# Saskatoon Skies

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

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To view *Saskatoon Skies* digitally, see our website:
**http://www.usask.ca/rasc/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)
- SkyNews Magazine (bimonthly)
- borrow the Centre's projector to give astronomy outreach presentations – contact Les Dickson at **astrochem@sasktel.net**
- rent the Centre's Telescopes **https://www.usask.ca/rasc/telescopes.html**
- use of the Centre library

**SASKATOON CENTRE'S MAIN OFFICERS**:

**President** – Daryl Janzen
**Vice-President –** Jim Goodridge
**Secretary** – Rina Rast
**Treasurer** – Norma Jensen
**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**.

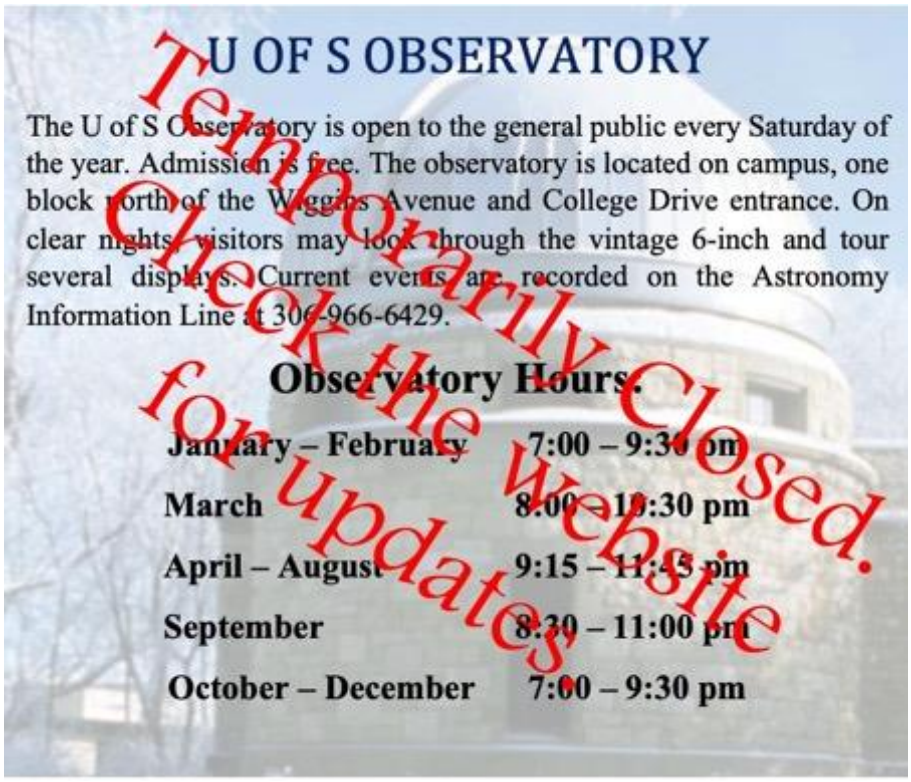
# NEWSLETTER INFO

**Newsletter Editor** – Colin Chatfield
**Copy & Collate** – Les & Ellen Dickson
**Labels & Temps** – Mark de Jong
**Web Posting** – 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 **colcha@sasktel.net** 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@sasktel.net** for rates. Members can advertise non-commercial items for free.

*Comet NEOWISE taken by Tara Magee July 20, 2020*




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

Facebook - **https://www.facebook.com/usaskobservatory/**

Saskatchewan Light Pollution Abatement Committee

Saskatchewan Light Abatement Committee -

**http://myotherlife.net/slpac/**

IDA INTERNATIONAL DARK-SKY ASSOCIATION

**www.darksky.org**

# RASC CALENDAR OF EVENTS

| | | |
|---|---|---|
| **Sept 21** | **RASC General Meeting - 8:00pm (info below)** | Daryl Janzen |

## September RASC General Meeting

for all members and guests

**Join us on September 21, 2020 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 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 - **Main Program**

**NOTE:** a link to register to attend the webinar will be emailed out, 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.

Speakers:
- **Rielly Castle and Alexander Magnus: "A Photometric Analysis of RRab Lyrae Variable Star V413 CrA"**

***PLEASE NOTE:** Club elections are coming up in October as well, with a few positions being open; including president, vice president, among others. So, please give some thought about the positions and be sure to join the October meeting and vote. More info will be given at the September Zoom meeting.

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

# PRESIDENT'S MESSAGE

Daryl Janzen

I hope everyone managed to have an enjoyable and safe summer, and that you took advantage of the clear skies we had after a cloudy June!

This will be an unprecedented year for us at the RASC Saskatoon Centre. With the pandemic and continued university closure, and the health and safety of our members a priority, our monthly meetings will continue to be held through Zoom, potentially for the entire year. Some of our members have been making good use of Sleaford Observatory, and hopefully this can remain a place to safely meet and enjoy the night sky together while physical distancing.

At the September Council meeting, we will discuss what this year might look like for our club. Elections will be held at the October meeting, with a number of positions open for election. The full list, which includes President and Vice President, will be discussed at this month's meeting.

