



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

May—June 2006

The President's Message

by Dave Armstrong



Particle track profiles of comet dust collected by Stardust probe.

Credit: NASA / JPL

The weather is improving at last. The constant rain has stopped but still the clouds gather for Public Nights. I know in my area we have had several nights that were clear however I have been too tired to even go out after doing some house repairs for a friend. As I am writing this, I am also preparing my camper to go to the Camp Delany Star Party put on by the Olympic Astronomical Society. They do this twice a year and have invited members of the Tacoma Astronomical Society to join them. This Star Party is much smaller

than the Table Mountain Star Party and a lot less formal. There are no speakers, raffle drawings, or planned events but is still a lot of fun. This is the third annual spring gathering. They had these twice a year with the next one occurring during Labor Day weekend I believe. It is held below the Dry Falls of the Columbia River. At least I hope the Banks Lake Dam holds!

Have you heard about Red Spot Junior? Jupiter has a new red spot (actually pinkish) in the Southern Hemisphere. It

is about half the size of the old red spot so it should be visible in mid-sized amateur scopes.

Remember Stardust; the comet Wild dust collector? Of the thousands of particles collected there are forty five particles large enough to see with the naked eye. They are also finding minerals formed by high temperatures of around 2000° F. This is surprising since they believe comets formed in the outer reaches of the Solar system where it is pretty chilly. This still has them wondering what has happened.

Closer to home, we need to start thinking and planning for Astronomy Fair IV in August and then the Puyallup Fair follows right afterwards.

Pray for some clear nights for Public Nights.

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

Bert Brown
continues to
detail Hans
Bethe's career
and
contributions to
physics and
astronomy.

People to Contact

You can also contact us via email through our website at

www.tas-online.org

Our mailing address is:

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What's Up In Astronomy

by Bert Brown

Last time we began a discussion of the astrophysics contributions of Hans A. Bethe, the noted physicist who died a year ago and whose 100th birthday will be celebrated in July this year. Before World War-2, Bethe was the first to examine the possible nuclear reactions in stars, and he came up with two sets of reactions that seemed to apply: The "proton-proton" (p-p) cycle, and the "Carbon-Nitrogen-Oxygen" (CNO) cycle. It turns out that the p-p cycle is likely predominant in our sun, while the CNO process can operate in hotter stars.

After a hiatus in his research during the war, Bethe did some fine-tuning with the reactions which are now generally

accepted by the astrophysics community. He was awarded the Nobel Prize in 1967 for this work and for his research in nuclear theory.

One of the by-products of the solar reactions is the neutrino--that elusive, almost massless neutral particle which had been proposed by Enrico Fermi in the early 1930s.

Neutrinos hardly ever react with anything, so are terribly difficult to detect. But they were indeed found in 1956, and several types of detectors have since been devised. [One such detector is in the Kamiokande project in Japan, which has been discussed earlier in this column. Other detectors have been built in this country and Canada.] Knowing Bethe's solar

reactions, one can calculate how many neutrinos the sun ought to be putting out, so if they can be detected this would be an additional test of his theories. Alas, early results seemed to show that only about 1/3 of the predicted numbers of neutrinos were arriving on the earth. So, is the theory wrong, or are the experiments wrong?

There are several types of neutrinos--three neutrino types, and three anti-neutrinos. In the early 1980s three Soviet scientists suggested that neutrinos might have the bizarre property of changing from one type to another, in flight; and in 1986 the 80-year old Bethe wrote a review article about that in terms American scientists would understand. The

solar neutrinos are only "electron-type", but if they could change to another type en route here they would not be observed by some of the detectors. Bethe's paper stimulated experimenters to look for other types which could be detected by other methods, and lo and behold, they were indeed found in appropriate numbers by the Sudbury Neutrino Observatory in Ontario in 2001. So the "solar neutrino problem" has apparently been solved, and the solar energy theory has survived--much to the delight of Hans Bethe who lived long enough to see that happen.

Hans Bethe retired from Cornell University in 1976...but he did not retire from research. Indeed, he was still publishing papers well into his 90s, often with collaborators. One such collaborator was Gerald E. Brown, who introduced Hans to the study of supernovae in 1978. Together they worked on astrophysics problems regularly, first in Copenhagen and later at Caltech. One of their early results was about the fate of stars which had used up all their nuclear fuel--first, hydrogen burning to get helium, then helium fusion to form heavier elements. It

turns out that nuclear fusion stops when the element iron is reached, and Bethe was able to show that if the iron core was massive enough, it would collapse further into a "neutron star", with a mass about 1.4 times the mass of the sun. (A 1.4-solar mass neutron star would be only about 15 km across!) Eventually any further collapse leads to shock waves that blow off outer parts of the star--a Type II supernova.

