

PeGASus  
Newsletter of the  
Royal Astronomical Society of Canada  
Prince George Centre

**The RASC-PG meets next at 7:30 pm  
Wednesday January 28th  
at The Observatory**

Map on Page 2

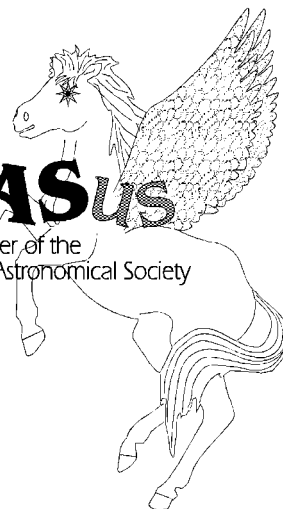
**JANUARY 2004**

In Issue # 133

PGAS Executive	2
Editorial	3
Coming Events	4
The Night Sky	4
Sky Map	8

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**PeGASus**  
Newsletter of the  
The Prince George Astronomical Society



*Also This  
Month;*

*Page 6 Executive summary*

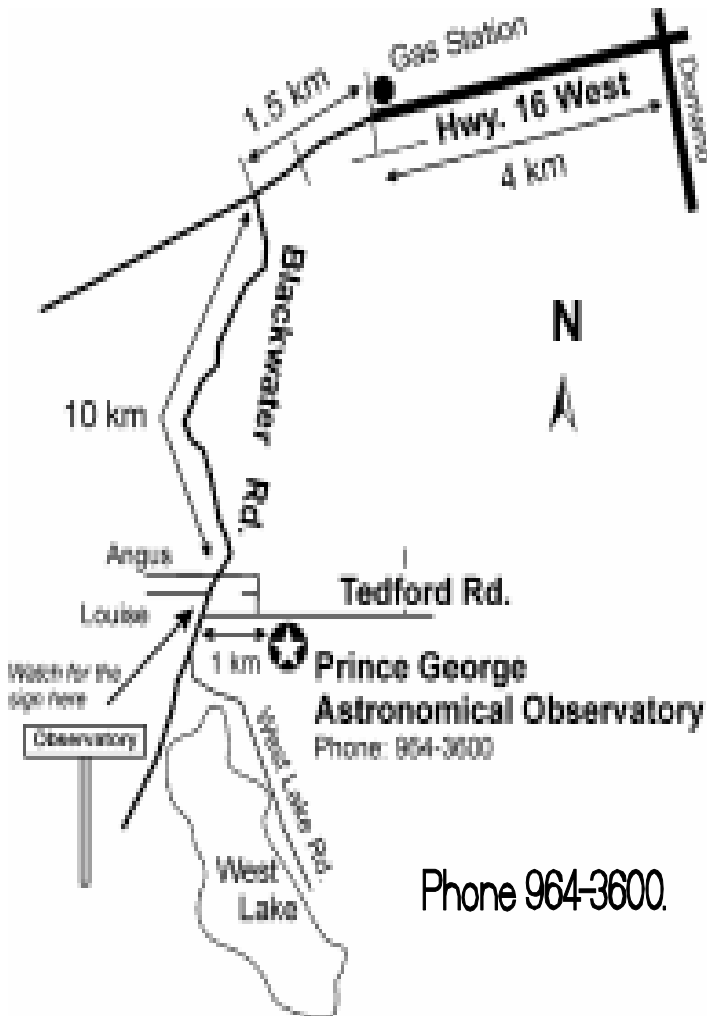
*Page 11 Finally, A first for PGAS*

*Page 13 January Star Hop*



**the PeGASus**  
 is published monthly by the  
**Royal Astronomical Society Canada**  
**Prince George Centre**

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



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Contributions to the newsletter are welcome.

**Deadline for the next issue is**

**February 14**

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you can renew your membership at  
[www.rasc.ca/princegeorge](http://www.rasc.ca/princegeorge)

The editorial page of the Prince George Astronomical Society's newsletter is probably not the right place for a personal plug, but perhaps when I explain myself, you will forgive me.

I know that there are others in our group that have had misfortune visited upon them, I certainly don't want to represent this as any more important or vital than many other worthy causes. But for now I will say my piece and you can let me know what you think.