The world is forcing us to take a long look at how we can run a club mandated to promote astronomy during a public health crisis, and this is a challenge our new Executive Council will likely want to address. Last year, our members noted the benefit of continuing to hold meetings over Zoom, and to continue providing the option even after the pandemic so those who do not live in Saskatoon can more easily participate. We also discussed setting up a robotic telescope at Sleaford Observatory that our members could use for both personal observations and public outreach. A subcommittee was formed to investigate what this venture would entail, and this will be discussed at this month's Executive Council meeting.

The new Executive Council will likely consider options such as these to keep the Centre thriving through the pandemic, so I want to encourage all of you to attend the Council Meeting this month and share any ideas you have, of how the club can remain relevant to you and others at this time. I hope we will have a lively and inspirational discussion!

# SPEAKERS FOR MEETINGS

Rick Huziak

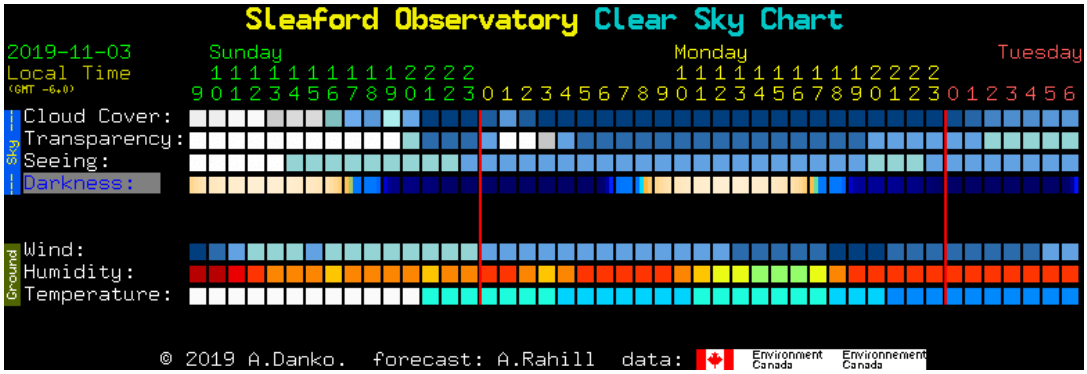
Getting speakers for each general meeting is harder than pulling teeth - plain and simple. Going forward, we have only three speakers lined up until the end of the season. Daryl Janzen will talk about U of S telescopes, and then possibly later in the spring, Gord Sarty will talk about his Space MRI. But with three other main talks and three minor talks to fill the agenda with, it is highly likely that you will be listening to talks about my favourite variable stars or the latest light pollution crisis … again. So, please volunteer to give a talk about your favourite astronomy topic or experience. It doesn't have to be long and everyone has some sort of interest in the sky. As a matter of fact, there is an entire universe out there to talk about! So, be it 5 minutes or 55 minutes. I'd love to hear from you.

# 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 -

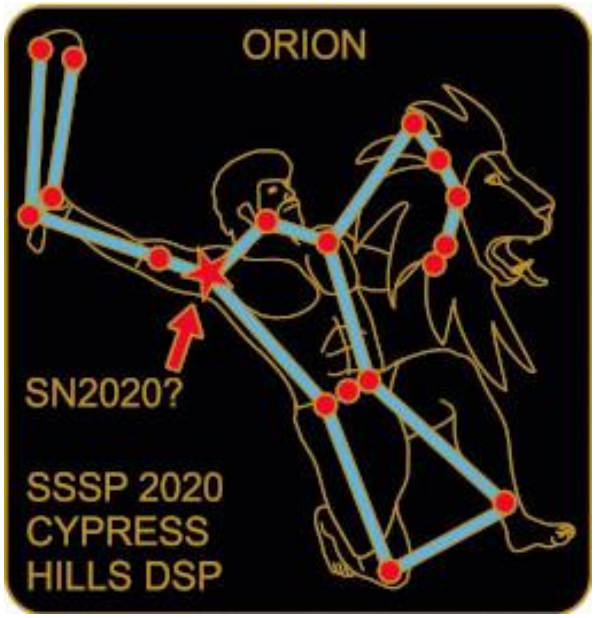
**www.weather.gc.ca/astro**

# SSSP 2020 - The Star Party That Never Was

Les Dickson with contributions from Rick Huziak and Vance Petriew

Despite having to cancel the Saskatchewan Summer Star Party to keep people safe, many of us are still longing to be in Cypress Hills under the stars. As a result we decided to offer SSSP shirts, pins and patches this year to commemorate the star party that never was. ***PLEASE NOTE: the cut-off date for ordering will be September 30th.***


The SSSP 2020 logo depicts the SSSP VOID falling into a 2020 black hole in 3-dimensions. The SSSP VOID represents the missing year in a long line of star parties in Cypress Hills. 23 to be exact. The word VOID could easily be CO-VOID but VOID was chosen as it is more astronomically significant. The design speaks to the missing star party, but could also be representative of the loss of life for victims of COVID-19. In general terms, the black hole represents "loss" which may have a different meaning for everyone this year. The 3-dimensions represents the far-reaching effects of the virus as we orbit on the 3rd rock from the sun. This year we are offering the usual apparel, t-shirts, golf shirts and hoodies in Adult sizes (small to XXL) and Youth t-shirts (small, medium and large). Prices are the same as last year: t-shirts $25, golf shirts ($45) and hoodies ($50). We are also offering the 2020 logo as an embroidered patch, along with the 2019 patch that was going to be offered at SSSP this year for sale on-site. The generic SSSP patch (with the Prairie Lily) can also be ordered.




