Winnicentrics

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

Regular meetings of the Winnipeg Centre are held in the Robert B. Schultz Lecture Theatre in St. John's College at the University of Manitoba, 92 Dysart Road. Free parking is available in the lot across the street. The theatre is on the lower (basement) floor of the College. Meetings are usually held on the second Friday of each month from 7 p.m. to 10 p.m. After the meetings, members who wish to do so usually retire for pizza and more conversation about astronomical subjects.

One of the summer meetings, usually in June but occasionally July, is not at St. John's College but is instead a barbeque at either a member's house or at Glenlea. Check the RASC Winnipeg website (http://winnipeg.rasc.ca/) in summer months to confirm the dates and locations of meetings and social gatherings.

Meeting dates and places may be adjusted during exam times and during Bombers home games or other stadium events.

Upcoming Events

Meetings
March 13
April 17 - via Zoom
May - TBA

Members' Observing Nights
On hold due to COVID-19
Glenlea Observatory Closed

Oak Hammock Marsh Astronomy Night
Cancelled until further notice

University of Manitoba Open House
Cancelled until further notice

New Moon
March 24
April 22
May 22
June 21

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Subscribe To Our YouTube Channel!

RASC Winnipeg meetings from January 2019 to the present are online at:

https://www.youtube.com/channel/UCI-5qhaejiUZHBnQdrbYDAA

If enough viewers subscribe to the channel, a more appropriate address using the RASC name can be obtained.

WHO, WHERE, WHEN?

Executive Council

Winnipeg Centre Officers & Volunteers

President: Bryan Stach

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Dennis Lyons

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Past President:
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Observatory Director:
Bryan Stach

Winnicentrics is published six times or more each year by the Winnipeg Centre, RASC. Winnicentrics is produced by and for the members of the Winnipeg Centre. Any opinions expressed are those of the author.

If you have comments, questions, or concerns about Winnicentrics, you can contact any of the councillors above.

Notices

Challenge your observing skills with the RASC *Explore the Universe* program. Visit https://rasc.ca/explore-universe or contact Dennis Lyons for more information.

The **Glenlea Observatory** is **CLOSED** until further notice, and no Members' Observing Nights will be scheduled at this time.

The **loaner scope program** is also on hold.

March 13, 2020 Meeting Schedule

7:00 pm Beginner's Session
7:30 pm Announcements
What's Up? Upcoming events in the sky
What's New? New discoveries in astronomy
8:30 pm Break for Coffee and Refreshments
9:00 pm Featured Presentation: Dr. Philip Groff
RASC National and Q & A

April 17, 2020* Meeting Schedule
(virtual meeting via Zoom)

7:30 pm Beginner's Session
8:00 pm Announcements
What's Up? Upcoming events in the sky
What's New? New discoveries in astronomy
8:30 pm Featured Presentation: Gerry Smerchanski
The Great Astronomy Debate of 1920

May 8, 2020 Meeting Schedule
(To be announced)

* Please note that the April 2020 meeting has been rescheduled for one week later to accommodate Good Friday.

Upcoming Observing Events
April – June 2020

The Planets

Mercury:
- Best opportunity for viewing will be in evening twilight on May 31, when it will be at an altitude of 16°.

Venus:
- At greatest brightness on April 28.

Mars:
- Conjunction with Ceres on May 31. Will be difficult to observe due to maximum altitude of 11° at dawn.

Jupiter:
- Visible in the morning until mid-July.

