

# SKYLIGHTS

Newsletter of the Astronomical Society of Northern New England



July 2006



Member of NASA's  
Night Sky Network

## ASNNE MISSION

ASNNE is an incorporated, non-profit, scientific and educational organization with three primary goals:

- 1) *To have fun sharing our knowledge and interest with others.*
- 2) *To provide basic education in astronomy and related sciences to all who are interested.*
- 3) *To promote the science of Astronomy.*

## What's Up In July

by *Bernie Reim*

Summer is now settling in over the Northern Hemisphere with its long, warm days and short nights.

The faint band of light which is one arm of our home galaxy, the Milky Way, is getting more prominent in our sky now along with the bright stars that make up the summer triangle. These three bright stars in our summer skies are Vega in Lyra, 26 light years away, Deneb in Cygnus the Swan, about 2000 light years away, and Altair in Aquila the Eagle, about 17 light years away. A blue super giant, Deneb is one of the largest stars in our whole galaxy. Deneb is at least 20 times more massive than our sun, 200 times its diameter, and at least 100,000 times more luminous. Although it is still a fairly young star, Deneb is burning through its fuel at such a furious pace that it will explode as a supernova within just a few million years.

Consisting of around 200 billion stars, our great home galaxy has four major arms in which most of the new star formation is taking place, and is 100,000 light years across, but only 7,000 light years thick. Our earth and solar system are located about 30,000 light years from the bright and busy hub of the center of our galaxy, out in the "suburbs". This is actually a good thing, because the sky would never get really dark much closer to the center, so we would probably not have advanced very far scientifically, since we need dark skies and excellent instruments to see way beyond our little galaxy across the 14 billion light years of space that makes up our observable universe.

This vast conglomerate of stars that is the Milky Way is rotating quite rapidly. We and our sun and all the billions of other stars that we share space with in our galaxy are being rapidly flung around its center at about 150 miles per second, or over 500,000 miles per hour! Even at that rate of speed, it still takes us nearly 250 million years to make a single orbit around our galaxy. On top of that speed,

our whole galaxy is rapidly approaching the Andromeda Galaxy, which is twice the size of the Milky Way and located 2.5 million light years away. We will collide, or merge, with Andromeda in about 5 billion years, which is when our sun will run out of fuel and explode, engulfing Earth and Mars.

If you shrink our sun and our whole solar system down to the size of a quarter and placed it somewhere on the ground in Colorado, then our galaxy would be the size of the whole North American Continent. Now you have a slightly better sense of the vast scope and power of our galaxy. To experience this even more directly throughout the rest of the summer, imagine you are looking down into the Milky Way when you look in the direction of Sagittarius, where the center is located. You actually would fall into the center of our galaxy if our gravitational bonds with Earth and the sun were somehow cut.

This will be the last month to see all the evening planets that we have enjoyed throughout the winter and spring. Saturn is sinking into the western evening sky, setting only one hour after sunset by mid-month. Mars is mov-

*"Continued on page 4"*

## Inside This Issue

**Constructing a Mental Model of the Milky Way Galaxy** pg 2

### Club Contact List

**Stellafane Convention Moon Data** pg 3

**Meteor Showers in 2006** pg 4

**A Basic Look At Stars** pg 5

**Meeting & Star Party Dates Directions ASNNE Locations** pg 6

**Become a Member** pg 7

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## Constructing a Mental Model of the Milky Way Galaxy

by Joan Chamberlain

Children and even some adults have difficulty picturing the structure and distances of our home galaxy, the Milky Way. We can help visitors better understand these concepts by using an interesting activity from the NASA Night Sky Network, when we show objects to our visitors at star parties or when we do presentations.

In this activity we will mentally construct a model of our place in the Milky Way and the distribution of stars with just a quarter and some birdseed. First, make sure your audience understands the differences between solar system, galaxy, and universe. You can do this by asking what objects we would find in each. Spend a few minutes talking about the real distances in the solar system. For example, the distance from the Sun to the Earth is 93 million miles. The distance from the Sun to Pluto is almost 40 times that distance. It takes light from the sun 8 light minutes to reach Earth; it takes sunlight 5 ½ light hours to reach Pluto, traveling at 186,000 miles per second.

Once you have established what is in the solar system and the distances there, tell them that you are shrinking our solar system, using the average distance from the Sun

to Pluto, down to a little bigger than the distance across a quarter. The Sun is so small on this scale that you almost couldn't see it.

