March 2003
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Stars and Scopes

Newsletter of the Rocky Mountain Astronomy Club
www.rmastronomy.com

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Upcoming Events

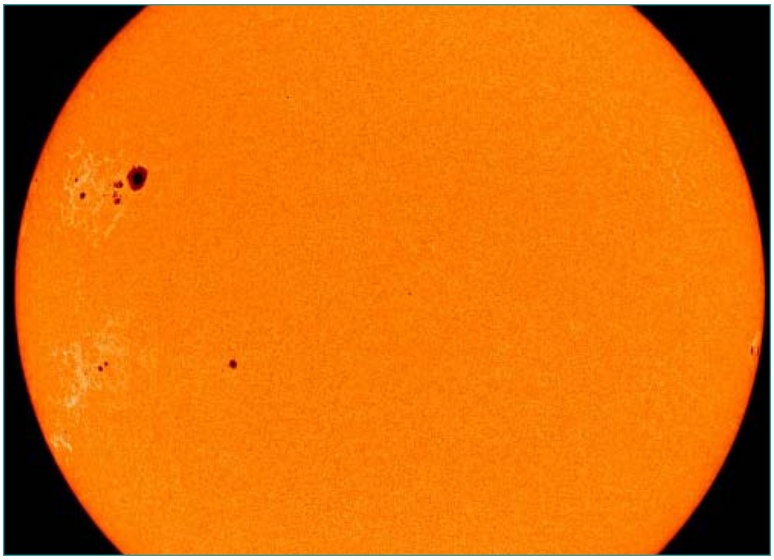
Mar 1 – Club Star Watch, location to be announced

Mar 10 – Board Meeting, 6 pm, Club Meeting and Program, 7 pm at University of Southern Colo.

Mar 29 – Star Watch, 6 pm at the so. Fishing area, Pueblo Resevior

Apr 14 – Board Meeting, 6 pm, Club Meeting and Program, 7 pm at University of Southern Colo.

Sunspot group 10296 will remain visible on the solar surface until mid-March. All you need to view it is a safe solar filter. A telescope helps, but the spot is so large you can see it without one. Courtesy SOHO.



Large Sunspot Visible

After being featureless for several weeks, the Sun's face now sports a large spot.

By the Editors of Sky & Telescope

After weeks of having a blemish-free face, the Sun now sports a giant spot. Designated active region 10296, the sunspot is so large that it's visible without magnification — all you need to see it is a sunny day and a safe solar filter. Of course, a properly filtered telescope makes the view even better. *continued on page 3*

Learning the Night Sky

"The Motions in the Sky and Finding your Way Around;" Part 3

By Bill Brown

The March 2003 presentation for the club meeting will address chapters 30-40 of ***40 Nights to Knowing the Sky*** by Fred Schaaf. This will be the final portion of a series of presentations on the basics in astronomy. For beginners this is a great time to learn the ropes, for long-time observers, a chance to brush up on your skills . . .

In our second discussion, we will futher explore the Moon, the moons and rings of Jupiter and Saturn, the phases of Venus and Mercury, and the orbit of Mars. We will also explore double and variable stars, star clusters, nebulae and galaxies. We will finish our series of discussions with a look at the other planets in our solar system, comets and asteroids. This will be your final chance to "come up to speed" on beginning astronomy!

Celestial Events

May 15, 2003
Lunar eclipse; totality lasts 55 minutes.

August 27, 2003
Mars closest to Earth in many centuries. Don't miss it!

October 2003
Comet Encke; 3.3 year orbit will bring it close enough to almost see naked eye nice with binoculars or scopes.

November 23, 2003
Lunar eclipse; totality lasts 24 minutes

December 2003
At Midnight, **Saturn** will be at its highest point in the sky in 30 years. Spectacular viewing!

"SCO" Operator Training

Beginning this month, RMAC will begin training members as **observatory operators** for the new Southern Colo. bservatory. All current paid, members of Rocky Mountain Astronomy Club are eligible for these series of training classes. The first classes will take place during the day on Saturdays so that trainees can learn their way around the observatory during daylight hours. Nighttime sessions will involve actual operation of the scope with one public session trial run. **The goal is to train operators to run public observing sessions at SCO.** Operators will be taught all responsibilities involved in opening, operating and closing the observatory for observing sessions. If you are interested in taking these training classes, **please contact Bill Brown** at (719) 549-2683 or via email: brownwc@uscolo.edu.

