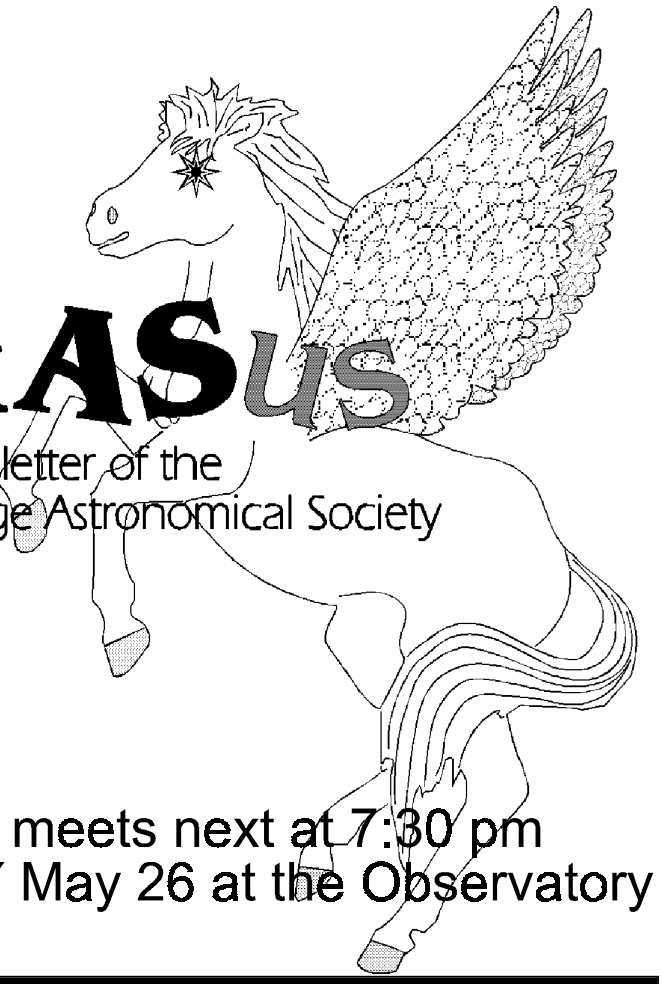
1999 MAY ISSUE #94



the

PeGASus

Newsletter of the
The Prince George Astronomical Society

The pgas meets next at 7:30 pm
WEDNESDAY May 26 at the Observatory

INSIDE :

the PeGASus is published monthly by the *Prince George Astronomical Society*.

Our pursuits are out of this world.
Our activities are astronomical.
Our aim is the sky.

Contributions to the newsletter are welcome.

Deadline for the next issue is

JUNE 18

Send correspondence to
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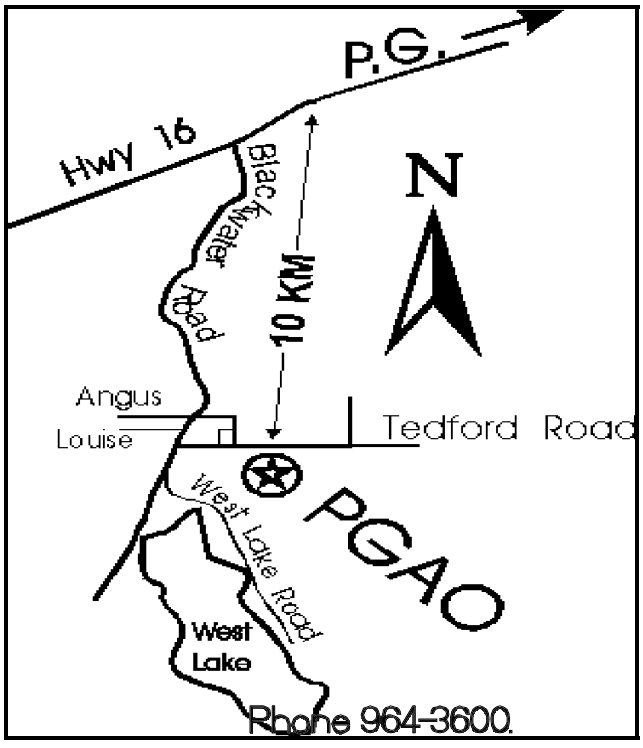

