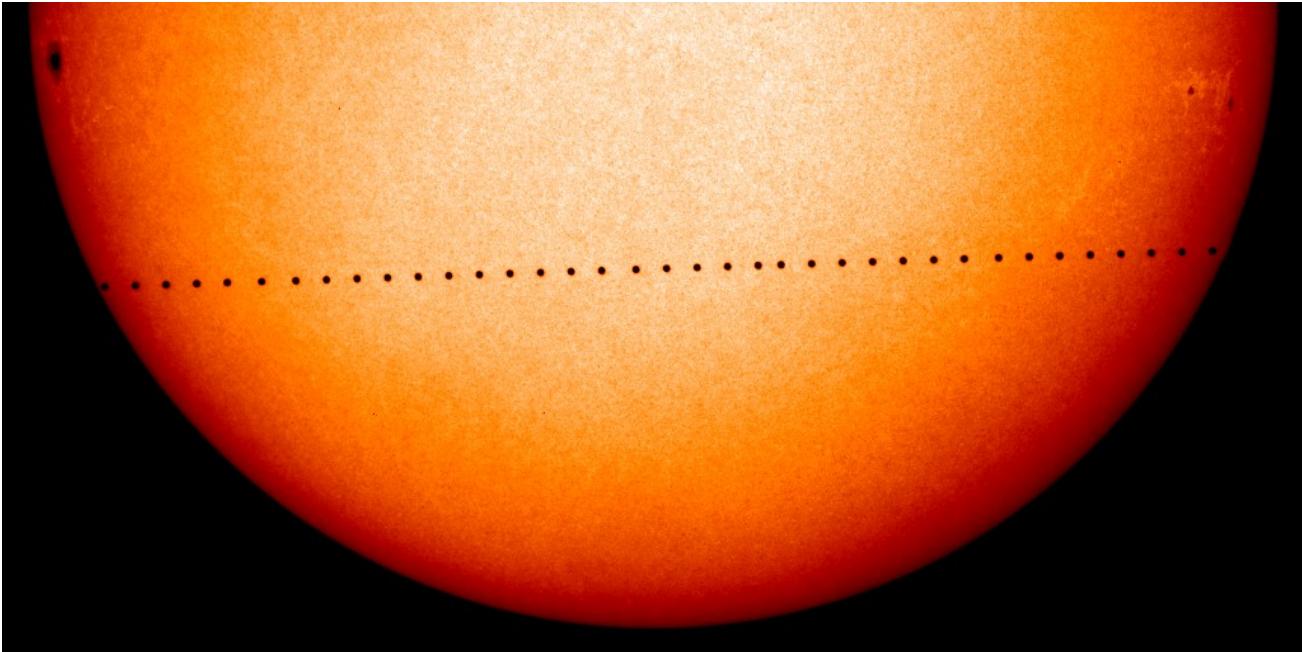


# Saskatoon Skies

The Newsletter of the Saskatoon Centre of the Royal Astronomical Society of Canada

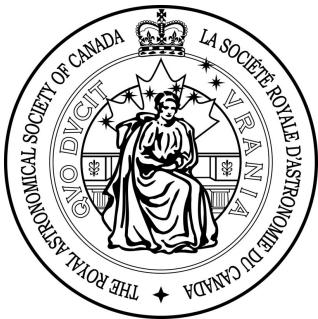
Vol. 47, No. 5

May 2016



The above composite image was taken of the Mercury transit in November, 2006. A similar sight will be visible in the early morning hours of Monday, May 9<sup>th</sup>.

Image Credit: NASA



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see our website:

<http://www.usask.ca/rasc/newsletter.html>

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# MEMBERSHIP? JOIN TODAY!

**Regular: \$85.00 /year**

**Youth: \$45.00 /year**

**Family: \$80/year**

The Saskatoon Centre operates on a one-year revolving membership. You will be a member for the next 12 months no matter when in the year you join. If you do not want to join at this time, ask to get onto our FREE 3-month Temporary Membership list. You will receive regular mailings of our Saskatoon Skies newsletter and will be invited to participate in Centre activities. Members are encouraged to renew early to avoid disruption in publications. Renew through the National Office at <http://www.rasc.ca/join-us>

## Benefits of Membership in the Saskatoon Centre

- knowledgeable & friendly amateur astronomers
- use of the Sleaford Observatory
- use of the U of S Observatory (after training)
- Saskatoon Skies Newsletter
- Observer's Handbook
- Journal of the RASC (electronic format)
- SkyNews Magazine (bimonthly)
- use of the Centre library
- borrow the Centre's Data Projector to give astronomy outreach presentations – contact Les Dickson at [astrochem@sasktel.net](mailto:astrochem@sasktel.net)
- rent the Centre's Telescopes <https://www.usask.ca/rasc/telescopes.html>
- discounts to Sky & Telescope Magazine\*
- free, no-cost, no-obligation, 3-month temporary membership if you don't want to join right now!