Next, explain that the Milky Way Galaxy, the island of stars we live in, is 100,000 Light Years across. If a quarter represents the Solar System, from the Sun to Pluto (5 ½ Light HOURS), how big would you guess the Milky Way Galaxy would be? Bigger than a city? Bigger than the State of Maine?

After some audience guesses, tell them that on this scale the Milky Way would be about 2500 miles. This is about the distance across the United States. Emphasize that if the Solar System were shrunk to the size of a quarter, the Milky Way would span North America.

The thickness of the Milky Way is about 1,000 Light Years. On our scale the Milky Way would be 25 miles thick. Pick a city or town that is about 25 miles away and explain that the thickness of the Milky Way would be from your place to that place straight up. The cruising altitude of commercial airlines is about 7 miles up. The thickness of our scale model of the Galaxy is about 3 times farther up than an airplane flies. How small do you think a quarter would look from that height?

Now make sure the audience knows that all of the stars we see around us are part of the Milky Way Galaxy. Have them make guesses about how many stars they think there are in the Galaxy. Although estimates of the number of stars in the Galaxy range from 100 billion to over 400 billion, a generally accepted number is 200 billion. Remind them that the Sun is also one of those stars!

Here comes the amazing part of this scale model! Pass out the bird seed for your audience members to hold. Explain that the bird seed represents stars. The bird seed, on this scale, is actually too big for most of the stars on our North American sized galaxy scale, but we're just using them as an illustration. On this scale, the size of stars is generally much smaller than the smallest grain of sand. The bird seed is about the size of red giant stars.

Find someone in your audience about 4 feet tall or indicate that height on your body.

Now have your audi-

ence imagine a football field surrounded by a wall four feet high. Fill the football field with this bird seed to the top of the wall. That's 200 billion seeds representing the 200 billion stars in the Milky Way Galaxy!

What do we need to do with all those stars piled up on the football field? Take about 1/3 of them and spread them out over Kansas or Iowa for the central bulge of our Galaxy. Take the rest and distribute them all over North America, 25 miles deep. On this scale our nearest star (Alpha Centauri system), which is a little over 4 light years away, is about 600 feet or 2 football field lengths away. Polaris, the North Star, (430 light years away)

...all of the stars we see  
around us are part of the  
Milky Way Galaxy.

“Continued on page 3”

## Moon Phases

**July 3**

First Quarter

**July 10**

Full

**July 17**

Last Quarter

**July 25**

New

## Moon Data

**July 1**

Moon at apogee

**July 4**

Spica 0.1° north  
of Moon

**July 5**

Jupiter 5° north  
of Moon

**July 13**

Neptune 3° north  
of Moon

Moon at perigee

**July 14**

Uranus 0.4° north  
of Moon

**July 22**

Venus 6° south of  
Moon

**July 27**

Mars 1.1° south of  
Moon

**July 29**

Moon at apogee

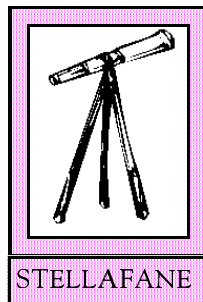
### ...Mental Model... "Continued from page 2"

is about 11 miles away.

Our solar system, shrunk down to a quarter, is about half-way out from the center of the Galaxy, maybe over the Rocky Mountains. If you look straight up or straight down, you see just a few stars. If you look toward Kansas, you will see many, many stars, fading into a haze as they get more distant, like distant city lights fade into a haze. This is what the Milky Way in the sky is: we are looking at our Galaxy edge-on in that direction, the plane of the Galaxy.

All information for this article is from the NASA Night Sky Network and is copyrighted by the 2004 Astronomical Society of the Pacific: [www.astrosociety.org](http://www.astrosociety.org)

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## Stellafane 2006

by Paul Kursewicz

This years convention runs from *July 28 - 29*. Thousands of amateur astronomers will meet at the summit of Breezy Hill in Springfield, Vermont.

Of all the astronomy and telescope conventions, this one stands out because it is deep in history. This is where amateur telescope-making got its start.

On December 20, 1989, the approximately 3.5 acre site on the summit of Breezy Hill, including the **Stellafane Clubhouse** and **Porter Turret Telescope**, were listed as a National Historic Landmark.