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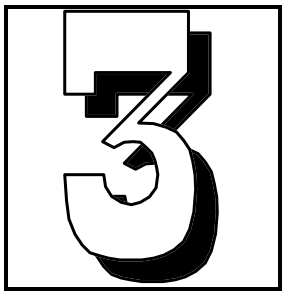


Editorial

by Gil Self

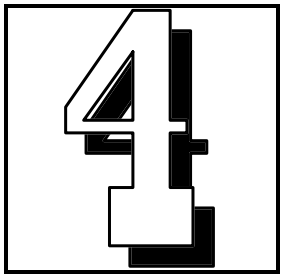
As you read this newsletter there will be only one more open house in our spring season. Once again we have offered our observatory to the community and welcomed many enthusiastic people , we should all be proud of our contribution and I thank you all for your participation.

This now brings on the most productive time of year and there are many projects coming up that you can help with. Almost right away there are two work days planned. On Saturday June 5 we are going to sand and paint the classroom floor, this is the room that our guests first see and I think it will be a real boost to our public image to get this area finished up. On that same day we are planning on washing the exterior of the building in preparation for painting. That brings us to the next work bee, Saturday June 12. On this Saturday we are going to paint the entire building including the dome. These planned projects can only be completed if we have a large turn out. We are going to be discussing the work to be done at the next meeting to ensure we will have enough people and all the materials we need. Please come and lend your support as this is probably the largest planned work project this year, all the rest of the jobs can usually be accomplished by two or three people on a weekend afternoon. (besides we want to get this finished before Bob N. gets back from Arizona).

Now since this months editorial sounds more like the coming events section, I will just briefly mention two items for you to mark on your summer schedule. The first is Canada Day at the Park, this is as you know a long time Prince George tradition. We have been involved many time over the last few years as we will be this year. We set up a C-8 with the solar filter and let folks look at the sun , this is always a lot of fun and gets us into the “pubic eye”, and often produces new members (me for one).

The next event I want to remind you of is by far my favorite astronomical event of the year, that is the Persieds meteor shower Aug 11/12. I have been watching the Persieds since before I knew what they were called. Warm August nights, no equipment needed except maybe a blanket to sit on if the dew is on the grass, me and my mom, watching for meteors. Over the years this transitioned into me bundling up my kids in their blankies to come and watch. Everyone huddled up on the deck ohhing and ahhhing. As they got older, a couple of times their friends even “hung around” to see what a meteor shower was —— and were amazed.

Summers now, my kids aren’t even home, they’re at camp, moms in Arizona . But there is always that phone call “ hey don’t forget the meteor shower tonight” or some reminder similar to that. So here is something you can still do together, just from different places — it’s almost as good. G.S.



Coming Events

If you are involved with any astronomical or otherwise scientific activity on behalf of the PGAS, please list the activity here.
PGAS Meets next Wednesday May 26
7:30 pm at the observatory

The Night Sky for June '99

by Bob Nelson, PhD
Hi Folks,

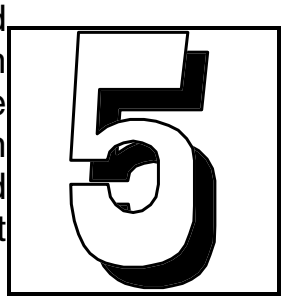
Well!! We've been having an amazing number of clear nights of late. I personally have been out 7 nights in March, 11 nights in April and, at time of writing (May 11), 4 nights in May! The catch is that you have to stay up late. Luckily I've finished classes and can sleep 'til noon if I want. It's a strange life! Almost all of my observing has been CCD imaging with out ST6 camera and f/7 telecompressor. I started out in March taking lots of pretty pictures of celestial objects then got down to work imaging eclipsing binaries to determine times of minima (to be published later). Bye and large, the 24" telescope is working quite well (there's an occasional glitch that you have to deal with), but it's a fine telescope with good images and a sturdy mount. The pointing accuracy is not all that one would want, but we're working on it. Stay tuned. If any of you new members would like to get involved, let me know, or just drop around on a clear night. I'll be there (unless ill or out of town).