As some of you know my wife Darlene, has MS. The disease not the software. MS is a nasty degenerative disease that some days leaves you unable to cope with even the simplest of tasks. And yet other days you can "almost" feel normal. Almost normal is a bit of a stretch, its always there sapping your energy changing your life. Fortunately there is a clinic and a branch of the MS Society in Prince George. The MS Society provides support for MS patients in a multitude of forms that I could offer more detail on if you wish. The Society has a fund raising "walk" in June. The walk follows the typical walk format, participants solicit funds based on their walking a prescribed distance. The participants are grouped in teams. Now, here is where my problem comes in, my daughter Aimee has formed a team for the last two years. She has done very well( when Aimee decides something is worth doing, she does it very well). She even received a plaque last year for the best individual performance. She and her boyfriend went door to door gathering donations. Last year I was a member of her team and , well let's just say I would like to do a whole lot better this year. The walk itself is really a formality, only a short one to five kilometres on a Sunday morning in June. Did I mention free food?

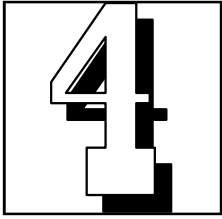
Societies often come to the aid of other organization and I propose that the PGAS adopt the MS Society and participate in this once a year event. We have approximately five months to fill in the pledge sheet, and the event in June would involve a couple of hours usually the first weekend in June.

Astronomers do occasionally come out in the daylight, for a good cause.

Let me know what you think?

Will you join me?

[gil-pg@shaw.ca](mailto:gil-pg@shaw.ca)



## Coming Events

**Next General meeting Wednesday January 28th at the observatory 7:30pm**  
**Executive meeting February 11 at gil's office**  
**February 25th general meeting at 7:30 pm at the observatory**  
**Open houses and Members Nights will start in March**

### The Night Sky for February 2004

by Bob Nelson, PhD

Hi Folks,

Ah, another year! What will this one bring? As always, only time will tell. What I can say is that I hope to see a number of improvements, by my doing, at the observatory. The first of these is adding soundproofing to the classroom. You may have noticed that the room when populated is somewhat 'active' and noisy – that is, voices and sounds of scraping chairs bounce around throughout the room, causing an unpleasant din. For the last few weeks I have been doing some acoustic research, making use of the Physics lab at the College, and I believe that I have hit upon a good solution. More later, but briefly, it entails suspending, from the ceiling and also on some of the walls, 2' x 4' acoustic panels with a pattern of fibrous strips and holes to break up the sound and drastically reduce reflec-

tions. Unlike some of the bare panels you buy, this should really work!

On the other front -- that of finishing the 'flip' secondary for the 24" telescope -- I can report some progress here. I have spun (at low speed, of course), the rotor that will contain both secondary mirrors with a gear-motor and locked it in place with the aid of an electro-magnet. The system needs 'tweaking' and torture testing, plus a controller and mirror clips, etc.; however, progress is good and my goal is to complete it this spring. After that, we should be able to get some really fine CCD images using the 24" telescope!

Anyway, here is what is happening in our skies next month.

#### **PLANET ROUNDUP**

**MERCURY** is a morning object all month. At month's start, it is some 20 degrees to the west (right) of the Sun and rises some 45 minutes before sunrise. By mid-month, these numbers have shrunk to 13 degrees and 23 minutes as Mercury races behind the Sun.

Superior conjunction occurs next month, on the 3rd.

**VENUS** is an evening object all month. On the 15th, it sets about 4 hours after the Sun and is a 70% illuminated 16" (gibbous) disk of magnitude -4.1. (It will reach its brightest in early May.) Very beautiful, as always.

**MARS**, passes from Pisces to Aries on February 2, transits at mid-month at 17:06 (just before sunset) and sets at 0:22 PST. Still there, but going fast as it zooms toward the Sun (from our Earth-bound seats). It's now a tiny 6.6" disk at magnitude 0.7.

**JUPITER**, in Leo until August, rises at mid-month at 19:00 and transits at 01:39. Go for it! It's a 44" disk of magnitude -2.4. Opposition is next month.

**SATURN**, in Gemini until 2005, transits at mid-month at about 21:00, PST and is therefore well placed for evening viewing. It's a 20" disk of magnitude -0.1.

# 5

**URANUS**, in Aquarius until 2009, is unobservable this month, rising and setting at mid-month at almost the same time as the Sun!

**NEPTUNE**, in Capricornus until 2010, is unobservable this month.

**PLUTO**, in Serpens until August, rises at mid-month at 03:17 PST – a tad late for most of us. As usual, it's a 0.1" disk at magnitude 13.8.

