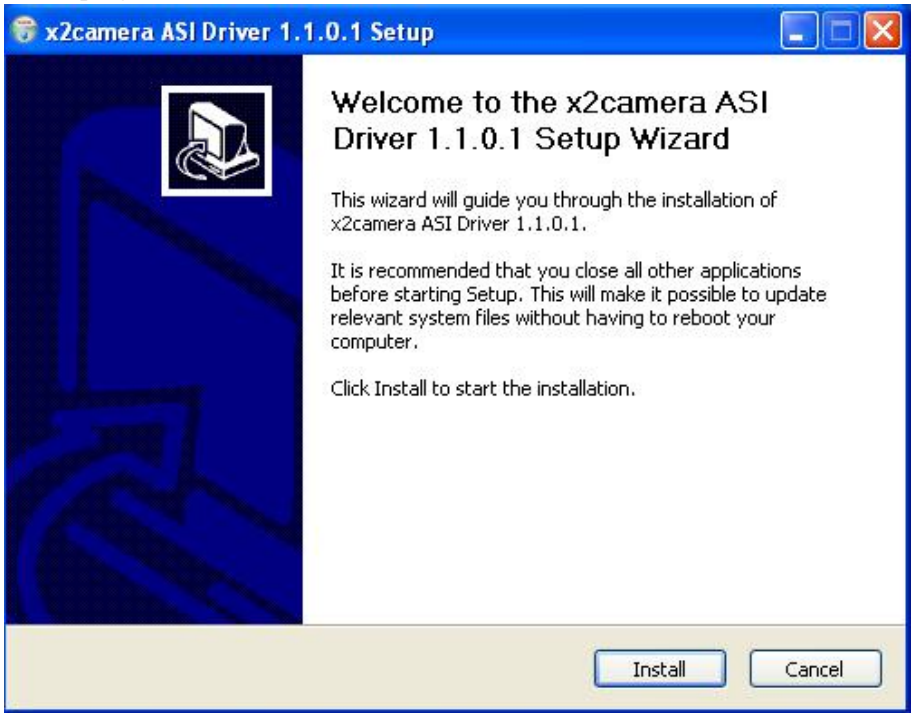




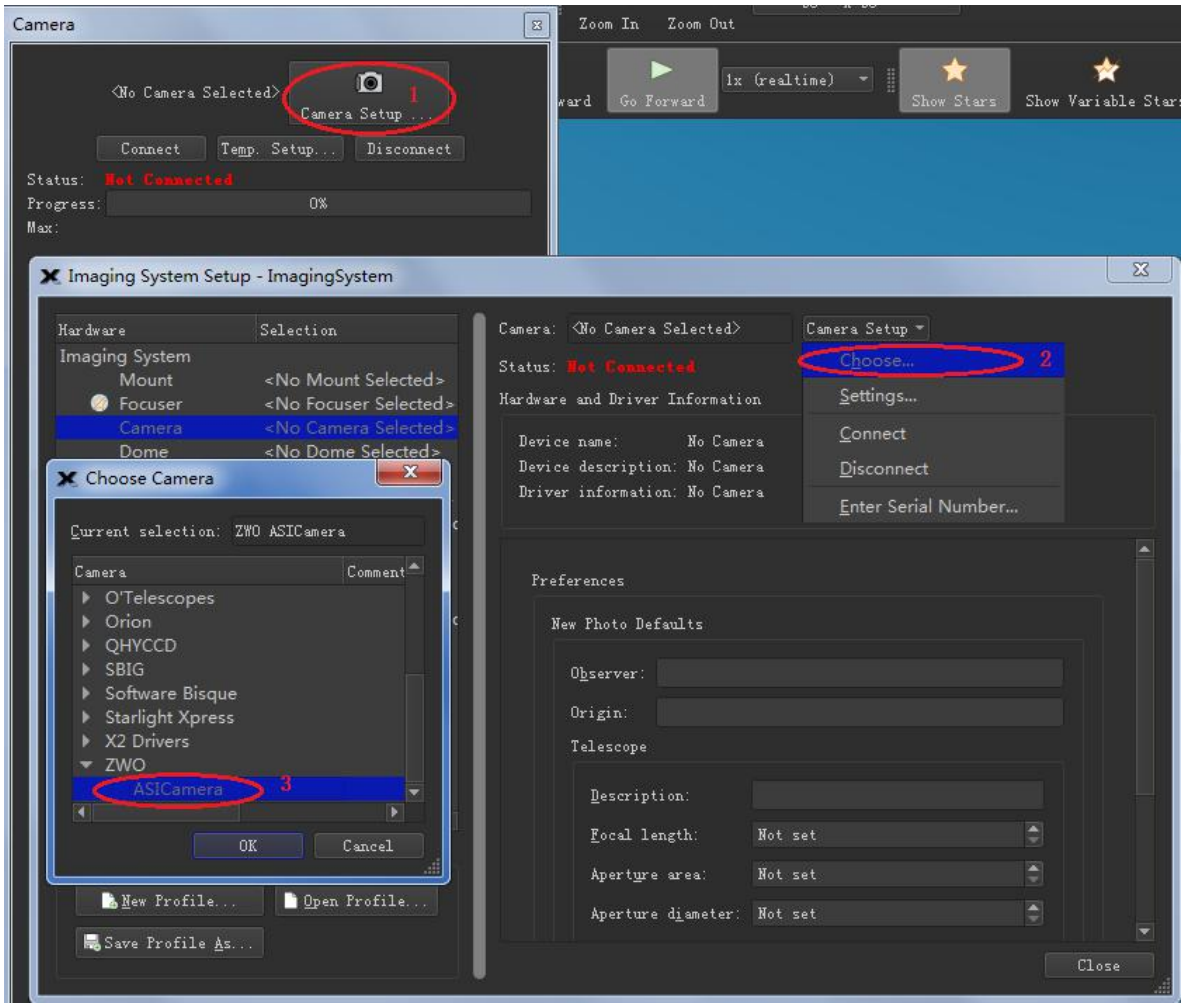
5.4 TheSkyX

You cam connect ASI camera through ASCOM driver, it's similar with other software, here we introduce connect camera through our x2camera driver.