The *Stellafane Clubhouse* was built in 1924, it includes a Polar Cassegrain Telescope, Transit Telescope, Solar Telescope and South Wall Sundial. All of the instruments except the Transit Telescope are still operational.

The *Porter Turret Telescope* is an unique 12-inch f/17 equatorial. See: <http://www.stellafane.com/history/early/ptt1.html>

There are other observatories located at the summit. Stellafane is best noted for a gathering of *amateur telescope makes*. Here, telescope makers from all over the world arrive annually to display their homemade instruments. If it's clear that evening, you get to look through some of these beautiful telescopes.

There is much to see and do here. During the day there are various talks and presentations. On Friday evening, informal talks and slide show presentations are given under the tent. The Saturday evening program (located at the outdoor amphitheater), is where you will find the Keynote Talk.

In town you can visit **The Hartness/Porter Museum of Amateur Telescope Making** which is located in the underground rooms at the Hartness House Inn. Many of the items on display are by or about **Russell W. Porter**, the person who started it all.

For much more information visit: [www.stellafane.com](http://www.stellafane.com)

For the convention bulletin and daily schedules see:

[http://www.stellafane.com/convention/2006/06bull\\_4page.pdf](http://www.stellafane.com/convention/2006/06bull_4page.pdf)

Got any News?  
Skylights welcomes your input.

## Principal Meteor Showers in 2006

**January 4**  
Quadrantids

**April 22**  
Lyrids

**May 6**  
Eta Aquarids

**July 30**  
Delta Aquarids

**August 12**  
Perseids

**October 9**  
Draconid

**October 21**  
Orionids

**November 9**  
Taurids

**November 18**  
Leonids

**November 26**  
Andromedids

**December 14**  
Geminids

**December 22**  
Ursids

*Note: Dates are for maximum*

### What's Up "Continued from page 1"

ing eastward more rapidly, now well past Saturn, but it will not quite be able to keep up with the rate that the constellations are setting in the west, so we will lose it by next month. Jupiter is the only evening planet that will remain visible throughout the summer. It will end its retrograde motion on July 6, and begin to creep eastward once again, approaching the bright star in Libra named Zubenelgenubi, which means southern claw in Arabic.

Venus remains the only morning planet, but it is also slipping lower in the morning sky. It rises about an hour before sunrise and will be nearly fully illuminated by the end of the month. It will be just 4 degrees north of orange Aldebaran in Taurus on July 2.

Look low into the western sky 40 minutes after sunset on July 2, and you will see Mercury, Saturn, Mars, and Regulus all about evenly spaced less than 10 degrees apart. Then watch the slender waxing crescent moon pass Regulus and Mars on the evenings of Wednesday the 26th and Thursday the 27th.

Another highlight this month will be the moon once again occulting some of the stars in the Pleiades. That just happened on April 1st, when the dark limb of the waxing crescent moon covered several of these stars in the evening. Now, on July 20, the bright limb of the waning crescent moon will cover the Pleiades in the morning sky. So you will need a small telescope this time to observe the final minutes and seconds as the bright limb of the moon begins to cover these stars.

The remaining highlight this July will be the Delta Aquarid Meteor Shower. Astronomers are not sure which comet causes these meteors, but you can expect between 20 to 30 meteors per hour from a dark sky site during the early morning hours of Thursday the 27th and Friday the 28th.

July 3. First quarter moon is at 12:37 p.m. EDT. The earth is at aphelion, or farthest from the sun at 94.5 million miles at 7 pm today.

July 4. On this day in 1054 Chinese astronomers and the Anasazi Indians in Chaco Canyon observed and recorded the supernova in Taurus that is now the Crab Nebula, or M 1, the first object in Charles Messier's catalog. This supernova was visible in the daylight for nearly one month and it was visible at night

without optical aid for nearly 2 years. It was four times brighter than Venus when it first exploded, and it is still expanding and still visible now in a telescope at 8.4 magnitude, or nearly half a million times fainter than it was originally. Since it is located about 6000 light years away, it actually exploded about 7000 years ago, which is about as far back as any written history on earth can be traced, but the light didn't catch up with Earth until the year 1054.

July 5. Jupiter will be about 5 degrees above the waxing gibbous moon tonight.

July 6. Newton published his Principia on this day in 1687.

July 10. Full moon is at 11:02 p.m. This is also called the Hay or Thunder Moon.

July 11. On this day in 1979, our first space station, Skylab, reentered the atmosphere.

