

Saskatoon Skies

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

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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>

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MEMBERSHIP? JOIN TODAY!

Regular: \$96.00 /year

Youth: \$52.00 /year

Family: \$90.50 + \$41/additional adult + \$21.10/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 – Mike Dolan

Vice-President – *vacant*

Secretary – Rick Huziak

Treasurer – Donna-Lee May

National Council Rep – Les Dickson

Canadian Tire money - Darrell Chatfield

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

NEWSLETTER INFO

Newsletter Editor – Colin Chatfield

Copy & Collate – Les & Ellen Dickson

Labels & Temps – Mark de Jong

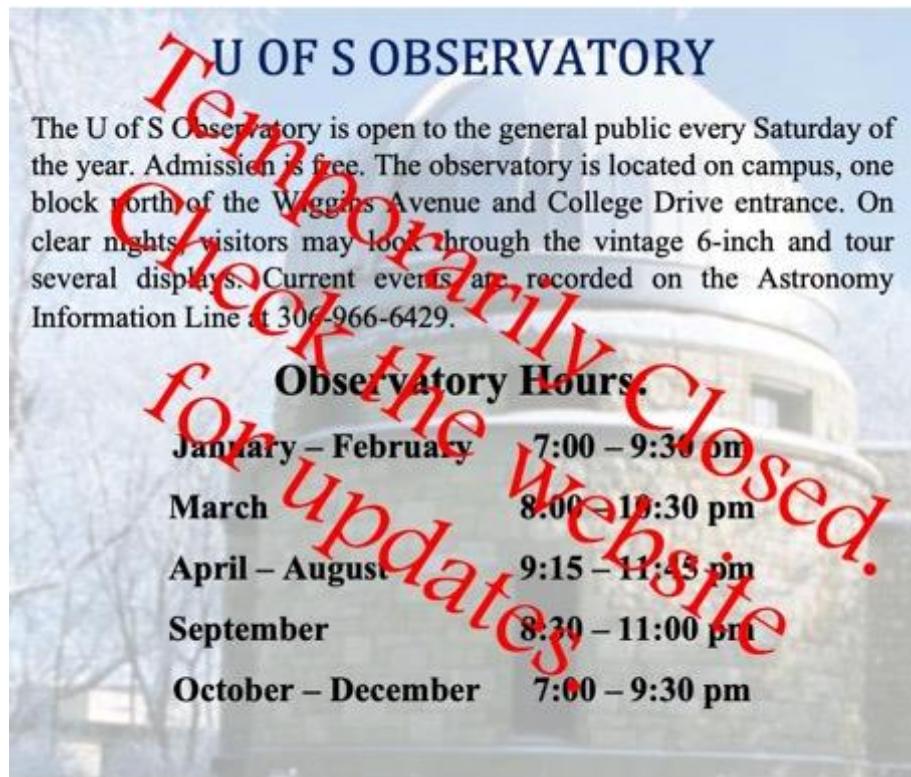
Web Posting/Content Editor – Gord Sarty/Tenho Tuomi

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.



*Northern skies & ocean view from Varadero, Cuba. January 10, 2022 10:00pm.
Canon 6D MKII, 15mm, 2.8. 6 sec 1600 iso. Taken by Tammy Vallee*



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

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



Image of the aurora over the Northeast Swale. Taken November 2021 by Tara Magee

RASC CALENDAR OF EVENTS & MEETING INFO

Feb 26th	Observer's Group - Sleaford Observatory	Larry Scott
Feb 28th	RASC General Meeting - 8:00pm (info below)	Mike Dolan

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>

February RASC General Meeting for all members and guests

Join us on February 28th, 2022 at 8:00PM (Executive meeting at 7:00pm)
Webinar (info below)

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).

8:00pm - **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.

8:30pm - **Main Program -**

RASC President Robyn Foret and Executive Director Phil Groff
(more info below)

Colin Chatfield & Tara Magee "What's up this month"

ALWAYS NEED MEETING SPEAKERS

Rick Huziak

Hi everyone. The title of this article is *Always Need Meeting Speakers*. I titled the article that way because I always need meeting speakers. Right now, we need speakers for 10-minute slots for all months March through June and 30 – 40-minute talks for April and May. Please volunteer to talk about your favourite topic.

Online meeting attendance is also pretty low for a club that has over 80 members. Online meetings are being held because of Covid-19, but our attendance is actually less than in-person meeting attendance before Covid. Online meetings attract between 12 and 18 people even though attending is technically easier, avoiding travel and parking. Current online meetings also fulfill an initiative we had previously discussed...transmitting in-person meetings to be on-line for members that are simply too far away to attend.