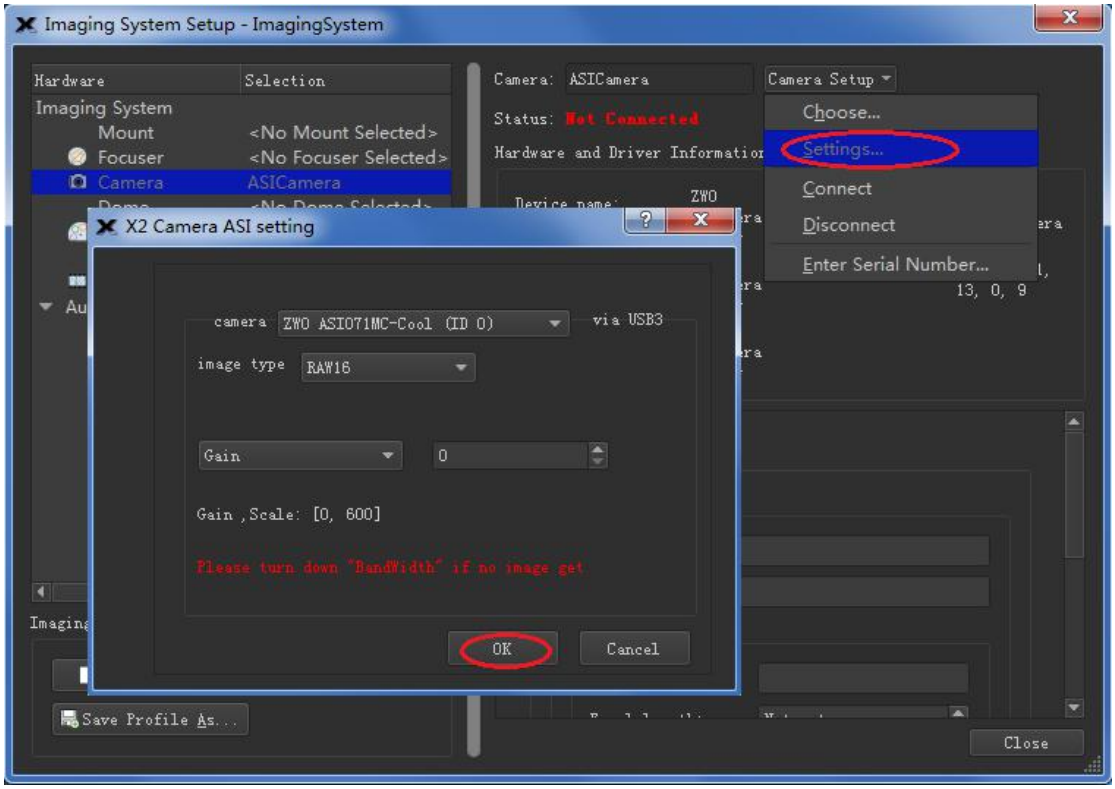
Install plug-in driver.



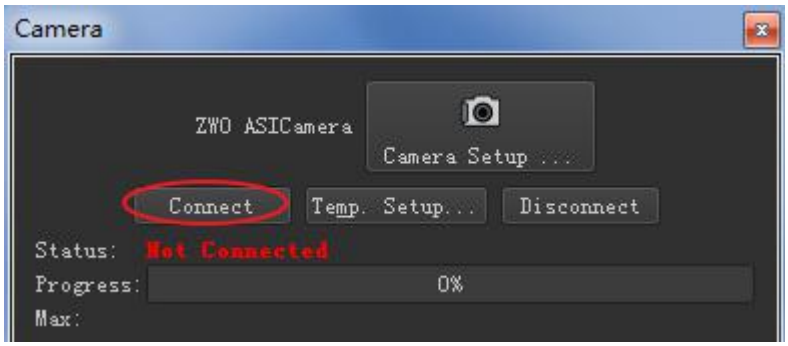
Choose camera



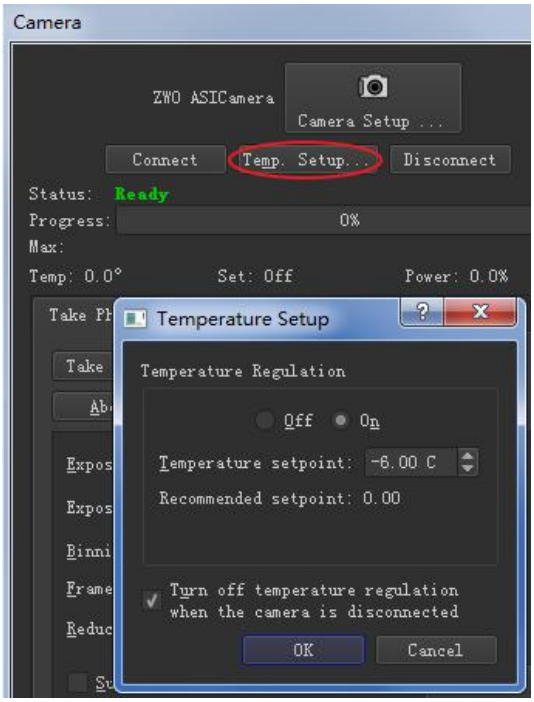
Camera setting, select a camera as imaging camera.