You may not think of Orion as a Summer Star Party constellation, but Orion's rising and the view of M42 just before the morning sunrise is the reward for SSSP observers who pulled that "all-nighter". However, we chose Orion because alpha Orionis, or Betelgeuse, was the major bit of astronomical news at the beginning of 2020 when this variable supergiant star decided to fade fainter than had ever been recorded. This extreme fading was touted by some as an omen of the upcoming supernova that Betelgeuse will eventually become. Betelgeuse is thus labeled "SN 2020?" on the pin, in the hope that between the time when the pin was designed (March) and the star party (August) that SSSPers would be able to observe until a supernova put an end to the star party, turning night into day! When Betelgeuse explodes, it is expected to be about as bright as the full moon.

The SSSP 2020 website can be found at https://sssp.saskatoon.rasc.ca/. Links can be found on the main page to information on the shirts, patches and pins and to the order page.

The dates of the 24th (mostly) annual SSSP 2021 are August 4th to 9th. We are pleased to say that our invited guests for 2020, **Dr. Fran Bagenal, Dr. Daryl Janzen, Sherry Campbell and Gerry Smerchanski**, have all indicated their interest in presenting at SSSP 2021.

We are sorry we could not have a proper SSSP 2020. Rick Huziak and a handful of others braved the wilds of the Dark-Sky Campground at Cypress Hills Inter-provincial Park over the planned SSSP weekend. By all accounts they had good skies and a great time. We hope we can be joined by a few hundred of our friends next year. We hope to see you there too!

If you have any questions, please contact us at sssp.sk@sasktel.net

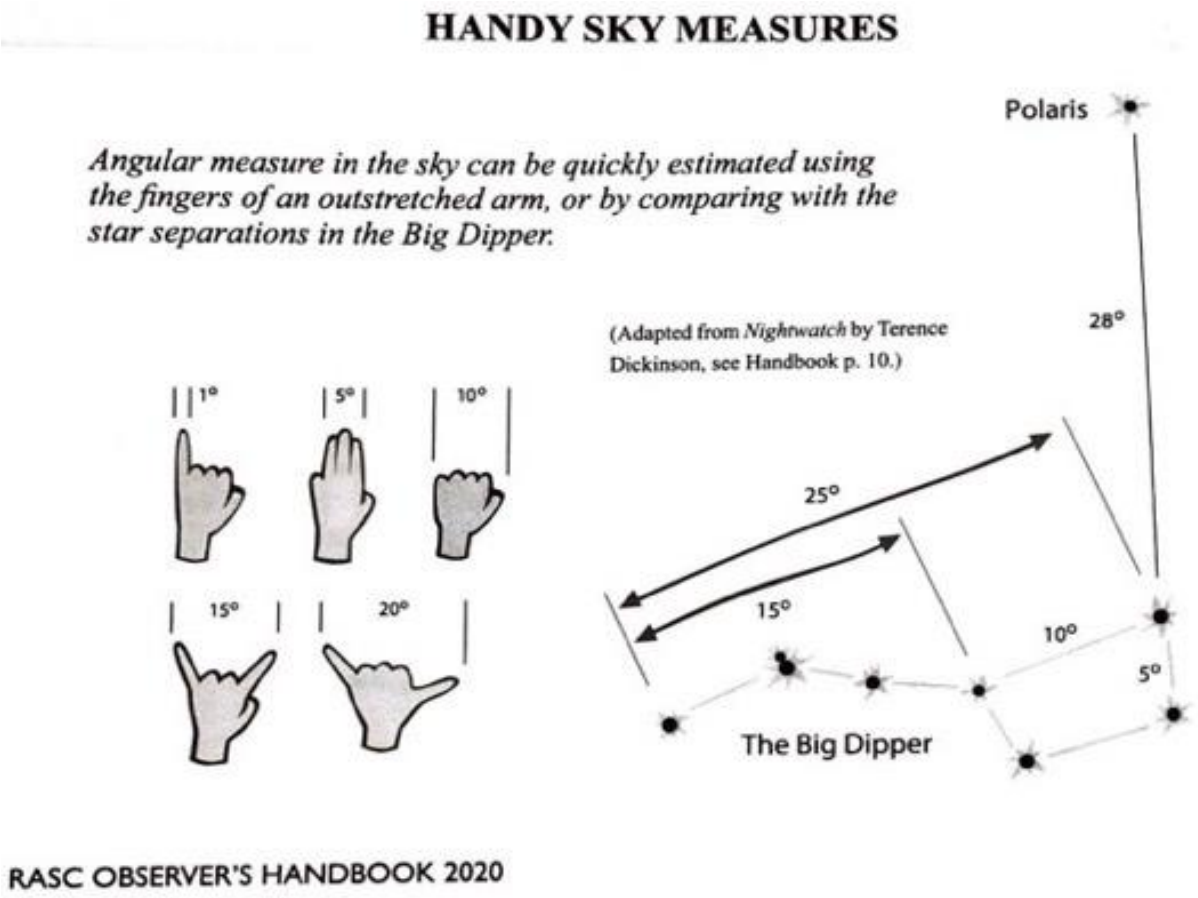

*Comet NEOWISE taken by Tara Magee near Bradwell July 16, 2020*

# BOOK DRIVE

Astronomy-related book donations are being accepted to the RASC Saskatoon Centre Library at the U of S Observatory during its regular Saturday evening open house (please note that the observatory is currently closed indefinitely due to COVID-19).

