



# Northwest Skies

The Official Newsletter of the Tacoma Astronomical Society  
Tacoma, Washington State, USA

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75 Years of Amateur Astronomy in the Pacific Northwest

March—April 2006

## The President's Message

by Dave Armstrong



**Chaco Culture National Historical Park & Aztec Ruins National Monument.**

**Credit: NPS Photo**

Wow, the third month of 2006 is actually here. The month of rain and clouds seemed like forever. It has helped that a few days in February cleared to allow some viewing. I was even able to do a Star Party for a High School in Kent. The criterion for selecting a night to have it was not based on the usual criteria - a quarter Moon phase. The sole selection criteria was the sky was clear even though it was only 3 days until the full Moon.

If you didn't come to the February General Meeting, you missed several inter-

esting events. The first was the first light views through the Clubs new 16 inch Dobsonian Telescope. Nate did a show and tell of the Moon and Saturn. This was the first viewing with the freshly Aluminized mirror. There were lots of "ohs and ahs". Nice job Nate, Chuck and Bill. It should soon be available for member checkout.

You also missed a very interesting DVD presentation and talk by my brother Jerry on the Indian Archaeoastronomy ruins at Chaco Canyon,

New Mexico. They had the motions of the Sun and Moon figured out very precisely and they didn't have chronometers or clocks. This was 900 to 1000 years ago! Jerry and Dorothy plan to go back as Volunteer Astronomy Guides sometime in the future.

I haven't been to many of the Public Nights lately, but I did get to Dan Gifford's excellent presentation on "Telescopes 101". It was a cloudy night, of course, but he had a full house audience. It is always encouraging to see our Students stepping up to make these presentations. In fact, the Students did both Public Night presentations in January. Way to go Students! Now if we can only get the sky to clear on the Public Nights, the visitors will go away with a full plate. It can't rain forever can it?

Keep looking up,

*Dave Armstrong*

**Northwest Skies** is a bi-monthly publication of the Tacoma Astronomical Society. All opinions expressed in this newsletter are those of the contributors and not necessarily those of the Tacoma Astronomical Society.

Original article contributions are strongly encouraged and may be submitted as an email attachment to

[editor@tas-online.org](mailto:editor@tas-online.org)

***A year after the death of scientist Hans Bethe at the age of 98, Bert Brown examines Bethe's contributions to science, especially in the fields of solar energy processes.***

## People to Contact

You can also contact us via email through our website at

[www.tas-online.org](http://www.tas-online.org)

Our mailing address is:

**The Tacoma  
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Tacoma, WA 98418**

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## What's Up In Astronomy

by Bert Brown

Just a year ago, on March 6, the world lost one of its most prolific scientists, Hans Bethe, at age 98 (nearly 99). His biggest contributions were in the field of nuclear physics, but along the way he also discovered the processes that produce the energy of ordinary stars. And he made many other significant contributions to astrophysics.

In the early part of the 20th century the only known source of stellar energy was gravitational contraction--a rather inadequate source. Around 1920 it was found that the mass of a helium atom was slightly less than the mass of 4 hydrogen atoms. Since it was known that there was a lot of hydrogen and helium in the sun, Arthur Eddington suggested that

perhaps hydrogen was being converted to helium, and the mass difference in the reaction could provide solar energy from Einstein's  $E = mc^2$ . But the details at that time were not known.

During the 1920s the quantum theory began to be developed, and in the early 1930s discovery of the neutron and positron helped physicists to unravel the structure of the nucleus. Then, along came Hans Bethe (pronounced "bait-a").

Hans Bethe was born in Strasbourg, Germany, in July, 1906. He showed early talents in math and science, and first attended the university in Frankfurt. But in 1926 he transferred to Munich where he was with the

group headed by Arnold Sommerfeld--right in the middle of the quantum theory scientific revolution. He got his doctorate there in 1928, then did further studies in Cambridge, England and in Rome--where he learned much from Enrico Fermi, another of the 20th-century physics giants.

In the fall of 1932 Bethe got a faculty appointment at Tübingen in Germany. But in January 1933 Hitler rose to power, and soon Jews were forbidden to hold government positions. Bethe's mother was Jewish, so he lost his job. Sommerfeld helped by awarding Bethe a fellowship at Munich for summer 1933, and then Hans went to Manchester, England, to be in a group under William Lawrence

Bragg, for a year.

In August 1934 the Cornell University physics department (in Ithaca, NY) offered Bethe a faculty position which he accepted, and he moved there in February, 1935. Bethe spent the rest of his long career at Cornell, although he often visited other leading science centers such as Caltech (where this writer got to meet him.)

In the US Bethe continued to produce much significant research work. In 1936-37 he contributed three papers, two with collaborators, to *Reviews of Modern Physics*, which summarized and explained all that was known about nuclear physics at that time.