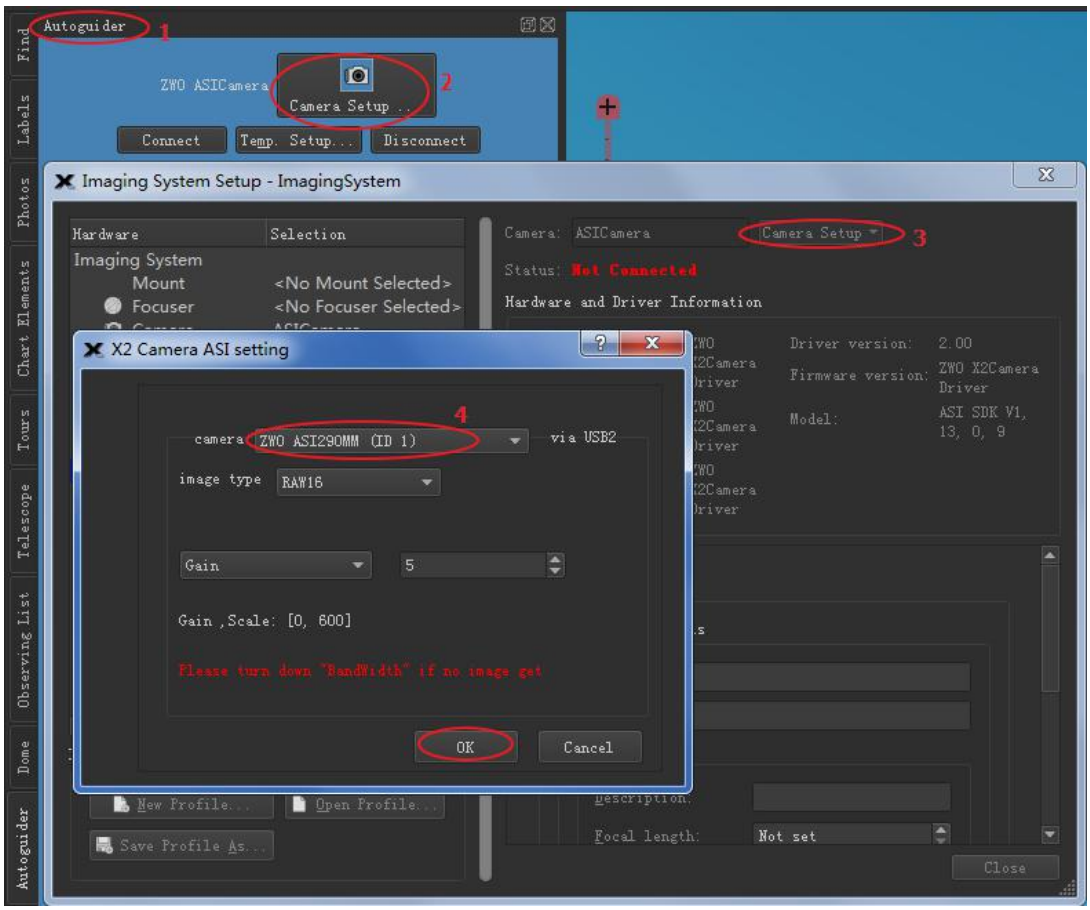
Connect



Cooling configure

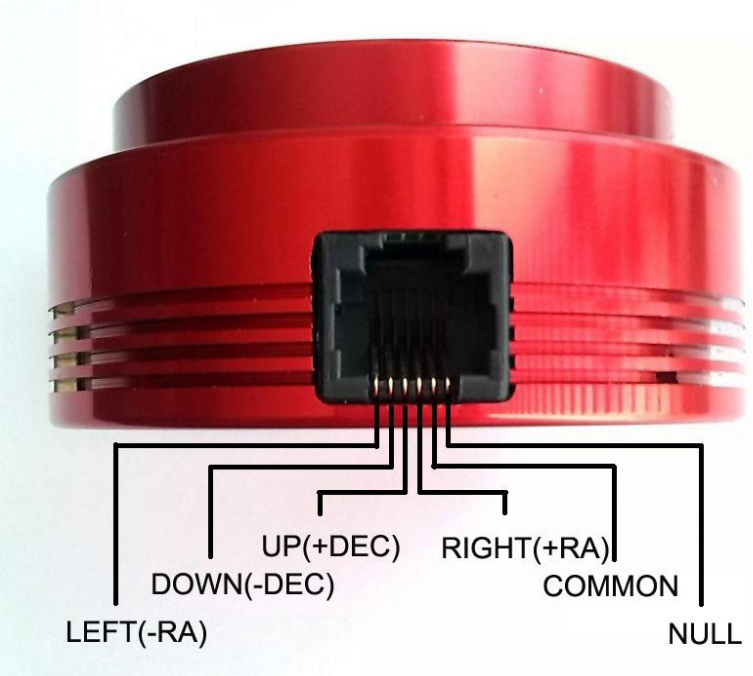


You can choose another camera as guider camera

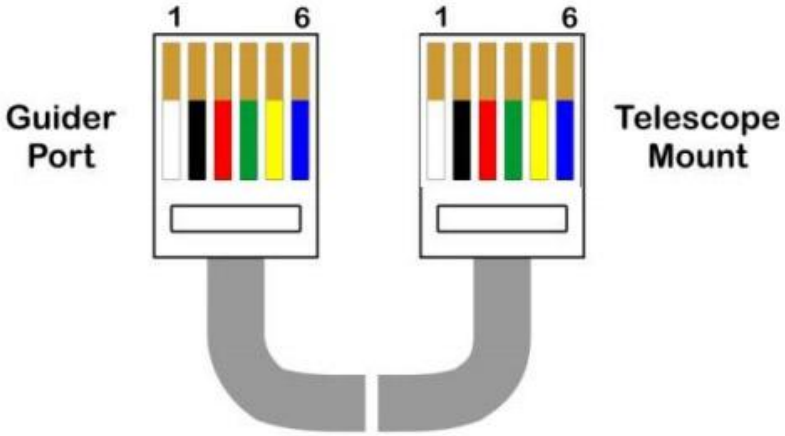


6. Auto Guider

ASI cameras which have a Guider Control Port can be used in conjunction with PHD or MaxIm DL to guide your mount for long time exposure imaging.
The image below summarizes how the Guider Port defines.