# SEPTEMBER NIGHT SKY EVENTS AND INFO

Images on the next few pages taken with permission from the 2020 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/Store/StoreMain.aspx?Category=CURRPUB



# THE SKY FOR SEPTEMBER

| | | Mercury | Venus | Mars | Jupiter | Saturn | Uranus | Neptune | Sun |
|---|---|---|---|---|---|---|---|---|---|
| RA | 1 | 11h 31m | 7h 42m | 1h 47m | 19h 15m | 19h 51m | 2h 32m | 23h 23m | 10h 41m |
| | 11 | 12h 28m | 8h 28m | 1h 50m | 19h 14m | 19h 49m | 2h 31m | 23h 22m | 11h 17m |
| | 21 | 13h 19m | 9h 14m | 1h 46m | 19h 15m | 19h 48m | 2h 31m | 23h 21m | 11h 53m |
| Dec | 1 | +4° 08′ | +19° 25′ | +6° 32′ | −22° 43′ | −21° 17′ | +14° 28′ | −5° 10′ | +8° 17′ |
| | 11 | −3° 22′ | +17° 56′ | +6° 45′ | −22° 45′ | −21° 22′ | +14° 24′ | −5° 16′ | +4° 34′ |
| | 21 | −10° 02′ | +15° 38′ | +6° 36′ | −22° 45′ | −21° 25′ | +14° 20′ | −5° 23′ | +0° 43′ |
| Dist | 1 | 1.34 | 0.85 | 0.50 | 4.45 | 9.24 | 19.29 | 28.94 | 1.009 |
| | 11 | 1.26 | 0.93 | 0.46 | 4.58 | 9.37 | 19.15 | 28.92 | 1.007 |
| | 21 | 1.15 | 1.00 | 0.43 | 4.72 | 9.51 | 19.02 | 28.94 | 1.004 |
| Mag | 1 | −0.6 | −4.3 | −1.8 | −2.6 | 0.3 | 5.7 | 7.8 | |
| | 11 | −0.2 | −4.2 | −2.1 | −2.5 | 0.4 | 5.7 | 7.8 | |
| | 21 | −0.1 | −4.1 | −2.3 | −2.4 | 0.4 | 5.7 | 7.8 | |
| Size | 1 | 5.0″ | 19.5″ | 18.9″ | 44.3″ | 18.0″ | 3.6″ | 2.3″ | 31′ 42″ |
| | 11 | 5.3″ | 17.9″ | 20.4″ | 43.1″ | 17.8″ | 3.7″ | 2.3″ | 31′ 46″ |
| | 21 | 5.9″ | 16.6″ | 21.6″ | 41.8″ | 17.5″ | 3.7″ | 2.3″ | 31′ 52″ |

**Moon:** On September 0 at 0h UT*, Sun's selenographic longitude is 59.16° and increases 12.2° each day thereafter.
Greatest N declination on the 12th (+24.3°)
Greatest S declination on the 25th (−24.4°)
Libration in longitude: E limb most exposed on the 25th (+7.1°)
W limb most exposed on the 13th (−7.2°)
Libration in latitude: N limb most exposed on the 3rd (+6.5°)
S limb most exposed on the 17th (−6.5°).
**Large tides** in the days following new Moon (Sep. 17)

**Mercury:** The best evening apparition of the year for Southern Hemisphere observers, as the innermost planet spends all of September gradually separating from the Sun and toward its greatest eastern elongation (GEE) on Oct. 1. Much more difficult for those in the Northern Hemisphere due to the unfavourable geometry of the evening ecliptic at this time of year. Makes a close pass of 1st mag. Spica on Sep. 21–22.

**Venus:** The brilliant planet remains well placed in morning twilight, towering high above the Sun along the steepest portion of the ecliptic. The waning crescent Moon passes 4° to its north on the morning of the 14th. By month end, it is nearing Regulus, with which it will have a close conjunction in early October.

**Mars:** With its best apparition of the 2020s now well underway, the fiery Red Planet rises soon after sunset and is prominent throughout the night, a few degrees north of the celestial equator. The waning gibbous Moon will make an extremely close pass on the evening of the 5–6, resulting in an occultation visible from South America and a close appulse from elsewhere in the Western Hemisphere. Mars reaches its first stationary point on the 9th about 5° due north of α Piscium and commences its retrograde loop thereafter. Meridian transit times at Greenwich on the 1st, 11th, 21st—03:06, 02:28, 01:45 UT*.

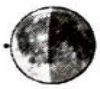
**Jupiter:** Reaches its second stationary point on the 13th, after which it slowly but inexorably recommences prograde motion against the background stars of Sagittarius. The gap between Jupiter and nearby Saturn will now start to close from its current 8° in celestial longitude to zero at their Dec. 21 conjunction. The waxing gibbous Moon passes 2° to the south on the 25th. Meridian transit times at Greenwich on the 1st, 11th, 21st—20:31, 19:51, 19:12 UT*.

**Saturn:** Continues its retrograde motion in eastern Sagittarius until the 29th when it achieves its second stationary point, after which it gradually resumes prograde (eastward) motion. The waxing gibbous Moon passes 2° to its S on the 25th. Meridian transit times at Greenwich on the 1st, 11th, 21st—21:06, 20:25, 19:45 UT*.

