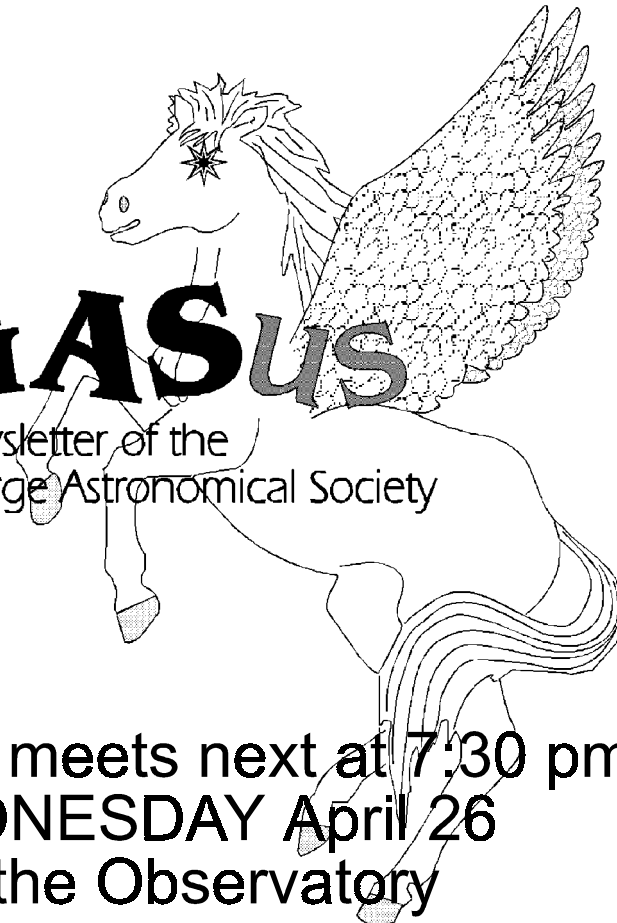


APRIL 2000 ISSUE #103

the

PeGASus

Newsletter of the
The Prince George Astronomical Society



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

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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

MAY 19

Send correspondence to
The PGAS
3330 - 22nd Avenue
Prince George, BC, V2N 1P8
or
selfs@attcanada.net

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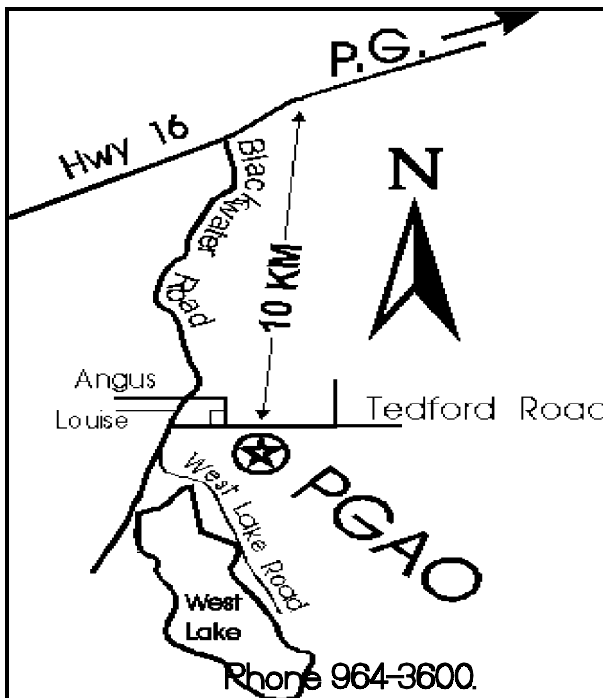
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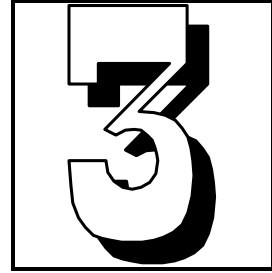
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<http://www.pgweb.com/astronomical/>

Editorial

by Gil Self



First the good news — Mathew Burke has agreed to update our web page. If you haven't visited our site, you really should. Mathew did a great job on the original site. We had planned on keeping it up in his absence but nobody could quite figure out the secrets necessary to bring it up to date. We may still need someone to update the weekly scroll, but let's wait and see how much time is required.

That being said, I turn the rest of this editorial over to Orla Aaquist and a student by the name of Serge Demers, who both have something important to say.