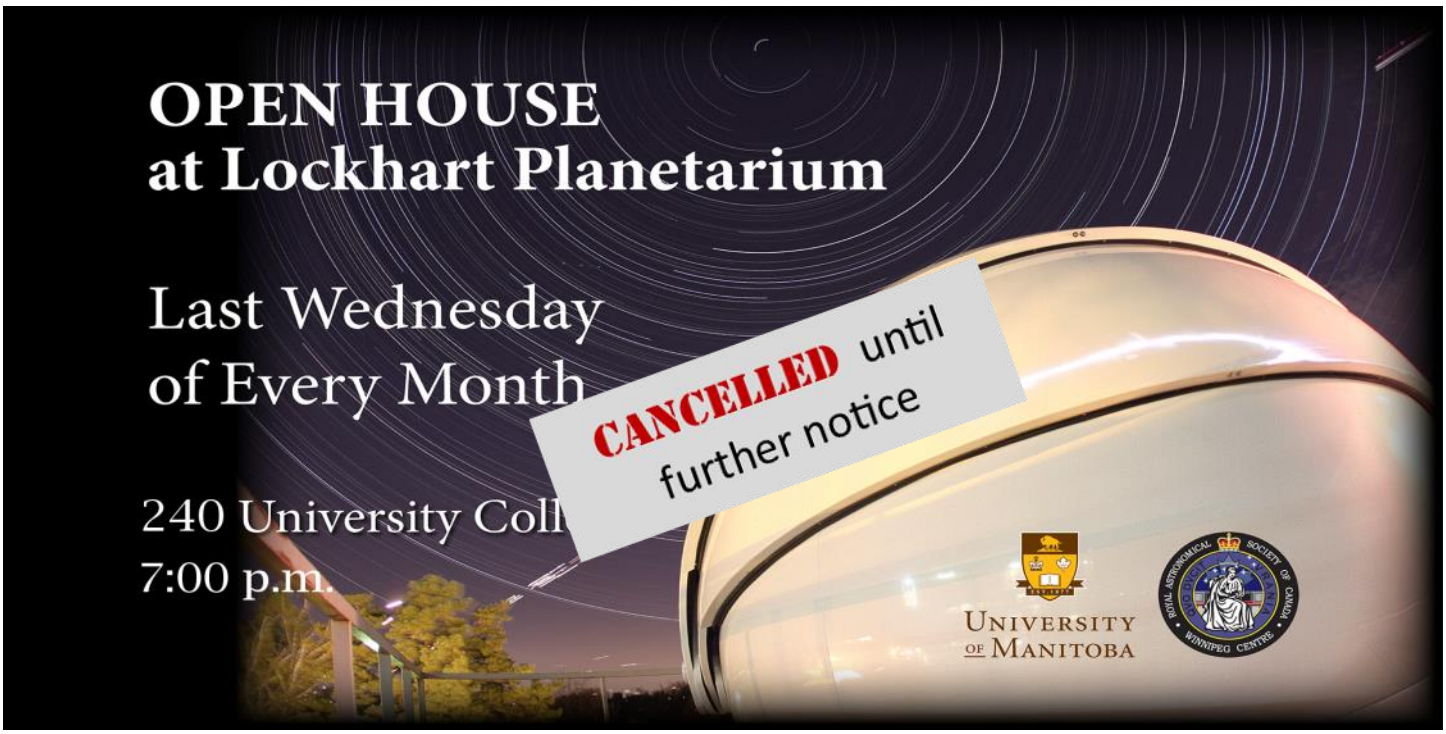
Saturn:
- Close to Jupiter in the morning sky.

Uranus:
- Reaches solar conjunction on April 26. Not currently visible.

Neptune:
- Emerging from solar conjunction and difficult to view at this time.

Other Events

- April 22: Peak of Lyrid meteor shower
- May 5: Peak of η-Aquariid meteor shower, not visible until 3:07 a.m.
- May 13: Comet C/2017 T2 (PANSTARRS) 1.62 AU from sun, between Camelopardalis and Ursa Major
- June 20: Summer solstice



Visit http://www.physics.umanitoba.ca/astro/ for more information, including planetarium videos for home viewing.

Building The NTT16 Part 1 – Optics, Design, and Components

By Gord Tulloch, RASC Winnipeg Centre

This series of articles will chronicle the build of a new 16" telescope.