**Uranus:** Now rising before midnight as it approaches its Oct. 31 opposition. Meridian transit times at Greenwich on the 1st, 11th, 21st—03:50, 03:10, 02:30 UT*.

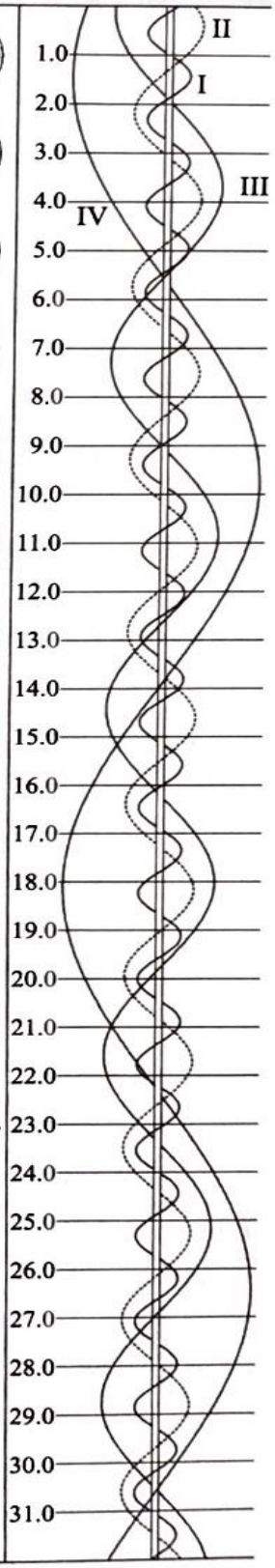
**Neptune:** Reaches opposition on the 11th, 4.0 light-hours (28.9 au) from Earth, mag. +7.8, with a 2.4″ disk. Neptune will be in the sky all night long throughout the month. Meridian transit times at Greenwich on the 1st, 11th, 21st—00:42, 00:02, 23:17 UT*.

*See p. 94, the bold-faced sentences of the first paragraph.

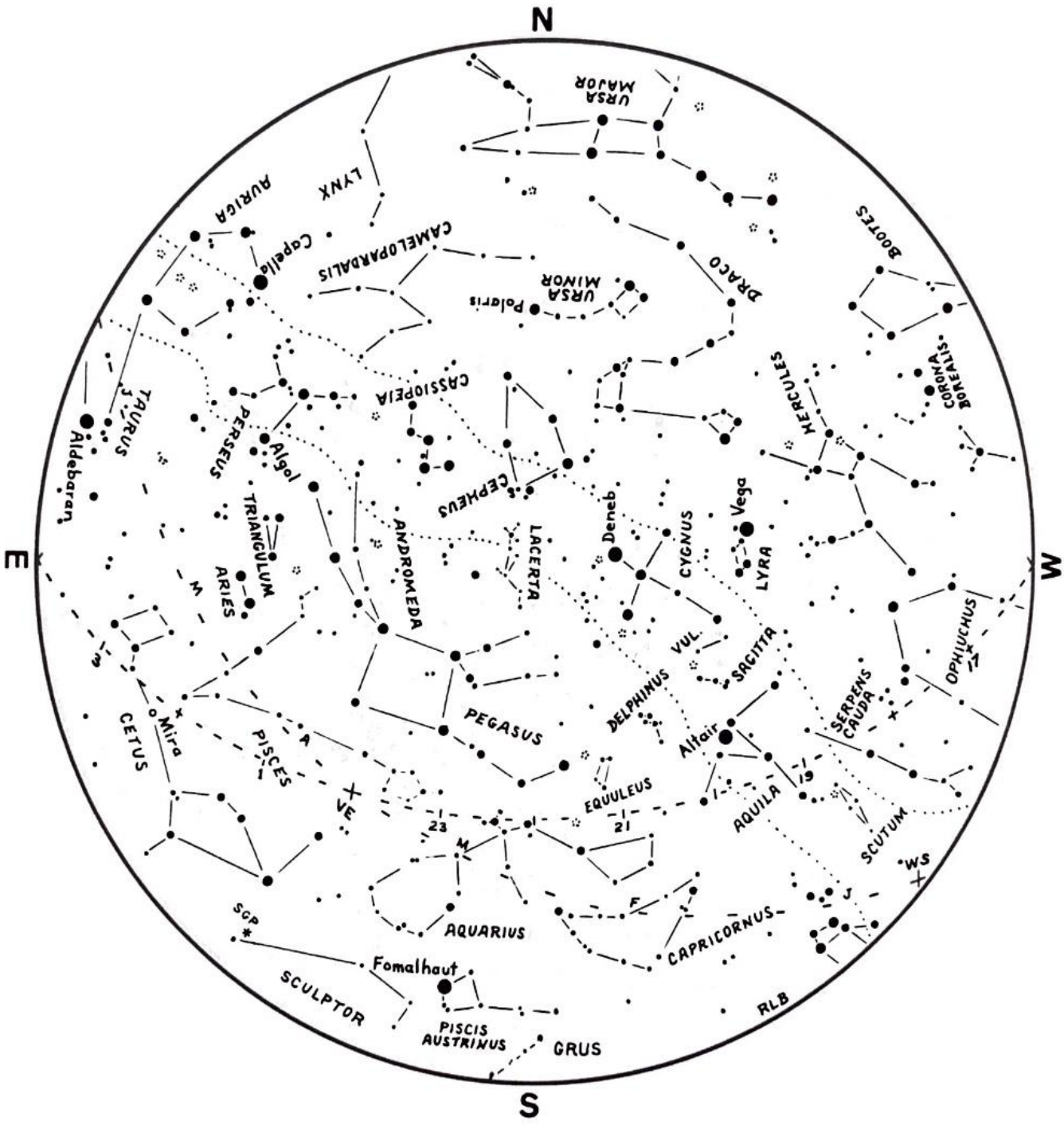
| Time (UT) d | h | m | SEPTEMBER EVENTS | |
|---|---|---|---|---|
| Tue. 1 | | | | |
| Wed. 2 | 5 | 22 | **Full Moon** |  |
| | 13 | | Pallas stationary | |
| | 13 | 52 | Algol at minimum |  |
| Thu. 3 | | | | |
| Fri. 4 | | | | |
| Sat. 5 | 10 | 41 | Algol at minimum |  |
| Sun. 6 | 5 | | **Mars 0.03° S of Moon, occultation†** | |
| | 6 | | Moon at apogee (405 607 km) | |
| Mon. 7 | 4 | | Uranus 3° N of Moon |  |
| Tue. 8 | | | Mercury at descending node | |
| | 7 | 30 | Algol at minimum | |
| Wed. 9 | 18 | | Mars stationary |  |
| Thu. 10 | 9 | 26 | **Last quarter** | |
| Fri. 11 | 4 | 19 | Algol at minimum |  |
| | 13 | | **Moon 0.3° S of M35** | |
| | 20 | | **Neptune at opposition** | |
| Sat. 12 | | | |  |
| Sun. 13 | 0 | | Jupiter stationary | |
| Mon. 14 | 1 | 08 | Algol at minimum | |
| | 5 | | **Venus 4° S of Moon** |  |
| | 6 | 57 | **Double shadow transit on Jupiter** | |
| Tue. 15 | | | **Zodiacal Light vis. in N lat. in E before morning twilight for next two weeks** |  |
| Wed. 16 | 21 | 57 | Algol at minimum | |
| Thu. 17 | 11 | 00 | **New Moon** (lunation 1209) |  |
| Fri. 18 | 14 | | Moon at perigee (359 082 km) | |
| Sat. 19 | | | Mercury at aphelion | |
| | 18 | 46 | Algol at minimum |  |
| Sun. 20 | | | | |
| Mon. 21 | | | | |
| Tue. 22 | 9 | | **Mercury 0.3° N of Spica** |  |
| | 13 | 31 | **Equinox** | |
| | 15 | 35 | Algol at minimum | |
| Wed. 23 | | | |  |
| Thu. 24 | 1 | 55 | **First quarter** | |
| Fri. 25 | 7 | | **Jupiter 1.6° N of Moon** |  |
| | 12 | 24 | Algol at minimum | |
| | 21 | | **Saturn 2° N of Moon** | |
| Sat. 26 | | | Venus at ascending node |  |
| Sun. 27 | | | | |
| Mon. 28 | 9 | 13 | Algol at minimum | |
| Tue. 29 | 3 | | Saturn stationary |  |
| Wed. 30 | | | | |