Gil,

The message below comes from CASCA. I encourage PGAS members to act on this issue since it is at the heart of the ability of amateur astronomers to function. My feeling is that astronomy is doing so much to promote science that they should be given some consideration in the community. This kind of action on the part of big entertainment is a slap in the face of science. The community should support us in this matter. The skies belong to everyone, and to monopolize it with a search light is ignorant.

You can see that I am working myself up to write a really good letter.

Orla

----- Forwarded message follows -----

Date sent: Wed, 22 Mar 2000 10:25:29 -0500 (EST)

From: Serge Demers Secretaire CASCA <casca@ASTRO.UMontreal.CA>

To: casca_lis@ASTRO.UMontreal.CA

Subject: light pollution

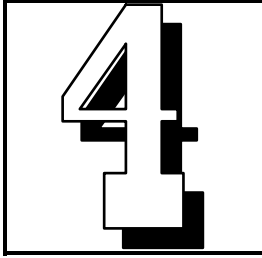
Hi Everyone,

The community of Langley Township, in British Columbia, is currently in a fight with a local multiplex cinema called Colossus. The Colossus has put a large searchlight into the sky, and a local citizens group has decided to fight it. Last night the town council was to pass a bylaw restricting the number of hours of operation per year they may operate this light. The companies' position seems to be that they have an operating permit and so don't want the law passed. York has recently been unfortunate to have such a beam put into the sky near our campus. Even in Toronto skies, the beam can be seen up to the zenith! I am trying to get a e-mail campaign underway showing support for the town for their stand and encourage them in fighting Colossus. I would like to encourage members of CASCA to send the town of Langley faxes or e-mails of support in their action, since it is not entirely clear what the response of Colossus will be to the bylaw. The town may be contacted in the following ways:

Phone:604-534-3211

Fax: 604-533-6052

Mayor's e-mail: Mayor@township.langley.bc.ca



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 May 31 7:30 pm at the observatory

This month's meeting will include a quick review of society business. A special presentation by Paul Roberts regarding his recent visit to the JAS in Hawaii and of course the constellation of the month.

May 4, Eta Aquarid meteor shower (in Aquarius, of course). As usual, it's best after midnight.

The Night Sky for May 2000

by Bob Nelson, PhD

Hi Folks,

To some extent, writing this month's column is quite easy since there are hardly any planets visible after last fall's extravaganza! However, as the temperatures climb (and the nights shorten) there are plenty of other things to look at.

Here is what is happening in the sky next month:

PLANET ROUNDUP

MERCURY reaches superior conjunction (that is, is lined up with the Sun, but on the opposite side of its orbit) on May 9th. As the month progresses, speedy Mercury becomes visible in the evening sky just after sunset in the last week or so of the month. At month's end, it rises some 15 degrees above the horizon at sunset and sets some two hours after sunset. According to the Observer's Handbook, this is the best apparition this year for northern observers (that's us!). Owen, Jon, Doug, what about some photos?

VENUS is not observable for northern observers until September.

MARS, in Taurus all month, is visible with great difficulty very low in the west-northwest just after sunset early in the month but soon gets lost in the glare of the Sun. A challenge object.

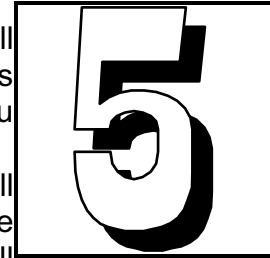
JUPITER, in Aries until May 30 when it passes into Taurus, reaches conjunction with the Sun on May 8th and is not visible to northern observers this month (don't say you didn't have your chances - it was visible all last fall!!).

SATURN, in Aries until May 29 when it passes into Taurus, reaches conjunction with the Sun on May 10th and is not visible to northern observers this month.

URANUS, in Capricornus all year, is a morning object all month. On the 15th, it rises at about 4:30 AM, some 1.5 hours before sunrise. As always, it is viewable with binoculars if you know where to look.

NEPTUNE, in Capricornus all year, is a morning object all month. On the 15th, it rises at about 2 AM and that time advances by about one hour every two weeks, so it will become more accessible as the weeks go by. As usual, it's a 2.3" disk at about magnitude 8.0.