February Club Program

"The Motions in the Sky and Finding Your Way Around, part 2"

Bill Brown began part two of the series with a study of the **constellations of the zodiac** using a comparison of ancient drawings and modern day star charts. The word zodiac comes from the Greek " zoidiakos kyklos" meaning circle of little figures–the original Greek zodiac consisted entirely of animals including human figures. In Roman times, the claws of Scorpius were converted into Libra, the Scales, which remains to this day the only inanimate object in our zodiac. Another change in our zodiac since Greek and Roman times is the constellation that leads the zodiac–Aries. The first constellation is supposed to be the one which contains the vernal equinox the position of the sun at the stargt of spring. However, due to procession, the Earth's axis has altered that position from Aries to Pisces. Aries is still considered as the first or lead constellation.

The next topic presented was how **brightness of objects is determined.** Bill explained that the ancients classified brightness from the first to sixth magnitude with "1" being the brightest and "6" being the limit of normal eyesight. Astronomers, however, extended that range to include dimmer and brighter magnitudes with the use of negative numbers being on the upper range of the scale. Using this scale, Sirius counts as -1.5 mag. and the full Moon at -12.7 and the sun at -27 mag. It is possible to see below the limiting magnitude with the use of telescopes and binoculars. Binoculars will extend the limiting magnitude to 11 mag., amatuer telespoces to 16 mag. The Hubble Space Telescope extends out to 30 magnitude. Bill then gave some seasonal examples of star magnitudes.

Bill continued his discussion with **naked eye planets. Venus** is probably the easiest planet to view and is visbile for 9 moths out of a year. It is visible at dawn for half ot that time and at duskduring the other half. It can be so bright as to cast shadows on the ground. **Jupiter** is the second brightest planet and can be viewed in the sky for longer periods to time. It appears to advance one zodiacal constellation per year since its period is 12 years. **Saturn,** in comparison, is the slowest of the naked eye planets with a period of 29.5 yearss. It spends 2.5 years in each constellation and its brightness ranges between 0.5 and 1.0 mag. Saturn also appears to be golden in color when viewed naked eye. **Mars,** in contrast, is pumpkin colored. Its appearance changes the most of the other planets due to it's elliptical orbit. **Mercury** is the most elusive of the naked eye planets. It is only visible for a few weeks near its greatest elongation. The best elongations occur within a month or two at dusk of vernal equinox and at dawn of autumnal equinox.

Bill continued his lecture with a discussion of special stars. **Binary stars** consist of two stars that are actrually orbiting each other. **Double stars** look like single points of light until they are split using a telescope. If double stars lie along the same line of sight, they are referred to as an **astronomical double.** A **variable star** actually varies in brightness. It may be caused by either physical pulsations or by the eclipsing of two components in a binary.

The next topic presented were **Deep-sky objects.** Deep-sky objects are objects that are beyond our solar system. While there are thousands of visible objects, only 110 of the brightest were cataloged by **Charles Messier** in the eighteenth century. Knonw simply as the messiers, they consist of star clusters, open clusters, globulars and nebulae. **Star clusters** are groups of stars that are bound together by gravity. **Open or galactic clusters** are loose arrangements of stars that are relatively close and appear as bright groups. **Globular clusters** are tight groupings that are sperical in appearance and consist of thousands or millions of stars. **Nebulae** are clouds of gas and dust in interstellar space.

Bill went on to discuss **meteors.** Known as shooting or falling stars, meteors appear as streaks of light caused by particles of space rock or metal hitting the upper atmosphere at high speeds and burning up. while still in space, these particles are called **meteoriods.** It the particle survives entry through the atmosphere and impacts on the

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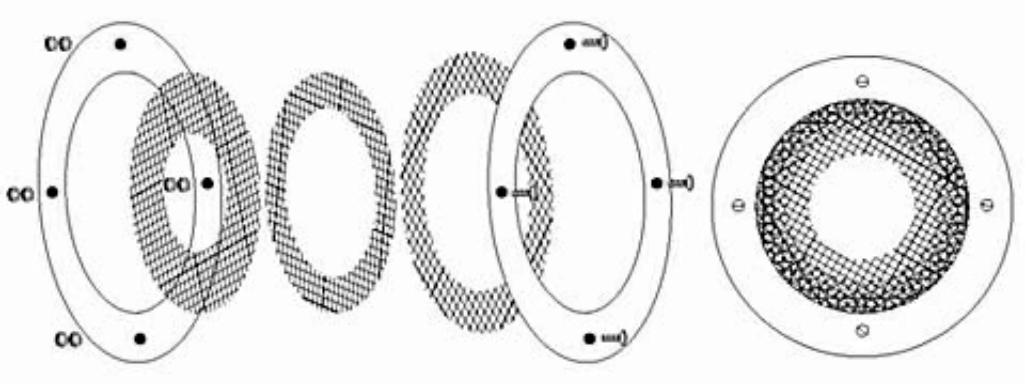
Large Sunspot Visible (continued from page 1)