Jupiter's Satellites

West East




†C & NE South America, Cape Verde Is., N Africa, S Europe


N
E
W
S
URSA MAJOR
LYNX
AURIGA
Capella
CAMELOPARDALIS
URSA MINOR
Polaris
DRACO
BOOTES
CASSIOPEIA
HERCULES
CORONA BOREALIS
TAURUS
Aldebaran
PERSEUS
Algol
CEPHEUS
TRIANGULUM
ARIES
ANDROMEDA
LACERTA
Deneb
CYGNUS
Vega
LYRA
VUL.
SAGITTA
OPHIUCHUS
DELPHINUS
PEGASUS
Altair
SERPENS CAUDA
CETUS
Mira
PISCES
EQUULEUS
AQUILA
SCUTUM
AQUARIUS
CAPRICORNUS
SGR
Fomalhaut
SCULPTOR
PISCIS AUSTRINUS
GRUS
RLB
WS

Here is LDN 1235 the Dark Shark Nebula in the constellation of Cepheus from Stan Noble. It's 650 light years from here and stretches about 15 light years across. It features a few small reflection nebula within it and even a faint and distant galaxy near the centre right. I have 324 - 120 second frames stacked into this pic for a total of 10.8 hours, taken from Far-Point Station observatory in Aneroid, SK under Bortle 2 skies. Sky Watcher 80ED, Starfield 1x's flattener, ZWO 294 MC Pro, Sky Watcher AZ-EQ 6 mount

Congrats to Stan as this image was just chosen as the Astropheric's Photo of the Month for September. Visit their website here https://www.astrospheric.com/apom/. Find Stan on Instagram: @stannoble564

*Five image panorama of the aurora display at Sleaford on August 18, 2020 by Colin Chatfield*

# LOOKING AT STUFF

Gordon E. Sarty

It's clear and you have some time to stay up late, so you get out your telescope to look at stuff. What do you look at? That's probably the question amateur astronomers ask themselves the most. What do I look at tonight?