Another astrophysics problem was that of gravitational waves, which had been predicted in Einstein's theory of relativity. Gravity is so weak that such waves, if they exist, are very difficult to detect. [It has been reported earlier in this column that one of the "LIGO" projects--Laser Interferometer Gravitational-Wave Observatory--was located at Hanford in this state.] It has been suggested that some astrophysical events could produce such waves, and primary candidates are mergers of compact objects in space. In January, 1996, Kip Thorne of Caltech asked Hans Bethe and Gerald Brown to study the merger of a neutron star and a black hole (which are in a mutual orbit.) So

they wrote a paper "Evolution of Binary Compact Objects that Merge" in which they estimate the strength of gravitational waves that could be produced. Such waves have not yet been detected, but improvements in technology and a better "LIGO-II" are in the works. "Stay tuned."

One of Bethe's quirks was that although he made many numerical calculations and estimates, he never used a computer, but rather operated his slide rule. He could read computer outputs, but used his slide rule to check the results.

Gerald Brown reports that Bethe was active in science research until the very end--indeed, he had talked to him by phone on the day Hans died.

Sources: Physics Today October 2005 special issue on Hans Bethe: Articles by John H. Bahcall and Edwin E. Salpeter (pp. 45-47) and Gerald E. Brown (pp. 62-65.)

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 Pettit, 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:	\$35.00
Adult:	\$25.00
Student:	\$15.00
Senior:	\$10.00

Thank you.



Snacks for the General Meeting

Our thanks to these volunteers for providing snacks at our next meeting.

May

**Joe
Witherspoon**

June

**Jeanette and
Chuck**

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



Astrophotography Part 3: Polar Alignment

by Jarvis Krumbein

The first two articles in this series dealt with the basics of simple Astrophotography. Part 2, "Making The Stars Stand Still" introduced equatorial tracking and the importance of good Polar Alignment to produce star images that are free of trails. If the polar alignment is off, guiding can produce good star images at the center of the field but can not correct the image trails at the edge of the field due to field rotation.

The greater the polar misalignment the greater the field rotation. This will probably not be noticeable when shorter focal length lenses and fairly short exposures are used but will become a problem for longer lenses and exposure times. The greater the polar misalignment, the greater the problem.

The more accurate the

polar alignment, the longer focal length optical systems can be used either guided or unguided. This is one of the basic requirements of taking good astrophotographs.

This can be seen in the "Guiding eyepiece" illustration below which shows a typical reticule pattern and the guiding accuracy needed for various focal lengths camera lenses when using a guide scope/eyepiece combination giving a magnification of 150 to 180 times.

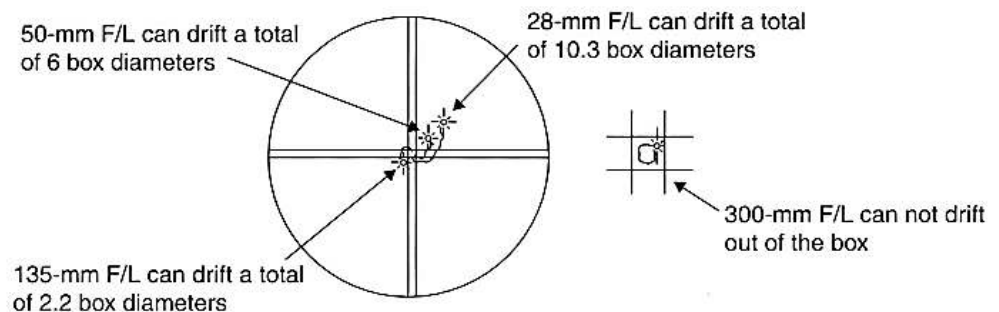
Many modern equatorial mounts have polar alignment telescopes either built in or available as an accessory and these can simplify lining up the mount. The simplest of these scopes has just a crosshair reticule and will be OK for visual observation or for piggy-back mounted cameras

with moderate focal length lenses.

