

Saskatoon Skies

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

Volume 55, Number 04

April 2024



Royal Astronomical Society of Canada
Saskatoon Centre Incorporated
Box 31086, RPO Broadway
Saskatoon, SK S7H 5S8

WEBSITE: <https://saskatoon.rasc.ca/>
E-MAIL: sk_centre@rasc.ca
FACEBOOK: [RASC Saskatoon Centre](#)
INSTAGRAM: [@RASCYXE](#)

To view *Saskatoon Skies* digitally, see our website:
<https://saskatoon.rasc.ca/newsletters.html>

In This Issue:	
Membership Information / Officers of the Centre	2
Newsletter Info / U of S Observatory Info	3
Calendar of Events & Meeting Info	4
Books and Equipment For Sale	5-6
Saskatchewan Summer Star Party	7
April Night Sky Events & Info	7-9
Reimbursement for Centre Expenses	9
Clear Sky Chart / Weather Info / Light Abatement Info	10
Solar Eclipse Viewing Info	11
Minutes of March Meetings	12-14
Observing Certificates & Clubs	16-17

MEMBERSHIP? JOIN TODAY!

Regular: \$111.00 /year

Youth: \$61.10 /year

Family: \$105.50 + \$42.90/additional adult + \$22.20/additional youth

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. Members are encouraged to renew early to avoid disruption in publications. Renew through the National Office at <http://www.rasc.ca/join>.

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)
- borrow the Centre's projector to give astronomy outreach presentations – contact Les Dickson at astrochem@sasktel.net
- rent the Centre's Telescopes <https://saskatoon.rasc.ca/telescopes.html>
- use of the Centre library
- SkyNews Magazine (bimonthly)

SASKATOON CENTRE'S MAIN OFFICERS:

President – Brent Burlingham

Vice-President – John Takala

Secretary – Lorie Tedford

Treasurer – *vacant* (Les Dickson interim)

National Council Rep – Joelle Sheard-Patrick

Canadian Tire money - Darrell Chatfield

If you cannot attend a meeting but would like to donate your old Canadian Tire money please to assist with club purchases, email Darrell at novachat@sasktel.net.

NEWSLETTER INFO

Newsletter Editor – Colin Chatfield

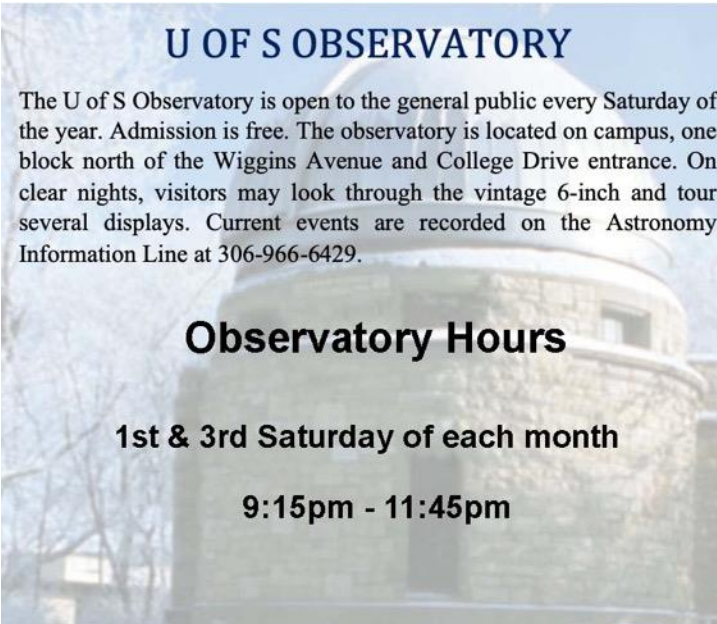
Copy & Collate – Les & Ellen Dickson

Labels & Temps – Mark de Jong

Web Posting/Content Editor – Tenho Tuomi/Andrew Kostiuk/Brent Burlingham

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 colcha@gmail.com in MS Word or text format. Images (new or old): any format, less than 30MB, sent by e-mail as attached files. Send any articles of interest to the night sky or astronomy. **Deadline for submission of all articles for an upcoming issue is the first Friday of each month!**

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 colcha@gmail.com for rates. Members can advertise non-commercial items for free.