So, back to speakers. With generally low attendance, I am reluctant to book external speakers who spend a lot of their time to prepare their talks then see that we have only a dozen people on-line. So, if I see larger meeting attendance I would book more external speakers. 😊 rickhuziak@shaw.ca

MINUTES OF JANUARY MEETINGS

Rick Huziak

Minutes of the Monthly Executive Meeting - RASC Saskatoon Centre Monday, Jan. 17, 2022 - 7:00 pm Online (ZOOM)

Attendees: Mike Dolan, Ron Waldron, Les Dickson, Rick Huziak, Donna-Lee May, Mark de Jong, Darrell Chatfield, Tenho Tuomi, Tim Yaworski, Ike Thiessen, Later: Colin Chatfield, Jim Wood.

1. **Call to order** 7:00 PM – Mike Dolan
2. **Approval of the December Executive Minutes** as circulated in Jan. newsletter.
Moved: Darrell Chatfield. **Seconded:** Ron Waldron. **CARRIED.**
3. **Call for additional announcements/items** to add to agenda. National database issues added under New Business.

4. Old business:

- **Reporting to National of Secretary and Treasurer reports** – Mike Dolan. Required to be submitted for Feb 28.
- **Web content** – Mike Dolan: Updated responsibilities. Tenho Tuomi taking care of general website. SSSP updates from Rick Huziak & Gord Sarty. Gord will post newsletters. Web content will approve through Executive if necessary.
- **Telrad and two mounts for Rentals** have been purchased - Ike Thiessen. Funds are reimbursed. Report is attached to the Minutes below.

5. New business:

- **Financial Report** – Donna-Lee May. Donna-Lee has questions related to budget accounts. Executive agrees accounts are to be kept separate for clarity. Forms for filing are still outstanding and will get from Jim Gorkoff. Books are nearing completion. Donna-Lee requests budgets:

Rick Huziak requests a **Speaker Budget** for Year 2022 (Jan. – Dec.) of \$200. **Moved:** Rick Huziak. **Seconded:** Donna-Lee May. **CARRIED.** Budget currently is not envisioned to include more than on-line honoraria for non-Centre speakers. Money collected for talks (such as at Parks this year) will be allocated to the Speaker Fund budget.

Les Dickson requests a **Newsletter Budget** for Year 2022 (Jan. – Dec.) of \$500. **Moved:** Les Dickson. **Seconded:** Rick Huziak. **CARRIED.**

Donna-Lee will calculate an average **Sleaford Maintenance Budget** for Year 2022 and will report to the Executive later and will table request for a budget at this time.

Ron Waldron is requesting a Centre account balance. Donna-Lee provides approximations since books are not completely done yet: General Account balance is very approximately \$26,400 (which includes terms of \$2800 & \$5000). More accurate numbers will be presented at the next meeting. SSSP account is not yet ready to report formally.

Donna-Lee/Mark de Jong: Centre fees confusion from National is causing clarity issues for Centre income.

- **SSSP update** – Rick Huziak/Les Dickson/Donna-Lee May – Committee met Jan. 17. Changes will include moving the star party from Wednesday thru Monday to Tuesday thru Sunday to relieve park camping issues. Campsites will require

registration for each site. Website needs updating. 2022, 2023 & 2024 deposits to the Cypress Resort are paid.

- **Sleaford Observatory Planning Committee** update – Ron Waldron – met Jan. 10. Committee decided to build a roll-off for the 16". Plan to have a cost figured out by the February meeting. Plan in March to present an overall plan and request a budget.
 - **Database issues at National** – Mark de Jong: Mark has a *Zoom* meeting on Jan. 19 to clarify with National IT on how the database works.
 - **Handbooks not received:** Les Dickson. Les will report back to Phil Groff as to who has not received Handbooks or ordered products.
6. **Call to adjourn 7:57 pm. Moved:** Les Dickson **Seconded:** Donna-Lee May. **CARRIED.**

Jan 14, 2022 RASC - Telescope rentals report by Ike Thiessen

The Telrad Reflex Sight from All Star has come, and client Juan-Nicolas, came over with his 3-year-old son to get the base mounted on his rental Dob, and took along the new magical star finder.

In addition to buying the additional base for \$17.95, Darrell Chatfield donated another Telrad base, that had a sticker price of \$13.95 from "the Science shop" so all three rental Dobs have the base. The cost from All Star totaled \$122.22, Donna-Lee has provided payment, thank you.