**CONSTELLATIONS** to look for in February (at 9:00 PM, PST) are Taurus, Auriga, Orion, Lepus, Canis Major, and Monoceros.

**Taurus** (the Bull) contains two well-known clusters: the Hyades (the horns of the bull) and the Pleiades (M45). Both were discussed last year. Look also for the Crab Nebula, M1, located about a third of the way from Beta Aurigae to Betelgeuse. This is a celebrated nebula, the remnant of a supernova (SN) explosion in 1054 July 4 (according to one account by Chinese observers), and the remnant was discovered in Europe by John Bevis in 1731 (just before Messier did). As you might imagine, Burnham's is full of lore; consult the

observatory's copy for more details. Scientifically, this nebula is almost certainly the best studied. Photographic records date from 1921 and it is possible to measure fairly precisely the expansion rate over some 80 years now which confirms the association with the SN. From many studies, an average distance of 6300 light years is found. Now in the 1930s, several theoreticians (Landau, Zwicky, Gamow, Baade) suggested that the final product of a SN explosion might be an incredibly compressed 'core' hundreds of millions of times more compressed than a white dwarf. Observationally, William Baade, about 1950, associated the SN remnant with a 16th magnitude hot blue dwarf. This was discovered in 1967 by J. Bell and A. Hewitt to emit vast amounts of radio energy in the form of pulses, at intervals of precisely 1.337301 seconds. Soon afterwards, it was announced as the first pulsar or neutron star. Since then, periods as short as a few thousandths of a second have been discovered! See if you can a CCD image of it - it's called CM Tau.

**Auriga** (the Charioteer) contains the open clusters M36, 37 and 38 which are quite nice and easily

found in binoculars or a finder scope. Much more remains to be said, but maybe next year!

**Orion** (the Hunter) contains (need we say?) the famous Orion Nebula, M42, which is probably the most spectacular object you can look at in the 24" telescope. Quite neglected is M78, a "featureless reflection nebula" on the other side of Orion's belt, but probably worth a look.

**Lepus** (the Hare) is a strange little constellation with little to see except M79, a fine globular cluster.

**Canis Major** (the Big Dog) contains of course Sirius, the brightest star in the night sky (at -1.46 mags). It's quite close, at 9 light years, and has a white dwarf companion that we can't see right now.

**Monoceros** (the Unicorn) lies in the Milky Way but has little of note except M50 and a few other open clusters.

Clear skies,  
-Bob





## Executive Meeting Minutes January 14, 2004

Location: #30-1839 1st Avenue, Prince George

Chairperson: Brian Battersby      Recording Secretary: Glen Harris

Executives Present: Glen, Gil, Brian, Rod

Members Present: Maurice, Wayne, John, Bob

Meeting Called to Order at 7:40 p.m.

### 1. Previous Meeting Minutes

No minutes were circulated

### 2. Treasurer's Report

#### Club Account

Total Income	\$2455.75
Total Expenses	\$2242.28
Total Income/Expenses	\$213.47
Total Net Worth	\$3003.86

#### Gaming Account

Total Income	\$260.99
Total Expenses	\$1954.06
Total Income/Expenses	(\$1693.07)
Total Net Worth	\$2868.92

### 3. Correspondence

IDA renewal form

RASC Observing Committee

### 4. General Business

**Motion:** To allocate an additional \$200 from the gaming account to cover the 2004 insurance policy due in September 2004  
Moved: Brian    Seconded: Gil    Carried

**Motion:** Table a motion to bring up the subject at the April 2004 executive meeting to spend the rest of the gaming money.  
Moved: Gil    Seconded: Wayne    Carried

**Motion:** To renew at US\$50 the IDA membership.

Moved: Maurice    Seconded: Gil    Carried

The Executive will promote participation in the RASC Explore the Universe program.

Bob displayed a ceiling sound baffle prototype. Further testing of it's sound deadening qualities will be done, and if the results are favourable, detailed measurements of the classroom will be taken, and an estimate of the cost/number of panels required will be submitted. Preliminary estimate per panel cost is \$15

Further discussion with optometrist John Bosdet regarding mirror grinding will be done by Glen and possibly Maurice.

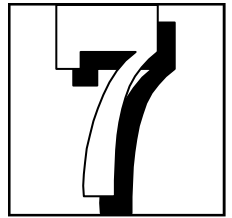
### Upcoming Events

February 24    6:00 p.m.    Westwood School    Wayne will give a short presentation to the Sparks group.

General Meeting

John Ascah will do the main talk.