Sunspots are dark blemishes on the Sun's photosphere, or visible surface. They form where the solar magnetic field traps ionized gas and allows it to cool. Whereas the photosphere's average temperature is 5,700° Kelvin, in the dark center ("umbra") of a sunspot, where the field is strongest, it's about 2,000°K cooler. If you could view a sunspot by itself, it would appear blazingly bright. But in contrast with its even brighter surroundings, it appears dark. The **umbra** of a large spot is typically surrounded by a **lighter penumbra,** where the magnetic field isn't quite as strong.

The Sun turns on its axis roughly once a month, so this large spot will remain on the Earth-facing side of the solar disk until about mid-March. Remember, never look at the Sun without proper eye protection. There are a variety of ways to safely observe the Sun, many of which can be found in the solar observing section of the **Sky & Telescope Web site** (http://skyandtelescope.com/observing/objects/sun). If it's cloudy, you can check out the solar disk on the **SOHO Web site** (http://sohowww.nascom.nasa.gov).



This diagram shows the construction of the apodizing mask. It can be made with rather inexpensive materials and can help improve the performance of large aperature scopes on less than perfect seeing nights. It works great on planets and other bright objects.

Apodizing Mask

This home-made lyot mask is used to cut through the seeing much like an aperture stop. It can help steady **planetary observing** on less than perfect observing nights. When used on a scope, it removes the first diffraction ring of the airy disk at the expense of fattening the central part of the disk. It works best on **large aperature reflector scopes** and helps with **enhansing detail on planets** and **split double stars**—small reflectors and SCTs have too large of a secondary mirror obstruction for the mask to be effective. The only drawback is that it causes a rainbow effect to appear around your object. The following specs come from *Improving Your Reflector Telescope Performance on Planets, Astro Techniques (Steve Waldee Web site no longer available).* Constructing the mask is very simple:

1. Use three layers of standard fiberglass window screening material. All three screens are cut to the diameter of the telescope.

2. Central holes are cut into each screen in the following diameters: 1st screen: 90 percent, 2nd screen: 78 percent and 3rd screen: 55 percent. The size of the holes in a 10 inch telescope would then be: 9 inches; 7.8 inches; and 5.5 inches.

3. Position each screen section so that their patterns are rotated by a successive offset of 30 degrees providing a relatively randomized blocking effect of the screen.

4. Sandwich all three screens between two pieces of lightweight wood or cardboard and secure into place. The dimensions are not very critical—just adapt to your own scope. To use, simply place the mask into the front of your scope resting it on top of the secondary spider.

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February Club Program (continued from page 2)

earth, it is then called a **meteorite. Meteor showers** occur when Earth crosses through a particle stream left by a comet. These meteor showers give the appearance of coming from a single point in the sky which is known as the **radiant.** Meteors that do not belong to any known shower are called **sporadics.**

The next topic discussed was about conjunctions and occultations. A **conjunction** is the close meeting of two celestial objects. A more technical description is the passing of one object through the same RA of the other object. A conjunction which partially hides another object is called an **occultation.** These typically occur when the Moon passes between a star or planet. A **grazing occutation** occurs when the hidden object appears to creep along the Moon's limb.

Bill concluded his discussion with a description of the mechanics involved in an eclipse. A **lunar eclipse** occurs when the Moon moves into the Earth's shadow and occurs during a Full Moon. Likewise, a **solar eclipse** occurs when the Earth moves into the Moon's shadow during New Moon. During a lunar eclipse, the Earth's shadow is cast on the Moon. The area directly in the middle of the shadow is called the **umbra** and is the darkest portion of the shadow. The area surrounding the umbra is called the **penumbra.** A **penumbral eclipse** occurs when the Moon only passes through this outer shadow. A **partial lunar eclipse** is when the Moon moves through the edge of the umbra and a **total lunar eclipse** happens when the Moon passes completely through the umbra. During a solar eclipse, the Moon passes between the earth and the Sun causing the Moon's shadow to be cast on the Earth. A **partial solar eclipse** occurs when the Sun is only partially hidden by the Moon. A **total solar eclipse** occurs when the Sun is completely hidden by the Moon. An **annular eclipse** occurs when the Moon passes directly in front of the Sun but is at a greater distance from Earth. During a total eclipse of the Sun, the color of the landscape changes, the temperance drops, the wind changes and there are changes in the behavior of animals. Planets and stars may also become visible depending on conditions.

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