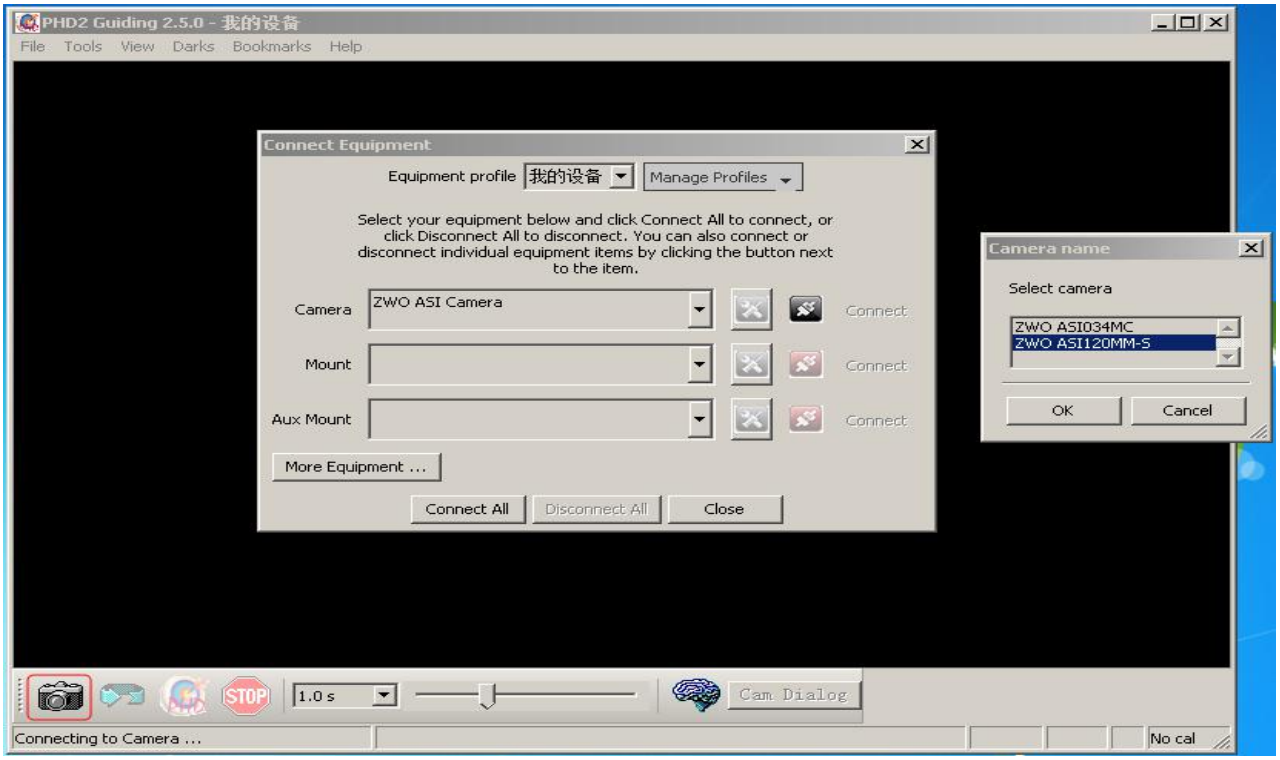


The connecting cable is a 6P6C telephone-style directly connecting cable.

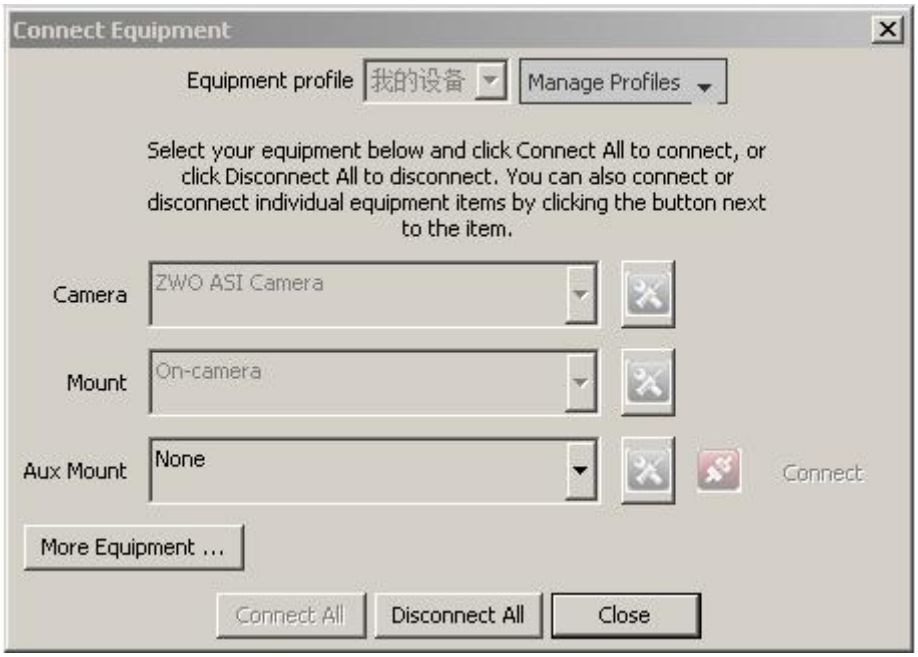


6.1 Guider with PHD Guiding

1. Open PHD and click the Camera button. Select “ZWO ASI Camera” in "Camera" combo box, click "connect", and select camera if more than one ASI cameras are plugged in, click "Ok"