Anyway, here's what's happening in our skies next month:

MERCURY is an evening object this month. It reaches greatest eastern elongation on the 28th when it's 26 degrees away from the Sun. By the end of the month, it sets over an hour after the Sun, in the northwest. Try looking for it with binoculars and then maybe with a small telescope. If you are in a good location and the sky is clear, you may be able to see it naked eye. On the other hand, telescopic views before the Sun sets (and the planet is higher in the sky) yield the best views (just be careful not to look at the Sun). On the 28th, it's a 8' disk of magnitude 0.6.

VENUS is still a fine evening object (and will be until late August). It reaches greatest eastern elongation on June 11 when it's 45 degrees from the Sun. In the first week, it's in the gibbous phase; on June 11,

it's half illuminated (diameter 25", magnitude -4.3); and thereafter, it's in the crescent phase. (It reaches maximum brilliance on July 15 when it's a large crescent.) At the beginning of the month, it sets 3 1/2 hours after the Sun and by the end of the month, as Venus swings round closer to the Sun, that shrinks to 2 hours. Have a look at it in binoculars or in a small telescope!



MARS, in Cancer for most of the month, rises at about 5 PM at the beginning of the month and 3:30 by the end. It shrinks from a 14" disk at magnitude -1.0 to 12" at magnitude -0.5 by the end of the month. Regettably, for us northern observers, it's low in the southern sky (since that's where the Sun will be six months hence, in the dead of winter). It's still worth a look.

JUPITER, in Pisces all month, is a morning object arising about 1 1/2 hours ahead of the Sun on the first of the month (low in the southeast), increasing to over three by month's end. On the 15th, its a 36" disk of magnitude -2.2.

SATURN, in Aries all month, is a morning object all month. It rises about an hour before the Sun on the first increasing to 2 1/2 hours by month's end. On the 15th, it's a 17" disk of magnitude 0.4. As the year progresses, Saturn will move into more convenient places in the sky.

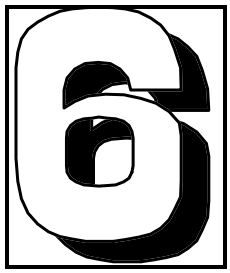
URANUS, in Capricornus all year, is a morning object. On the first of the month, it rises at about 1:22 PDT, but by month's end, that advances to about 11:20 PDT. As usual, it's a 3" disk of magnitude 5.8 (visible in binoculars if you know where to look).

NEPTUNE, in Capricornus all year, is also a morning object. On the first of the month, it rises close to 1 AM (PDT), but by month's end, it rises close to 11 PM (PDT). As usual, it's a 2.3" disk at about magnitude 8.0.

PLUTO, in Ophiuchus all year, rises on the first at about 8 PM PDT (an hour before sunset) and rises on the 30th at about 6 PM (PDT) As usual, it's a 0.1" disk (i.e., starlike) at magnitude 13.8.

CONSTELLATIONS to look for in June (at 12 midnight, PDT) are Libra, Serpens Caput, Ophiuchus, Serpens Cauda, Scorpius, Sagittarius, and Scutum,. Note that the two Serpens constellations are not contiguous.

Libra ("The Balance") contains no Messier objects. It does, however, lie far from the Milky Way and contains many galaxies NGC 5xxx plus the globular cluster NGC 5897, a large and loosely- structured cluster.



Serpens Caput and Serpens Cauda ("The Serpent"). Caput, the western half, lies off the Milky Way and contains the spectacular globular M5 (the fifth brightest, after Omega Centauri, 47 Tuc, M22 in Sgr and M13 in Her) lying some 26,000 light years from us. It's one of the oldest objects around, dated at 13 billion years and must have formed very early in the history of the universe.