Darrell also refurbished the focuser assembly from the #1 Dob, so all 3 units now are in good condition, after repairs to the base of 2 of the Dobs, the problem being the Teflon slider plates did not provide enough clearance and the revolving base bolt heads were rubbing on the bottom plate. The problem has been solved by removing the Teflon plates, held on by small finishing nails, and making spacers out of thin wood paint stir sticks, just the right thickness and width, easy!! The basic problem I think was in the quality of the base construction, which became apparent when I discovered one of the finishing nails had been bent over and worn down from rubbing a long time, maybe a new employee being given the simplest task, and screwing up!!

Next, I'll return #1 Dob to storage room at the Observatory, one is on rental maybe till May, and have one here at my place ready to go. The matching lens kits to always accompany the scopes. Also, I need to make, or find better looking stickers to identify all the kits and pieces.

Then another task is to upgrade the Rental Agreement form to include all the information, legal liability, itemize if Telrad included, Observers Guide loaned out, and basic care instructions on use, ensuring lenses don't get touched or cleaned; Rule #1!!

Minutes of the RASC Monthly General Meeting - RASC Saskatoon Centre
Monday, Jan. 17, 2022 - 8:00 pm Online (ZOOM)

Attendance: Thirteen members on-line at beginning of meeting.

1. **Sharing / Networking Time** – all members (8:00 – 8:15 PM.)
2. **Call to order:** 8:17 PM – Mike Dolan
3. **Call out to new members/guests - no new members or guests.**
4. **Adoption of December General Meeting minutes** as circulated in Jan. newsletter.
Moved: Tim Yaworski. **Seconded:** Les Dickson. **CARRIED.**
5. **Executive Meeting summary** – Mike Dolan reported – see Executive Minutes for the summary.
6. **Financial Report** – Mike Dolan for Donna Lee May: Financial report will be presented in February once all is completed for annual reports.
7. **New Business:**
 - **Web content requests procedures** – Mike Dolan. See Executive Minutes for responsibilities.
 - **On-site visit for tractor mower** has been arranged for spring. – Mike Dolan
 - **Handbooks have not been shipped** to everyone: James Wood. Jim requests that the National Board should report to our Centre on what *all* of the National problems are. Les Dickson will pass this request along with the Centre's blessing. Mike Dolan will request Phil Groff or a National representative or Board member to talk to the Centre at the February meeting.
8. **Programs:**
The Upcoming Sky – Colin Chatfield

Book Review - The Backyard Astronomer's Guide – Mike Dolan

The Quest for a Saskatoon Light Pollution Bylaw - Rick Huziak

Call for adjournment. 9:35 pm. **Moved:** Cam McLelland. **Seconded:** Ellen Dickson. **CARRIED.**

FEBRUARY MEETING INFO

Phil Groff

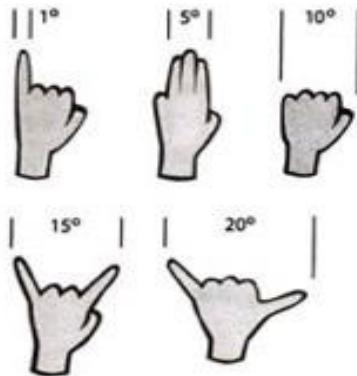
RASC President, Robyn Foret, and Executive Director, Phil Groff, will be presenting on the strategic plan of the Society, and how that translates into the operational plans and budget for 2022. Highlights of upcoming programs will be presented. Plenty of time will be allocated to address any questions.

FEBRUARY NIGHT SKY EVENTS AND INFO

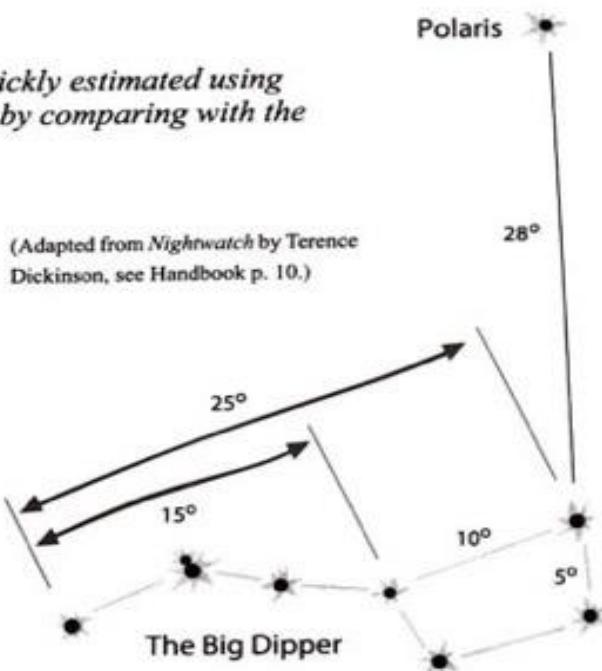
Images on the next few pages taken with permission from the 2021 Observer's Handbook. It can be obtained by joining the RASC here <http://rasc.ca/join> or ordered from <https://secure.rasc.ca/Portal/Shop/RASC/StoreMain.aspx?Category=CURRPUB>