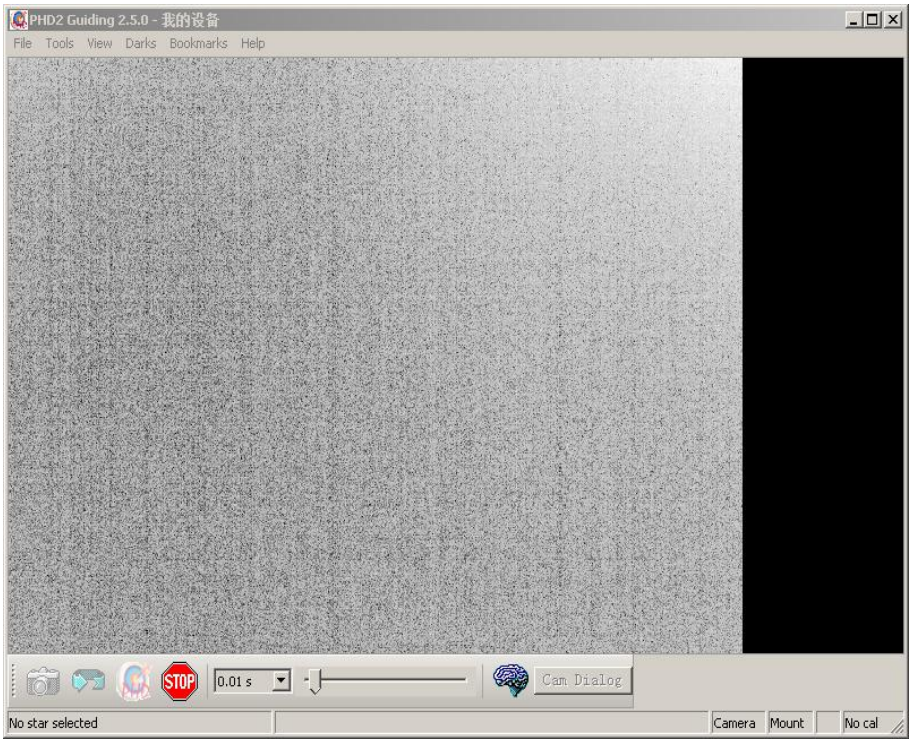


2. Select " On-camera " in "Mount" combo box.

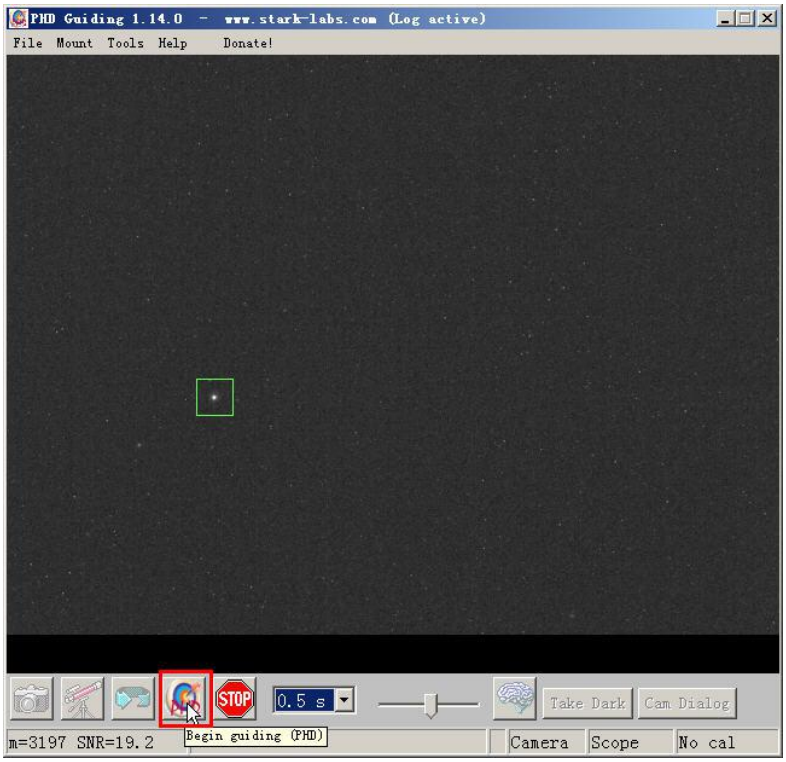


3. Click the refresh button to get image.

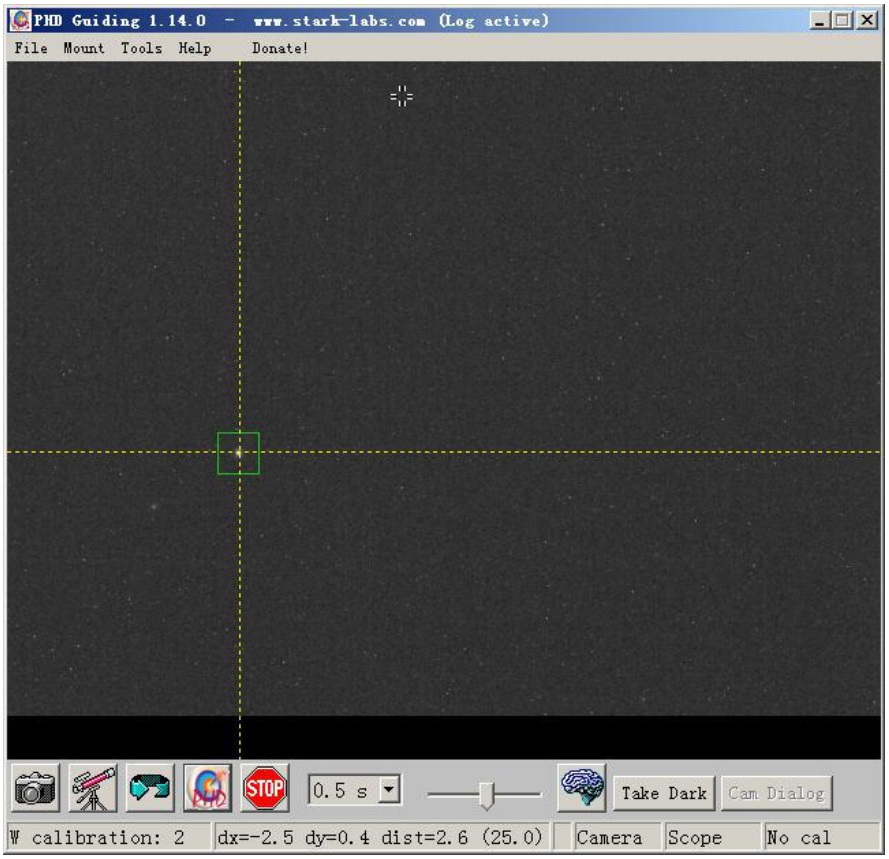
4. Now can see the star in the image.



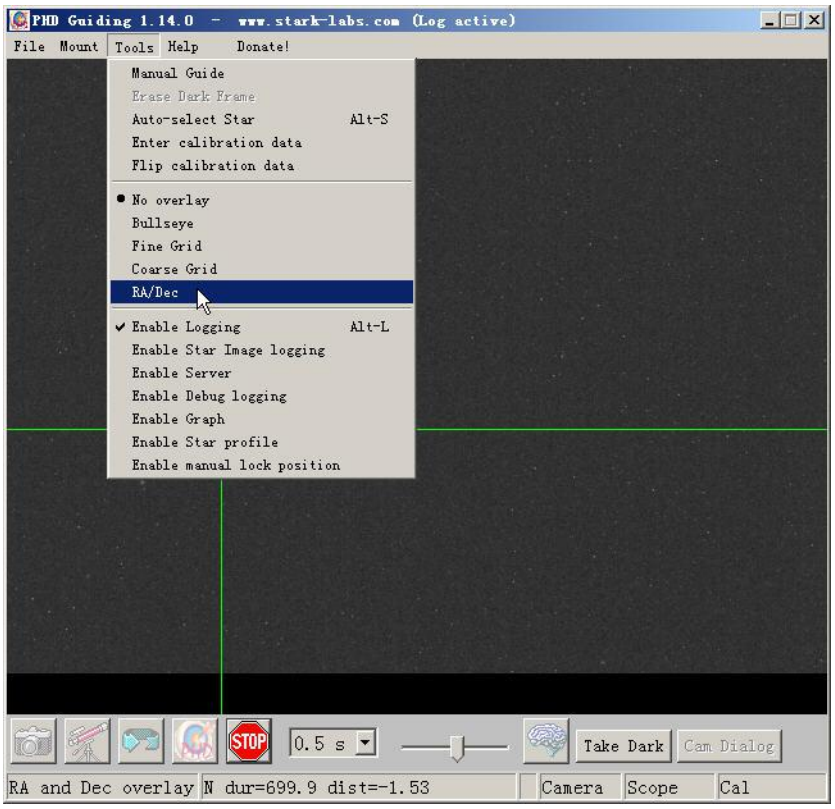
5. Choose a star and Click the guider button.