A graphic with a background image of the U of S Observatory building. The text is centered and reads: "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 306-966-6429.", "Observatory Hours", "1st & 3rd Saturday of each month", "9:15pm - 11:45pm".

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 306-966-6429.

Observatory Hours

1st & 3rd Saturday of each month

9:15pm - 11:45pm

Hours subject to change, so check below for more info -

Website - <https://artsandscience.usask.ca/physics/facilities/observatory.php>

Facebook - <https://www.facebook.com/usaskobservatory/>

RASC CALENDAR OF EVENTS & MEETING INFO

April 8	Solar Eclipse Viewing	U of S Observatory
April 15	RASC Saskatoon Centre General Meeting	Brent Burlingham

Observer's group viewing starts at dusk at the Sleaford Observatory dark site. Get there early and set up for a great night of observing! Members and their guests only.

For a complete list of club events, please visit: <https://saskatoon.rasc.ca/activities.html>

April RASC General Meeting

for all members and guests

Join us on April 15th, 2024 at 8:00PM (Executive meeting at 7:00pm)

Webinar (info below)

***Please note:** the meeting will be at the U of S Observatory at 108 Wiggins Ave (on the U of S Campus)*

7:00pm - **RASC Executive Meeting** (Members may attend the executive meeting as observers if they wish)

A Zoom registration link and phone-in numbers will be emailed to Members.

After that, the procedure to register and join the meeting is the same as for the webinar (explained below).

NOTE: links to register to attend the webinar will be emailed out as well so we know who is planning to attend. After registering, an email invitation will be sent with a link to join via computer or a number to phone in. When joining via computer, participants will have to first download and install the Zoom app, if they have not done so already.

8:15pm - **Main Program -**

"What's Up This Month?" – Colin Chatfield

Jeff Swick unveils his latest telescope project along with answering how's and why's. He'll be live from the "Centre for Backyard Astronomy and Beer Garden." Photo below



Photo taken by Jeff Swick

BOOKS AND EQUIPMENT FOR SALE

All books are in either new, or like new condition. Retail price in brackets. Please email at novachat@sasktel.net or text/call 306-222-0515 if you want a particular book to make arrangements. All books being sold by Darrell Chatfield.

“Deep-Sky Observers Handbook”	Volume 1-5	Enslow-Lutterworth	\$40.00
“International Encyclopedia of Astronomy”	1987	Patrick Moore	Color \$10.00
“Backyard Astronomers Guide”	T. Dickinson & Alan Dyer	2008	Color \$25.00
“Atlas of Deep Sky Splendors”	1978	H. Verhenberg	(50.00) B & W \$22.00
“Amateur Astronomers Catalog of 500 Deep Sky Objects”	Vol 1	1980	B & W
R. Morales			\$15.00
“Observing the Constellations”	1989	J. Sanford	Color charts \$10.00

NOTE: “I will be advertising the astronomy equipment and accessories from the Melby Estate in the next few newsletters. I will also bring a selection of eyepieces, etc. to the next few meetings for your perusal. Some items were never used. All monies go to the Estate. Thank you.” Darrell Chatfield

FOR SALE FROM THE MELBY ESTATE - A PARTIAL LISTING

Please email me if you want to see any other set - novachat@sasktel.net. Darrell Chatfield

- **Marksman 7 x 50 binos.** Great condition. Hard shell case \$25.00

- **Bushnell Astralis 20 x 80 binos.** New. Never used. Built in tripod mount. Hard shell case with soft sided Velcro case for binos. \$145.00

- **3 - 1.25" rack and pinion focusers** for refractor type telescopes. Brand new. Never used. Inset diameter is 57mm. Heavy duty type with metal knurled knobs. All have boxes. \$20.00 each.