July 16. On this day in 1994, the first of 21 fragments of Comet Shoemaker-Levy 9 impacted Jupiter.

July 17. Last quarter moon is at 3:13 p.m.

July 20. The waning crescent moon covers the Pleiades this morning. The first humans, Neal Armstrong and Buzz Aldrin, walked on the moon on this day in 1969.

July 22. Mars will be less than one degree above Regulus this evening and Venus will be just below the moon this morning and the next.

July 25. New moon is at 12:31 a.m.

July 27. Mars will be just below the waxing crescent moon this evening.

July 28. The Delta Aquarid meteor shower peaks this morning.

July 30. Apollo 15 landed on the moon on this day in 1971. This was our fourth landing, but the first one during which the lunar rover was driven on the moon. Only 12 humans have ever walked on the moon. The last one was Gene Cernan with Apollo 17, which left there on Dec. 14, 1972.

## Did You Know

▶ The prefix "astro" means "star" in the Greek language.

▶ Our Sun is just one of an estimated 100 billion billion stars in the Universe.

▶ Recent findings suggest that Brown dwarf stars are by far the most common type of star in outer space. Next would be Red dwarf stars.

▶ Many of the stars you see at night are giant stars. Like a light house, giant stars glow very brightly. When the Sun becomes a giant star (in about 5 billion years) it will be seen from much further than it is right now.

▶ All of the stars that have names (approx. 300) were named between 500 and 2000 plus years ago. Most of the star names in use now came from Arabic names. Today, all stars are named for their coordinates.

## A Basic Look At Stars

by Paul Koursewicz

### What are Stars?

Stars are luminous gaseous bodies that generate energy by means of **nuclear fusion reactions** (converting hydrogen into helium) in their cores. Stars that burn this way are called **main sequence stars**. Stars also come in many different sizes and colors.

### Birth and Death

Like people, stars have a life cycle. They are born in cold interstellar gas and dust clouds, go through adolescence and adulthood, then die. Unlike people, though, the life cycle of a star can span many billions of years.

The death of a star can either be quiet and calm or dramatic and violent. How a star dies depends on its mass. Low-mass stars live considerably longer than high-mass ones.

### Basic Star Types

▶▶ **Brown dwarfs:** If, for some reason, insufficient gas is available to form a star, then the body will not be able to increase its mass and temperature sufficiently to be able to sustain hydrogen fusion. Brown dwarfs are stars in the technical sense, but have so little mass that nuclear fusion is not occurring at their cores.

▶▶ **Red dwarfs:** Are very small, smaller than the Sun and are very cool relative to other stars. Since these stars burn their hydrogen fuel at such a slow rate, they can live for many billions, or even trillions, of years.

▶▶ **Yellow dwarfs:** Are moderately bright, medium-sized main sequence stars that are very common in the universe. Our Sun is a yellow dwarf star.

▶▶ **White dwarfs:** Are formed when a star dies. They are what is left over after a star has collapsed onto itself. They are much hotter than the other dwarf stars.

▶▶ **Red giants:** Are very large, but relatively cool. When a mid-sized star (like our Sun) dies, it swells up tremendously in size and cools off before it finally collapses into a white dwarf star.

▶▶ **Red supergiant stars:** Are the most massive stars in the universe. They are formed when a very massive star begins to die. Red supergiant stars die in a very spectacular explosion called a supernova and then finally collapse into a neutron star or a black hole.

▶▶ **Blue supergiants:** These rare stars are amongst the hottest (unlike red supergiants), largest and brightest in the known Universe.

### The Nearest Star

The nearest star to the Earth, apart from the Sun, is **Proxima Centauri**, 1 of 3 stars in the **Alpha Centauri System**.

Proxima is a dim M class star at a distance of 4.24 light years. At 11th magnitude, it is too dim to be visible to the naked eye. However, it orbits the **nearest visible star**, **Alpha Centauri**, brightest star in the constellation Centaurus, 3rd brightest in our sky, and is at a distance of 4.34 light years.



**Alpha Centauri:** Our closest naked eye star. Located in the southern sky. Not visible to observers at a latitude greater than about 25° north. I took this photo from Aruba during the month of Feb. To find Alpha Centauri, first find the Southern Cross (smallest of the constellations). Then using the cross-arm, draw an imaginary line to the left. This will point the way to two bright stars. The brighter star and the one farthest from the Cross, is Alpha Centauri. It shines brightly at 0 mag.