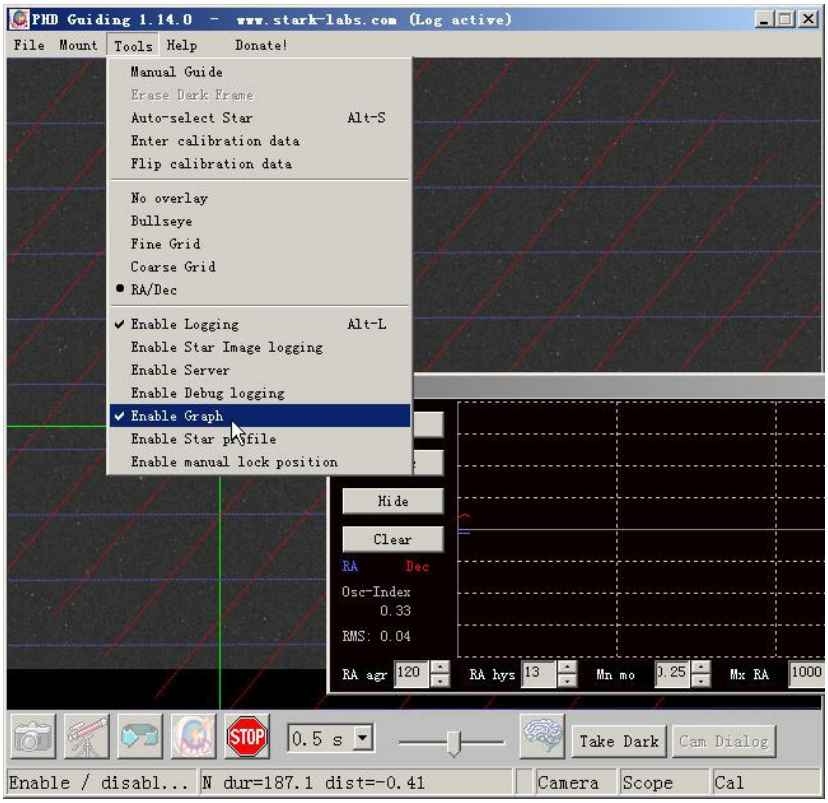
6. PHD is calibrating now.



7. PHD start guiding after calibrating.

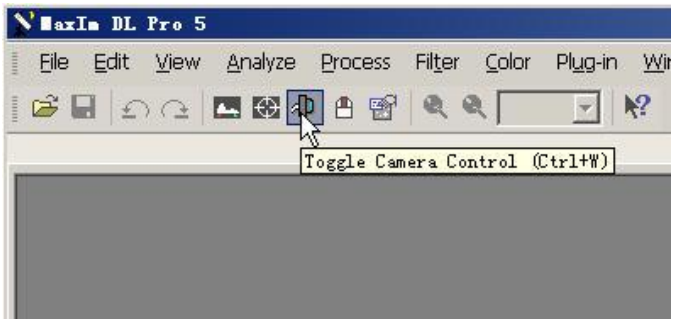


8. Enable Graph to see the guiding result.

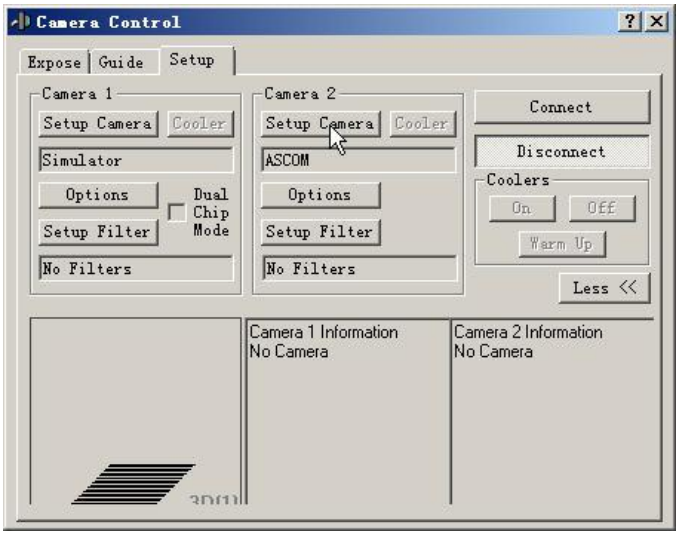


6.2 Auto Guider with MaxIm_DL

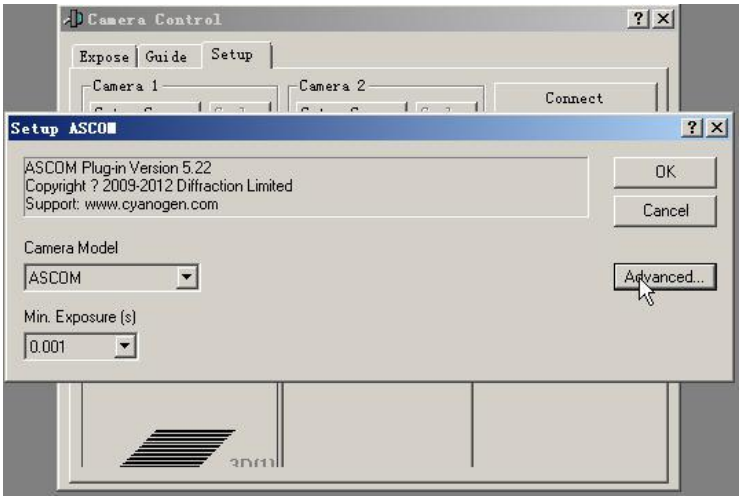
1. Select Camera from the toolbar of MaxIM_DL