- **Original Celestron orange tube C5" scope** with tangent arm. Fork arms. **SCOPE ONLY. No tripod or wedge.** 5 x 30 finder, 1.25" visual back, diagonal, eyepiece, lens cap, metal case. Was used as a spotter scope. Not a mark on the tube. Clean looking. \$250.00

- **Original Celestron orange tube Nexstar C4SE scope.** Starbrite coatings. Comes with tripod, Starpointer red dot finder, 25mm Celestron eyepiece, metal case, manual. New condition. \$725.00

- **Original orange tube C14" scope.** Comes with fork arms, base, wedge, lens cap, 2" visual back, huge 2" diagonal, 5 x 70 finder, swing through locking tripod; 40, 25, 12, and 6mm Kellner eyepieces, 2" – 32mm. Konig eyepiece, 2x barlow, tele extender, hand toggle controller box for slow motion controls, counterweights and 2 rails, power cord, fitted carrying case. All in like new condition. Great looking scope. Hardly used! \$3000.00

- **3" Tasco refractor.** Fl is 1200mm. 6 x 30 finder. Slow motion controls. Counterweight. Sits on an equatorial mount base with an adjustable wooden tripod. The tripod is missing the spreader however. Comes with 0.965 eyepieces, barlow, extender. A more detailed list will be provided if interested. \$300.00

2	T mount adapters for Miranda cameras	\$5.00 each
3	1.25" diagonals 2 new in boxes	\$15.00 each
1	2" – 32mm Erfle eyepiece new in box	\$85.00
1	2" – 60mm Kellner eyepiece new in box	\$85.00
1	1.25" Celestron volcano top eyepiece in box	\$15.00
1	1.25" Celestron volcano top eyepiece in box	\$15.00
1	1.25" eyepiece extender - 3" long	\$20.00
1	5x24mm Celestron orange tube finder new in box	\$20.00
3	1.25" rack and pinion refractor focusers new in boxes	\$25.00 each
1	1.25" Celestron off axis guider c/w 12.5mm ep. Can be illuminated. New.	\$45.00
1	Celestron 4x 1.25" eyepiece turret new in box	\$65.00
1	Celestron 1.25" reticle. Can be illuminated	\$20.00
1	3.5" long 1.25" tele-extender	\$20.00
3	1.25" visual backs new	\$10.00 each
1	1.25" to 0.965" visual back	\$10.00
1	Camera to visual back adapter Lightly used	\$10.00
1	Threaded visual back to 16mm male threads camera adapter	\$10.00

SASKATCHEWAN SUMMER STAR PARTY 2024

Rick Huziak

Saskatchewan Summer Star Party Planning Going Well

SSSP would like everyone to know that pre-booking of campsites is going well with 75 of our 130 sites booked on the opening day, so if you are considering coming, book a campsite now. There are also several resort rooms remaining.

Our main speakers for the programming slate have been filled. After we get back from our eclipse trips, we will be opening the SSSP registration on April 20. We were able to hold pricing to be the same as 2023 rates except for a slight increase in banquet costs.

SSSP is a fun event where you can hang out with 300 of your closest astronomy friends from August 7th through August 11th. If you haven't been to a star party before, come join us at Western Canada's largest star party at the Cypress Hill Inter-provincial Park!

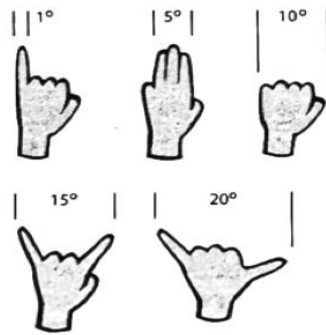
See all of the details at: <https://sssp.saskatoon.rasc.ca/>.