In 1938 Hans and a student, at a suggestion of Carl von Weizsäcker, turned their attention to the problem of energy production in the sun. With his nuclear physics knowledge they looked at the various nuclear reactions that might apply, knowing that the conversion of hydrogen into helium should be the final goal. One such reaction was the simple fusion of a couple of protons to produce deuterium (equals heavy hydrogen, a proton and neutron) plus a posi-

tron and neutrino. Two more reactions involving the deuterium finally resulted in the normal form of helium-4. Now the energies involved in these reactions had been measured in the lab; also they knew something about the reaction rates, which depended strongly on temperature. From knowledge of the sun's internal temperature they were able to estimate the total energy production rate of their reactions... which, however, was less than the sun's observed luminosity. But the problem soon vanished when new information about the sun's internal temperature became available; while not yet in complete agreement, at least the results were "in the right ball park." In this cycle, 6 hydrogen nuclei are converted into a helium plus two hydrogen; it is called the proton-proton or p-p cycle.

Bethe also began work on another set of reactions, now called the "carbon cycle" or carbon-nitrogen-oxygen (CNO) cycle, which also resulted in the conversion of hydrogen into helium. The carbon acts only as a "catalyst", that is, one gets a another carbon atom back at the end so the total amount of that element stays the same.

We now believe the sun's energy is primarily from the p-p reactions, because the temperature needed for the CNO process is much higher than the sun's temperature. But the CNO scheme could be dominant in hotter stars.

In this research Hans Bethe essentially had created the science of nuclear astrophysics. But World War II interrupted his basic science work and he became the chief of the theoretical group at Los Alamos. In the next issue of *Northwest Skies* we will continue with Bethe's post-war contributions to astrophysics.

#### Sources:

(1) *Physics Today*, October 2005, special issue honoring Hans Bethe; particularly articles by his colleagues beginning on pages 38, 44, and 62.

(2) *Text, Modern Physics for Scientists and Engineers*, by Stephen T. Thornton and Andrew Rex, 1993 Ed.; pp491-492.

### Membership Subscriptions for 2006

Membership subscriptions for 2006 are now due. Please mail your membership renewal to

**The Tacoma  
Astronomical  
Society  
PO BOX 8881  
Tacoma, WA 98418**

or bring your check along to the next General Meeting and hand them to John Pettitt, our Treasurer.

Membership dues are the primary income for the society and it allows us to fund member activities and parties as well as the Outreach and Student Programs. Your membership is very important to us.

The annual fees are:

Family:	<b>\$35.00</b>
Adult:	<b>\$25.00</b>
Student:	<b>\$15.00</b>
Senior:	<b>\$10.00</b>

Thank you.



### **Snacks for the General Meeting**

Our warmest thanks to Paul and John for providing snacks at our next meeting.

#### **March**

**Paul Goodwin**

**John Finnan**

#### **April**

**We need a  
volunteer!**

We will be providing coffee and tea during the break as usual. Thank you!



### **Astrophotography: Part 2, Making The Stars Stand Still**

The first part of this series described the methods used to take star trail photos. Now it's time to make the stars stand still during the exposure so that they appear as points of light instead of trails. To do this we have to change the way we mount the camera so that instead of being fixed on a tripod, it can follow the stars movement across the sky. This will require that we replace the tripod with some sort of tracking mount.



#### **Barn Door Mount**

The simplest of these is called a "Barn Door Mount" which can manually track over short periods of up to 20 minutes. Slightly more complex is a conventional tracking mount which uses an "Equatorial Head" and a drive motor to follow the stars. The last option is to use an equatorial

mounted telescope with the camera "Piggy Backed" on the telescope. The camera uses its own lens to take the picture while the telescope can be used to guide the camera during the exposure. Altazimuth or Dobsonian mounts can not be used because the star images will be rotated during the exposure and will exhibit trailing. The exception is the altazimuth mount used with most SCT type telescopes including the small Meade refractors such as the ETX series. These are suitable with a polar wedge so the telescope is operated in an equatorial mode.

The mounts polar axis alignment to the celestial pole should be carried out with as much care as possible. With short focal length lenses (24 to 50mm) this is not too critical. A simple zero power finder such as used on the simple "Barn Door Mount" is sufficient. As the focal length increases (100 to 270mm) alignment accuracy becomes much more important for good tracking .

Exposures of up to 20 minutes can be made

**by Jarvis Krumbein**

before sky fog becomes a problem. No guiding is necessary for the shorter focal lengths but may be necessary for the longer focal length lenses. The equatorial mounted telescope/piggyback camera arrangement permits the use of a guiding eyepiece to correct tracking errors and insure good images.

