“COLOR IN THE NIGHT SKY”

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Gazing at the night sky, we see stars bright enough to shine through our light polluted atmosphere. Binoculars and telescopes improve our ability to view celestial objects. When properly pointed and focused, the eyepiece of the telescope can display an array of objects such as distant galaxies that are tens of millions of light-years from Earth as well as our intra-galactic neighbors known as nebulas and star clusters. Unfortunately, images appear as gray and faint wisps of gas clouds and other stellar matter. How can we see these objects in color? The answer is astrophotography.

The back part of the eye called the retina is lined with tiny biological sensors called rods and cones. The brain interprets the light striking the retina as either gray or color depending on the amount of light entering the eye. In the daylight, we see color. At night, even the light energy collected by the telescope is only sufficient to trigger the retina’s rods and therefore we see shades of gray. A word of caution – never look at the Sun through a telescope. The telescope is designed to concentrate star light. Sun light viewed through a telescope will cause permanent damage to the eye unless a solar filter is installed.

Attaching a film or digital camera to the telescope, the eye is replaced with a chemical or electronic sensor. If the camera exposure is set to a few seconds, the result is no different than the visual experience. When set to a long exposure, the camera’s sensor detects the color of the object that the eye could not. Digital cameras made for astronomy come in two forms. The first is known as one-shot color where the red/green/blue pixels numbering in the hundreds of thousands or millions are combined into an electronic array. The second method employs a highly sensitive monochrome element. Red, green and blue filters are placed between the telescope and the camera. Multiple monochrome images are captured through the three filters and then combined into a single color image. This process is called color-combining with image-stacking and is the same method used by professional astronomers to create the spectacular images seen in magazines and on the internet.

The final aspect of astrophotography may seem less intuitive but is an essential component of the process. The Earth spins on its north/south axis and the telescope with camera must be mounted on a device that tracks the gradual movement of the stars across the sky caused by this movement. The precise movement of the mount counteracts Earth’s spin and freezes the image over the film or sensor. To add greater image stability and increase the photographic resolution, a secondary device called a guide telescope/camera sends small correcting signals to the mount when it detects the slight excursion of an adjacent star caused by disturbances in our planet’s atmosphere. The frames from the camera are downloaded to a computer and processed to create a color picture of the deep space object.

You can learn more about astrophotography and observe many amazing celestial objects through one of the two 14” reflector telescopes at the Rotary Club of Cameron Park - Community Observatory located behind the El Dorado Center of Folsom Lake College off of Green Valley Road. For more information about the observatory go to www.communityobservatory.com for current hours of operations and driving directions.