HANDY SKY MEASURES

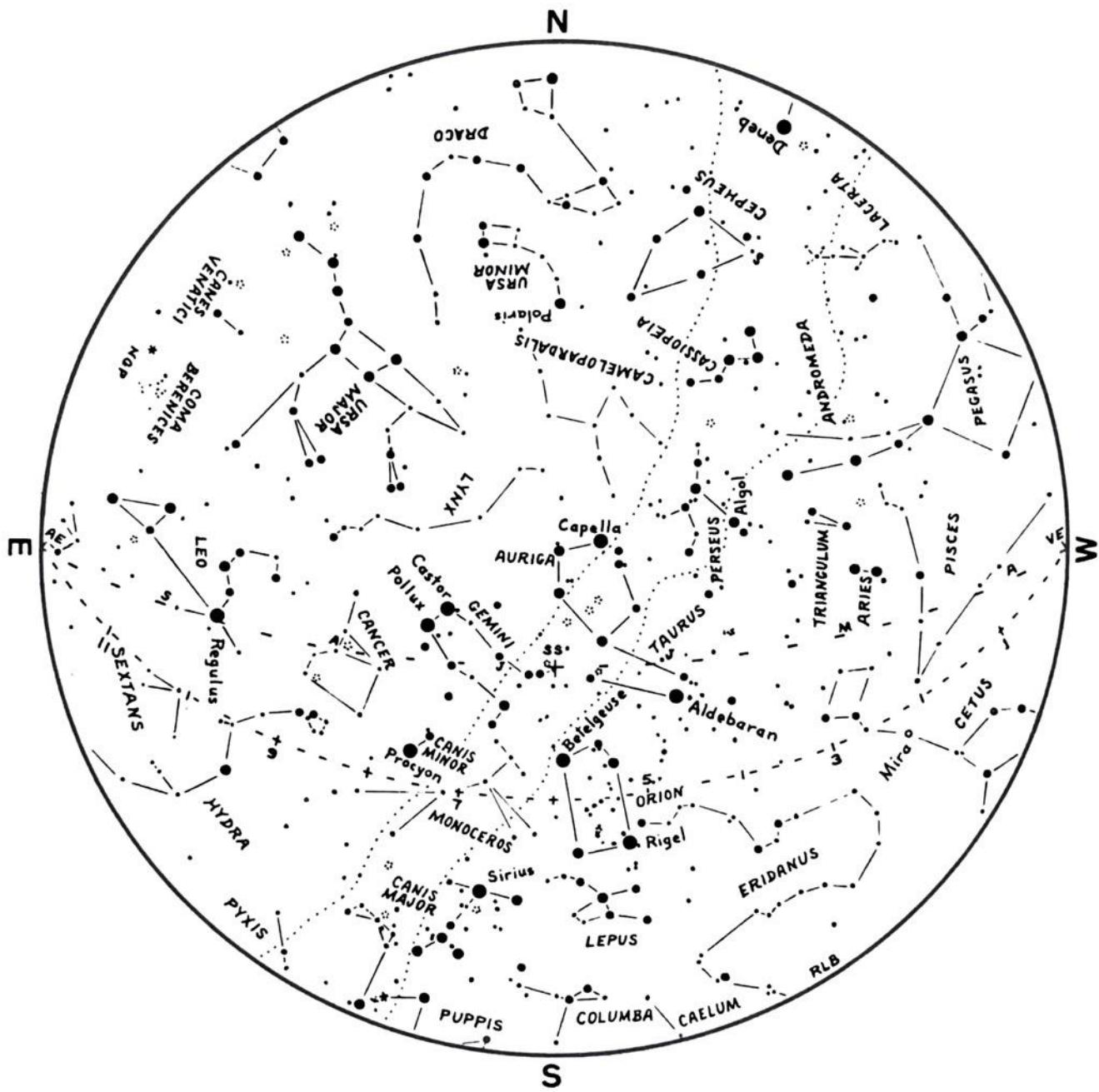
Angular measure in the sky can be quickly estimated using the fingers of an outstretched arm, or by comparing with the star separations in the Big Dipper.



