

Photography with the 100 inch Telescope

August 2, 2015

Because of the exceptional light collecting ability of the 100 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 your 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, permission from the group is a must to avoid hard feelings during or after the session. Please discuss the desire to use cameras or smartphones 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 easiest way to take pictures at the 100 inch. 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. iPhones do well with the moon, but due to minimal exposure control, other bright objects that don't fill the field usually expose poorly and are too bright in the final image. Keeping the lens on axis with the centerline of the eyepiece is the most important consideration for getting an image with your camera.

Shooting with SLR's is the best way to get good images. Using prime lenses with a filter size of 52-58mm works well as the filter will seat onto the ring at the end of the eyepiece and provide a stable base to hold the camera and lens to 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. *Do not touch the lens or your fingers to the glass of the eyepiece.* 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.

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Smartphones are best used with the moon. The even illumination of the eyepiece field allows the exposure metering to be correct and good results usually follow. Try to 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 see the full eyepiece field. Zooming in slightly on your screen will give a fully filled frame. 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 smartphone so we can provide that information to our future clients. Samsung phones seem to have the best exposure controls and photograph the planets easily with spot metering and exposure compensation of -1 to -2 stops.

Mounting an SLR camera on the telescope itself gives the most stable mounting, but uses the f/11.1 focal ratio and will require longer exposures. The magnification is also much higher than through the eyepiece so large objects like the M13 and M42 will only show the very center. This technique requires removing the diagonal and eyepiece and centering the object in the viewfinder or screen. Your Telescope Operator or Session Director will handle that for you. Usual setup is about 2 minutes. A T-mount for your camera mount is required, ie. Canon EF, Nikon F, etc. Please have a T-mount and 2 inch adaptor of your own as we do not keep them available at the telescope. Also be aware that, when pointing low to the south, your camera will be pointed straight up into the accessory telescope and if the 3 set screws are not tight, it could slide out of the focuser. *You are responsible* for the safety of your equipment when taking these photos. Long exposures are possible due to the rigid mounting, but a slow drift in the tracking means that anything over 30 seconds will show a small drift in the image. Stacking shorter images will work better than taking 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 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

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objects allow, those with point-and-shoots and smartphones 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, smartphones and iPads in the dome 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 a lighted area is better such as 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 do during your night. 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. You may also offer feedback about this document or your experience at the telescope.

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