## Club Meeting & Star Party Dates

Date	Subject	Location
July 07, 7:30 PM	The <i>regular club</i> meeting will be held at 7:30pm. Key speaker: Joan Chamberlin - NASA Night Sky Network Coordinator - will talk about "Shadows and Silhouettes," the Kepler Mission and how transits will be detected. Also, how the habitable zone of a planet is determined.	Masonic Hall West Kennebunk, Me.  <b>NOTE: Beginner classes will be held from 6:30 PM to 7:15 PM.</b>
July 21, Dusk	Open Observing Session with rain/cloud date of July 22nd (New Moon on the 25th).	Starfield Observatory, West Kennebunk, Me.
Aug. 04, 7:30 PM	The monthly Club Meeting. Topic TBD.	Masonic Hall West Kennebunk, Me.
Aug. 25, Dusk	Open Observing Session with rain/cloud date of August 26th (New Moon on the 23rd).	Starfield Observatory, West Kennebunk, Me.

### Directions to ASNNE event locations

#### Directions to Masonic Hall

##### **From I-95:**

If coming southbound, take Exit 25 off of I-95. Come out to Rte. 35. Turn left at stop sign and turn right at next stop sign. Proceed straight ahead and you will see a variety store on the left and the Masonic Hall will be on the right.

If coming northbound, take Exit 25 off of I-95. Turn right at the stop sign and cross over I-95. Proceed straight for about 1/2 mile. There will be a variety store on the left and the Masonic Hall will be on the right.

#### Directions to Starfield Observatory

##### **From North:**

Get off turnpike at exit 32, (Biddeford) turn right on Rt 111. Go 5 miles and turn left on Rt 35. Go 2 miles on Rt 35 over Kennebunk River to very sharp 90 degree left turn. The entrance to the Starfield Observatory site is at the telephone pole at the beginning of the large field on the left. Look for the ASNNE sign on the pole.

##### **From South:**

Get off the turnpike at exit 25 in Kennebunk. After toll both turn right on Rt 35. Go up over the turnpike and immediately turn right on Rt 35. About 4 miles along you will crest a hill and see a large field on your right. Continue until you reach the end of the field. Turn right into the Starfield Observatory site at the last telephone pole along the field. Look for the ASNNE sign on the pole. If you come to a very sharp 90 degree right turn you have just passed the field.

To join **ASNNE**, please fill out the below membership form. *Checks should be made payable to: Astronomical Society of Northern New England (A.S.N.N.E).* For more details, please visit our website:  
<http://www.asnne.org>



Astronomical Society of Northern New England  
 P.O. Box 1338  
 Kennebunk, ME 04043-1338

**2006 Membership Registration Form**

(Print, fill out and mail to address above)

Name(s for family): \_\_\_\_\_

Address: \_\_\_\_\_

City/State: \_\_\_\_\_ Zip code: \_\_\_\_\_

Telephone # \_\_\_\_\_

E-mail: \_\_\_\_\_

Membership (check one):

Individual \$35 \_\_\_\_\_ Family \$ 40 \_\_\_\_\_ Student under 21 years of age \$10 \_\_\_\_\_ Donation \_\_\_\_\_

Sky & Telescope (\$32.95) \_\_\_\_\_ Astronomy (\$34) \_\_\_\_\_

Total Enclosed \_\_\_\_\_

Tell us about yourself:

1. Experience level: Beginner \_\_\_\_\_ Some Experience \_\_\_\_\_ Advanced \_\_\_\_\_

2. Do you own any equipment? (Y/N) And if so, what types?  
 \_\_\_\_\_

3. Do you have any special interests in Astronomy?  
 \_\_\_\_\_

4. What do you hope to gain by joining ASNNE?  
 \_\_\_\_\_

5. How could ASNNE best help you pursue your interest in Astronomy?  
 \_\_\_\_\_

6. ASNNE's principal mission is public education. We hold many star parties for schools and the general public for which we need volunteers for a variety of tasks, from operating telescopes to registering guests to parking cars. Would you be interested in helping?

Yes \_\_\_\_\_ No \_\_\_\_\_

7. ASNNE maintains a members-only section of its web site for names, addresses and interests of members as a way for members to contact each other. Your information will not be used for any other purpose. Can we add your information to that portion of our web site?

Yes \_\_\_\_\_ No \_\_\_\_\_