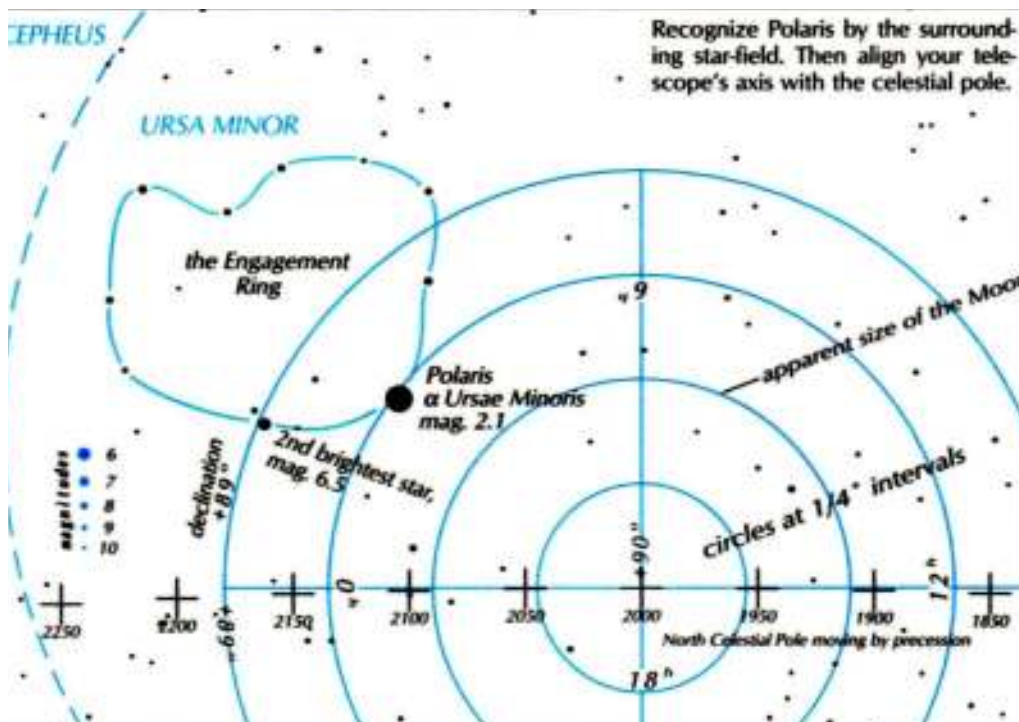
Since Polaris is not at the precise pole, more sophisticated alignment scopes will have an eyepiece reticule which will use Polaris and one or more nearby stars to improve the alignment so that when the appropriate stars are lined up in the scope, the polar alignment will be very good.

Most Schmidt-Cassegrain telescopes such as those made by Meade and Celestron and using an equatorial wedge do not have built in alignment scopes but can be set up by swinging the telescope to the +90 degree Declination position and then adjusting the mount so that Polaris is in the eyepiece.

The mount is then carefully offset so that Polaris and the surrounding star field match the "Polar



Credit: Robert Reeves, 'Wide Field Astrophotography'



Credit: Guy Ottewell, 'The Astronomical Calendar', Sky Publishing.

Offset" illustration shown on the next page.

No matter what method you use, the alignment can be checked by going to other bright stars and reading the setting circles on your scope.

This is best done using stars near the celestial equator. If the indicated positions are more than a degree off the alignment should be rechecked and improved if possible.

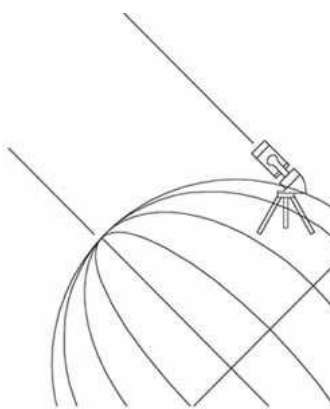
The most precise alignment method uses the drift of a tracked star in the eyepiece. This method requires that one of the previous alignment methods be used to set up the scope and then a

star close to the ecliptic is observed with the clock drive running to keep the star in the field of view. No guiding adjustments are made but seeing which way the star drifts in the eyepiece will show which way the mount must be moved for a more accurate alignment.

A complete description of this method is too long to be presented here but can be found in most books on astrophotography.

I highly recommend "Wide Field Astrophotography" authored by Robert Reeves and published by Willmann-Bell

as a good reference work for anyone seriously interested in photographing the stars.



Credit: tusconastronomy.org

Polar alignment explained and detailed by Jarvis Krumbain in part 3 of his series on astrophotography.

Magazine Subscriptions

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

Sky & Telescope
\$32.95 / year

Astronomy
\$34.00 / year

Contact the Treasurer, John Pettit, for more information.

May Schedule of Events

- **May 2nd:** General Meeting. Please note we are meeting at **Wyatt Hall, Room 109** at UPS until further notice. 7:30 PM.
- **May 12th:** Student Observing Night. 9:00 PM
- **May 16th:** Trustees Meeting. 7:30 PM.
- **May 20th:** Public Night at Pierce College, Sunrise Building. Program will be 'Space Exploration'. 9:00 PM.
- **May 26th:** Student Meeting. 'Galaxies: their formation, types of galaxies and black holes.' 7:00 PM.
- Klickitat Star Party starts.
- Fire in the Sky 2006 starts
- **May 27th:** Public Night at Pierce College, Sunrise Building.