## U OF S OBSERVATORY

The U of S Observatory is open to the general public every Saturday of the year. Admission is free. The observatory is located on campus, one block north of the Wiggins Avenue and College Drive entrance. On clear nights, visitors may look through the vintage 6-inch and tour several displays. Current events are recorded on the Astronomy Information Line at 966-6429.

### Observatory Hours:

January-February	7:30-9:30 pm
March	8:30-10:30 pm
April	9:30-11:30 pm
May-July	10:00-11:30 pm
August	9:30-11:30 pm
September	8:30-10:30 pm
October-December	7:30-9:30 pm

## SASKATOON CENTRE'S MAIN OFFICERS:

**Interim President** – Les Dickson

**Vice-President** – **to be filled**

**Secretary** – Tenho Tuomi, 306-858-2453

**Treasurer** – Norma Jensen, 306-244-7360

**National Council Rep** – **to be filled**

Bottle Drive &  
Canadian Tire \$  
By Les Dickson

If you cannot attend a meeting but would like to donate your Canadian Tire money please email me at [astrochem@sasktel.net](mailto:astrochem@sasktel.net)

**Newsletter Editor** – Kris Ohnander

**Copy & Collate** – Les & Ellen Dickson

**Labels & Temps** – Mark de Jong

**Web Posting** – Gord Sarty

Saskatoon Skies is published monthly by the Saskatoon Centre of the RASC. Distribution is approximately 100 copies per issue. Saskatoon Skies welcomes unsolicited articles, sketches, photographs, cartoons, and other astronomy or space science material. Submissions should be sent by e-mail to the editor at [krisohn@gmail.com](mailto:krisohn@gmail.com) in msword or text format. Images: any format, less than 30MB, sent by e-mail as attached files. **Deadline for submission of all articles for an upcoming issue is the first Friday of the month!**

A separate by-mail subscription to Saskatoon Skies is available for \$15.00 per year. Saskatoon Skies is also posted on our Saskatoon Centre homepage as a .pdf file and can be downloaded free-of-charge. Members may choose to receive the newsletter by regular mail or via the Internet. Articles may be reprinted from Saskatoon Skies without expressed permission (unless otherwise indicated), provided that proper source credit is given. Saskatoon Skies accepts commercial advertising. Please email the editor at [krisohn@gmail.com](mailto:krisohn@gmail.com) for rates. Members can advertise non-commercial items free of charge.

**LIGHT POLLUTION  
ABATEMENT**  
WEBSITE AT:  
[www.ras.sk.ca/lpc/lpc.htm](http://www.ras.sk.ca/lpc/lpc.htm)

## RASC CALENDAR OF EVENTS

<b>May 16</b>	<b>RASC General Meeting</b>	Les Dickson
<b>May 24</b>	<b>Nature City Festival Solar Observing</b>	Les Dickson
<b>June 4</b>	<b>Observers Group</b>	Larry Scott
<b>June 20</b>	<b>RASC General Meeting</b>	Les Dickson
<b>July 22-24</b>	<b>Grasslands West Block Star Night</b>	Les Dickson
<b>July 30</b>	<b>Observers Group</b>	Larry Scott
<b>August 3-7</b>	<b>Saskatchewan Summer Star Party (<i>More details online!</i>)</b>	Les Dickson

For a complete list of club events, please visit: <http://www.usask.ca/rasc/activities.html>

### May RASC General Meeting

for all members and guests, Room 175 Physics Bldg  
University of Saskatchewan, on