PLUTO, in Ophiuchus all year, is visible all night long all month. On the 15th, it rises at about 9:20, only 10 minutes after sunset. This should be a wonderful target for long-exposure 35 mm photography, CCD imaging or just plain viewing. Let's give it a try!! As usual, it's a 0.1" disk at magnitude 13.8 (easily visible with our big 'scope). Full Moon (boo, hiss!) is on the 18th. The best viewing, therefore, is at either end of the month.



CONSTELLATIONS to look for in May (at 12 PM, PDT) are Corvus, Eastern Hydra, Virgo, Coma Berenices, and Canes Venetici.

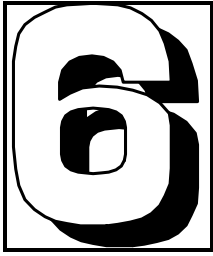
Corvus ("The Crow") is the small lectern-shaped constellation southeast of Leo (the top two stars point up towards Spica up and to the left). It contains a number of NGC galaxies on the eastern boundary, clearly part of the sprawling Virgo cluster. Messier 104 ("The Sombrero") is just over the north boundary in Virgo. This is a spiral galaxy, discovered by P. Mechain in May 1781, that lies almost exactly edge-on, revealing a prominent dust lane. According to Burnham, the Sombrero is forever linked to the discovery of the expanding universe, at Lowell Observatory, beginning in 1912, before the true nature of galaxies was known.

Hydra ("The Sea Serpent") is a sprawling constellation running from 8 hours to 15 hours right ascension and from -35 to +5 degrees declination. It contains the globular cluster M68, and several galaxies, including M83.

Virgo ("The Virgin") and Coma Berenices ("Bernice's Hair"), lying to the east of Leo, are the regions of the sky rich in galaxies. Virgo contains 11 Messier objects, all galaxies and many NGC objects too numerous to mention. These are part of the giant Virgo cluster of galaxies lying some 20 megaparsecs (65 million light years) from Earth. This contains some 1000 galaxies and shines with the light of 10^{14} suns. It is thought that the local group (containing the Milky Way Galaxy, M31, M33 and others) may be falling towards the Virgo Cluster. Nearby in the sky, but much more distant is the even larger Coma cluster which lies some 150 megaparsecs (500 million light years) away. It contains some 10,000 galaxies and shines with the light of 10^{15} suns.

Also in western Coma Berenices lie the globular clusters M53 and NGC 5053, about 1 degree apart. In Canes Venetici, about 15 degrees to the northeast, lies M3, one of the three finest globular clusters in the northern sky, (the others are M13 and M5).

Clear skies,
-Bob



The Quiz

I know this is going to start a debate, but that was the idea.
Lets start with the original suggestion from Orla

Here is a quiz question for PeGASus. You could probably find other interesting questions that will keep your readers thinking about astronomy. As incentive to answer the question, you could have a rebate of \$1 for the first correct submitted answer. Over the period of 10 issues, a reader could get a rebate of \$10 on their membership. You would, of course have to exclude Bob Nelson from the contest.

In the May 16 issue of the Edmonton Journal the following question appeared in one of their Isaac Asimov tests: "On what planet is the year shorter than a day?"

The answer that they provided was Venus. Do you agree?

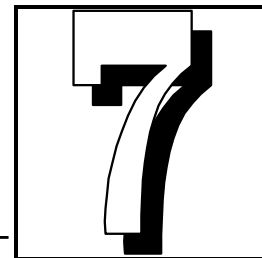
I think that the correct answer is Mercury rather than Venus. It is true that the rotation period of Venus (243 days) is longer than its year (224 days), however the rotation period is not equal to the length of the day. Since Venus's rotation is retrograde, the length of a day (noon to noon) must be less than its rotation period (I believe the length of the day is 116 days for Venus). Mercury's year is 88 days and its rotation period is 58.7 days, and it turns out that noon to noon is 176 days (two years).

I hope this adds to your collection of PeGASus ideas.