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



Time (UT) d h m				FEBRUARY EVENTS	Jupiter's Satellites West East	
Tue.	1	5	46	new Moon (lunation 1226)		
Wed.	2	21		Jupiter 4° N of Moon		
Thu.	3	13	40	Algol at minimum		1.0
		22		Mercury stationary		2.0
Fri.	4	19		Saturn in conjunction with the Sun		3.0
Sat.	5					4.0
Sun.	6	10	29	Algol at minimum		5.0
Mon.	7	20		Uranus 1.2° N of Moon, occultation†		6.0
Tue.	8	13	50	first quarter		7.0
Wed.	9	7	18	Algol at minimum		8.0
		11		Ceres 0.03° S of Moon, occultation‡		9.0
Thu.	10					10.0
Fri.	11	3		Moon at apogee (404 897 km)		11.0
Sat.	12	4		Moon 1.9° N of M35		12.0
		4	07	Algol at minimum		13.0
		22		Venus greatest illuminated extent		14.0
Sun.	13			Venus at greatest heliocentric lat. N		15.0
		1		Venus 7° N of Mars		16.0
Mon.	14					17.0
Tue.	15	0	56	Algol at minimum		18.0
Wed.	16	16	56	full Moon		19.0
		21		Mercury greatest elongation W (26°)		20.0
Thu.	17	21	45	Algol at minimum		21.0
Fri.	18			Mercury at descending node		22.0
				Zodiacal light vis. in N lat. in W after evening twilight for next two weeks		23.0
Sat.	19					24.0
Sun.	20	18	34	Algol at minimum		25.0
Mon.	21					26.0
Tue.	22					27.0
Wed.	23	15	23	Algol at minimum		28.0
		22	32	last quarter		29.0
Thu.	24					30.0
Fri.	25					31.0
Sat.	26	12	12	Algol at minimum		
		22		Moon at perigee (367 789 km)		
Sun.	27	9		Mars 4° N of Moon		
Mon.	28			Mercury at aphelion		
		20		Mercury 4° N of Moon		



OPTIMIZING TELESCOPES FOR FAINT OBJECTS

Rick Huziak

A recent discussion on the RASCLIST regarding the ability to see the faint Horsehead nebula (in actual fact, the “dark bay” of the Horsehead dark nebular projecting into the faint reflection nebula IC 434.) I decided to comment on some issues I see all of the time with telescopes trying to look at faint stuff and so I will repeat it for our members. A lot of it has to do with telescope design itself, and the observers’ unawareness of these issues. Me, a Newtonian user, will comment on Newtonians … mostly.

When you want to see faint stuff, contrast is everything and small issues of stray light and glare kill contrast. All telescopes have these issues, but Newtonians are the easiest to modify to remove these issues.

First, make a rear dust cover cloth cap that can be secured to the rear of the tube. Make it from black cloth that can breathe. Often there is a gap between the tube and the mirror/mirror cell that allows light reflecting from the ground to come into the back of the scope and light up the inside of the tube wall, or even right up onto the secondary mirror. This is worst in the winter, but even reflections from gravel or concrete surfaces can be surprisingly bright in the summer, even if illuminated only by starlight, and when the moon is out. You can also make a ring stop at the very back of our scope to create a light trap at the tube edge.

Stray light also enters the tube at strongly off-axis angles from the front of the scope, and this lights up the wall of the scope at the front of the tube. The stray light can be minimized by lengthening the front of the tube beyond the secondary. I often see scopes with only a few inches of wall forward. This allows off axis light to illuminate the inside of the tube opposite the eyepiece or light to shine directly into the focuser draw tube from the far side past the tube wall. My 10” scope, by design, has a 12” extension past the secondary. Best would be an 18” extension (1.5x the tube diameter) to kill off-axis illumination of the scope tube and eyepiece draw tube. (Space telescopes are build this way.) This causes transport issues, so you can make this extension removable. Balance and wind issues can also be created but compensated for.

Black, black, black – the inside of a lot of tubes is just flat metal spray painted flat black, but if that surface is not really rough the grazing reflection along the wall can be very bright on the main mirror. Place flocking, sawdust, cork, crumpled paper or even ring stops along the tube and paint it flat black using Krylon Flat Black from Canadian Tire. This is the blackest commercial paint. Ring stops are tricky though and can create air flow/turbulence issues if not added properly.

If you have an open truss tube scope, make sure you *always* install and use a cloth cover to stop all kinds of stray light falling onto your mirror from everywhere! But even some of the cloth covers provided for open truss tube scopes can be very bright in grazing reflection, especially if the cloth is synthetic. If you have shiny struts, paint them flat black!

Black around the eyepiece! Put your eye near the eyepiece and glance around past it in all directions. Often tubes are painted bright white enamel to make them look nice, but it doesn't really matter what the surface is made of, it is going to be brighter than whatever you are looking for in the eyepiece. Whatever you can see around the eyepiece, sand it down and paint it flat black. My scope has about a 12" flat black spot around the eyepiece holder so all I see is flat black everywhere ... and what is in the eyepiece.