***Monday, May 16<sup>th</sup>, 2016 at 8:00PM***

***Presented by Taylor Bell:  
Observations of Exoplanets***

*The existence of planets orbiting other stars (exoplanets) was first confirmed in 1992. There are now a total of 1 977 exoplanets that have been confirmed, and the number continues to grow. The detection and study of these small, faint objects requires advanced technologies and techniques. In my presentation, I will provide an introduction and overview of the different methods used to detect and study exoplanets. I will also discuss the exoplanet transit observations that I have made under the supervision of Stan Shadick through the Variable Star Research Group at the University of Saskatchewan. Finally, the important role that amateur astronomers can play in exoplanet research will be discussed.*

***Presented by Jim Goodridge:***

***The RASC Visual Observing Log: How and Why to Use it***

*Keeping track of your observations and noting important information is easy if you use this form. Extra copies of the log sheet will be available so you can have your own printed. Handouts will be provided.*

***Note: There will be an Executive meeting at 7:00PM***

# Observations of Exoplanets – Taylor Bell

The existence of planets orbiting other stars (exoplanets) was first confirmed in 1992. There are now a total of 1 977 exoplanets that have been confirmed, and the number continues to grow. The detection and study of these small, faint objects requires advanced technologies and techniques.

However, the study of exoplanets is not only for those in academia – amateur astronomers can play an important role too. With a telescope that is  $\sim 10''$  in diameter and a CCD camera, it is possible to collect scientifically useful data. For example, a recent paper published by Baluev et al. (2015) had the University of Saskatchewan's Stan Shadick as a co-author as a result of the data he gathered with small telescopes on the roof of the Physics Building. Several U of S undergrads have also contributed exoplanet observations: myself included.

I have just completed my B.Sc. Honours in Physics at the University of Saskatchewan, specializing in astronomy. During my time at the University of Saskatchewan, I became increasingly excited about exoplanet research and the role that I could play. This September I will be moving on to McGill University to pursue graduate studies in astronomy focusing on exoplanets in particular.

My experience so far with exoplanet research has been as an amateur observer using the transit method which is one of the main techniques used to study exoplanets. A small fraction of exoplanets will appear to cross in front of their host star from Earth's vantage point. When the exoplanet passes in front of the star, it blocks out some of the light from the star (normally 1% or less). Exoplanet transits can be detected using telescopes on the ground and in space by continually taking images and looking for the small dip in the light from the star. NASA's Kepler Space Telescope has discovered over 1000 confirmed exoplanets by staring at one small patch of the sky. Future telescopes such as the Transiting Exoplanet Survey Satellite will allow this field to grow even further.

It is through the transit method that amateur astronomers can have an impact on exoplanet research. Since most transit events last for an hour or more, observations with large scientific telescopes can be quite costly. Also, continued monitoring of transit events can provide information about the presence of other exoplanets around the star and possibly even moons orbiting the detected exoplanet (called exomoons). There has not yet been a confirmed detection of an exomoon, but the discovery of these small bodies is likely to come soon.

In order for amateur astronomers to contribute observations, the observations have to be reduced using differential photometry. Differential photometry is the process of looking for changes in the intensity of light coming from a star by comparing it to other stars with constant brightness. Bruce Gary has created a Microsoft Excel spreadsheet which can be used to determine which stars should be used as constant stars. It will also allow you to produce a light curve which shows the transit event. The spreadsheet can be found online at [www.brucegary.net/book\\_EOA/xls.htm](http://www.brucegary.net/book_EOA/xls.htm). Observations can then be submitted to the Exoplanet Transit Database (ETD) hosted by the Czech Astronomical Society. The ETD also has a wealth of information about many known transiting exoplanets, and it can be used to determine when to observe an exoplanet from your location. The ETD website can be found at [var2.astro.cz/ETD](http://var2.astro.cz/ETD). Those who do not have a telescope suitable for such observations can also help to classify observations from scientific telescopes through the Planet Hunter project found at [www.planethunters.org](http://www.planethunters.org).

Exoplanet research is a quickly growing field, and there are many exciting discoveries that are on the horizon. The search for exoplanets, exomoons, and extraterrestrial beings is a human endeavour, and there are opportunities for all to contribute. So grab a friend, stare into the night sky, and join in the search!

# Minutes of the April Meetings – *Tenho Tuomi*

## Minutes of the April 18 Executive Meeting

The meeting was called to order by President Les Dickson at 7:04 pm.

### Business:

Moved by Darrel Chatfield and Les Dickson that the minutes of the February 22 executive meeting be accepted as circulated. Carried.