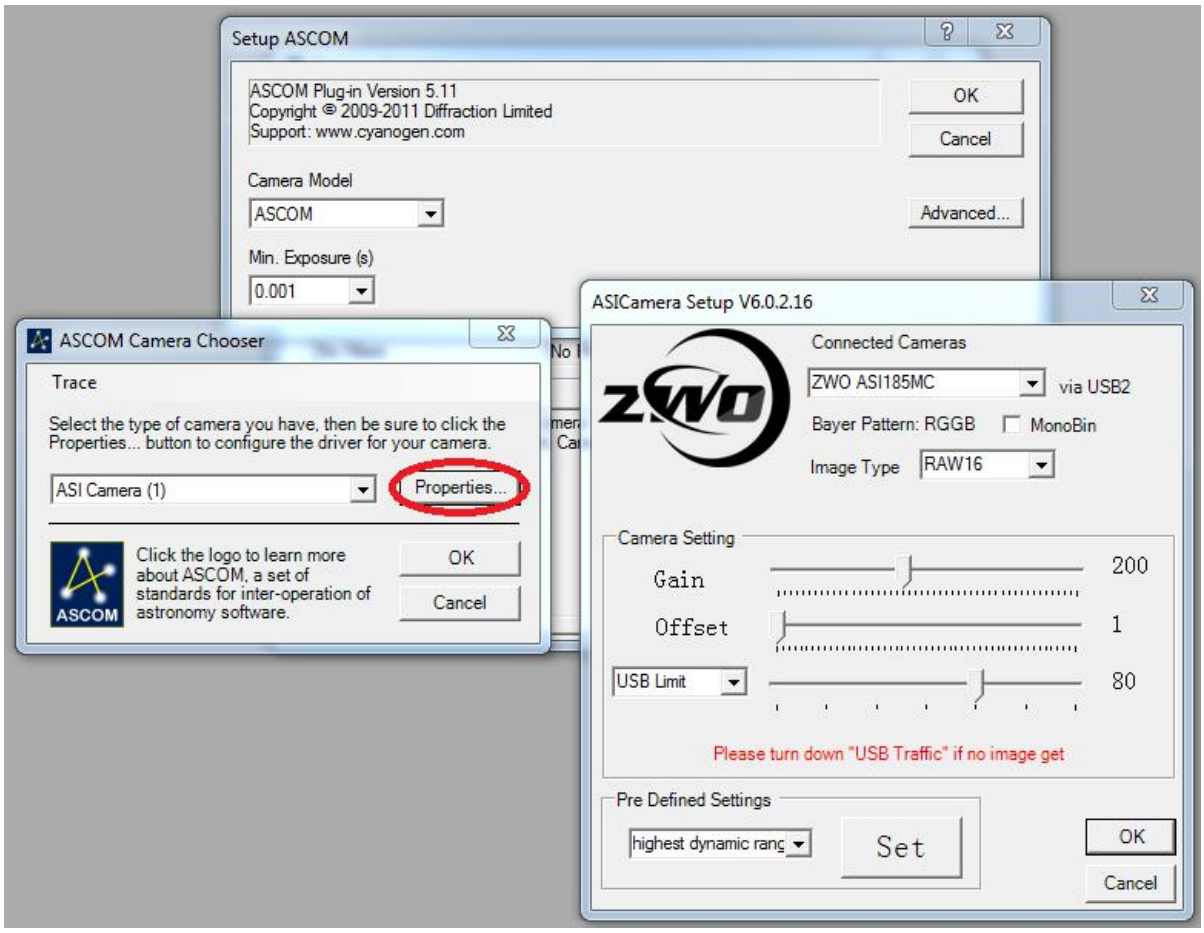
2. Click “setup camera” from the Camera2



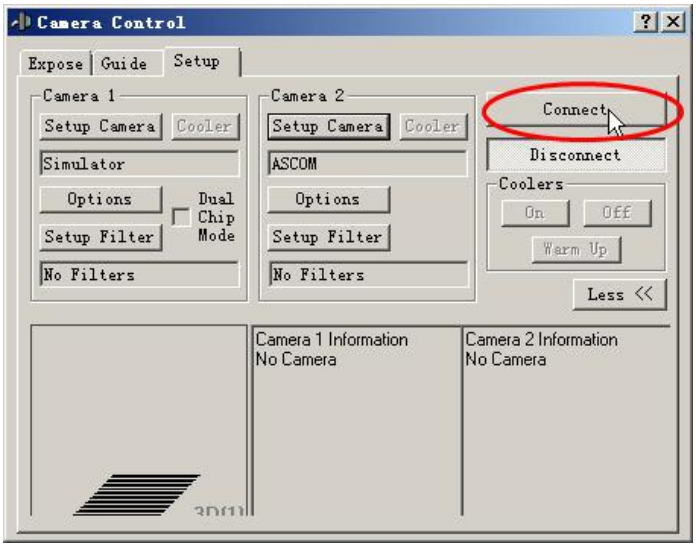
3. Camera Model select “ASCOM” and click “Advanced”. You can choose “video” if connecting through the WDM driver.


Camera Control
Expose
Guide
Setup
Camera 1
Camera 2
Connect
Setup ASCOM
ASCOM Plug-in Version 5.22
Copyright ? 2009-2012 Diffraction Limited
Support: www.cyanogen.com
OK
Cancel
Camera Model
ASCOM
Advanced...
Min. Exposure (s)
0.001

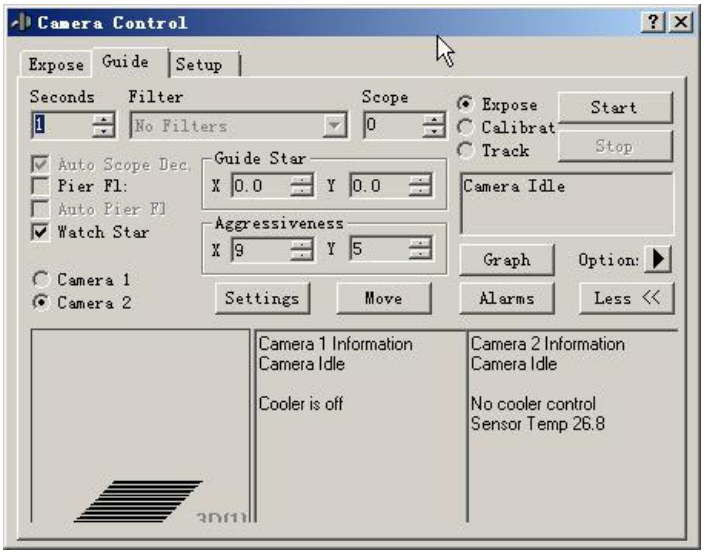
4. Select "ASI Camera(1)" or "ASI Camera(2)" from the popup dialog and click "Properties". Click “Ok” after setting a reasonable gain value.



