radio waves, and x- and gamma rays.

How big is the Sun? Well, its diameter is about eight million miles. If you lined up 2,000 Earths like beads on a string, they would just barely stretch across the diameter of the Sun. The Sun's influence stretches far beyond its surface. The solar wind blows out beyond the planets, forming an "envelope" of particles around the solar system, but we don't yet know exactly how far beyond the solar system this wind blows. The Pioneer and Voyager spacecraft, outbound from the planets, will pass beyond the reach of the solar wind someday, giving us a better idea of the domain of the Sun.

Here's another interesting fact: energy generated in the core of the Sun takes nearly a million years to reach the "surface" of the sun. From there, the energy that we know as "light" reaches the Earth -- 93 million miles away -- in just 8 minutes.

You might ask at this point, "Why is the Sun a sphere? What keeps it together?" The answer is in one word that we'll see throughout our studies of the cosmos: GRAVITY.

Gravity is a force that acts on everything in the universe -- from the smallest atom to the largest supercluster of galaxies. It holds us down on our planet, and keeps the planets themselves in orbit around the Sun. So, it's not a surprise to find that the Sun has a strong gravitational field which pulls atoms of hydrogen toward its center, toward the collisions that take place in the nuclear furnace.

I told you earlier that the Sun sends its energy outward! If the Sun has such great gravity, it must be hard for the energy to move away. Yet, the speed and pressure of the enormous energy output is enough to escape the gravity, and move out from the Sun. It moves out fairly evenly in all directions. What we see, as a result, is a sphere-shaped ball of "burning"
gas.

Why study the Sun? Because it's the closest star we have to study. If we can understand how
this one works, it might help us figure out how other stars work. If we can puzzle out how the Sun formed, along with its planets, we might be able to make a guess about how other planets form around other stars.

We have formulated basic laws of nature from our studies of the Sun and planets, and we assume that those same laws apply everywhere in the universe. Now, we can make guesses based on these laws, and in the process, understand a little bit more about the cosmos.



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# A Brief History of the Prairie Astronomy Club, Part 2

Chronologically, here are some other highlights of the club's first two decades:

**June 30, 1962** -- first private star party held at the home of Dick Hartley.

**August 9, 1962** -- First astronomy show at Gateway shopping center.

**July, 1965** -- Club observatory plans first discussed.

**December 20, 1965** -- Prairie Astronomy Club formally incorporated as a non-profit corporation, thanks to Philip and Richard Johnson.

**June 9, 1967** -- Club members first attend a Mid-States Regional astronomy league convention.

**August, 1967** -- the club joined the Astronomical League and changed Eastern Nebraska from North Central to Mid-States Region.

**August, 1968** -- First club family picnic and star party.

**June 5,6,7, 1970** -- The club is host to the Mid-States convention. The convention is held at Olin Hall at Nebraska Wesleyan University, where the club was meeting regularly.

**Summer 1973** -- The Lincoln and Omaha clubs co-host the national convention of the Astronomical League in Omaha.

**November 1977** -- Hyde Observatory is opened for business.

[Editors Note: *This is as far as the 'written' history I have goes. It would be GREAT if someone would like to take a trip back on memory lane and bring the history up to date! Just send me your article or notes.*]

# A Planetary Grand Tour

## *by Carolyn Collins Petersen*

## A FIRST STEP -- CHECKING OUT THE SUN

A journey of many light years begins with a first step out the door, and a glance upward -- to the stars. Many an astronomer started on the road to the stars this way. The easiest way to learn about the universe is to explore the "neighborhood" -- take a look at the things that make up the cosmos.

Let's 'take a walk around the celestial block', and start by visiting the Sun.

The Sun is a star -- the closest star to the Earth, and the most prominent feature of our "neighborhood." Early people saw the Sun as a god or goddess, and worshiped it for its light and warmth. Of course, we have our share of sun worshippers these days. Just take a trip to the beach and check them out!

Unlike our ancestors, though, we think we have a pretty good handle on what the Sun is -- a sphere, or mass of gaseous material, shining from the heat of nuclear reactions at its center.

That may sound rather complicated, so let's state it more simply: the Sun is a violent place of burning gases. It is a nuclear furnace, and the fuel it "burns" is hydrogen. All *we* see from Earth is its yellow surface, sometimes marked by sunspots -- gas storms that move across its face in hours, days or months. Occasionally, the Sun's surface bursts out in prominences and flares, sending powerful streams of gas and plasma out into space. This seething, burning place radiates more power and energy in one second than the human race has used in its entire history!

It's easiest to think of the Sun as layers of hot gases, held together by gravity. The heat and energy generated in the Sun overcomes the gravity, and pushes out through the layers, eventually warming the planets, and bathing the Solar System in a steady stream of particles called the solar wind.

Let's take a look at these layers -- beginning at the center of the Sun, where all the action starts. Here is where the process of "burning" hydrogen happens. Atoms of hydrogen are under the pressure of millions of miles of gases being pulled inward by the Sun's gravity. The atoms are squeezed together, and "smack" against each other very rapidly. If they smack hard enough, they "fuse" -- that is, two hydrogen atoms combine to become a helium atom.

This fusion produces energy -- heat and radiation. When you have a lot of hydrogen atoms smacking together to form helium, you have a lot of heat and energy. In fact, the temperature at the core of the Sun is around 25 million degrees Fahrenheit.

The core is surrounded by a layer of hydrogen and helium gas, and above that is a layer called the PHOTOSPHERE, or the "surface" of the sun. This region, heated by energy rising up from the core, is around 11,000 degrees Fahrenheit. The photosphere radiates visible yellow light, and is what we see when we look at the Sun.