There are many ways to answer that question. Lists are one way. Work your way through the Messier list, or the Finest NGC list or the H400. I've done that. It's a good way to learn about the sky. But lists can draw you into a check-off-the-boxes mentality. To avoid that, I like to sketch the things I see, especially when I haven't seen them before. But still, following lists can make your viewing a little too goal-oriented. I look through my telescope to escape all that. After all, I've done photometry and spectroscopy using big professional telescopes, and space telescopes, and have published some cool papers. I don't need to accomplish anything with my astronomy. I just want to look at stuff. Train spotting. Escape. Connecting with the actual universe.

Many years ago I remember a conversation at some star-party with famous Alberta astronomer Paul Campbell and famous Saskatchewan astronomer Rick Huziak as dusk was falling. The discussion was around, "what are you going to look at tonight?". Rick mentioned that he was working on the H400 list. Paul said, "I don't do lists". That stuck me. Maybe I should avoid lists too.

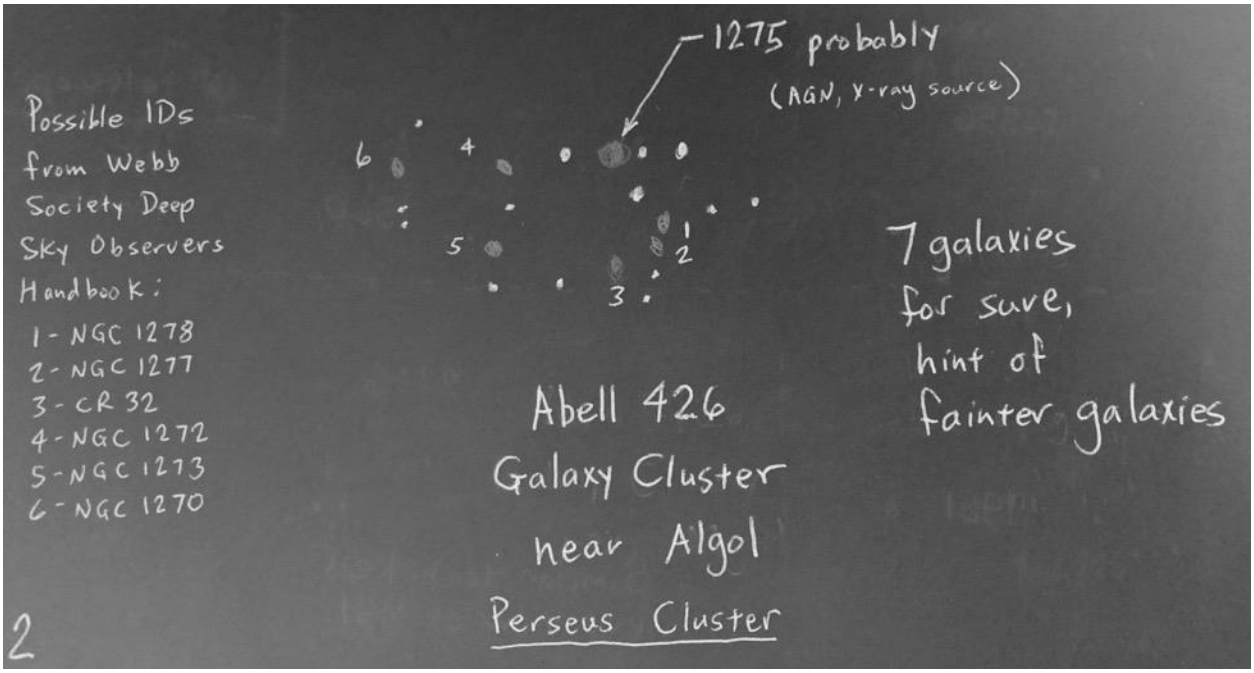
Well, I still do look at the H400 list to get some ideas, but I like to set up my viewing to focus on a well-placed constellation or two. Lists often have you scrambling for objects on the southern horizon. That's kind of crazy. We live in Canada. The best stuff is straight up where the air is a lot better. Cygnus, Cepheus, Lacerta.

If you don't have a list, how do you figure out what to look at? Lately, I've simply opened up Sky and Telescope Pocket Sky Atlas to the constellation I'm viewing and see if I can find all the deep-sky objects plotted on the star maps. If you'd like to try something similar there are a few things that I should mention. First, I do my viewing with my big homemade 18 inch telescope. That generally makes finding the objects I go after more or less a sure thing. If you have a smaller telescope, maybe not. But I would try anyway with a smaller telescope just to see. In the city, I go after mostly open clusters and planetary nebula. Galaxies really do need a dark sky, even with a big telescope. But sometimes I try to see galaxies from the city just for fun.

I have a further word of warning if you try this at home. Ignore the plotted PK planetary nebula. I tried to find those and failed. Later I looked them up in Simbad on the interweb.

They are 20th magnitude objects and fainter. Not even my 18 inch telescope can handle that. I'm really not sure why Sky and Telescope plotted them in their star atlas.