Introduction

Since my trusty old Celestron 8" is permanently embedded in my observatory, I need a scope I can easily load up in the truck and take to star parties and member observing events. Lately I've been reading Albert Highe's *Engineering, Design, and Construction of Portable Newtonian Telescopes*, so I decided to use his ultralight telescope design as a guide for a new 16" telescope. Since I'm a real techno-nerd I decided I would stack this telescope with as much new, open source technology as I can – there's lots of cool things out there! Hence the name NTT16 – the New Technology Telescope 16". Since the telescope is nearing completion, I thought I'd share how it was built.

Why build versus buy? For apertures below 16" the answer is simple – don't do it. You'll never save any money versus buying a similar size scope, unless you want something unusual (this is the reason I built an 8.25" f/9 scope with an undersize secondary specifically for planetary observing/imaging), or you're learning how to build telescopes to make a larger scope in the future. My intention is to keep building larger and larger scopes, so this telescope is a test bed for design elements that will be used in future projects – a metre-class telescope is on my bucket list. So by all means, build yourself a 8" or 10" telescope as an educational exercise but you won't save any money or time.

Figure 1 - Author Albert Highe with a telescope of his design

Optics

Originally I posted on the Cloudy Nights classifieds (www.cloudynights.com) and Astromart (www.astromart.com) for a 16" mirror blank that I could grind myself, expecting to spend about $300-500 for a good Pyrex blank. I've ground and polished 8" and 9" mirrors in the past, so a 16" was a logical next step, and a stepping stone to even larger mirrors in the future where making versus buying starts to make a lot of sense.

I got lots of responses, some much below $500 (for example, one person offered a plate glass blank that only needed to be edge ground for $145!) I was eventually offered a 16" f4.5 Meade primary mirror and 3.1" secondary from an old Starfinder Dobsonian. So for my budget, I was able to skip the laborious grinding of the mirror, and start building the telescope structure right away. Observing sooner versus spending a year grinding a new mirror was a great idea!

This is by no means a premium mirror, but since the mirror needs to be recoated relatively soon, I can also correct any issues with the figure that might arise during testing. I still want to grind a 16" to improve my mirror-making skills, but might as well have a scope to use in the meantime.

Figure 1 – The Main Mirror (71.3 is the focal length of the mirror)

Mount

The main design points for the mount are as follows:

1. Truss tube Dobsonian
2. Must fold up into a relatively compact space to fit in the back of my Ford Escape
3. Set up / tear down time should be minimal
4. Hexapod collimation
5. Full GOTO and computer control from a phone, tablet, or laptop
6. No visible wires and motors as much as possible - I really dislike everything being exposed
7. Easily used as an outreach scope for public and club events

The **hexapod** idea is a clever one – use opposing male/female bolts in the ends of the truss members so you can rotate the truss members to make them longer or shorter, which in turn moves the entire upper tube assembly to collimate the telescope, instead of the more traditional three bolts at the back of the telescope in the mirror cell. This allows you to collimate from the eyepiece using a star test any time you're observing, versus needing to turn bolts on the bottom of the mirror cell.

I decided I would make the base unit and lower tube assembly (LTA) one inseparable unit, with stepper motors driving large diameter "gears" built using a long GT2 belt glued to 1/4" plywood.

The Azimuth axis will sit on a lazy Susan bearing mounted on a fixed disk with GT2 belt glued to it - the azimuth motor would stick through the rocker box and engage the gear from above, so all motors and drive electronics would rotate around the lower base box. It should be easy to hide the motors and electronics this way. (Note: Pet peeve of mine: Never make a Dobsonian with lazy Susan bearings if it's not motor-driven! My wife's 8" scope had its nice Teflon/ Laminate azimuth bearing replaced with a lazy Susan and it was horrible to use, never stayed put!) The relatively frictionless bearings on this scope are designed to give the motors less work to do.

The Altitude bearings also need to be fairly frictionless, so rather than a Teflon laminate combination commonly used for Dobsonian scopes, this scope will have ring bearings that run against aluminum strips around the wooden bearing surface. A gear surface will extend out from each bearing so it can engage with a pair of drive gears to drive the Altitude axis.