Adjourned at 9:10 pm

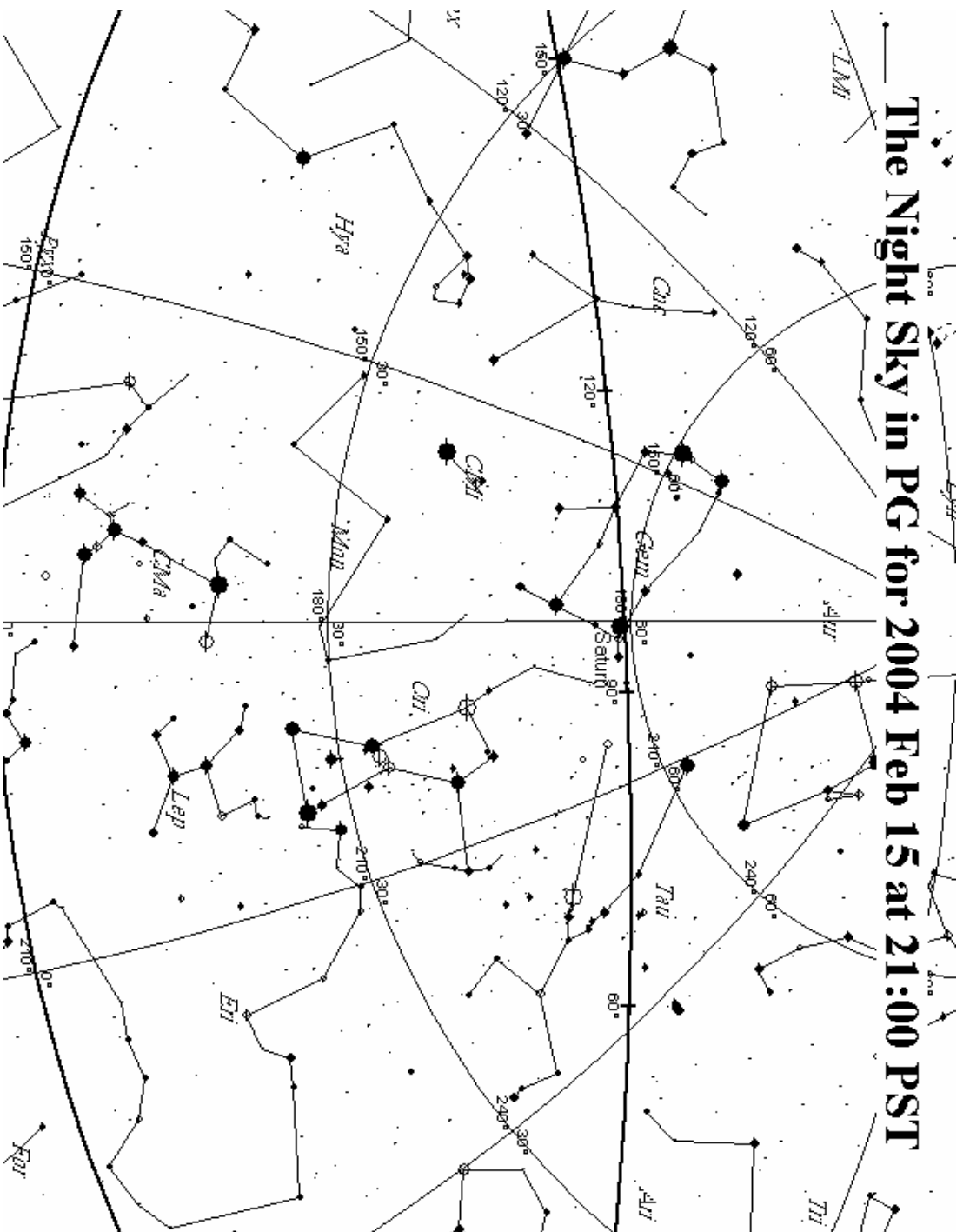


## Christmas 2003 Potluck Dinner Report

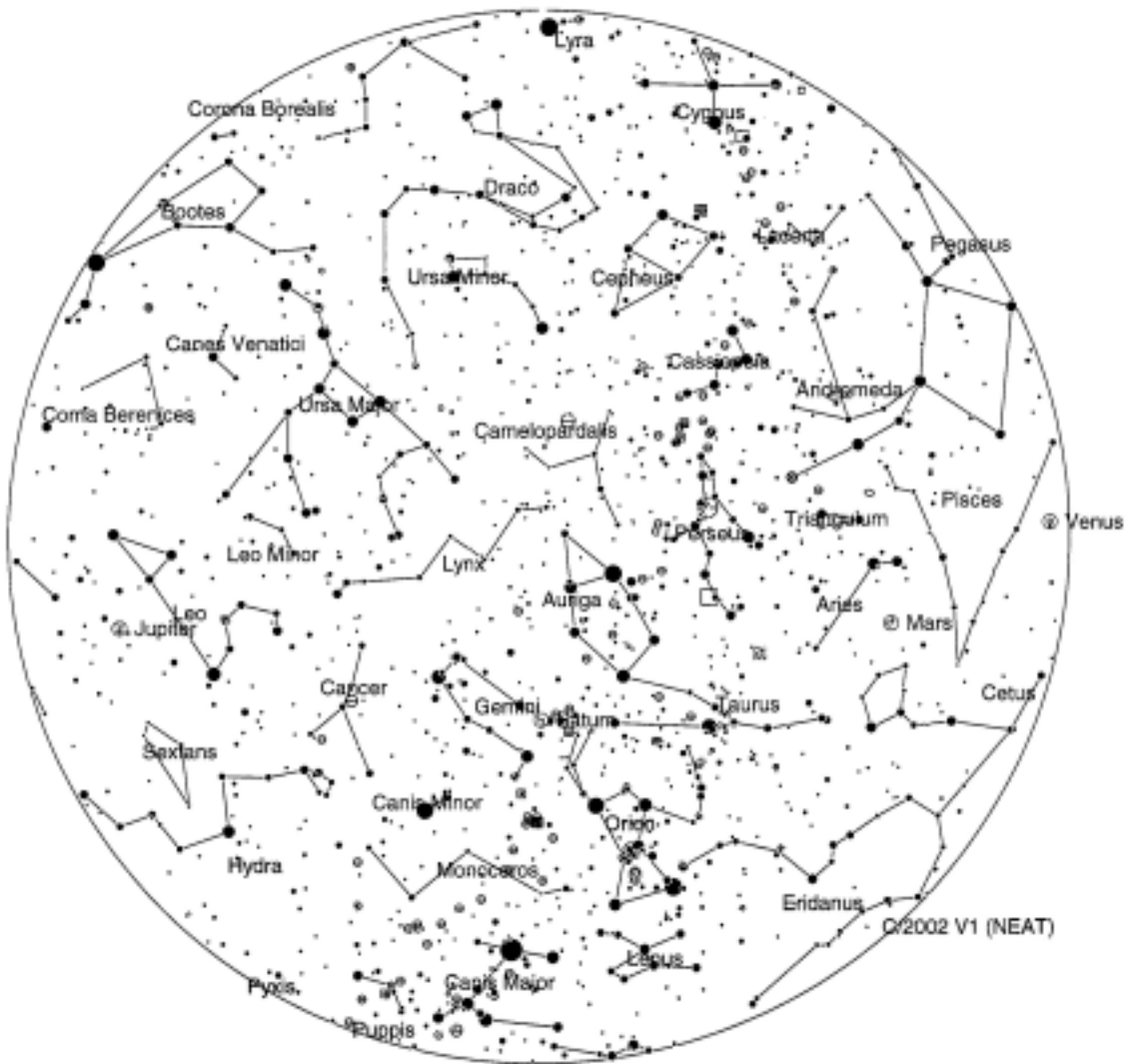
The Christmas Potluck dinner has, in the course of three short years, turned into the PG Centre's premier event of the year. In 2003, the dinner was held on Dec 10 and was attended by 28 people. As usual, the selection and tastiness of the food was excellent, and was thoroughly enjoyed by all. Much socializing occurred before, during and after the actual dinner, and a short presentation of archived images depicting the observatory's construction as well as a few pictures of the Nelson's trip to Italy rounded out the evening.