Cauda, the eastern half, lies essentially on the Milky Way but is not part of the luminous band owing to the large amount of intervening dust. It contains M16, the famous "Eagle Nebula" (with its EGGs). M16 lies some 8000 light years away in the great Sagittarius arm of the Galaxy.

Ophiuchus ("The Holder of the Serpent" -- and separating the two halves) contains numerous globular clusters -- Messiers 9, 10, 12, 14, 19, 62 and 107 -- too many to discuss! The southern part of the constellation lies in the rich portion of the Milky Way (see below).

Scorpius ("The Scorpion") contains numerous globular clusters: M80, about 4 degrees northwest of Antares (Alpha Scorpii), M4, just one degree west of Antares, M62, about 7 degrees southeast of Antares, and M6, near the tail of the beast (which will be very low in our northern skies) plus other NGC globulars.

Sagittarius ("The Archer") contains, along with southeastern Ophiuchus and eastern Scorpius, the richest part of the Milky Way since we are looking towards the centre of the Galaxy (located at 17 h 46 m, -29 00'). There are many wonderful sights which, unfortunately for us in P.G., are low in the southern sky and therefore hard to observe. Also, you have to stay up late to see all this (or wait 'til late August or September for more reasonable times). Maybe in the September issue, I'll discuss Sagittarius more.

Scutum ("The Shield") is a small constellation just to the north of Sagittarius. It contains two open clusters, M11 & M26 plus a few other things.