APRIL NIGHT SKY EVENTS AND INFO

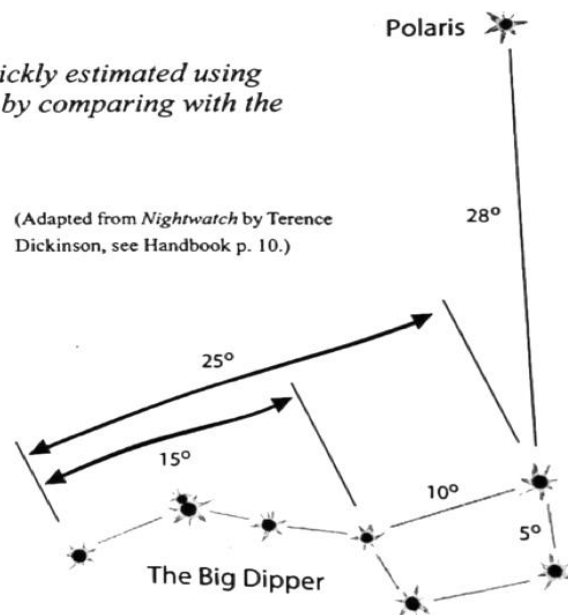
Images on the next few pages taken, with permission, from the 2024 Observer's Handbook. It can be obtained by joining the RASC here <http://rasc.ca/join> or ordered from <https://secure.rasc.ca/store/product/observer-s-handbook-2024>

HANDY SKY MEASURES

Angular measure in the sky can be quickly estimated using the fingers of an outstretched arm, or by comparing with the star separations in the Big Dipper.



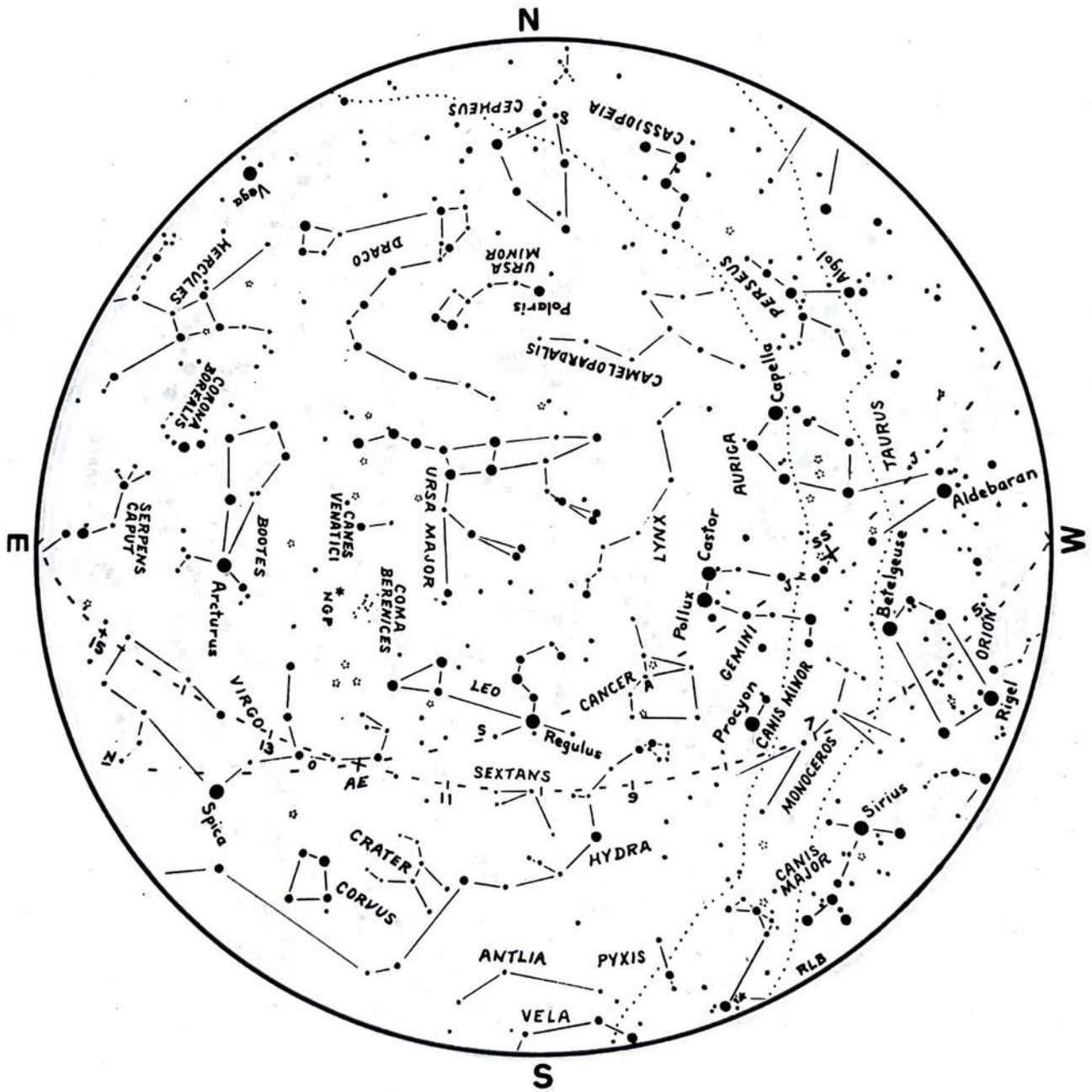
(Adapted from *Nightwatch* by Terence Dickinson, see Handbook p. 10.)