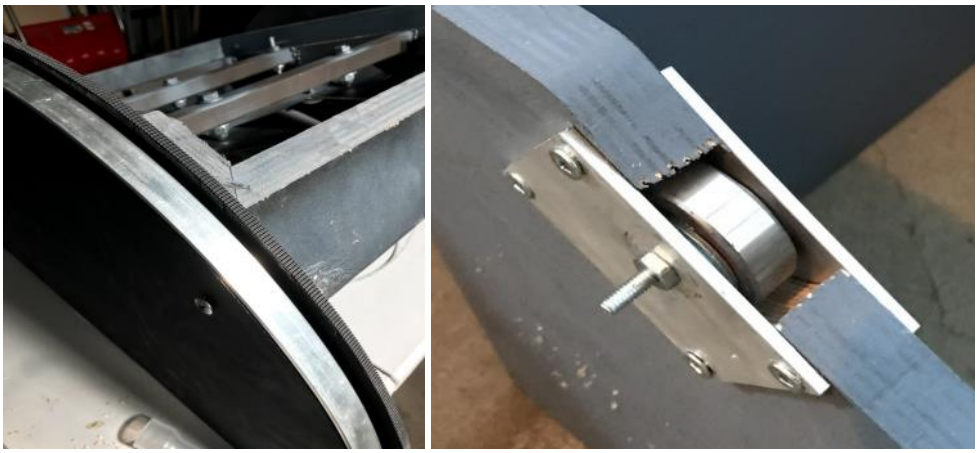


Figure 2 – Prototype Azimuth Bearing

Electronics-wise, I pretty much already have all I need already. For “smarts”, a Raspberry Pi 4 (Rpi4) allows me to run the Stellarmate (www.stellarmate.org) operating system (basically a Linux specially configured for astronomy applications) that gives me lots of control options including phone, tablet, or PC. Raspberry Pi’s are single-board computers you can purchase for under $100 including a case, cables, etc. The RPi4 can also act as a wireless network hub, so control of the telescope will be wireless. Stellarmate has the INDI (similar to ASCOM on Windows) software pre-installed so it supports a wide variety of devices that can be added to the scope and connected via USB. I use this software on my C8 in the observatory and have found it simple and reliable to configure and use. You can purchase a Raspberry Pi preconfigured for Stellarmate for $179 USD or just the operating system for $49 USD.

Since the Pi4 is not suitable for a real-time application like driving stepper motors, I went with an Arduino board typically used for running 3D printers. The MKS Gen L 1.0 (https://spool3d.ca/mks-gen-l-v1-0/ for $29 CDN), will control a couple of 12-volt stepper motors. This board is capable of running the OnStep (https://onstep.groups.io) telescope control software that turns an Arduino into an LX200 controller (plus lots of additional features). The stepper motors selected (about $15 each from https://www.omc-stepperonline.com/) are rated at 400 steps per rotation, plus with the right stepper drivers (DRV8825 chips) used on the board will give 32 microsteps per step. Geared down 32:1 this means sub-arcsecond tracking, more than adequate for this visual scope, with around 1 degree per second slewing, which is acceptable. Faster OnStep-compatible boards are available for faster slewing, but I like the fact I don’t need to solder anything together with this board.

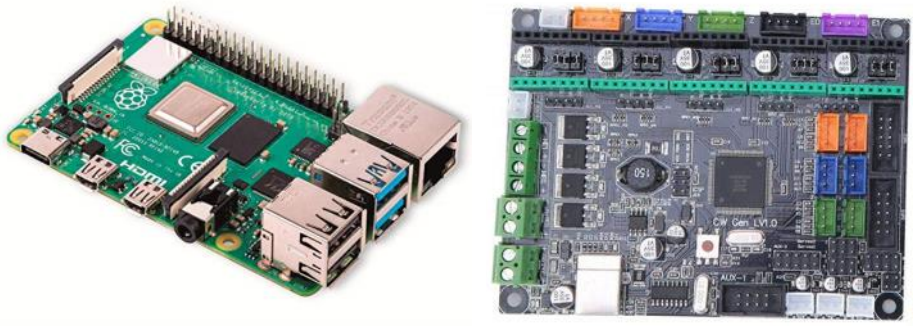


Figure 3 – Raspberry Pi 4 and MKS GEN-L boards

One neat feature of Stellarmate is built-in plate solving with astrometry.net software, so this telescope can use plate solving to avoid n-star alignments and provide very precise GOTOs. I have an old ETX70 optical tube assembly that, mated with a cheap camera, will be used for this purpose.