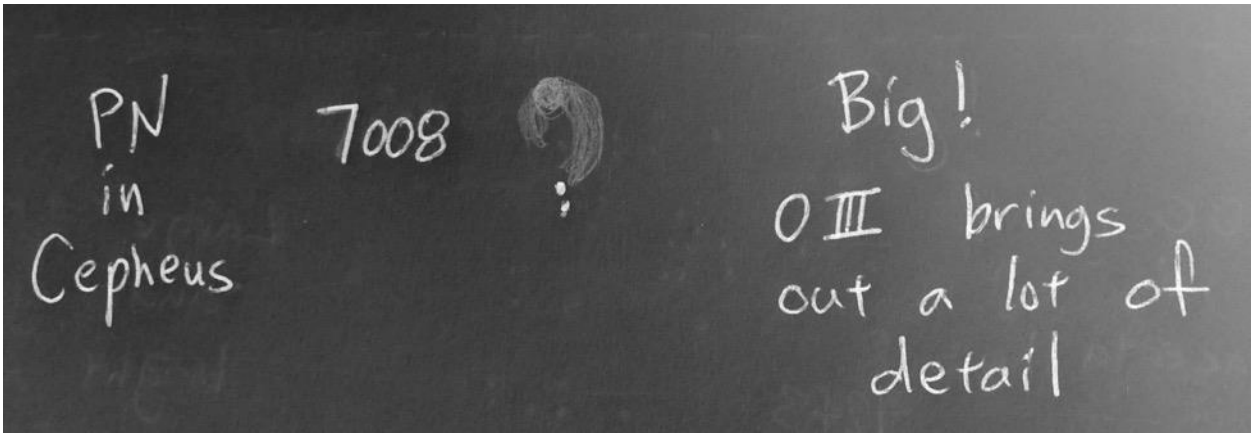
Well enough of the how. What have I seen that's cool lately? A couple of objects stand out. The first is a sighting of the Perseus galaxy cluster, Abell 426, that I made on the last day I was at the Cypress Hill un-star party this August (as the actual star party was cancelled by COVID-19). I made the observation from my Meadows campsite with streetlights hidden behind trees. Here's what I saw:




Galaxy clusters generally don't appear on lists. I wasn't actually going after the cluster, I was just going after NGC 1275 because that's what was plotted in the pocket star atlas. I looked also at my Uranometria star chart to see that I was looking at a Perseus galaxy cluster. The Perseus cluster is something I've wanted to see since I was a kid but, until now, hadn't. So I spent some time looking at it. The galaxies plotted on the Uranometria star chart are all piled on top of each other so it's useless for identifying the galaxies that you can see. So I just drew what I saw and later figured out what I saw from the Webb Society's book as you can see on my sketch.

The second cool thing I've seen lately was from my backyard in the city. The light pollution is pretty strong in my backyard but, for planetary nebula, an OIII filter really helps. Just picking stuff out at random on the star chart one night, after looking at a bunch of open clusters, I decided to try for the planetary nebula NGC 7008. It's in Cepheus and, on the night I looked at it, was almost exactly straight up. That's a tough spot to move a Dobsonian

telescope around but it can be done and, actually, NGC 7008 was pretty easy to find. That's because it is big and bright! (At least in the 18 inch telescope.) Here is what I saw:




Many planetary nebula are just small disks, some so small that it can be difficult to distinguish the planetary nebula from a star. Not this one! It is big and bright and shows structure! The magnification I used here, to show all that off, was 273x. So you might find my superlatives a little biased if you look at this with a smaller telescope. Let me know!

NGC 7008 is not on the finest NGC list or on the H400 list. It's a real good example of stuff you can find off lists. I was blown away.

It is hard to find time in our busy lives to look at stuff with our telescopes. But when I do get out and find more really cool stuff, I may come back here and show off more sketches to you.

## TOUCH THE SKY: THE STORY OF AVRO CANADA

**This exhibit is closed temporarily, but I'll leave the info in case it opens again.**

A pioneer in aircraft manufacturing, Avro Canada Ltd. was most recognized for its Avro Arrow aircraft—a model intended to serve the Royal Canadian Air Forces. Highly debated in government for its cost and national defence implications, Prime Minister Diefenbaker abruptly cancelled the production of the Avro Arrow in 1959. Curated by the Diefenbaker Canada Centre, this exhibit tells the story of Avro Canada's creation and its impact in the world of aeronautics and technology.

https://diefenbaker.usask.ca/exhibits/Current-exhibits.php#TouchtheSkyTheStoryofAvroCanada

*Milky Way over the Frenchman River Valley by Colin Chatfield from August 22, 2020*

# 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 B & W
R. Morales $15.00

**"Observing the Constellations"** 1989 J. Sanford Color charts $10.00

*Taken by Ron Waldron in July*

*This photo was taken by Ron Waldron through his 80 mm, f6 Antares refractor telescope in August*

*Comet NEOWISE over an old church by Colin Chatfield from July 18, 2020*


*"Summer on the Prairies" Comet NEOWISE is nestled between the Big Dipper and a barrage of lightning. This image was captured north of Humboldt, SK by Tim Yaworski*


*Comet NEOWISE with aurora. Taken by Darrell Chatfield on July 20, 2020 with a Canon 60D and Tokina 11-16mm f/2.8 lens*


*Comet NEOWISE with aurora. Taken July 20, 2020 by Darrell Chatfield with a Canon 60D*


*August Moon taken by Mike Dolan*

*Heart and Soul Nebulas and double cluster by Colin Chatfield August 16, 2020 from Sleaford*

*Milky Way over an abandoned house taken by Tara Magee on August 22, 2020*

# 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-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 |

**EXPLORE THE UNIVERSE**
**Certified at 55 to 110 Objects:** *T. Tuomi,*

| | |
|---|---|
| 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*

**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 |

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.astroloeague.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.shtm**