

Photography with the 60 inch Telescope

Because of the exceptional light collecting ability of the 60 inch telescope, photography through the eyepiece or with a camera on the telescope itself can be a very rewarding experience. While great images can be taken in a very short time, care must still be taken to understand one's camera's abilities and the proper techniques for getting the best possible image with the least amount of time and effort.

Since photography at the eyepiece will take time away from actual viewing through the eyepiece, permission from the group is a must to avoid hard feelings during or after the session. Please discuss the desire to use cameras or smart phones for photography with the group before the session and come to an agreement as to what kind of photography will be allowed during the night. Advise your Session Director and Telescope Operator of your decision. For example, some groups have allowed photography after all have viewed the object with no other restrictions. Other groups have designated the best photographer or best camera to take pictures for the group which are shared after the session. Since it's your time, the group itself should set the rules as to how much photography will be allowed.

Photography through the eyepiece is the quickest and usually the easiest to do. It is best to try imaging bright objects like the moon, Jupiter, Saturn, Mars, Venus, and bright double stars. Advise your Session Director or Telescope Operator if the object is not centered in the eyepiece so it can be adjusted. Holding the eyepiece and camera/phone in the same hand helps to steady the camera and keep it on axis with the eyepiece. Be careful not to touch the glass of the eyepiece. Smart phones do well with the moon, but due to minimal exposure control, planets usually expose poorly and are too bright in the final image.

Shooting with SLR's is the best way to get good images. Using prime lenses with a filter size of 52-58mm works well with the 100mm eyepiece as the filter will settle into the metal ring at the end of the eyepiece and provide a stable base to hold the camera and lens to the eyepiece. Larger filter sizes will fit over the end of the eyepiece. Lenses of 35-100mm focal length (35mm film equivalent) usually work the best as they will give a full field view at the wide end to a magnified view at the telephoto end for smaller objects. Prime lenses work better as they are more stable and have faster f-ratios than zooms. Many zoom lenses are tricky to use as the zoom mechanism changes the length of the lens and this is a liability when trying to hold the lens against the eyepiece at certain zoom settings.

Point and shoot cameras have taken many great pictures, but present challenges when used at the eyepiece. The small lens can contact the glass element of the eyepiece and needs to be kept clear of the glass so as not to scratch it. Encircling the zoomed lens with your left forefinger and thumb, then holding your hand to the eyepiece, is a good way to keep the lens aligned with the eyepiece and keep it away from the glass. Move the lens side to side and up and down instead of tilting the camera to acquire the image. The live view on the back of the camera is of great help when composing the image and gauging exposure and focus.

Smart phones are best used on the moon. The even illumination of the eyepiece field allows the exposure metering to be correct and good results usually follow. Hold the lens directly in line with the eyepiece glass and keep the phone level with the end of the eyepiece. You may have to hold the lens away from the eyepiece by an inch or so to get the full frame to be filled. An adapter is also available to mount a smart phone to the 100mm and 80mm eyepieces and hold it securely and on axis. It was designed for iPhones, but can hold other types with some effort. Please ask your Session Director or Telescope Operator if you want to use this device. Planets are harder to image due to difficulty in getting the exposure metering correct. Android menu options like Spot metering and Exposure compensation have allowed proper exposure to be achieved on planets. When the seeing is good, the higher power eyepieces, 55mm, 50mm, 32mm, and 27mm eyepieces, give larger images which make proper exposures more likely and give images with less noise. Video of objects is also possible and can allow for processing to yield much sharper images than were seen when recording or viewing. Some long exposure and camera apps can enable more exposure control and we encourage you to try them out before and during your visit. Please let us know of any apps that you feel worked well on your smart phone so we can provide that information to our future clients.