Eventually, a second RPi (an older 3B+ model with a touchscreen) will be mounted in the secondary cage to allow for touchscreen interaction with the scope. But that’s a phase II thing (although I couldn’t resist starting to write the program to run the scope, below)

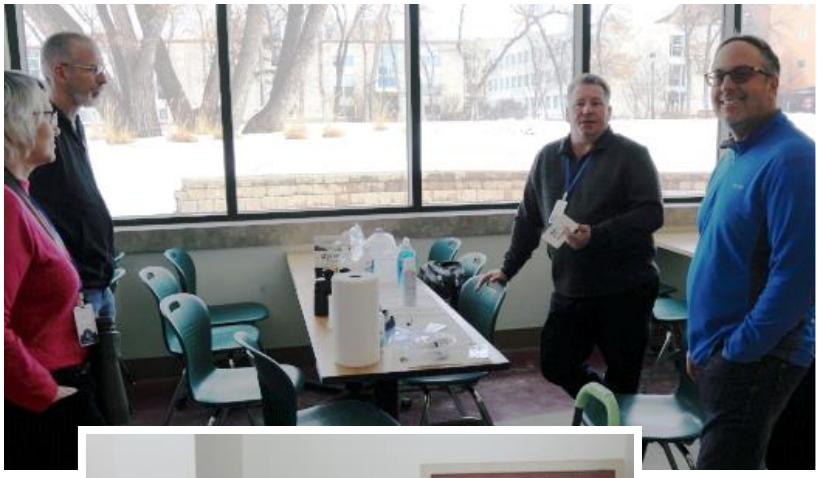
Figure 4 – Touchscreen Sky Tour Interface Prototype

Now that we have the primary mirror and a workable design, it’s time to start building the core components of the telescope. First up, welding up a mirror cell and creating the mirror box to protect the main mirror!

Next time: The Mirror Cell and Mirror Box

Mentor Program Hardware Clinic

On Saturday, March 7 the Mentor Program held a "Get your gear ready for spring" event at St. John's College. About two dozen Winnipeg Centre members dropped in over the course of the afternoon, bringing scopes, mounts, binoculars, cameras and eyepieces for cleaning, adjustment, and expert advice.