Above the photosphere is the CHROMOSPHERE -- the Sun's "atmosphere". This is an invisible layer of very hot hydrogen gas (18,000 degrees Fahrenheit). Surrounding the chromosphere is the CORONA -- the very thin, but extremely hot outer atmosphere of the Sun. The combination of pressure and radiated energy cause temperatures in the corona to reach as high as 3,600,000 degrees Fahrenheit.

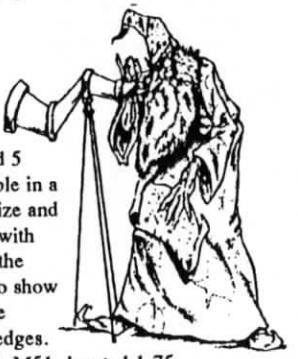
Blowing out from the Sun is the solar wind -- a stream of atomic particles that rushes out past all the planets. If we measure the solar wind as it passes by, we clock it at 375 miles per second -- 1.5 million miles per hour!

So, the Sun as a very powerful radiator of energy. WE experience that energy as heat and light, and we can measure other forms of energy coming from the sun -- like ultraviolet rays,

The Prairie Astronomer is published monthly by the Prairie Astronomy Club, Inc., and is free to all club members. Membership status and expiration date are listed on the mailing label. Membership dues are: Junior Members and Newsletter Only Subscribers...$10/yr; Regular Members...$26/yr; Family Memberships...$29/yr; Address all new memberships, renewals, or questions to THE PRAIRIE ASTRONOMY CLUB, INC., P.O BOX 80553, LINCOLN, NE 68501. For other club information contact one of the following officers: Dave Knisely (Pres)223-3968, Eric Hubl (V.Pres)423-6267, Ron Veys (Sec)486-1449, Lee Thomas(Tres)483-5639, Jack Dunn (2nd V. Pres)475-3013. All newsletter comments and articles should be sent to Newsletter Editor JOHN LORTZ, 12023 PARKER PLZ #105, OMAHA, NE 68154 no later than 10 days before monthly club meetings. Club meetings are held the last Tuesday of each month at Hyde Observatory in Lincoln, NE.

# Observing Chairman's Report

## *by Dave Knisely*



THE NEXT SCHEDULED STAR PARTIES WILL BE HELD ON JUNE 7TH, AND 14TH AT THE ATLAS SITE. Galaxies still continue to dominate the late spring sky, with one of the brightest and yet most difficult being M101. This face-on spiral can be found 5 degrees east and a half south of Alcor (80 Ursa Majoris) and is visible in a pair of 10x50 binoculars as a faint fuzzy spot. /this object's large size and low surface brightness make it difficult to see in small instruments, with many 60mm refractor users failing to find it. A six inch will make the center brighter, but it takes at least a ten inch and good conditions to show much detail in the galaxy. At times, a patchy spiral structure can be glimpsed, with several very faint star clouds being visible near the edges.

A somewhat easier target is another nearly face-on spiral, M51, located 1.75 degrees south and one west of 24 Canum Venaticorum. I have seen it often in small binoculars and finders, and even a 2.4" refractor will show it as a fuzzy faint circular patch with a noticeably brighter middle and the faint companion galaxy, NGC 5195 sitting jut off the north edge. A six inch under good conditions will make the main galaxy seem mottled, while an eight or ten inch will reveal the spiral structure fairly clearly. This object stands moderate to high powers well, with a ten inch at 200x revealing several star clouds and dark detail on a good night. Farther south in Coma Berenices is another nearly face-on spiral, M100, located 1.75 degrees east and one north of 6 Comae. Visible in small instruments, this galaxy shows hints of outer spiral arm fans in an eight inch aperture, plus some mottling. A ten inch will show the arms vaguely as tightly wound but dim and narrow features. A degree south east of 6 Coma is another interesting spiral, M99. An eight inch aperture will give this galaxy a hint of mottling, while a ten inch may show one spiral arm along the south-west side. Also in the area is the spiral galaxy M88, about half a degree west and four south of 24 Comae. A 2.4 inch refractor shows it as a moderate sized faint elongated fuzzy patch with a brighter core, while a ten inch reveals some dark detail and hints at the spiral structure.

In Virgo about 1.25 degrees north and a half east of 16 Virginis is M61, a spiral galaxy which is easy to see, but show only some mottling in large instruments. A much easier and more famous galaxy is the Sombrero spiral, M104, located 3.75 degrees south of Chi. A good pair of binoculars may show this object as a tiny fuzzy spot near a group of three stars, while a 2.4 inch will show its elongated shape and brighter core. A six inch at high power will sometimes show the famous dark lane, with the view in a ten inch being similar to some photographs.

If you are getting tired of galaxies, then try one of the best globular clusters in the sky, M5, located 1/2 degree north and 1/4 degree west of 5 Serpentis. This bright object is easy in binoculars and will show many outlying stars in a four inch aperture. The view in an eight inch is glorious, with thousands of component stars appearing. There is a tight grouping near the center that almost looks like one bright star, but high magnification will sometimes reveal the individual components.

# Eclipse Note From Dave

On Thursday, July 11th, shortly after one p.m. CDT, a partial eclipse of the sun will begin. It will last until around 3 p.m. and at maximum will cover roughly a third of the sun. Those of you who can get off work or are available might want to consider helping at the observatory, since there will probably be many school groups present. If you have a telescope capable of safe solar viewing, you may want to bring it with you. by save we mean either a projection onto a card view, or a front aperture filter like solar screen, which is difficult to remove. Previous eclipses have had attendance of over 500 people, so even if you just want to help with traffic control, you are welcome.