

Welcome

Garland Public Library's "Solar Saturday"

(Telescopes provided by the Bear River Observatory)



Daytime Astronomy

There are many things to see when doing solar astronomy!

- Eclipses
- Alignments
- Transits
- Sunspots
- Flares and Prominences



Solar Eclipse Events



- **Partial**

When the moon passes in front of a portion of the sun.

- **Annular**

When the moon passes directly in front of the sun but is too far away to completely cover the sun's disk.

- **Total**

When the moon passes directly in front of the sun and the distance is exactly right to cover the same size of sky as the sun's disk.

Christmas Partial Solar Eclipse from December 25, 2000

A partial solar eclipse was visible on Christmas morning on December 24, 2000. In this photo a commercial airplane was also captured in the frame as it was crossing in front of the sun. Observed from Ogden, Utah.

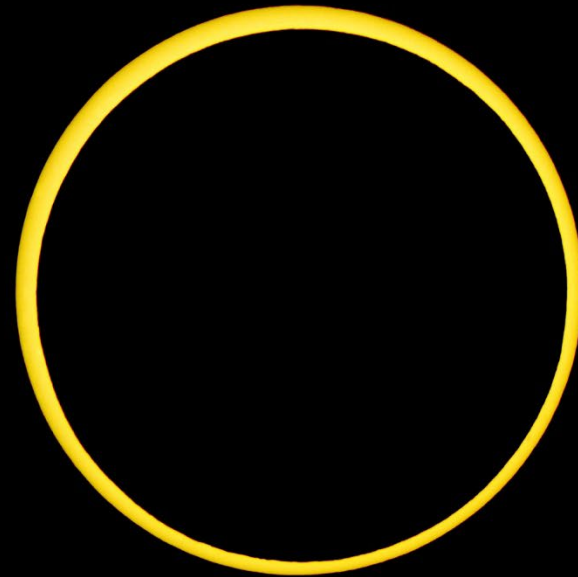


2012 Annular Eclipse



The sequence of images above was taken on May 20, 2012 of an annular eclipse. This event was observed from Parowan Utah.

“Ring of Fire” at right →



2017 Total Solar Eclipse



Total Eclipse taken from Boysen State Park, WY in 2017.

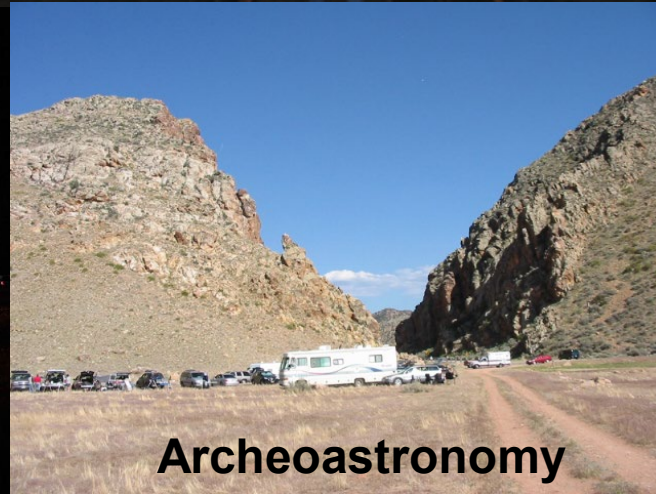
Special Alignments in Archeoastronomy



Parowan Gap near Cedar City, Utah is a solar calendar created by the Sevier-Fremont tribe approximately 1,000 years ago. This calendar utilizes a natural narrow “gap” which when standing in the correct location at sunset, they would use to keep track of time.



Solstice Sunset



Archeoastronomy



“Zipper” Glyph

Special Alignments in Land Art

- 1976 Land Artwork by Nancy Holt
- Popular during summer and winter solstice
- Patterns of light inside the tunnels recreate the constellations of Draco, Perseus, Columba, and Capricorn using sunlight.
- Located right here in Box Elder County!



Planetary Transits



Transit of the Planet Venus on June 5, 2012. Photo taken from Ogden, Utah. These events are extremely rare, and the next such event will happen in the year 2117.

Transit of the Planet Mercury on November 11, 2019. Photo taken from Tremonton, Utah. These events are moderately rare occurring once every 7-8 years. The next such event will happen in the year 2032.



Sunspots

- Sunspots offer observers the chance to watch something that moves and changes.
- Sunspots usually occur in pairs.
- Solar activity reaches a maximum every 11 years.
- Sunspot activity should increase over the next 5-6 years since we are currently at the “minimum”.

Flares and Prominences

- Massive ejections of energetic plasma.
- A single flare releases more energy than all the energy humans have ever used throughout all of recorded history.
- If we could harness the power of a single flare, it could power all of our planet's energy needs for 10,000 years.
- This photo shows the sun's photosphere, coronasphere, and a region of solar flare activity.

What not to use!



Cheap eyepiece filters commonly available online are extremely dangerous. These filters attempt to block sunlight after it has been intensified by a telescope. These filters easily overheat and break. If this happens while in use it would cause immediate and permanent blindness!



Welding masks are not safe to use. They do not adequately block the full intensity of the sun which is much brighter than a welding arc.



Ultraviolet rays penetrate cloud layers easily. Even though the sun may not appear as bright visually, ultraviolet rays cause damage to your eyes just as easily as they do to skin. (Think sunburn on your eyeballs!) This light if intensified with a telescope can easily cause permanent blindness.

Correct Safe Solar Viewing



Full aperture glass solar filters fit over the **FRONT** of the telescope and block sunlight **BEFORE** it is magnified by a telescope.

Also a full aperture type of solar filter, flexible ones made from a special solar mylar film can also be used safely. These DIY versions can be made very inexpensively but are just as safe.

“Eclipse” glasses are made from the same type of solar film pictured at left and are a safe way to view the sun.

No matter what type of filter you use, remember that solar viewing **always requires** one. Never look at the sun without proper filters. Even without a telescope, looking directly at the sun can cause permanent eye damage.

What is a “Hydrogen Alpha” filter?

- Most solar astronomy is done with a visible light solar filter. These filters will show sunspots and a few other features.
- Some features such as prominences, flares and solar eruptions can only be seen with a very special piece of equipment called a Hydrogen Alpha filter.
- These filters are usually built into a dedicated “solar telescope” which can only look at the sun and cannot be used for night-time viewing.
- Hydrogen alpha filters are extremely expensive and very difficult to make.
- H-alpha filters isolate a specific frequency of light at 656 nanometers.
- The image at right shows what the sun looks like with an ordinary glass solar filter (right) vs. a hydrogen alpha filter (left).



Hydrogen Alpha Instrumentation

- There are two ways to isolate the H-alpha wavelength. The first is with a dedicated solar instrument like the one pictured on the left, the second is through the use of a Daystar Quark used in combination with a front energy rejection filter attached to a conventional telescope, this device is pictured on the right.
- For “Solar Saturday”, the Bear River Observatory will be providing both visible light and Hydrogen-Alpha capable instruments to look through.



or



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