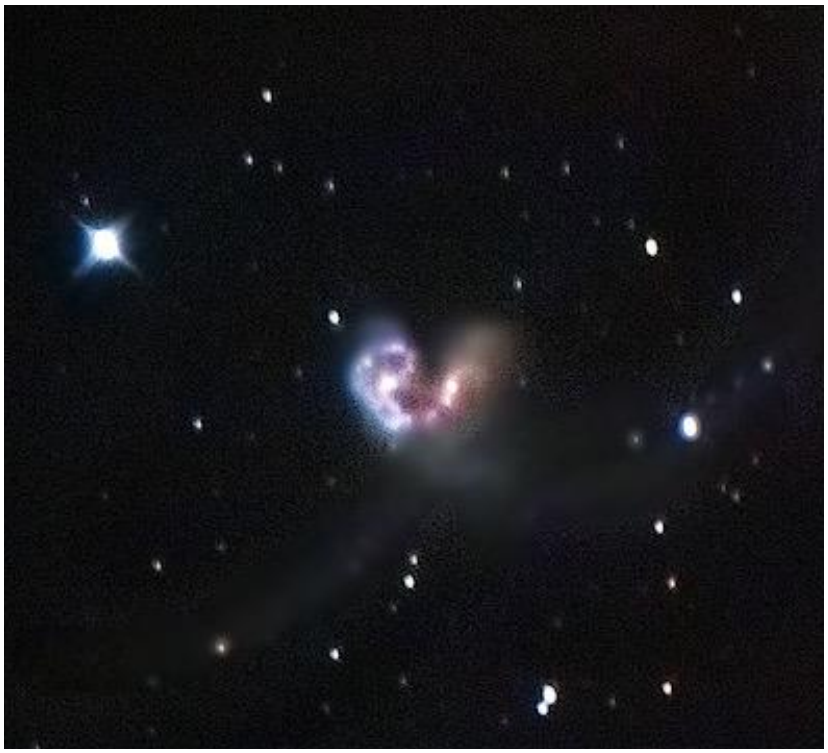


"We learned a lot during this session," said Darren Hennig, "and many said they'd love us to do these twice a year, spring and fall before weather hits... The key was to get information and help in a way that allowed folks with tight free time requirements to be able to have the extra time (as breaks during meetings often get very busy) to really go over what they needed."

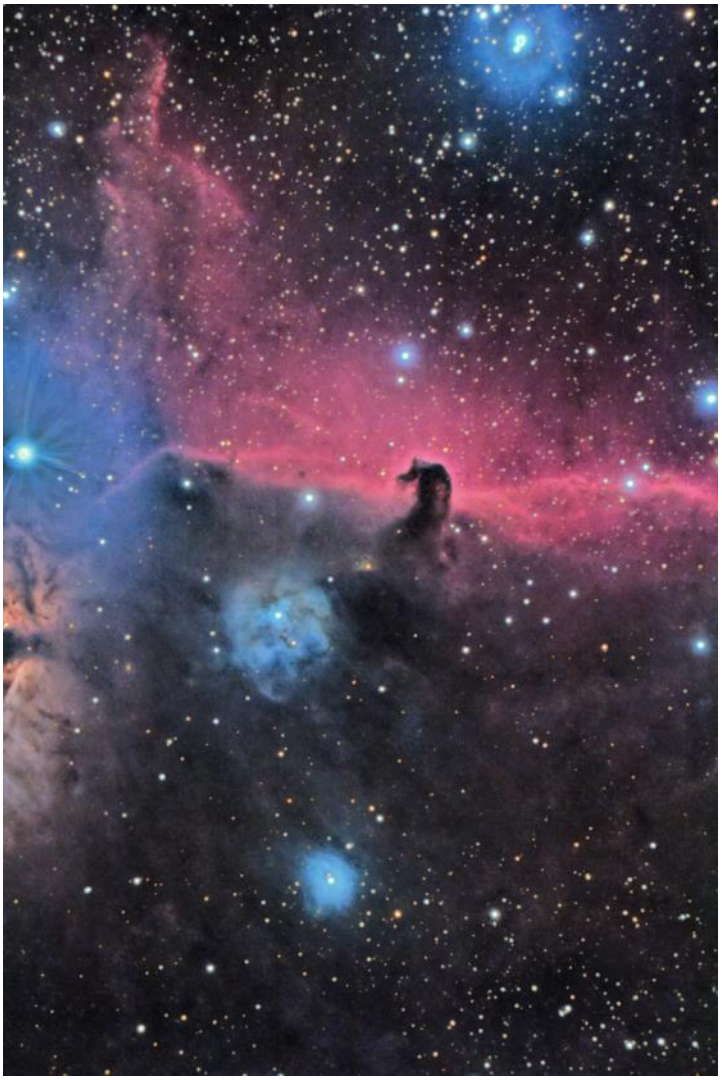
(Photo credit: Bryan Stach)

40-hour crescent moon photographed in late March 2020 by Bill Krosney. 300mm telephoto.

Kevin Whiteside: "Sunday night [March 22, 2020] was a beautiful night at Glenlea. I captured the Monkey Head Nebula (NGC 2174), 45 subs x 3-minute exposures using Sky-Watcher Quattro 200 and Atik 460ex OSC on Sky-Watcher EQ6-R."