Clear Skies,
Bob

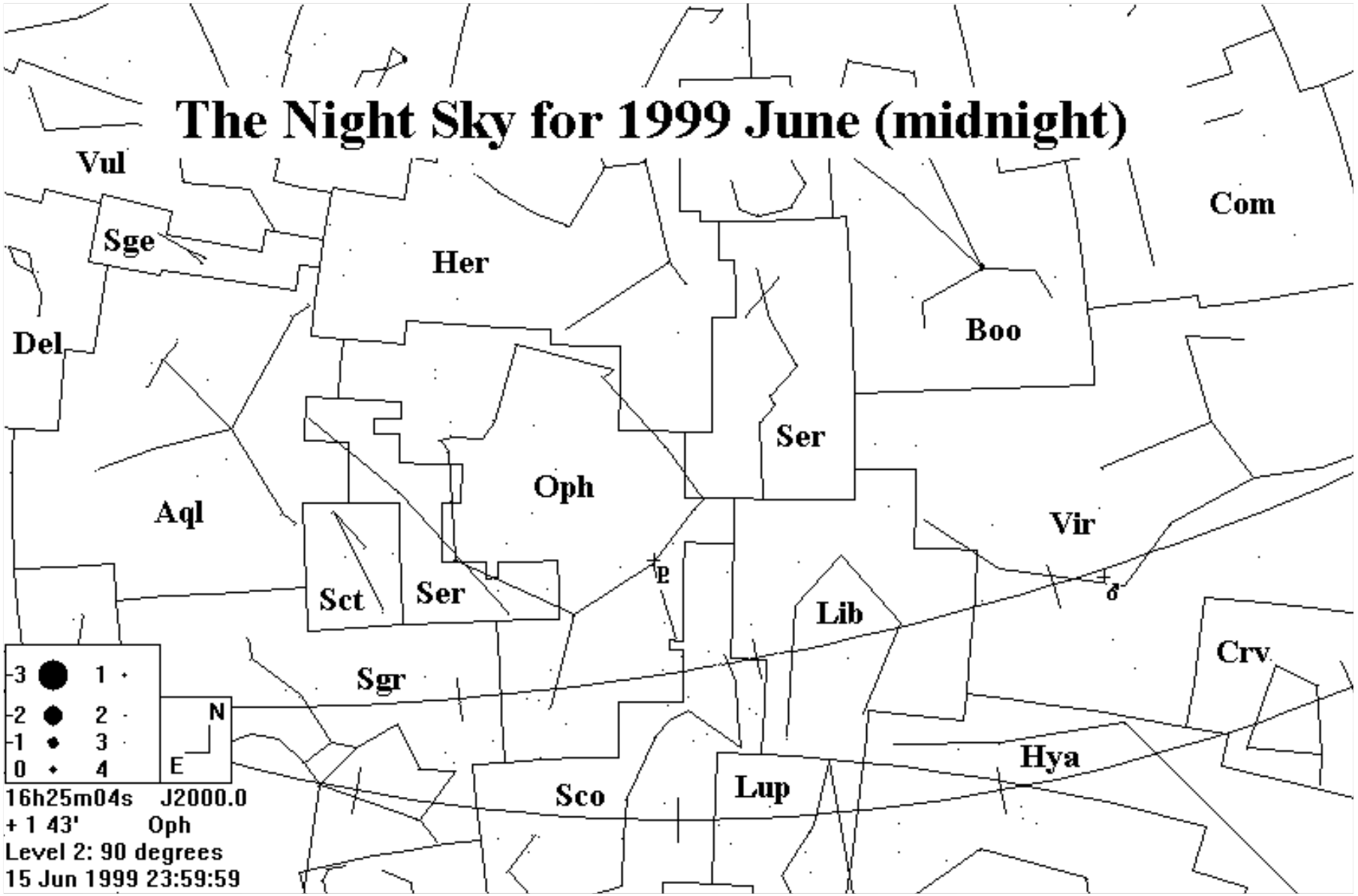
Photo Gallery

by Owen Salava

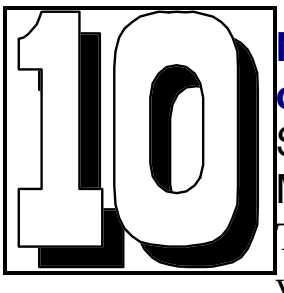
conjunction of Venus and Jupiter Feb 23

lunar halo Feb 23 with Orion etc below the first quarter moon

conjunction of Venus, Saturn and 3 day old moon Mar 20 taken from next to the C-8 pier at the observatory



JUNE15 Skys for Prince George courtesy Dr Bob Nelson



Natural lenses in space stretch Hubble's view of the universe

STScI NEWS RELEASE
May 13, 1999

The NASA Hubble Space Telescope serendipitous survey of the sky has uncovered exotic patterns, rings, arcs and crosses that are all optical mirages produced by a gravitational lens, nature's equivalent of having giant magnifying glass in space.

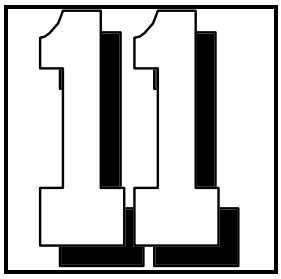
A gravitational lens is created when the gravity of a massive foreground object, such as a galaxy or black hole, bends the light coming from a far more distant galaxy directly behind it. This focuses the light to give multiple or distorted images of the background object as seen by the observer.

A quick look at over 500 Hubble fields of sky has uncovered 10 interesting lens candidates in the deepest 100 fields. This is a significant increase in the number of known optical gravitational lenses. Hubble's sensitivity and high resolution allow it to see faint and distant lenses that cannot be detected with ground-based telescopes whose images are blurred by Earth's atmosphere. An analysis of this "Top Ten" list of Hubble gravitational lenses is published by Kavan Ratnatunga and Richard Griffiths of Carnegie Mellon University in the May issue of the *Astronomical Journal*.

The amount of gravitational lensing in the universe depends strongly on the cosmological constant, a hypothesized repulsive force that indicates the universe is older and larger than without this force. Therefore a large cosmological constant implies a larger number of more distant objects whose light can, by chance, pass close to a massive galaxy on its way to Earth and appear lensed.

The 100 Hubble fields cover a total area equal to that of the full Moon. Hubble's ability to see so many of these lenses in a small fraction of the sky takes them from being a scientific curiosity to serving as a potentially powerful tool for probing the universe's evolution and expansion. "In fact, these much more distant gravitational lenses are potentially more valuable to derive fundamental cosmological parameters than rel-

atively closer lenses discovered from ground-based observations," says Ratnatunga. "Follow-up spectroscopic observations are now needed to verify that the object is far more distant than the lensing galaxy seen at the center, as well as to derive better distance estimates to confirm that multiple images really belong to the same object. These are however very difficult observations even for the largest ground-based telescopes."