# The Night Sky in PG for 2004 Feb 15 at 21:00 PST





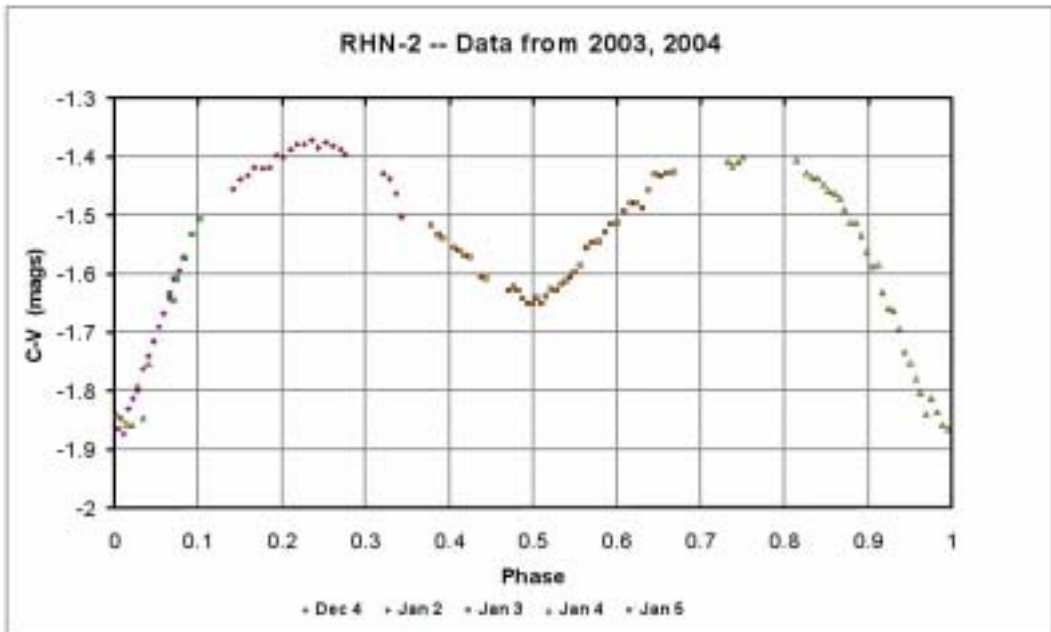
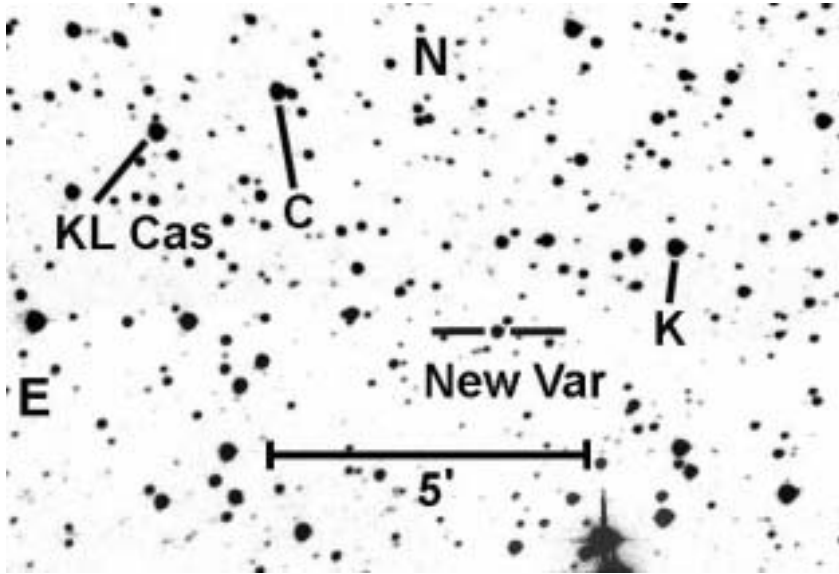


SOUTH

From the P.G.A.O.  
 February 15, 2004  
 9:00 pm

## New Variable Star ( RHN-2 )

Discovered by Dr. RH Nelson, PGAS  
December 3rd, 2003



## Discovering Variable Stars

The advent of CD cameras and modern computers has led to an explosion in the discovery rate of variable stars. Programs like ROTSE (Robotic Optical Transients Survey Experiment) and TASS (The Amateur Sky Survey) have led the way, but there are many more. It is exciting, therefore, for one to discover a few of his own.

Most of you will know that I spend a lot of time observing eclipsing binaries. (These stars, almost all of which are two distant to be optically resolved, are characterized by two stars revolving about their centre of mass. Twice every orbit, one star passes in front of the other resulting in a dip in the light intensity. The light curve, as it is known, can be analyzed to yield an astonishing amount of information about the physical natures of the compo-

nent stars.) What I do is take multiple images of a field of stars over time, then do aperture photometry (brightness measurements) of several of the stars, relating their brightness to a single comparison star. Unfiltered observations are fine for just determining the times of minima, but using coloured filters allows one to do detailed analysis of the light curve.