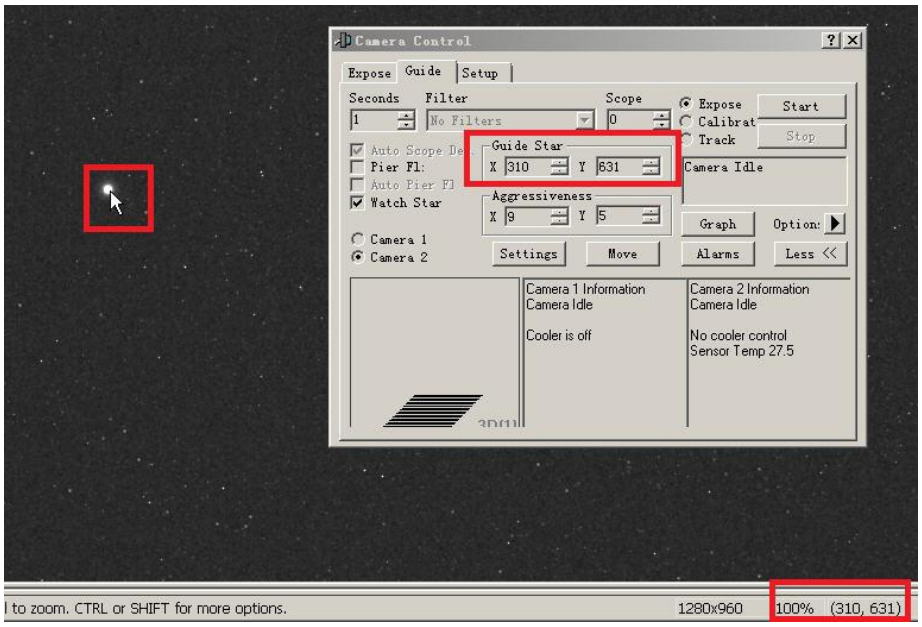
5. Connect now



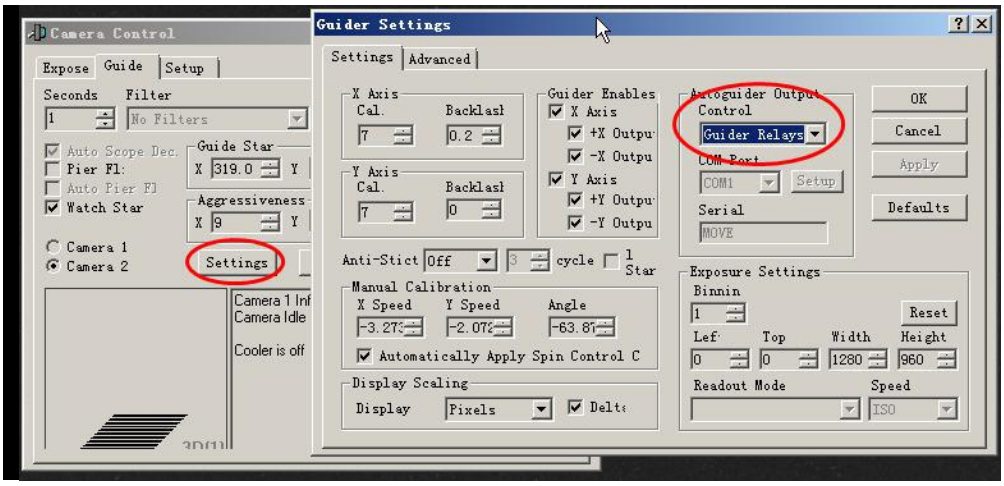
6. Shift to the Guide page and Click “start” to expose one image.



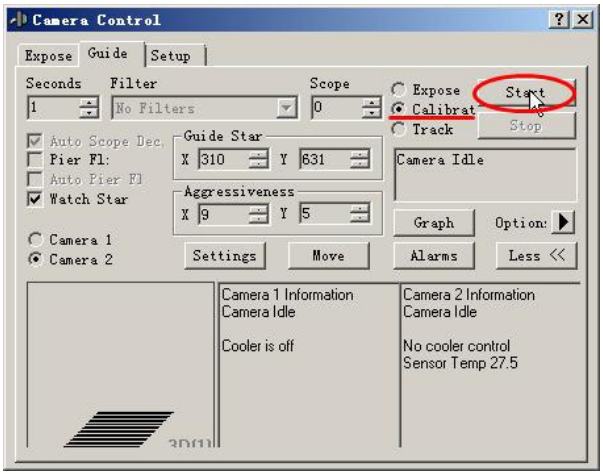
7. Choose a bright start and click it to be a “Guide Star”



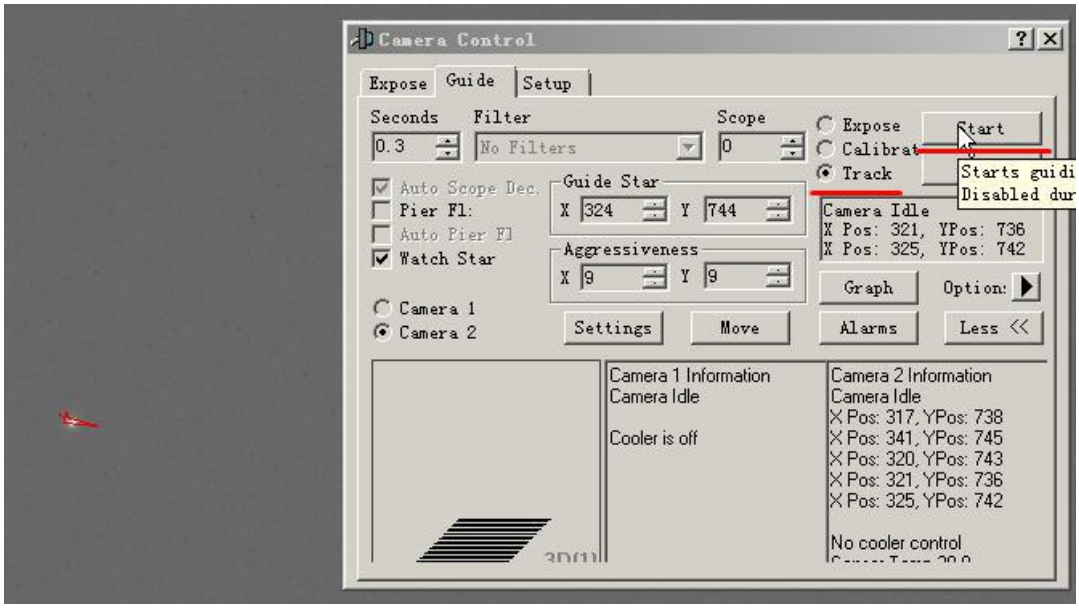
8. Click “Setting” to make sure that Autoguider Output is “Guider Relays". Then MaxIm_DL will use the ST4 port on the camera to guide. Or choose “ASCOM” driver to connect “ASI Camera ST4 telescope driver” if you connect camera through WDM driver.



9. select “Calibrate” and click Start.



10.There is a cross red line when calibrate successful. Select “Track” and click “Start” to start to guide.



11. Click “Graph” to show the guiding result.