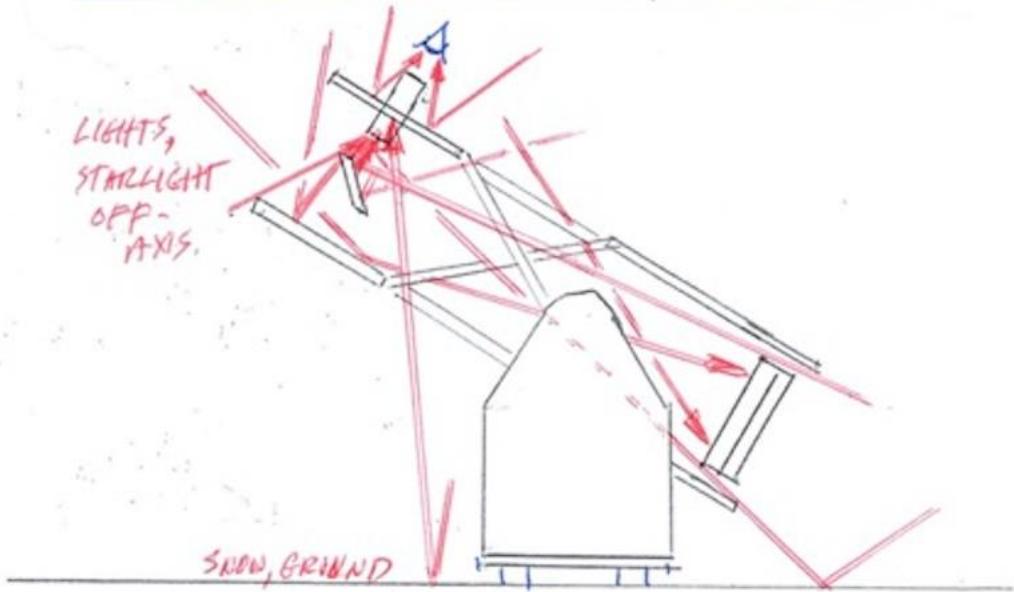
Use an observing hood. A large black cloth over your head and extending to and past the scope tube removes all stray light. Once you have the hood over your head, you might even realize how bright the ground is by your feet! My observing hood can close at the bottom for this reason, though you can also create fogging from your breath, but you'll figure it out.

And lastly, a larger secondary. "*No, I say ... there will be more diffraction!?!?!*" Well, most commercial scopes come with undersized secondaries. Once you recalculate, you might see that the secondary sees only 9" of your 10" mirror. You might notice this by trying to collimate with a Cheshire eyepiece and not being able to see the mirror clips. (The secondary should be large enough to see the mirror clips *and* the rear of the tube, or you will not be able to properly collimate!) Put in a larger secondary. A bit more diffraction is way more desirable than a smaller functional scope!

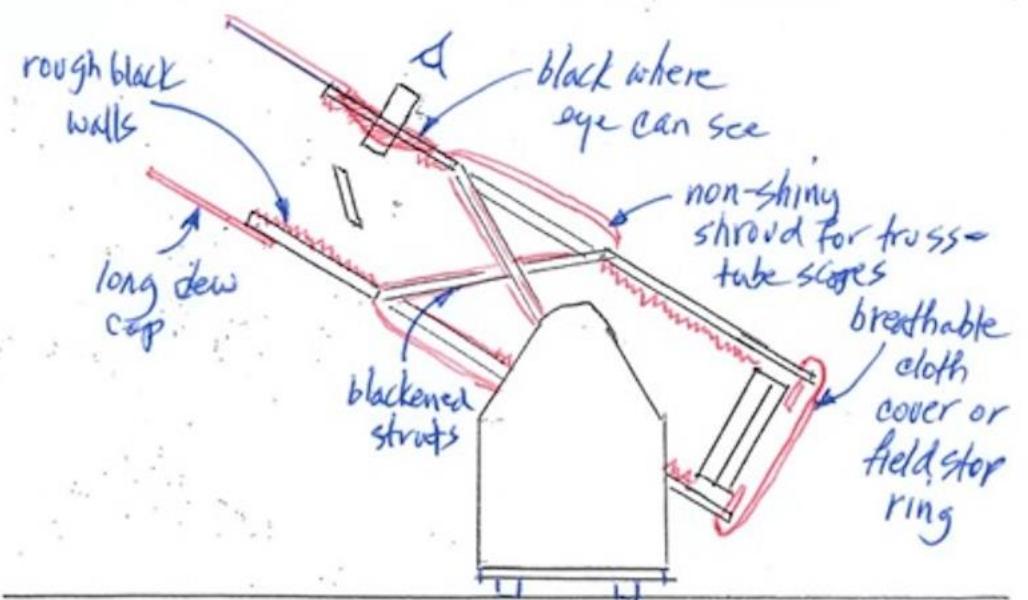
Yes – this is about Newtonians, but the principles of blackening surfaces and using an observing hood apply to all scopes.