Orla

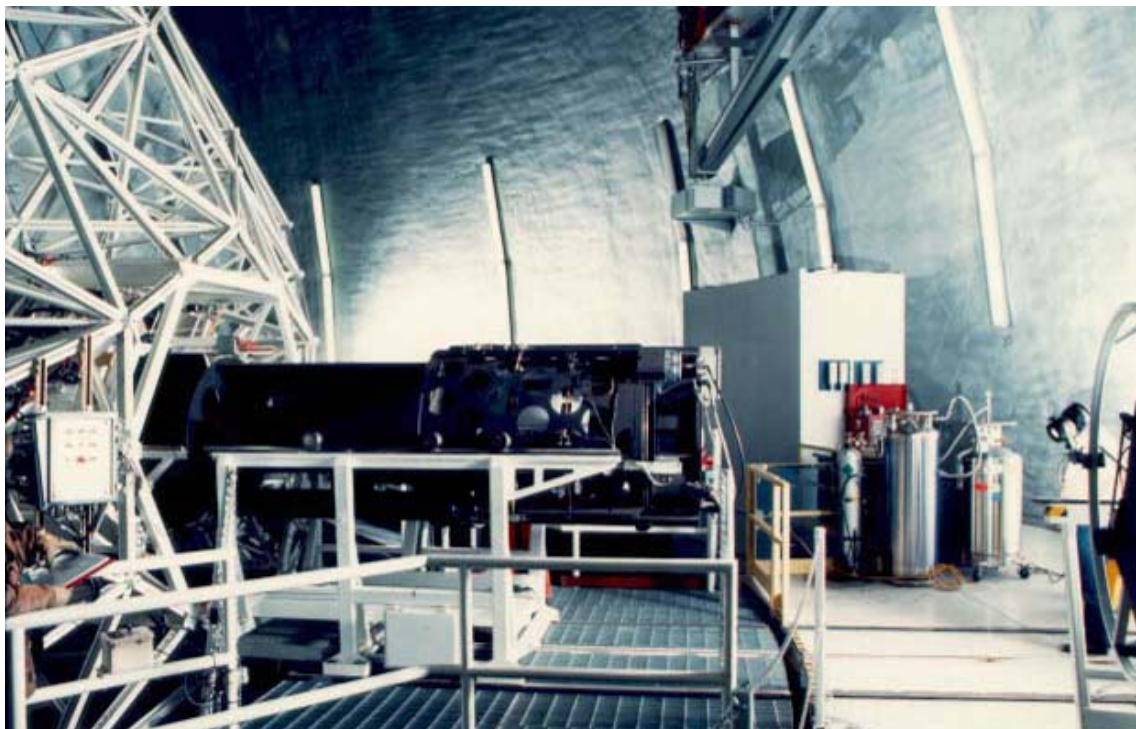
Now you know the answer we were after. Because of the special twist here, none of the answers were wrong. But I only received one really good write up that clicked into the catch in the question, ie a twisted enough mind to catch on to what we were looking for. For the truly eloquent explanation of the question and to see who is this months PGAS MENSA award winner, please turn to page eleven.

Need more reason to attend the next PGAS meeting??