RASC OBSERVER'S HANDBOOK 2024 – STANDARD EDITION

Time (UT)		APRIL EVENTS	Jupiter's Satellites	
d	h m		West	East
Mon.	1 20	Mercury stationary	1.0	Callisto
Tue.	2 1 30	Algol at minimum	2.0	
	3 15	last quarter		
Wed.	3		3.0	
Thu.	4 19	Pallas stationary	4.0	Europe
	22 19	Algol at minimum		
Fri.	5		5.0	Ganymede
Sat.	6 4	Mars 2.0° N of Moon	6.0	
	9	Saturn 1.2° N of Moon, occultation†	7.0	
Sun.	7 8	Neptune 0.4° N of Moon, occultation‡	8.0	Io
	17	Venus 0.4° S of Moon, occultation*		
	18	Moon at perigee (358 850 km) Large tides		
	19 08	Algol at minimum	9.0	
Mon.	8 12 20	Moon at ascending node	10.0	
	18 21	new Moon (lunation 1253)		
		Total Solar Eclipse (p. 127)		
Tue.	9		11.0	
Wed.	10 15 57	Venus at greatest heliocentric lat. S	12.0	
	21	Algol at minimum		
		Jupiter 4° S of Moon	13.0	
Thu.	11 3	Mars at greatest heliocentric lat. S	14.0	
	13	Mars 0.5° N of Saturn		
	23	Moon 0.4° S of Pleiades (M45)	15.0	
		Mercury in inferior conjunction		
Fri.	12		16.0	
Sat.	13 12 47	Algol at minimum	17.0	
Sun.	14		18.0	
Mon.	15 14	Pollux 1.5° N of Moon		
	19 13	first quarter	19.0	
Tue.	16 9 36	Algol at minimum		
Wed.	17		20.0	
Thu.	18 15	Juno stationary	21.0	
Fri.	19 6 25	Algol at minimum		
Sat.	20 2	Mercury at descending node	22.0	
	8	Moon at apogee (405 623 km)		
		Jupiter 0.5° S of Uranus	23.0	
Sun.	21		24.0	
Mon.	22 3 14	Algol at minimum		
	7	Lyrid meteors peak	25.0	
	10 45	Moon at descending node		
Tue.	23 3	Spica 1.4° S of Moon	26.0	
	23 49	full Moon		
Wed.	24 8	Mercury stationary	27.0	
Thu.	25 0 03	Algol at minimum	28.0	
Fri.	26 21	Antares 0.3° S of Moon, occultation§		
Sat.	27 20 52	Algol at minimum	29.0	
Sun.	28		30.0	
Mon.	29 4	Mars 0.04° S of Neptune		
Tue.	30 17 41	Mercury at aphelion	31.0	
		Algol at minimum		

†Most of Antarctica Kerguelen Is. Marion Is. ‡S. Georgia & S. Shetland Is.. Marion Is..