During a filtered study of one star, ZZ Cygnii, I also did a number of check stars. In general, check stars are used to check that your comparison star is not also varying and also as a check on the overall quality of one's work. (The light curve of a check star should be a horizontal line – in other words, totally constant.) Well, I noticed that the light curve of one of these check stars just happened to be dropping sharply! As I continued to observe ZZ Cyg, the new

light curve went through a minimum then rose again. Over multiple nights (I was fortunate to have had a string of clear nights at that time!), I was able to piece together a full light curve for the new variable, also determining a period in the process. (By the way, this process is not always simple, especially if the nights are separated in time.)

I was further able to do a full Wilson-Devinney analysis. (This process, which I have described before in these pages, models the light curve and other data. By modelling, I mean that the program starts with a few basic star parameters - like temperature, mass ratio and orbital inclination – then calculates the expected light curve, etc. that one should get. By suitable manipulation of the starting parameters, one can get a fit, thereby gaining the actual values for these basic



parameters.) I have written the paper and await a bit

more information before publishing.

Well, now! It occurred to me that I have a large backlog of images (some 45,000 taken over 5 years!) that await analysis. (It's called data-mining. People take data accumulated for some other purpose, analyze them and discover new things. ROTSE data, originally taken to discover optical transients, are now being used to discover variable stars.)

Accordingly, I started to look back at some of my old images. Typically, I might have a string of 30 – 60 images with perhaps 20-50 stars on each that have not been measured. I use this program called MIRA, do aperture photometry for the 20-50 stars and dump the results (sometimes over 1000 lines of data!) into an Excel template worksheet that automatically plots a light curve for each of the stars. (It sounds compli-

cated, but all I have to do is click on the star images for one frame, and the program does the rest, tracking through the 20-50 images and producing a nice table that is saved to disk.)

Well, the fourth star field produced a new discovery. (The run was taken on my birthday, Dec 3, (but Dec 4 UT) to boot!) I realized that the star was varying in early January and was extremely fortunate to get a string of clear nights (Jan 2-5) that allowed me to observe a full light curve, just using the clear filter this time. This string of consecutive nights made it very easy to determine the period (0.7427 days) quite easily.

This star, which I am calling RHN-2, has the technical name GSC 2.2 N311332336840 and has not been observed by anyone else, as far as I can tell. I have submitted the data to IBVS (Informational Bulletin on Variable Stars), and they will include it in publication #5500. It's available online at <http://www.konkoly.hu/cgi-bin/IBVS?5500>, entry 11.

Continuing on, thirteenth field to be examined also appears to contain a new variable star, which I've dubbed RHN-3. I have yet to determine the variable type, much less a period. It's quite faint (14<sup>th</sup> magnitude; RHN-2 was only 13<sup>th</sup> mag) and so will be hard to observe. (It's time to get the 24" telescope into action!)

It is interesting to estimate the possible number of new variable stars that I might expect to find. In addition to the thirteen data sets, there were an additional three that were unsuitable for analysis, so that means a discovery rate of one per eight data sets. Since I have in the neighbourhood of 500-1000 such sets to analyze, I have potentially 50 to over 100 new discoveries to make.

A lot of work for cloudy nights!

Bob Nelson  
2004-01-10

# January / February Star Hop in Auriga

By Doug Wayland

# 13

Map ( page 15)

Courtesy Your Sky

web: [www.fourmilab.ch/yoursky/](http://www.fourmilab.ch/yoursky/)

North is Up, West to the Right  
Stars to mag 6.5

Just look for the small bold numbers on the map and match them to the corresponding numbers in the text. It is very important that you know the directions in both your finderscope and your telescope eyepiece. You can do this by nudging your scope in a known direction while looking in the eyepiece, note which part of the field the stars are appearing, that is the direction in which you were pushing the scope. You may have to do this for both finder and telescope.

Auriga is situated in the winter milky way and therefore is home to several nice open clusters and double stars. Lets take a look at a few.

**1) NGC 1664** Open cluster. Capella can be your starting point, about 4 degrees SW naked eye star Epsilon Aurigae is easily visible. Put your finder there and you will see the two

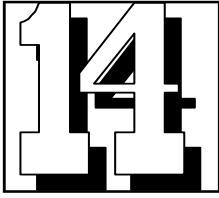
stars indicated on the map to the west and SW. Center your finder in the area as indicated by the circle on the map. At 57x in my LX10 I could see a fairly large dim fan of stars with a tail coming off the south side. There is a brighter star just to the west of the south end of the tail. 1664 is about 300 million years old and 3900 ly away from us.