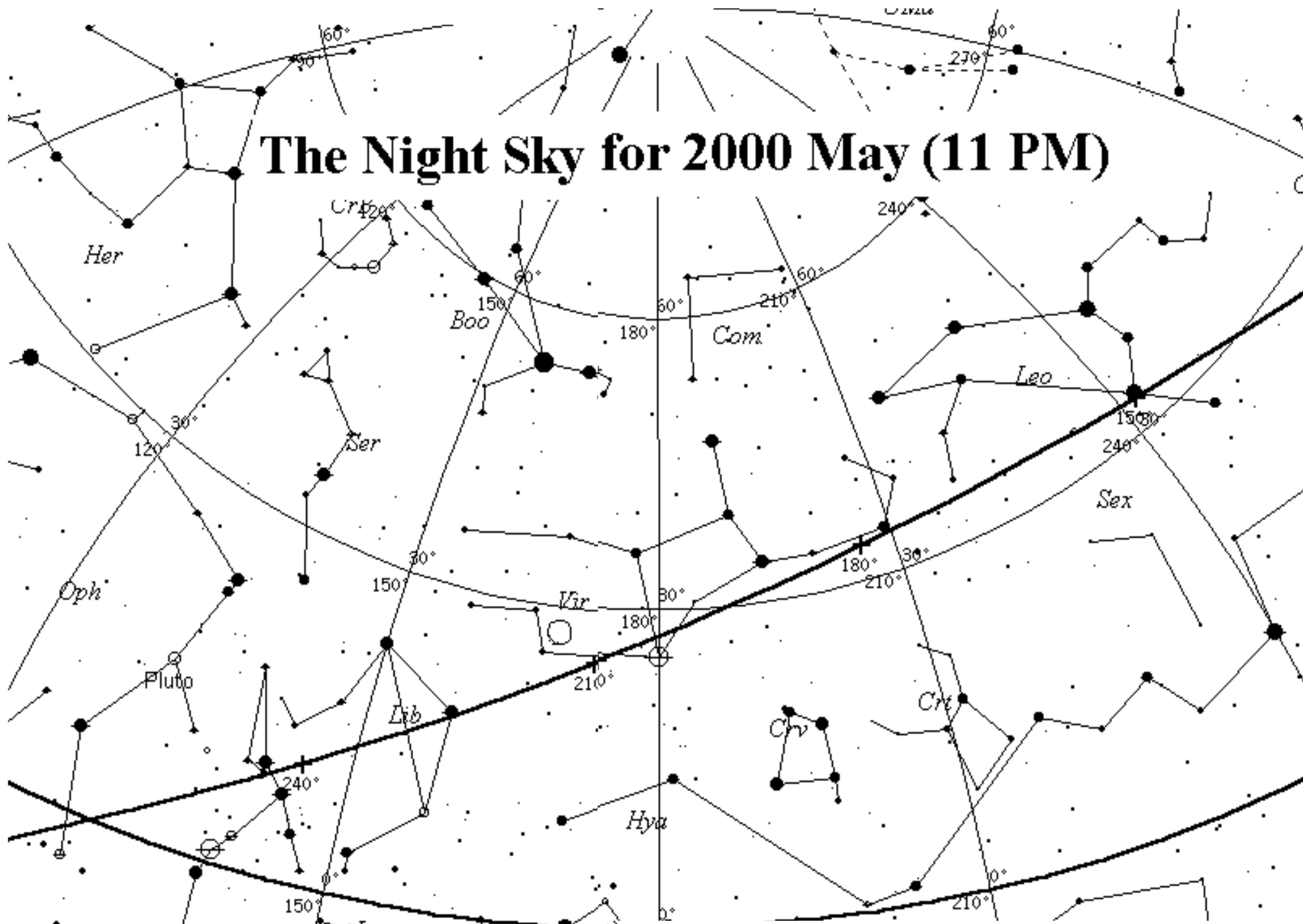


Paul Roberts recently visited his daughter at the JAC on the Big Island of Hawaii. Paul will make a brief presentation at the meeting at the Observatory on April 26, 2000.

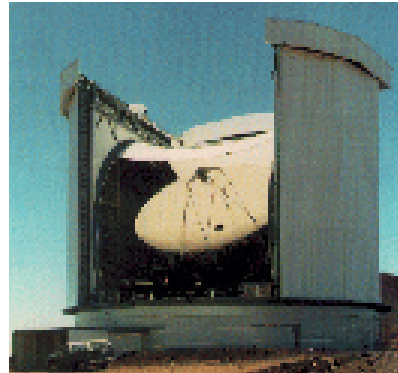
Joint Astronomy Centre



The Night Sky for 2000 May (11 PM)

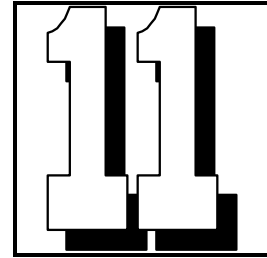


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Hi Gil,

In response to your question of the month. On what planet is the year shorter than a day?



Answer: Mercury.

It takes Mercury 87.97 Earth days to circle the Sun but sunrises happen every 176 earth days. It's interesting how the numbers work out. Mercury's rotational period is 58 Earth days & 16 Hours. $87.97/58.67=1.499$ about 1.5 rotations for every orbit around the Sun. Since Mercury spins in the same direction as it orbits the Sun, it is only half a rotation ahead after it orbits the Sun Once. One more orbit is required to gain the other half day. It would take two years to rotate three times a day. You could celebrate your birthday twice a day, every day.

Venus has a much slower rotational period than Mercury. 243.01 Earth days per rotation and 224.7 Earth days to circle the Sun. Since it spins backward compared to everybody else, sunrises are more frequent at 117 Earth days. If you were to consider a day to be one rotation, then Venus would be the winner. Galileo would have had a tough time convincing people that the Sun does not orbit the planet (and withstanding the intense heat and pressure) had he lived on Venus. The Sun would appear to be one of the faster moving objects in the sky.