REIMBURSEMENT FOR CENTRE EXPENSES

The Centre has a reimbursement procedure on submission of expense claims. A writeable pdf claim form can be found on the Centre webpage under the Executive tab. The expense form **must** be submitted *along with original receipts* to the Treasurer within 30 days of the transaction. All expenditures must be preapproved by the Executive or be within allocated budgets.

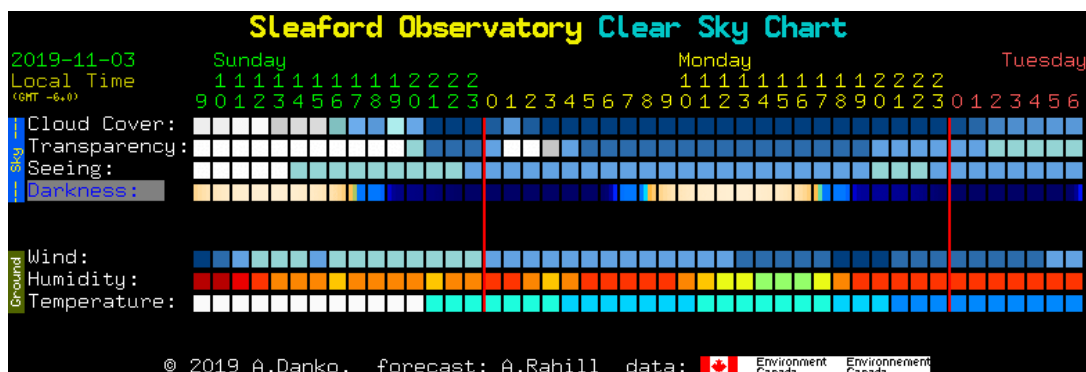
Please contact the Treasurer with any inquiries.

CLEAR SKY AND WEATHER INFO

To find clear skies, visit the Clear Dark Sky website -

<https://www.cleardarksky.com/csk/>

Once there, one can enter your location to find clear skies. The chart will appear as follows:



Environment Canada provides weather information for astronomy -

www.weather.gc.ca/astro



Saskatchewan Light Pollution Abatement Committee -

<http://myotherlife.net/slpac/>



www.darksky.org



VIEW THE PARTIAL SOLAR ECLIPSE

APRIL 8th 2024 @ 11:30 AM – 2:00 PM

THE OBSERVATORY - USASK CAMPUS



The USask Observatory, RASC Saskatoon, and
SuperDARN Canada present:

A LIVE FREE PUBLIC VIEWING OF THE SOLAR ECLIPSE

- Look safely at the Sun through the Observatory's specialist Solar telescope and RASC telescopes with Solar filters
- Tour the Observatory facilities
- Learn to make pinhole cameras to safely view the eclipse yourself
- Space Physicists from SuperDARN talk about the Sun and Space Physics

[CLICK HERE FOR LIVE VIEWING](#)



The Royal Astronomical Society of Canada
Saskatoon Centre

MINUTES OF MARCH MEETINGS

Lorie Tedford

**Minutes of the Monthly Executive Meeting of the RASC Saskatoon Centre
Monday, Mar 18, 2024 - 7:00pm. Hybrid: Online & In person: U of S Observatory**

Attending: Brent Burlingham, Lorie Tedford, Les Dickson, Yannis Pahatouoglou, Joelle Sheard-Patrick, Colin Chatfield, John Takala