The film/exposure information in the previous article should be referred to as a guide. To start, a series of exposures up to 20 minutes long should be made for both the polar region of the sky and for stars along the ecliptic. An unguided combination exposure with part of the exposure made with the mount tracking and part trailing (the mount not tracking) should also be made. To do this, make a normal trailing exposure for 10 minutes with the clock drive turned off (or for the Barn Door, not turning the drive screw). Cover the lens of the camera for a few minutes when you stop trailing and then uncover the lens again for the 10 minute tracking portion of the exposure with the clock drive on (for the Barn Door turning the drive screw). Do not close the

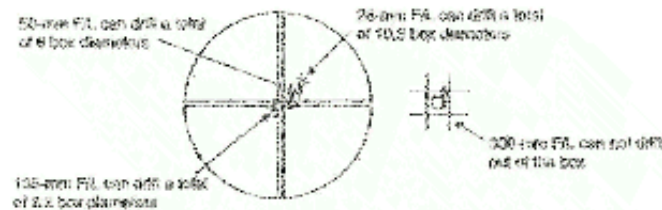


**Table Mountain Skies**

shutter until the complete two part exposure is finished and be careful not to move or jiggle the camera when covering or uncovering the lens. When these are examined, you can determine if your tracking was good enough so that the pictures don't show any signs of trailing of the tracked star images. If all went well, the tracked portion should have sharp star images and a small gap (when the lens was covered) with trailed images for each star. No problems should be found with images made using short focal length lenses (up to 50mm). Examine one of these images carefully and you

**Credit: Jarvis Krumbein**

will note that there are more stars recorded on the film when the mount is tracking. This is due to the longer exposure of



the star at one point on the film while for a trailed star, the light from the star is constantly moving to a new spot on the film.

For longer focal length lenses (100 to 270mm) guiding may be necessary to eliminate tracking errors. These errors, which will show up as

trailed star images instead of points can be due to either polar axis alignment not being good enough, clock drive problems or a combination of both. The piggyback camera on a scope with an equatorial mount which has fine adjustments on each axis is necessary as is some form of guiding eyepiece. Now it's possible to watch a star in the eyepiece and correct the errors while tracking. A typical guiding eyepiece has an illuminated reticule that allows you to determine when adjustments are necessary. The longer the focal length of the camera lens, the more accurate the guiding must be as can be seen in the illustration below.

The next article will describe methods used to very accurately align the polar axis of the equatorially mounted scope. For plans to build a simple "Barn Door Tracking Mount" contact Jarvis Krumbein at [jkopic@juno.com](mailto:jkopic@juno.com).

**In the previous edition Jarvis Krumbein described star trails.**

**Now Jarvis explains how to get a steady image of the night sky.**

## Magazine Subscriptions

Don't forget to use your member benefit by receiving a discounted annual subscription to either *Sky & Telescope* or *Astronomy* magazines.

**Sky & Telescope**  
\$32.95 / year

**Astronomy**  
\$34.00 / year

Contact the Treasurer, John Petitt, for more information.

### March Schedule of Events

- **March 3rd:** Student Observing. Check website for details. 7:00 PM.
- **March 7th:** General Meeting. Please note we are meeting at **Wyatt Hall, Room 109** at UPS until further notice. 7:30 PM.
- **March 9th:** Outreach Star Party for Peninsula Middle School at Key Center. Check the website or contact Outreach (Joe Witherspoon) to volunteer and for more details. 6:00 PM.
- **March 11th:** Public Night at Pierce College, Sunrise Building. Program will be 'Reasons for the Seasons' presented by Ken Slavens. 7:30 PM.
- **March 15th:** Outreach Star Party at Fruitland Elementary School, Puyallup. Check the website or contact Outreach (Joe Witherspoon) to volunteer and for more details. 6:00 PM
- **March 21st:** Trustees Meeting. 7:30 PM.
- **March 24th:** Student Meeting. Preparation for debate on 'Is Pluto a planet?' and preparation for Messier Marathon. Please check the website student schedule for more details. 7:00 PM.
- **March 25th:** Public Night at Pierce College, Sunrise Building. Program will be 'Observing The Night Sky' presented by Sion Heaney. 7:30 PM.
- **March 31st:** Student Messier Marathon, Centralia. All night through to Saturday April 1st.

# March 2006

Sun	Mon	Tue	Wed	Thu	Fri	Sat
			1	2	3 Student Observing.	4
5	6 ☽	7 General Meeting.	8	9 Star Party.	10	11 Public Night.
12	13	14 ○	15 Star Party.	16	17	18
19	20	21 Trustees Meeting.	22 ☾	23	24 Student Meeting.	25 Public Night.
26	27	28	29 ●	30	31 Messier Marathon.	