Moved by Les Dickson and Mark de Jong that we pay the University \$523.69 as our share of the expenses for 2014-2015 for Sleaford. Carried.

Items rising from the Joint Sleaford Site Management Committee meeting.

- Our club will pay for trenching for a service entrance for our new shed.
- The mouse problem in the roll-off to be solved with mouse traps and frequent visits.
- Problem with a raccoon in the old school house.

Moved by Darrel Chatfield and Mark de Jong that a maximum of \$6000.00 be paid for electrical trenching from the old school to the new shed, and for a service entrance box, wiring and lighting in the shed. Carried.

There was more talk about how the old observatory and dome will be removed.

Moved by Les Dickson and Darrel Chatfield that we pay up to \$600.00 for our share for additional red lights in the Service Center at the Meadows at Cypress Hills Provincial Park. Carried.

There was discussion on how to deal with capital items for SSSP regarding accounting and sharing with Regina.

Moved by Tenho Tuomi and Darrel Chatfield that Les Dickson be paid \$65.80 for expenses related to James Edgar's visit. Carried.

There was discussion regarding what compensation to pay for speakers. This will be decided at the next meeting.

A new 3' x 6' banner is needed for table fronts at events. Quotes will be brought to the next meeting.

Important documents relating to our Centre as a corporation are in Jim Gorkoff's care presently. We should put them on a secure website.

### Reports:

- President's Report by Les Dickson – Astronomy Day events at Lakewood, Farmer's Market and Beaver Creek went well with about 6 to 8 volunteers.
- Treasurer's Report by Jim Gorkoff – About \$14,000 in investments came due and is held for expenses. PayPal is working well for SSSP registrations.

- SSSP Report by Les Dickson – Registration is open and 30 to 40 have registered. Ron Waldron will be giving a binocular star walk at the SSSP. One more speaker is needed. Next year rooms can be held for Wednesday.
- Membership Report by Mark de Jong – 76 members.
- Scope Rental Report by Errol Frazer-Harrison – All scopes are fixed and operating.

Meeting adjourned at 8:04 pm.

## **Minutes of the April 18 General Meeting**

Meeting opened at 8:15 after a coffee break.

Les Dickson gave a summary of the Executive Meeting. Thanks to Andrew Kostiuk for the new SSSP registration website.

Rick Huziak gave a review of the new Pocket Star Atlas Jumbo Edition put out by Sky & Telescope.

Hope Boyce gave a presentation on the study of stars around a possible black hole in the large Magellanic Cloud.

Meeting adjourned at 9:40 pm.

## **The May 9<sup>th</sup> Morning Transit of Mercury** *– Rick Huziak*

Should the very early morning of May 9 be clear, early risers will be treated to a transit of Mercury, the last one of which occurred in 2006. Excellent articles about this transit appear in *SkyNews* (May/June 2016, Alan Dyer) and in *Observer's Handbook 2016* (pp. 142 – 147, Fred Espenak), so I won't repeat much of what they've said. However, this Monday morning transit presents an opportunity to do some sidewalk and "work-walk" astronomy. Since I am often tired, but not yet *retired*, I will be going to work that Monday, and I plan to take my telescope to work and wow my fellow (and fella) employees for an hour or so before work starts. It is an opportunity for you to do the same, but remember to remind everyone on the previous Friday to come in to work early.

However, in Saskatchewan, the transit begins much earlier than work does for many of us. Unfortunately, Mercury's first contact with the sun occurs while the sun is still one degree *below* the horizon at 5:16:20 a.m. CST for Saskatoon, and 4 seconds later for Regina. The sun's top edge breaks the horizon about 5 minutes later and the sun is completely up 4 minutes after that. By this time, Mercury has travelled three of its diameters onto the sun, and will appear as a small (12 arc-sec) dot on the east limb (or to the ESE for the naked-eye observer, who should be smart enough to already be using some sort of a solar filter.)

Over the next two hours, by which time people will begin arriving at work, the sun and Mercury will rise out of the muck of the lower atmosphere, and by 7 a.m. will be about 12 degrees above the

horizon, hopefully with sharper views. With a properly filtered telescope, employees should be absolutely astounded by the minuscule round black dot. Be prepared for some to be rolling around on the ground uttering things in strange languages! It might be difficult to calm them enough to be productive for the rest of the day. I'd bring an Epi-pen, just in case! Hopefully, there will also be a few sunspots for comparison. Of course, this also provides an opportunity to inject the scientific significance of what is happening into the conversation. If you have some solar glasses left over from the last partial solar eclipse, it might be fun to see if anyone can spot Mercury at unit magnification.