THIS MONTHS WINNER of the PGAS MENSA AWARD

GLENN ZUHLKE

Congratulations and well done Glenn

NEXT MONTHS QUESTION

Assuming 359 teeth on the ring gear of the telescope, and an 1800 rpm motor and one turn of the worm gear moves the ring gear one tooth. And assuming everything ran constantly and perfectly (24 hours a day) . How many times would the motor rotate from 12:00 noon local January 1st 2000 until 12:00 noon local 2001?



Near Earth Asteroid 1989ML₁₄

By Julie Roberts, Joint Astronomy Centre, Hilo, Hawaii
For the Technically Minded Astronomer

The 22nd to the 24th of March 1999, Dr. Dave Tholen, from the University of Hawaii at Minoa, collaborated with Dr. John Davies. This time the object of interest was a Near Earth Asteroid, specifically 1989ML₁₄. Infrared photometry was obtained using the infrared camera IRCAM on the 3.8m United Kingdom InfraRed Telescope (UKIRT), Mauna Kea, Hawaii. The IRCAM image for a given filter, J, H or K band, comprised a mosaic of several separate frames, each with exposure times set to be background-limited. The mosaics comprised of five, nine or thirteen frames, each offset by 10-20 arcsec from each other to minimize the effect of bad pixels. This process is commonly called a "jitter", and is used for fainter objects in order to maximize the signal to noise ratio from the sky. After subtracting an appropriate dark, which is an image taken by the camera of nothing (essentially putting blinders on the CCD), frames in each filter were median-filtered to produce a flat-field, divided by this flat field, then mosaiked together.

One of the problems that we came across while trying to obtain the photometry with this data was the improper mosaiking of the frames. When observing "stationary" objects, the telescope can be set to track at sidereal rates, to keep locked on to the target. When observing an asteroid, there is the added complication that it is moving with respect to the background stars as well as sidereally. The ideal situation is when the asteroid is bright enough so that the telescope's guider can lock on to the asteroid, and its movement will drag the telescope across the sky. This situation allows for the tip-tilt mechanism on the telescope work to improve image quality by reducing effects of changing seeing. The rates of the asteroid are also input to the computer so that when the telescope moves off position to take one of the jitter images, it can easily return to the asteroid's current position. The second most common situation is when the asteroid is too faint for the telescope to guide on, too faint to see. In this situation, the rates of the asteroid are input to the computer and the telescope guides blindly across the sky. This situation does not allow for the tip-tilt to improve the image quality and is generally less desirable. When the computer data reduction program (ORACDR) takes these off center images and tries to put them together, it can either register on several bright stars in the field and line those up, this smears

out the asteroid on the image. Or it can take into account the track rates of the asteroid and create an image with one point source of light in the center surrounded by smeared out stars. This final point source image is what is needed in order to perform the photometry on the asteroid.



In some situations, the data reduction package registered on a bright star, which smeared out the asteroid, and in other situations, the track rates were not correct. We had to go through each frame, determine the nature of the problem, and then send the raw images through ORACDR to be re-reduced using the correct method.

Once all the frames were corrected, plotting the Zero-Point of standard stars against the changing airmass created extinction curves. The photometry was then easily obtained in 5 and 10 arc second apertures using GAIA. The light curve for the asteroid was quite obvious in this case... as opposed to my other FLAT light curve of 1997CU₂₆. We obtained a double peaked light curve, which suggests an oblong shape, much like a potato, with a full rotation period of about 19 - 20 hours. The data has been sent to Dr. Tholen to be scrutinized and fit with a proper fitting method, and to obtain a more accurate light curve.

Last Friday Bob Nelson recorded data on an eclipsing binary , after a request from another observatory. Collaborating on observations is a very significant development for our observatory. This is the e-mail he received, I hope we will hear more.

Bob:

When Ray Berg and I arrived for the AAVSO banquet last evening Dan Kaiser hit us with the latest news from Prince George, B.C. Needless to say, we were both more than just a little bit pleased with the way things were shaping up with CD Lyn.

Now it's on to determine if we can separate the secondary eclipse from the primary..... or whether the orbit may be elliptical and a shallow secondary lies at some odd location between primary eclipses.