Glare-reducing measures and contrast-increasing measures can gain you easily one or two magnitudes whether in the city or in the country. Even in the absolute pitch blackness of somewhere like Grasslands NP DSP, the grass in the summer is green and shiny at night because the stars light it up, so even under the darkest of skies, you need to remove glare and stray light from your scope and environment.

THE MANY PATHS OF SCATTERED LIGHT



A PROPERLY LIGHT-BAFFLED SCOPE



COMET REPORT

Tenho Tuomi

Periodic comet 19P/Borrelly with an orbit of 6.8 years, discovered in 1904. My photograph from February 2. At magnitude 9 it will our brightest comet in the sky for the next two months at least. I photographed it previously in October 2015.

There is nothing brighter in the forecast until comet C/2017 K2 (PANSTARRS) this summer. It is a slow moving comet that was discovered in May 2017 but won't reach perihelion until this fall. I have been photographing it since May of last year.



LIGHT POLLUTION NOTES - FEBRUARY 2022

Rick Huziak

Well ... I was a bit surprised by the reception for the January light pollution article and the 20-minute Q&A after my January meeting talk, so I'll give it another go this month!

Electronic Message Boards (Saskatoon): Last month I mentioned that *Directwest's* horrifically bright (for over 90 minutes after sunset or before sunrise) generated a bylaw complaint requesting that they be responsible and reduce the brightness at sunset and do

the opposite at sunrise. **Well, it seems bylaw complaints work.** As of about January 26, the billboards at 29th Street West & Idywyld Drive and Broadway & 8th Street are now dim once the sun goes down. So if you see billboards with distracting moving images, or ones that are too bright at night, please complaint against Bylaw 8770 using the bingo form for complaints here: <https://www.saskatoon.ca/city-hall/city-bylaws-policies/making-bylaw-complaint>. It works!

Light Nuisance Bylaw (Lethbridge, AB) – Rena Woss, who some of you know from SSSP is busy fighting light pollution in Lethbridge. In particular, she is requesting a Light Nuisance Bylaw, similar in structure to a Noise Bylaw, with limits on brightness (through shielding) and time of use. Both light and noise can be nuisances, so the bylaw request is that a neighbour's lights should not shine onto adjacent properties, and that a citizen has a right to darkness on their property. She met with the Community Safety Standing Policy Committee on January 13 and got a decent reception – at least a promise to look into the issue. We submitted a letter of support for her cause. To all of our surprises, she actually received 10 letters of support! For those who lobby councils, it is unusual to have more than one or two, so this was an avalanche of support. Those interested in seeing the letters and watching her presentation can access the meeting agenda and video here: <https://agendas.lethbridge.ca/AgendaOnline/Meetings/ViewMeeting?id=3148&doctype=2>

Saskatoon Public Library (Saskatoon, SK) – Plans for the new library have been out for about six months now and a more detailed plan was under public review at the end of January. I had a chance during the initial consultation in the fall to submit some comments. The building is a huge mass of curved glass walls with a public courtyard, so what pops to mind are lights coming out of the building in all directions, how the courtyard will be (over) lit and bird collisions – a situation very similar to the RBC/Nutrien towers. It seems that how lighting will be done inside will not cause a lot of light pollution out of the windows, but lighting design of the courtyard has not been announced yet. The updated design does, however, now include patterned glass that should no longer be a hazard to birds. Glass patterns are most useful to reduce daytime collisions, but it will be wait and see on what the lit windows look like at night.

The World Migratory Bird Day foundation has decided that light pollution's effect on birds will be their theme for 2022. They have declared that May 12 and Oct 8 will be World Migratory Bird Day and will lobby governments to turn lights off to help migrating birds during these major migration seasons. Their slogan is “**Dim the Lights for Birds at Night!**” Read more at: <https://www.migratorybirdday.org/>.

As you can see, fighting light pollution is a multidisciplinary effort. Just fighting from the point of view of seeing stars isn't always the path we need to take to reduce waste light in our society!