Mid-transit occurs at 8:57:56 a.m. (two seconds later in Regina). Contact with the western limb of the sun occurs at 12:38:31 (one second later in Regina), conveniently over the noon hour. Last contact, with Mercury moving completely off of the sun, occurs three minutes later, at 12:41:43 for both Saskatoon and Regina. The sun will be 55 degrees above the horizon (57 in Regina) and still a little east of the meridian.

Egress of Mercury provides a good opportunity to look for the teardrop phenomenon, where Mercury could appear to be attached to the sun's edge by a tiny "string" for a bit before and after egress. Depending on how bright the sun's corona is (and how dark blue the sky is), you might also be able to see Mercury for a few minutes *after* it has left the sun, since it will be silhouetted against the solar actual corona. I've seen this in normal light, but the effect is more pronounced if you have a hydrogen-alpha telescope.

Note that during the transit, Mercury is illuminated only on the far side (duh!), so its actual visual magnitude will be +6.2, more or less the same brightness as the faintest stars on a dark night. That kind of implies that if the universe was as bright as the sun, you could see all 6000 naked eye stars during the day, but you'd need a really big universe filter! The next transit of Mercury will occur on November 11, 2019, and since that is Remembrance Day, you are likely to forget to look for it. That one is also a morning transit, but it will be half over by the time the sun rises, unless you are in sunny South America!

## Is T CrB Ready to Go Boom? – *Rick Huziak*

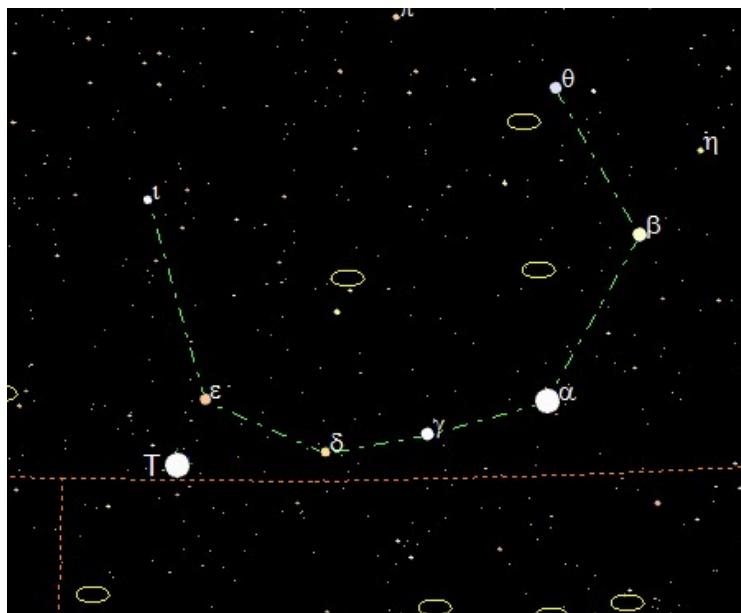
From February through April, T Coronae Borealis (T CrB), a recurrent nova that has previously been seen in eruption in 1866 and 1946, raised eyebrows enough to have the American Association of Variable Star Observers (AAVSO) issue Special Alert Notice #415. The alert notice called for ongoing monitoring of the star to see if it is indeed preparing for the imminent next eruption. The eruption is inevitable, but no one knows for sure if it will be next week, in 2026 or sometime thereafter. Recurrent novae, like their smaller dwarf novae cousins, are only quasi-periodic, but they will erupt brightly sooner or later! With recurrent novae, the red giant has overflowed its Roche lobe, and gas flows outward towards the fairly distant co-orbiting white dwarf. The gas goes into orbit around the white dwarf forming a huge accretion disk of hot material. Some of the material falls onto the white dwarf, while much of it remains in orbit, becoming denser and hotter as more gas accumulates. In recurrent novae, the gas that has piled up on the white dwarf heats up enough to undergo thermonuclear and radioactive "burning" as the pressure and temperature reaches a critical level and major brightening of the system occurs until the surface of the star and the disk "burn down". The gas from the dwarf is ejected into space at high speeds. However, the exact mechanism of the eruption remains unclear, and the eruption might actually occur right in the accretion disk itself.

