

## Solar Viewing

**By Gene Grahek, Lead Solar Program Docent, CPRC Community Observatory**

In a recent Heavenly News article I wrote about sunspots. Continuing with our sun as a theme, this article describes other amazing features of our favorite star, the sun. To prepare you for this, you'll need to know some basic sun facts. Our sun is about 93,000,000 miles from earth and is an averaged sized star. It contains 99.9% of all matter found in our solar system. Traveling at the speed of light (about 186,000 miles per second), it takes just over 8 minutes for energy from the sun to reach our earth. This energy is seen and felt as heat and light.

To visualize our sun you can think of different layers just like an onion. The center, or core, is where hydrogen fuses into helium releasing energy in the form of photons. The core's temperature reaches an astounding 27,000,000 degrees Fahrenheit and although not solid, is 8 times denser than gold. These photons then pass through the next layer called the radiation zone and can take tens of thousands of years to eventually reach the sun's surface. The next layer, the convection zone is where energy is transferred through the convection process, giving the appearance of boiling water on the sun's surface (called granulation).

We have now reached the sun's atmosphere consisting of the photosphere and chromosphere where we are able to view the sun's features. The final layer of our onion is the corona where solar winds carry energy deep into space.

So how and what can we see on the sun? As always a word of caution is needed. Never look directly at the sun and only look through approved solar equipment. The eyes you save may be your own! Cameron Park Rotary Community Observatory has two different types of telescopes capable of safely viewing the sun, each allowing us to view different features. Our white-light telescope is a normal telescope fitted with a special high quality filter designed to block out harmful solar radiation. This filter allows a mere 1/1000 of 1% of incoming solar radiation to be seen. This is white light and the sun appears as a white ball in the telescope's eyepiece. If sunspots are present they appear as dark spots on this ball. It is also possible to see bright cloud-like features called faculae found near the sunspots.

The other solar telescope is just that, specially designed to safely view the sun and nothing else. This is the hydrogen alpha telescope that makes the sun look like a red/orange ball (thank you Placerville Kiwanis Club for your generous donation to purchase this costly telescope). Through it we can see spectacular features on the sun such as granulation referred to earlier. Filaments are clouds of material that appear on the sun's surface as dark lines. These filaments are called prominences when they appear on the edge of the sun and can look like large loops. Prominences can extend over many thousands of miles with the largest recorded at 216,000 miles long. Some live only minutes, while others can last several months. Eruptions of these loops can send large amounts of plasma into space. Solar flares are the sun's most violent event and eject energy into space equal to millions of hydrogen bombs. If enough matter is ejected into space these flares become coronal mass ejections (CME) and can cause havoc with earth's power grids and communication satellites. They can also cause beautiful visual effects such as the aurora borealis.

As you can now see our sun is a dynamic ongoing process of movement making solar viewing exciting and rewarding. Through the auspices of the El Dorado County Office of Education, we are now offering safe solar viewing to the county's school students.

Want to safely view the sun? Solar Celebration Day is on Saturday June 12, 2010 from 10:00am-2:00pm at the Cameron Park Rotary Community Observatory ([www.communityobservatory.com](http://www.communityobservatory.com)). Solar-trained docents will be available with several white-light and hydrogen alpha telescopes to safely show you our sun. We will also be showing a 3D movie about the sun complete with 3D glasses! Let's hope for clear skies!