1. **Call to order** 7:00 pm – Brent Burlingham (President and Chair)
2. **Approval of the Executive meeting minutes for February 2023** as printed in the January newsletter. Moved by Les Dickson, seconded by Joelle Sheard-Patrick; carried.
3. **Call for additional announcements/items** to add to the agenda.
4. **Announcements from the Chair** – Brent Burlingham
 - No announcements presented.
5. **Old Business** - Reports from the Executive Council
 - 5.1. **President's Report** – Brent Burlingham.
 - The U of S, SuperDARN and the RASC will be hosting an event on April 8th from 11:30-2 pm for the partial solar eclipse.
 - Ike Thiessen has offered his dome for use at Sleaford.
 - Discussed the 16" telescope survey results. 19 Responses in total; 12 for selling the 16" scope, 3 for construct an observatory and 6 for automating imaging.
 - 5.2. **Acting Treasurer** – Les Dickson.
 - No announcements presented.
 - 5.3. **National Council Rep** – Joelle Sheard-Patrick
 - No announcements presented.
 - 5.4. **Activities Coordinator** – Joelle Sheard-Patrick
 - Wildwood Star party is being postponed to May 7th due to job action.
 - The RASC was at Wanuskewin for the Kona festival. Daryl Janzen gave a presentation. Main issue was that the event concluded at 7 pm which didn't give enough time to showcase the night sky.
 - 5.5. **Bylaws Committee** – Les Dickson
 - No announcements presented.

5.6. SSSP 2024 Update – Les Dickson

- Guest speakers for the upcoming star party have been confirmed.
- Camping reservations are opening in March, registration will be opening in April.

5.7. Sleaford Update – Darrell Chatfield

- Sleaford observing coordinator position still vacant.
- There is still no one to clear snow. Discussed selling the snowblower and hiring the RM to clear snow/cut grass.

6. Old Business

6.1. Meade 16” Telescope

- Motion to sell the Meade 16” telescope made by Brent. Seconded by Les. There was 5 votes in favour, carried.
- Discussed avenues to sell the scope including Astrobuysell.com, Facebook – Canadian Telescope Buy and Sell etc., all the accessories that go with the scope (i.e. Pier) and listing price.

6.2. Mentorship Program. Any interest from members in offering expertise?

- Discussed handling requests for help with gear when approached, no formal program will be offered.

6.3. Future Meetings

- There will be no change in the frequency in executive meetings and will remain before the general meeting.

6.4. Sleaford – New Security Cameras, Wi-Fi Booster

- New security cameras will be ordered for the Sleaford site. Brent and Daryl will explore options and purchase cameras.
- Discussed locations for Wi-Fi booster and possible weather proofing needed.

6.5. Sleaford – Site Maintenance

- Discussed the need to have an Observers Group Coordinator.
- The proposal of a grass cutting and/or snow blowing schedule with members who are interested in helping.

7. Motion to adjourn by Joelle Sheard-Patrick, seconded by Les Dickson; carried. 8:00pm.

**Minutes of the Monthly General Meeting of the RASC Saskatoon Centre
Monday, Mar 18, 2024 - 8:00pm. Hybrid: Online & In person: U of S Observatory**

Sharing/Networking Time - 8:00-8:15 pm – all members.

1. **Call to Order** – 8:22 pm – Brent Burlingham (President and Chair)
2. **Call for additional announcements/items** to add to the agenda
3. **Call out to new members/guests:** None present.
4. **Adoption of the February General meeting minutes** as printed in the January newsletter. Moved by Lisa Codwell, seconded by John Takala; carried.
5. **Executive Meeting Summary** – Brent Burlingham
 - Motion was made and carried to sell the Meade 16” telescope. The next step would be to get the necessary parts together, decide on a listing price and post the ad. The scope is too heavy to offer shipping, buyer will need to pick it up.
 - There will be an event at the U of S Observatory on April 8th from 11:30-2pm for the partial solar eclipse. The RASC will be joined by the U of S and SuperDARN. Any members that are available can bring scopes to set out on the lawn.
 - New security cameras and a Wi-Fi booster will be purchased for the Sleaford site.
 - Ike has offered his dome for Sleaford.
 - Sleaford yard maintenance and lack of help an issue. Discussed hiring the RM to clear snow and cut grass or creating a schedule of members who are interested in maintaining the site.
- 5.1. **(Acting) Treasurer:** Les Dickson
 - Presented the Draft SK Corporations Branch financial report.
 - Different breakdowns when compared to the financial report for National.
 - Main expenditures include the break in at Sleaford, an extra insurance payment within the same fiscal year.
 - As of the end of February the SSSP is all cleared up with the RASC and Les will provide a report for the year in the upcoming meetings.
6. **New Business** – no items brought forward to discuss.
7. **Main Program**
 - “**The Upcoming Sky**” presented by Colin Chatfield
 - “**Solar, lunar, and deep sky imaging using the revolutionary ZWO SeeStar S50 telescope**” - Tim Yaworski
8. **Call to adjourn** – Moved by Les Dickson, seconded by Yannis Pahatouroglou; carried.