**2) NGC 1857** Open cluster. To find this one move south of Epsilon about 3.5 degrees to the obvious pair Eta and Chi. Then look ESE and SE about the same distance to see the two bright stars as indicated on the map. Put your finder cross hairs or red dot in the area where the circle for 1857 is. This cluster is fairly small and dim, but is located kind of on the south side of a wide area of bright stars. You'll know you are on 1857 when you see a pair of fairly bright stars oriented NW-SE and another pair a little dimmer and just to the SE oriented N-S. Also you will see a small triangle of equally bright stars a little way to the N, within the field. NGC 1857 is 6200 ly away.

**3) Next we will move south in the constellation to **14 Aurigae**.** This is easy to find just SW of an obvious and beautiful quadrilateral group of stars that are located easily in your finder at the apex of a triangle formed with Beta Taurus (Nath) and Iota Aurigae. In your finder you will see the two stars spaced away to the SW of the quadrilateral. Target the second one away and at about 50x or so you will see a beautiful close double of a bright yellow and dim blue stars. they are separated by 14" and a position angle of 226 degrees.

**4) NGC 1893** Open cluster. Go back to the quadrilateral and shift your finder about a degree east, positioning at the right angle corner of a triangle formed with the quadrilateral and the two brighter stars to the NE, all visible at once in your finder. This open cluster is fairly large, I saw an indistinct "S" formation within a brighter triangle of stars. Some references say it is a "Y" shape This cluster is embedded in the

*(Continued on page 14)*



nebulosity of IC 410, but I didn't see it. Try a UHC or OIII filter and you may catch a glimpse of it. 1893 is a young cluster, about 1 million years, probably formed out of the nebula. It is 13,000 ly away from us.

**5) M38** Open cluster. Now to move on to some brighter open clusters from the Messier catalogue. From the quadrilateral group of stars go about 4 degrees NE and M38 should show as a fuzzy area in your finder. In a low power, wide field eyepiece this cluster is very nice. It's large and fairly bright. If you put M38 at the N edge of your eyepiece field, you will see another smaller open cluster, NGC 1907, nearly a degree to the SSW. These contrasting open clusters in the same field is truly a beautiful sight. M38 is 16 ly wide, 2800 ly away and 220 million years old.

**6) M36** Open cluster. Move about 3 degrees SE and M36 should show as another glow in your finder. This open cluster is smaller with a bright, loose concentration of stars. It looks very nice in a low power eyepiece.

I think it looks like a small beehive cluster. M36 is 13 ly wide, 3,700 ly away and 25 million years old.

**7) M37** Open cluster. If you shift about 4 degrees SE and position your finder according to the stars indicated on the map, you should find M37. This, in my opinion, is the most spectacular of the three Messier clusters in Auriga. At 57x it shows large and concentrated, like diamond dust. Each star is dimmer than in the other Messier clusters just mentioned, but there are many more of them. M37 is 24 ly wide, 3,600 ly away and 300 million years old.

**8)** Now to find our next target, start at the naked eye star Upsilon Aurigae, the one that looks like a written v on the map. About 7 degrees to the ENE you should be able to see the crooked N-S line of three stars. In your finder you will see a fourth dimmer star just SW of the three. That is **Otto Struve 147**. At 57x I saw a very nice, fairly close triple. The primary is bright yellow and the two secondaries are dimmer blue stars to the east forming a neat triangle with the primary.

**9) NGC 2281** Open cluster. About 5 degrees NE you should be able to find the open cluster NGC 2281. It is about one degree SSW of a mag 5 star. It is a fairly large dim cluster within a polygon of brighter stars. This cluster is 1600 ly away and 300 million years old.

**10)** We will finish this star hop with a nice tight, bright double star, **41 Aurigae**. Start at Beta Aurigae and follow the star pattern 4 degrees N, then turn and follow 3 degrees NW. When you are on the right star it is obvious in the eyepiece. After finding it in at low power, switch to a higher power to give the best view. These two are 7 arc seconds apart in a N-S orientation and are fairly evenly bright white. After you have finished admiring this double, keep your eye in the eyepiece and gently move your scope about 3 degrees ENE and you will see an orange star come into view. This is the variable star 46 Aurigae.

I hope you enjoy this months tour.

Doug Wayland e-mail: [djwayland@hotmail.com](mailto:djwayland@hotmail.com)