..... Marv



Check It Out

Gil Self

From time to time in this newsletter I suggest internet sites that are of interest to me and perhaps to you. I still have to marvel once in a while at how amazing all this is. More information than I could use in a lifetime and the cost is almost insignificant. So if your not on yet, beg or borrow a computer and get connected, I'll even volunteer to help you, just call.

I offer an example. The Next Generation Space Telescope (NGST) will be launched in about 7 years. At this time they are designing the spacecraft and telescope. NASA employee in a high-tech store— I'll take 4 thrusters and a half dozen gyro-stabilizers, oh and a wide field planetary camera please.... Nah!

Some of the science and technology hasn't even been developed yet, they are in the process of doing that. This is an e-mail newsletter I receive every week, that is detailing the progress of the NGST... Read on

Hi Folks,

Team NGST has just recently returned from the 3rd meeting of the NGST Standing Review Board in Huntsville, Alabama. The preparations and actual 2 day review were quite grueling, but the contractor and government teams did quite well. We asked the Board's advice on numerous specific issues, having to do with things like the Phase 2 downselect criteria and approach, soundness of wavefront control plans, schedules, and the tact we are taking with the instrument module.

Regarding news on the instrument front, Matt Greenhouse points out that technical specifications to guide MEMS MOS technology development have recently been posted to the web document system. Refer to URL <http://ngst.gsfc.nasa.gov/cgi-bin/pubdownload?Id=614> The ISIM team, lead by Paul Geithner, is preparing a detailed PERT flow of the ISIM I&T, with the goal being to generate a detailed cost estimate for the work in time to support the Phase 2 downselect. On the international front, the NASA/ESA/CSA team is marching towards the signing of a top level agreement on contributions to the ISIM by late May of this year. Finally, proposals for NRA #2 are due on 5 May. This NRA, sponsored by NASA Headquarters, addresses development of specific instrument related technologies to a high enough degree of maturity that they can be picked up and proposed by future (November, 2002) instrument development teams.

Plans for the Nexus technology validation flight in late 2004 are gelling. The successful prime contractor team will provide a 3 meter segmented deployable telescope, based on their NGST mirror design concept, for the NASA-led mission development team. The plan is to launch this aboard either a Delta 7920 or Shuttle/Upper Stage launcher and fly it to L2. This active cryogenic telescope will employ full (NGST) size deployment devices, hinges, actuators, etc., and in these areas, together with the mirrors, backing structure, and ground control software, provide "dollar for dollar" savings to the Phase C/D development cost and significant, measurable risk

mitigation for the full scale NGST observatory. The phasing and wavefront control experiment will necessitate the use of 2 small infrared focal planes in an infrared camera/guider configuration. It is quite likely that these would be the sensor chip assemblies or "unit cell" chips for the larger, more ambitious NGST mosaics, thus further reducing the risk associated with engineering low noise, cryogenic readouts and arrays. One key aspect of this space experiment is that the contractors will be able to anchor their design and performance models to real on-orbit performance data, in time to impact the development of the NGST observatory.



Programmatically, the NGST Quarterlies resume next month, with a government-only team meeting on May 15th at GSFC, followed by a half-day with each of the two primes on the 16th. The final meeting of the Ad Hoc Science Working Group (ASWG) is scheduled in conjunction with the AAS meeting in Rochester on June 7th. This group has served the project well over the last 3 years, and we owe them a great deal of thanks. A new body, to be called the Interim SWG, or ISWG, will be solicited by a "Dear Colleague" letter, with the aim being to form up the international group by the August/September timeframe. Look for further information in the AAS e-news in the coming months. That's all for this week...

yours,
bernie

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.

	\$25,000
Ministry of Adv. Ed. Training and Tech.	16,000
BC Science Council	3,900
BC Lotteries	1,932
Helmar Kotsch (Acme Mas.)	1,665
Northwood Pulp and Timber	1,583
Electrical Services Ltd.	1,500
Royal Bank of Canada	1,300
Xerox Canada	1,000
Regional District of Fraser-Fort George	1,000
Prince George Rotary Club	750
The Pas Lumber Co	750
Rustad Broth & Co Ltd	744
Canfor Polar Division	500
Bisque Software	500
Canfor Clear Lake	

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