This latest brightening of T CrB is pretty spectacular as things go - T CrB has been brightening since early February and is currently approximately about one magnitude brighter than it has been during the quiescence state after since last outburst in 1946. In the first few weeks of April, the recurrent nova rose to 9th magnitude (from 10<sup>th</sup>), and has now faded slightly. Careful photometry shows there seems to be the appearance of *superhumps*, possibly reflecting the precession period of the accretion disk in a very approximate 2-week quasi-period. (The orbital period of the two stars, the spectral type M3III red giant and the white dwarf with the accretion disk around it, is 227 days, indicating a fair separation of the pair, thus long periods between outbursts, but the accretion disk spins and precesses much faster.)

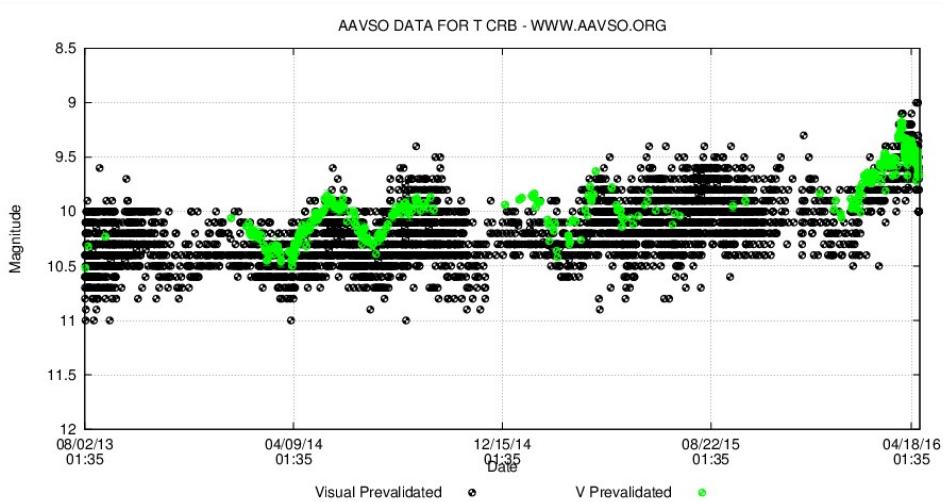
The last outburst in 1946 appears to have been preceded by a few pre-burst brightenings, though it seems that those happened months or even years before the main outbursts, but from the current “bluing” (heating) of the star system and the increase in brightness of 2.5 times greater than the baseline brightness, it seems this star is preparing for something to happen *soon*, in astronomical terms, and that the accretion disk is filling toward some critical tipping point.

I thus highly encourage putting this star on your observing program every night until it goes boom, and then for the next several months afterward. (This could be a long-term project, still.) I made a Newtonian and a Cassegrain comparison chart for the star using the AAVSO chart-maker ([www.aavso.org/vsp/](http://www.aavso.org/vsp/)) with fields-of-view at 1.2 degrees to catch all of the standard comparison stars. You can make your own chart from the website, or just download the ones I created: chart ID X16120EB for the Newtonian version and X16120EC for the Cassegrain view). Don't just find the star ... make an estimate of T CrB's brightness every clear night and report it to the AAVSO! Finding T CrB is a breeze – it is an easy star-hop from the bright stars of CrB.

Astrophotographers should also take advantage, shooting 5 consecutive frames of the field each night (for statistical purposes) even if you are planning to photograph something else. Just include Corona Borealis in your nightly imaging, and archive the frames after taking a quick look. Of course, shooting in a raw format is more useful, but any band imagery might just show the rise of this star when it eventually happens. It reaches 2nd magnitude when it blows, changing what CrB looks like for a few weeks!



T CrB is just off of eta CrB – in this chart it is shown as bright as it will be when it erupts, about 2<sup>nd</sup> magnitude. It will change the look of CrB for a few weeks as the star brightens quickly then fades.



The visual and CCD light curve of T CrB for the last 3 years. Normally, T CrB oscillates about half a magnitude in about a 90-day quasi-period, but jumped more than a magnitude over the last three months, increasing its amplitude and maximum brightness. Graph from AAVSO LCG data.