Photo of M42 taken by Joelle Sheard-Patrick



The comet of late winter has been 12P/Pons-Brooks, which will be brightest in April. However it has been getting lower in the west and this picture, taken March 10 through my 80mm telescope, was the last I could get of it from my observatory before it sunk behind trees. Photo by Tenho Tuomi.

OBSERVING CERTIFICATES AND CLUBS

RASC OBSERVING PROGRAMS AND CERTIFICATES

The RASC offers four observing certificates for **members** who observe all objects in each of the following observing lists in this chapter:

- THE MESSIER CATALOGUE (p. 312)
- THE FINEST NGC OBJECTS (p. 316),
- THE DEEP-SKY CHALLENGE OBJECTS (p. 320),
- DEEP-SKY GEMS (p. 322).

See rasc.ca/certificate-programs for details and contact the RASC Observing Committee Chair at rasc.ca/contact/observing for further information.



The RASC also offers the **Explore the Universe Certificate** for novice observers (who do not have to be RASC members), the **Explore the Moon Certificate** for beginning members, and the **Isabel Williamson Lunar Observing Certificate** and the **Double Stars Observing Certificate** for intermediate to advanced members. In addition, **Astroimaging certificates** are available for those members with a photographic bent. See rasc.ca/astro-imaging-certificate

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. Chatfield, T. Tuomi, L.
Scott, G. Charpentier, B.
Johnson, L. Dickson,
B. Burlingham, Norma Jensen,
Donna-Lee May*

Ron Waldron	108
Brent Gratias	104
Marcel Müller-Goldkuhle	94
Wade Selvig	75
Wayne Schlapkohl	43
Ellen Dickson	34
Graham Hartridge	9

CHATFIELD BINOCULAR CERTIFICATE

Certified at 35 to 40 Objects:
T. Tuomi, R. Huziak

Jim Goodridge	12
---------------	----

FINEST NGC CLUB

Certified at 110 Objects:

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

Larry Scott	110
Scott Alexander	97
Norma Jensen	83
Sandy Ferguson	23
George Charpentier	13
Brent Burlingham	97

EXPLORE THE UNIVERSE

Certified at 55 to 110

Objects: *T. Tuomi, B. Gratias*

Wayne Schlapkohl	55
Jim Goodridge	35

ISABEL WILLIAMSON LUNAR OBSERVING CERTIFICATE

Certified at 140 Objects:

T. Tuomi, N. Jensen

EXPLORE THE MOON CERTIFICATE

T. Yaworski

Brent Gratias	37
---------------	----

HERSCHEL 400 CLUB

Certified at 400 Objects:

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

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

HERSCHEL 400-II CLUB

Darrell Chatfield	400
Tenho Tuomi	378
Rick Huziak	246

LEVY DEEP-SKY GEMS

Certified at 154 Objects:

Tenho Tuomi	150
Darrell Chatfield	70

Messier, Finest NGC, and David Levy's Deep-Sky lists in the *Observer's Handbook*.

The Explore the Universe list is available here <http://www.rasc.ca/explore-universe>
Messier and Finest NGC lists, charts and logbooks: <https://www.rasc.ca/certificate-programs>

Herschel 400 List: <http://www.astroloague.org/al/obsclubs/herschel/hers400.html>

Chatfield Binocular List is at: https://saskatoon.rasc.ca/Chatfield_Binocular_List.pdf

“Isabel Williamson Lunar Observing Program Guide” program details can be found at:

<https://www.rasc.ca/isabel-williamson-lunar-observing-program>