Mounting an SLR camera on the telescope itself gives the most stable mounting, but uses the $f/16$ focal ratio and will require longer exposures. The magnification is also much higher than through the eyepiece so large objects like the Orion Nebula will lose the outer portions. As this technique requires removing the eyepiece and adjusting the secondary focus, viewing time will be lost as it is set up and removed. Usual set up and removal is about 2 minutes each. Permission from the group is a must for this process. A T-mount for your camera is required, ie. Canon EF, Nikon F, etc. Please have a T-mount of your own as we do not keep one available at the telescope. We have a 2 inch adaptor to screw into the T-mount to secure the camera to the focuser. Long exposures are possible due to the rigid mounting, but a periodic error in the drive gear means that anything over 2 minutes will show a small drift in the image. Stacking shorter images will give better results than one long one.

Exposure control is very important when photographing planets due to their high contrast against a dark background. Manual exposure control on SLR's and better point-and-shoot cameras handle this easily. Exposures can range from 1/60 sec. for bright objects like Albireo or Jupiter to 30 sec. for nebulae or galaxies. Automatic settings usually fail to get the exposure correct. Some point-and-shoots have modes that can trick the camera into getting the exposure short enough to be correct. We have had success with sport mode and also by enabling the flash, but covering it, to get faster shutter speeds and correct exposures. Zooming in on planets or using higher power eyepieces also helps as the planet fills more of the view and the exposure is better as the amount of dark sky is reduced.

Focus can be tricky, but, for bright objects, autofocus can often get a sharp focus. When autofocus does not work, setting the lens to infinity or manual and using the telescope's focus knob and live view on the back of the camera works well. Brighter objects can be focused manually through the viewfinder using the camera lens or focuser.

Please understand the use of your camera before coming to the telescope to take pictures. Know your ISO, focus, exposure, flash, and other modes and controls so you can take pictures quickly. Priority will be given to those with the most capable cameras, then as objects allow, those with point-and-shoots and smart phones will be advised when pictures are possible with their cameras.

Tripod photography is very rewarding and long exposures in the dome give a very good feel for the atmosphere of the observing session. Wide angle lenses work best to include as much of the telescope, sky and setting as possible. Red light dominates the photo as the dim red lights we keep on show very well on film or digital cameras. Favorite images include recognizable constellations, planets or the moon behind the telescope, blurred dome as it rotates, time lapses, observers at the eyepiece, and wide shots of the group with the telescope. Please be mindful of where you place your tripod so that it does not interfere with the group's ability to move around the dome in the dark. Put it away when you are not using it.

Flash photography in the dome is only appropriate at the start of the observing or when the lights are still on. We encourage a group photo before the lights are turned down and one at the end is also fun to show who stayed. When viewing bright objects like Jupiter or the moon, we may have the lights on and flash is fine if you announce it to the group so no one is surprised by it. Ask observers at the eyepiece if you can

use flash so they are not blinded or surprised by the flash. Please make sure your camera's flash is turned off when you come to the eyepiece for photography. An inadvertent flash in the darkened dome is no fun and hurts dark adaptation.

Bright screens on cameras, smart phones and tablets give off a lot of light and can be disruptive to a group which is intent on serious observing. Please dim your screens to the lowest setting you can still see and keep all screens facing outward and away from the others and the observing floor. Using them in lighted areas is better such as at the food table or downstairs. Digital cameras can have very bright screens. Hold lit screens to your body to keep light away from dark adapted guests when near the telescope. Show your photos in an area away from those who do not want to lose their night vision.

Sharing images is greatly appreciated. If you get images that you feel are really good, share them with the group and with us as well. We hope to create an image gallery where our guests can show off their best work from their observing sessions. Please also consider sharing images to Facebook, Twitter and Instagram and tagging the Mount Wilson Observatory to let others know what you were able to capture during your night. Our social media account info is posted on the observing floor. If you have posted images online, let your session director know so we can repost or link to your work.

If you have any technical questions, feel free to contact me before your night. I'll try to answer any questions to ensure you have a successful experience with the telescope and photography. Norm Vargas Normvargas2011@gmail.com