OBSERVERS GROUP COORDINATOR(S) NEEDED

Larry Scott

The Saskatoon Centre of the RASC is seeking one or more volunteers to take over the Observers Group Coordinator/Yard Monkey position currently held by me (Larry Scott). This position has many perks - fresh air and exercise in beautiful surroundings; works in close proximity to many bird species, butterflies, racoons, deer and gophers; the appreciation of your fellow club members; free parking; and more! Below is a list of opportunities for energetic club members that need to be passed on or not as the club sees fit.

If possible I would continue doing this for years but I'm planning a move in a few years and simply won't be here. My hope is to give the club time to consider its options and that I can pass on some tips to whomever(?) comes next.

Observers Group Coordinator

- Set schedule for Observers Group based on dark skies(new moon) and not on a long weekend.
(Also Messier Marathon)
- Interpret weather reports to base a go/no go decision the day of Observers Group and notify club members.

Yard maintenance

- Mow grass or blow snow as required so yard is useful and combustibles near buildings are kept to a minimum.
- Care and feeding of snow blower and lawn mowers. ***Important***

Key Master

- Give tours of Sleaford to club members and hand out keys to the kingdom.

Sleaford Open House

- | | |
|----------------------|----------------------------|
| - Set a date | - Nag George for posters. |
| - Distribute posters | - Nag everyone to show up. |

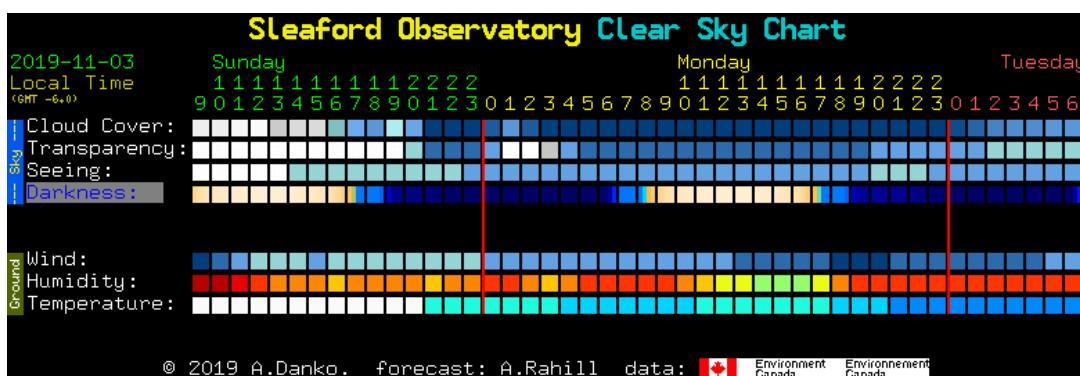
Starting in 2006 I began hosting Observer's Group meetings and as the years went on I accumulated some other responsibilities as listed above. Not sure if everything will be picked up by the members but I am hoping someone will step up to host the Observers Group and assist with these other responsibilities. Cheers for now, hope to see some of you out at Sleaford before I'm gone.

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

BOOKS 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 R. Morales	B & W	\$15.00
“Observing the Constellations”	1989 J. Sanford	Color charts	\$10.00

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. 314)
- THE FINEST NGC OBJECTS (p. 318),
- THE DEEP-SKY CHALLENGE OBJECTS (p. 322),
- DEEP-SKY GEMS (p. 324).

See www.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** for intermediate to advanced members. In addition, **Astroimaging certificates** are available for those members with a photographic bent. See www.rasc.ca/astro-imaging-certificate

RASC OBSERVER'S HANDBOOK 2020

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
Marcel Müller-	94
Goldkuhle	
Wade Selvig	75
Wayne Schlakohl	43
Ellen Dickson	34
Graham Hartridge	9

CHATFIELD BINOCULAR CERTIFICATE

Certified at 35 to 40 Objects:

T. Tuomi, R. Huziak

Jim Goodridge	12
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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

EXPLORE THE UNIVERSE

Certified at 55 to 110

Objects: *T. Tuomi,*

Wayne Schlakohl	55
Jim Goodridge	35

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

ISABEL WILLIAMSON

LUNAR OBSERVING CERTIFICATE

Certified at 140 Objects:

T. Tuomi, N. Jensen

EXPLORE THE MOON CERTIFICATE

T. Yaworski

LEVY DEEP-SKY GEMS

Certified at 154 Objects:

Tenho Tuomi	150
Darrell Chatfield	70

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

<http://www.rasc.ca/observing>

On-line Herschel 400 List:

<http://www.astroligue.org/al/obsclubs/herschel/hers400.html>

Binocular List is at: https://www.usask.ca/rasc/Chatfield_Binocular_List.pdf

“Isabel Williamson Lunar Observing Program Guide”:

<http://www.rasc.ca/sites/default/files/IWLOP2015.pdf>

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