The Hubble images in which these lenses were discovered are part of the Medium Deep Survey database. The survey catalog contains over 200,000 objects, mostly faint galaxies. The public can search the catalog at http://www.stsci.edu/mds/ and study the myriad of never-before-seen galaxies from this huge Hubble database on their own home computer. Users can call up one of 500 survey fields and mouse-click on any galaxy image to see a full resolution view of the galaxy and estimates of its shape and brightness. Visitors can even look for patterns that may be caused by a gravitational lens. Hubble astronomers expect that there could be a few hundred more lenses which are more difficult to identify confidently in these images.

In 1936 Albert Einstein computed the gravitational deflection of light by massive objects and showed that an image can be highly magnified if the observer, source and the lensing object are well aligned. However, the lensed image separations were predicted to be so small in angular size, Einstein knew they were beyond the capabilities of ground-based optical telescopes. This made him remark that "there is no great chance of observing this phenomenon."

It wasn't for another 40 years since Einstein's conclusion that the first gravitational lens was discovered in 1979. Several bright and nearby lenses have been discovered since then from ground-based observations.

Further lens discoveries required Hubble's high resolution Wide Field Planetary Camera 2 (WFPC2) which allows the search extended to much fainter and farther objects. It is expected that the Advanced Camera for Surveys, to be installed on Hubble in the year 2000, will be able to discover many more gravitational lenses because of its sensitivity and relatively wide-angle coverage.

Astronomy 102 By Steve Senger

Well I made it ! I took Bob's second course Astronomy 102 from Jan. to April. I took his first course 101 last year. The previous course dealt mainly with the solar system. In 102 we visited the stars and other galaxies. (My favorite topics). We calculated distances, motions, luminosity, and Supernovas to name a few. Unfortunately we ran out of time to do Black Holes (Chucks). Anyhow I really enjoyed Bobs lectures, and I learned a lot.

I thought I would go over briefly each week's topic and labs to share with you some of the things I learned in class. You will not need a compass, protractor, or calculator. Just an imagination and some logic. I hope I can transpose what I learned into a few paragraphs on each topic.

Proper motion

This is defined as a stars apparent motion observed from earth in arc sec. per year ("u"). All stars have some motion compared to our sun. If the star has a very fast velocity, or more important, it is very close to our Sun, then we might notice this motion.

We do this by looking at two photographs taken of the same grid of the sky, but taken 50 to 100 years apart. The Star in question is compared to the much more distance stars surrounding it. These distance stars proper motion is negligible and can be considered reference sources.

The star we choose in our lab to do was Cygni 61. Its distance is about 11 LY. Historically this was also the first star used to measure parallax back in 1838 by FW Bessel (.292 arc sec). If you are worried about this bi-yearly parallax motion, don't. The stars proper motion spanned over a 100 years totally over shadows the parallax motion . To do this lab we choose 6 stars that were in both photographic charts. These star charts were almost 100 years apart. We had to adjust the scale of one chart to match the other chart. I measured and averaged the angles of the 6 stars compared to Cygni 61 in both RA & Dec. Then using parthaganans theory I would get the total Proper Motion. Cygni 61 has a proper motion of 5.2 arc sec/year. **NOTE** Bernard's star which is closer at 5.9 LY has the greatest proper motion of all the stars out yonder with a whooping 10.3 arc sec / year.