Program will be 'Stellar evolution: The Life of a Star' presented by Ray Stinson.

9:00 PM.

- **May 28th** Klickitat star party ends.
- **May 29th:**

Fire in the Sky 2006 ends.

- **Outreach Events:** As we move towards summer our Outreach Program has become more popular than ever. Unfortunately, there is simply not enough room here to

detail all the exciting events Outreach is providing so please check the website for further details. For more information and to participating in these events please contact Joe Witherspoon or Ray Stinson.

May 2006

Sun	Mon	Tue	Wed	Thu	Fri	Sat
	1	2 Outreach event. General Meeting.	3 Outreach event.	4 Outreach event.	5 ☽ Outreach event.	6 Outreach event.
7 Outreach event.	8 Outreach event.	9	10	11	12 Student Observing.	13 ☉ Outreach event.
14	15	16 Trustees Meeting.	17	18	19 Outreach event.	20 ☾ Public Night. Outreach event.
21 Outreach event.	22	23	24	25	26 Student Meeting. Klickitat star party start. FIT SP start.	27 ● Public Night. Outreach event.
28 Outreach event. Klickitat star party finish	29 FIT star party finish.	30	31			

June Schedule of Events

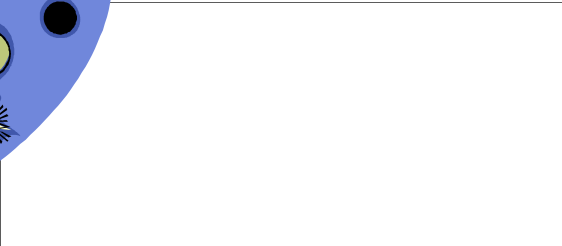
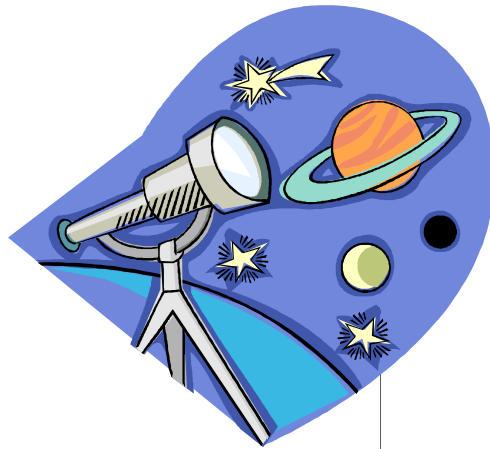
- **June 6th:** General Meeting. Please note we are meeting at **Wyatt Hall, Room 109** at UPS until further notice. 7:30 PM.
- **June 9th:** Student Observing Night. 9:00 PM.
- **June 17th:** Public Night at Pierce College, Sunrise Building. Program will be 'Extra-Solar Planets' presented by Joe Witherspoon. 9:00 PM.
- **June 20th:** Trustees Meeting. 7:30 PM.
- **June 23rd:** Student Meeting. 'Black Holes: Origins, nature and structure' 7:00 PM.
- **June 24th:** Public Night at Pierce College, Sunrise Building. Program will be 'Scale of the Universe' presented by Sion Heaney. 9:00 PM.
- **June 30th:** Student Observing Night. 9:00 PM.

June 2006

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

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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

Observations: Regional School Science Fair

by Joe Witherspoon

As the regional science fair at Pacific Lutheran University were winding down the Director of the Regional School Science Fair and Aaron McDondald, a science teacher from Steilacoom, came over the Tacoma Astronomical Society stomp rocket table to chat and check out our activities being provided for children and adults alike for the science fair.

After a short explanation of stomp rockets both Aaron and the director succumbed to the inner child within us all and started building their own rockets. They were given

careful instruction and guidance to correctly make a rocket. They carefully cut the appropriate shapes and set to completing their rockets under the guidance of Ray Stinson who instructed them on the finer points in Stomp Rocket construction.

Once completed and giddy with anticipation both they headed out to the launch pad to meet the launch manager, Bill Briggs. The Regional Science Fair Director launched his first and as he watched his rocket fly, the higher it went the wider his mouth opened.

Soon he and the teacher were adjusting the launch angle to try and competing for the most distance.

That is when I returned to the TAS table and let the boys play. I think the Director is the oldest person to launch a stomp rocket to date but no less youthful for having done so.