## Observer's Group – *Larry Scott*

On May 7th two members attended the scheduled Observer's Group meeting at Sleaford. It was a beautiful, warm evening with clear skies and a light wind out of the south. There was a sliver of one day old moon at sunset. Then as the sky darkened a band of light was spotted stretching from east to west, just south of zenith. Fearing the worst I checked the auroral oval display on [spaceweather.com](http://spaceweather.com) and there it was. A geomagnetic storm was underway and continued for the rest of the night. I watched for three hours as the pulsating lights ebbed and flowed. Then I packed up my scope and tried to go home. After I closed the gate at Sleaford I stopped to watch for another 15 minutes. Finally I left and managed to travel about 10 minutes before having to stop the van and watch another outburst of activity from the side of a prairie road. Spectacular display!

A week prior to that on April 29th three members were able to do some actual observing with telescopes at Sleaford. I had hoped for some more observing time but smoke filled skies dominated for most of our dark sky period.

Next scheduled Observer's Group is June 4th.

# Observing Clubs and Certificates

Join the Club! Observe all 110 Messier, 110 Finest NGC, 400 Herschel I or II, 140 Lunar, 154 Sky Gems or 35 Binocular objects, or Explore the Universe and earn great OBSERVING CERTIFICATES!

## MESSIER CLUB

### Certified at 110 Objects:

R. Huziak, G. Sarty, S. Alexander,  
S. Ferguson, D. Jeffrey, D.  
Chatfield, B. Christie, K.  
Noesgaard,  
M. Stephens, B. Hydomako, T.  
Tuomi, L. Scott, G. Charpentier,  
B. Johnson, M. Clancy, L.  
Dickson, B. Burlingham, K.  
Houston, Norma Jensen

Ron Waldron	108
Wade Selvig	75
Garry Stone	57
Bernice Friesen	45
Wayne	43
Schlakohl	
Barb Wright	40
Ellen Dickson	34
Jeff Swick	24
Graham	9
Hartridge	

## Chatfield BINOCULAR CERTIFICATE

### Certified at 35 to 40 Objects:

M. Stephens, T. Tuomi, M.  
Clancy,  
R. Huziak, K. Maher

Jim Goodridge	12
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## FINEST NGC CLUB

### Certified at 110 Objects:

R. Huziak, D. Jeffrey, G. Sarty,  
D. Chatfield, T. Tuomi

Larry Scott	110
Scott Alexander	97
Norma Jensen	83
Sandy Ferguson	23
Kathleen Houston	23
George	13
Charpentier	
Mike Clancy	7

## EXPLORE the UNIVERSE

### Certified at 55 to 110 Objects:

M. Clancy, T. Tuomi, K. Maher,  
B. Gratias

Wayne	55
Schlakohl	
Jim Goodridge	35
Sharon Dice	31

## Isabel Williamson Lunar Observing Certificate

### Certified at 140 Objects:

T. Tuomi

Norma Jensen	140
Jeff Swick	29



## HERSCHEL 400 CLUB

### Certified at 400 Objects:

D. Jeffrey, R. Huziak, D.  
Chatfield, T. Tuomi

Gordon Sarty	251
Scott Alexander	117
Larry Scott	45
Sandy Ferguson	18

## HERSCHEL 400-II CLUB

Darrell	400
Chatfield	
Tenho Tuomi	378
Rick Huziak	246

## LEVY DEEP-SKY GEMS

### Certified at 154 Objects:

Tenho Tuomi	150
Darrell	70
Chatfield	

The Messier, Finest NGC and David Levy's Deep-Sky Gems lists can be found in the *Observer's Handbook*.

The Explore the Universe list is available on the National website.

On-line Messier and Finest NGC lists, charts and logbooks: <http://www.rasc.ca/observing>

On-line Herschel 400 List: <http://www.astroloegue.org/al/obsclubs/herschel/hers400.html>

Binocular List is at: [http://homepage.usask.ca/%7Eges125/rasc/Chatfield\\_Binocular\\_List.pdf](http://homepage.usask.ca/%7Eges125/rasc/Chatfield_Binocular_List.pdf)

"Isabel Williamson Lunar Observing Program Guide:

<http://www.rasc.ca/observing/williamson-lunar-observing-certificate>

Program details can be found at: <http://www.rasc.ca/williamson/index.shtml>