If you know the distance to cygni 61, then one could also calculate the **Tangential** velocity by using the equation Tang. Vel.= 4.74 * u r, where r is the distance in parsecs, and " u " is proper motion. Now chances are this star is either moving towards us or away from us as well. This is called **Radial velocity**. You can measure this by the Doppler shift of its spectrum. Once you have that value you can get it's true vector, this is called **"Space velocity"** by the equation T[2] + R[2] = S[2] [2]=squared

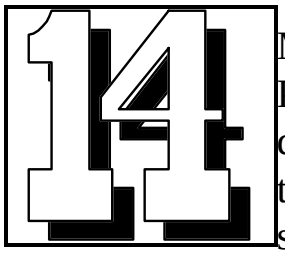
The sun and the local neighboring stars all orbit around the center nucleus of our galaxy at about the same velocity (speed & direction) its about 220 km/sec. It takes about 200 million years to make this trip. Our Sun will eventually pass some stars, well other stars will pass us, so this apparent motion we can measure of the local stars seems to contradict the above statement. But if you made hundreds of measurements up to 100 parsecs out, you would fine that the net velocity of all those stars works out close to zero as compared to our Sun. This is called the **Local Standard of Rest LSR .** So yes we are one big happy family trudging along around our own galactic nucleus.

Steve

NEW BOOKS AT THE PUBLIC LIBRARY.
by Yvonne Whebell

VOLCANOES OF THE SOLAR SYSTEM. by Charles Frankel. Cambridge University Press, , 1996

Beginning with the earth, the author discusses volcanoes and the history of
volcanism in the solar system, primarily on earth, the moon, Venus and Mars, although there are sections on other planets and moons. The last chapter, titled Volcanism: A Planetary Perspective deals with an assortment of topics, such as volcanism on asteroids, the effect of gravity on the development of volcanoes, the effect which volcanoes have on atmospheres.



My favorite story for this week: in partnership with The Planetary Society, we (NASA) are providing an unprecedented opportunity for children around the world to join the first ever student team to serve on a planetary mission. This Planetary Society project will allow students hands-on participation in the operation of a Mars rover and robotic arm on the Mars Surveyor 2001 Lander mission, which launches in April 2001 and arrives at Mars in January 2002. I never got to play with a robot on another planet when I was a kid... Parents, take your kids to

http://rrgtm.planetary.org/

Astronomers have found the first hints that failed stars known as 'brown dwarfs' may have weather patterns with winds, clouds and storms. Story at http://www.aao.gov.au/press/browndwarfweather.html

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Star-Studded Photo Album Delivered to Internet - the first major data release from the 2 Micron All Sky Survey (2MASS), a project sponsored by us (NASA) and the National Science Foundation, is now available. See it at
http://www.ipac.caltech.edu/2mass/

GAMMA RAY BURST IMAGED FOR FIRST TIME
Astronomers racing the clock managed to take the first-ever optical images of one of the most powerful explosions in the Universe -- a gamma ray burst -- as it was occurring on Saturday, Jan. 23, 1999. Gamma ray bursts produce more energy in a very short period than the rest of the entire Universe combined.
Because such bursts occur with no warning and typically last for just a few seconds, quick detection by orbiting spacecraft and instant notification to astronomers are critical in order to catch the bursts in the act. In just 27 sec the Robotic Optical Transient Search Experiment (ROTSE) in Los Alamos, NM, photographed the peak brightness, we found a whopper.

If this burst had originated in the Milky Way Galaxy, it would have lit up

PGAS CONTRIBUTORS

The PGAS would like to thank the following individuals, corporations and government agencies who, since 1991, have donated money, goods or services to the construction and operation of the Prince George Astronomical Observatory.

Ministry of Adv. Ed. Training and Tech.	$25,000
BC Science Council	16,000
BC Lotteries	3,900
Helmar Kotsch (Acme Mas.)	1,932
Northwood Pulp and Timber	1,665
Electrical Services Ltd.	1,583
Royal Bank of Canada	1,500
Regional District of Fraser-Fort George	1,000
Prince George Rotary Club	1,000
The Pas Lumber Co	750
Rustad Broth & Co Ltd	750
Canfor Polar Division	744
Bisque Software	500
Xerox Canada	500
Canfor Clear Lake	500

The greatest contributors to the construction and operation of the observatory are from PGAS members who have generously contributed their time to this project. The value of their contribution surpasses all external contributions.

The PGAS is a non-profit organization dedicated to the advancement of astronomy and science in general in Prince George and the neighboring northern communities. Donations of money or materials to the society are greatly appreciated and tax deductible.