### April Schedule of Events

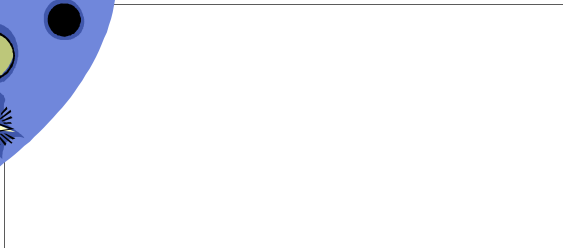
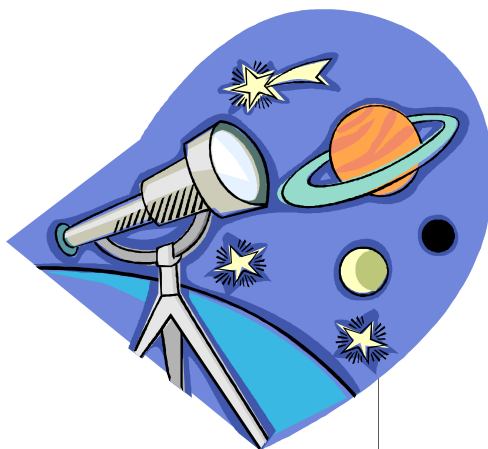
- **April 4th:** General Meeting. Please note we are meeting at **Wyatt Hall, Room 109** at UPS until further notice. 7:30 PM.
- **April 8th:** Public Night at Pierce College, Sunrise Building. Program will be 'Remote Control Telescope' presented by Alice Few. 7:30 PM.
- **April 18th:** Trustees Meeting. 7:30 PM.
- **April 21st:** Outreach Solar Party at Nelson Crain Christian School, Puyallup. Check the website or contact Outreach (Joe Witherspoon) to volunteer and for more details. 9:00 AM.
- **April 21st:** Outreach Solar Party at Puyallup Library. Check the website or contact Outreach (Joe Witherspoon) to volunteer and for more details. 3:30 PM.
- **April 28th:** Student Meeting. Student debate on 'Is Pluto a planet?' Please check the website student schedule for more details. 7:00 PM.
- **April 29th:** Public Night at Pierce College, Sunrise Building. Program will be 'Black Holes' Presented by Ken Slavens. 7:30 PM.

# April 2006

Sun	Mon	Tue	Wed	Thu	Fri	Sat
						1
2	3	4 General Meeting.	5 ☽	6	7	8 Public Night.
9	10	11	12	13 ○	14	15
16	17	18 Trustees Meeting.	19	20 ☾	21 Solar Party.	22
23	24	25 Solar Party.	26	27 ●	28 Student Meeting.	29 Public Night.
30						

Please note there will be no Student Observing on the 7th April due to Messier Marathon previous Friday.

## Northwest Skies



First Class

If undelivered, please return to

Tacoma Astronomical Society  
PO BOX 8881  
Tacoma, WA 98418

### We need your articles.

If you are interested in contributing an article or would like to make a suggestion as to what you'd like to read in **Northwest Skies** then please do contact the Editor. We are always in need of original contributions.

Deadline for submitting articles for inclusion in the next edition of **Northwest Skies** is the last Thursday of the month before publishing.

We're on the web!  
[WWW.TAS-ONLINE.ORG](http://WWW.TAS-ONLINE.ORG)

### Observations: Mount Palomar Observatory

by Ray Stinson

In 1997, an observing friend in Reseda, California offered to loan me his 8 inch Newtonian for a run to Palomar Observatory. After meeting up with several observing friends in San Diego, we set out for Palomar where we found a camp ground at the 5000 foot level of Palomar Mountain for astronomers. There were a lot of telescopes on hand for the legendary dark skies of Palomar. I got the Newtonian set up with a little help and took my first look. The number of stars was overwhelming, but the seeing conditions were not the best due to

high winds. There were so many stars in the sky, I had trouble finding the Big Dipper and never did locate Polaris. Frustrated, I walked around the observing field checking out everyone's scopes and asking some basic questions. I ran across a fellow with a *big* Dobsonian that was pleasant to talk to and very knowledgeable. I asked him if he could show me NGC6992 to which he replied, "No problem". He took out a filter, attached it to the eyepiece, slewed the scope with the built in digital setting circles, and said, "Take a look!" without even veri-

fying the object in question was in the eyepiece. The result was one of the best views of the Veil Nebula I had ever seen. I learned some humility when talking with other astronomers. This guy obviously knew what he was doing and had some great equipment. The Dobsonian turned out to be a 25" Obsession. I felt very lucky to have had the opportunity to look through such a fine instrument. The rest of the evening, I spent trying to identify all the wonderful objects through the 8" Newtonian. Moral: Respect others knowledge!