Enlarged detail from photo of the Antennae Galaxies, NGC 4038 and NGC 4039, captured by Sheila Wiwchar in late March. The Antennae Galaxies are two interacting spiral galaxies where rapid star formation is occurring due to the collision of gas clouds.



Jay Anderson's account of reprocessing the image shown at left:

"I dug out an old Horsehead image from 2014 and tried processing in ImagesPlus and StarTools. While the IP image was OK, I couldn't get much from StarTools. I sent it off to Richard Konrad, who you might recall gave the StarTools demo last meeting. He showed that ST is quite capable of doing the job and sent me the results, along with a link to a video that showed every step.

"I followed those instructions and came up with this result. The important part is that the stars have color, the bright stars of Orion's belt are well resolved, and the faint detail below the Horsehead is starting to show. There is a lot of noise in the image; the camera used is a Canon 60D. StarTools, bless its little heart, has marvelous noise-reduction tools.

"The final image is a stack of 14 5-minute subs."

GLP-Trained Users and Spotters RASC Winnipeg Centre

9 August 2019 (Expires 8 August 2022)

Abdul al Manni
Kaeren Anderson
SHR Bannister
Michelle Boyce
Sean Ceaser
Ralph A. Croning
Patrick Curry
Kevin Davis
Michael Fry
Darren Hennig
LLoyel Hull
Paul Karlowsky
Clifford Levi
Dennis Lyons
Alan Macklem
Jim Mcdowal
Krzysztof Keller
Daemon Nightshade
Brian Renaud
Stan Runge
Gordon Sharr
Bryan Stach
Gail Wise

11 August 2019 (Expires 10 August 2022)

Jay Anderson
Judy Anderson
Trevor Bryant
Silvia Graca
Marc Sarrasin
Gerry Smerchanski

13 December 2019 (Expires 12 December 2022)

Stephen Altstadt
Robin Clarke
Lucille Eustache
Ed Johnson
Adelle Kennedy
Timothy Kennedy
William McDonald
Kevin McGregor
Michelle Paquette
Ed Rajfur
Bruce Smith
Sheila Wiwchar

Some late-breaking news in astronomy

'Oumuamua: Planetary fragment?

In 2017, the first interstellar visitor to our solar system came and went so quickly that there wasn't much time to study it. The most notable feature of 'Oumuamua was its shape -- long and thin, rather than round. Now astronomers Yun Zhang and Douglas N. C. Lin have a possible explanation: 'Oumuamua may be a fragment of a planet torn apart by the tidal forces of its host star. An example of tidal fragmentation is comet Shoemaker-Levy 9, which was broken up by Jupiter's gravity and subsequently crashed into it in July 1994.

https://www.universetoday.com/145689/astronomers-finally-think-they-understand-where-interstellar-object-oumuamua-came-from-and-how-it-formed/

Mars 2020 Rover still 'Go' for this summer

Despite staff shortages and enhanced health precautions during the coronavirus pandemic, NASA is planning to launch the Mars 2020 Rover on schedule. Two teams, one at Kennedy Space Centre in Florida and the other at the Jet Propulsion Laboratory in California, are finishing hardware and running tests to be ready for the launch window of July 17 – August 5.

https://spacenews.com/mars-2020-remains-on-track-for-july-launch/

Milky Way nearly 2 million light years in diameter

A team led by Alis Deason of Durham University may have found the edge of the Milky Way.

The outer reaches of our galaxy consist primarily of dark matter, making it difficult to directly measure its size. However, the investigators discovered that at approximately 950,000 light years from the galactic center, there is a sharp drop in the velocities of nearby small galaxies. This gives a diameter of 1.9 million light years for the Milky Way, plus or minus 0.4 million light years. The visible portion of the galaxy, by comparison, is estimated to be between 100,000 and 200, 000 light years.

https://www.sciencenews.org/article/astronomers-have-found-edge-milky-way-size

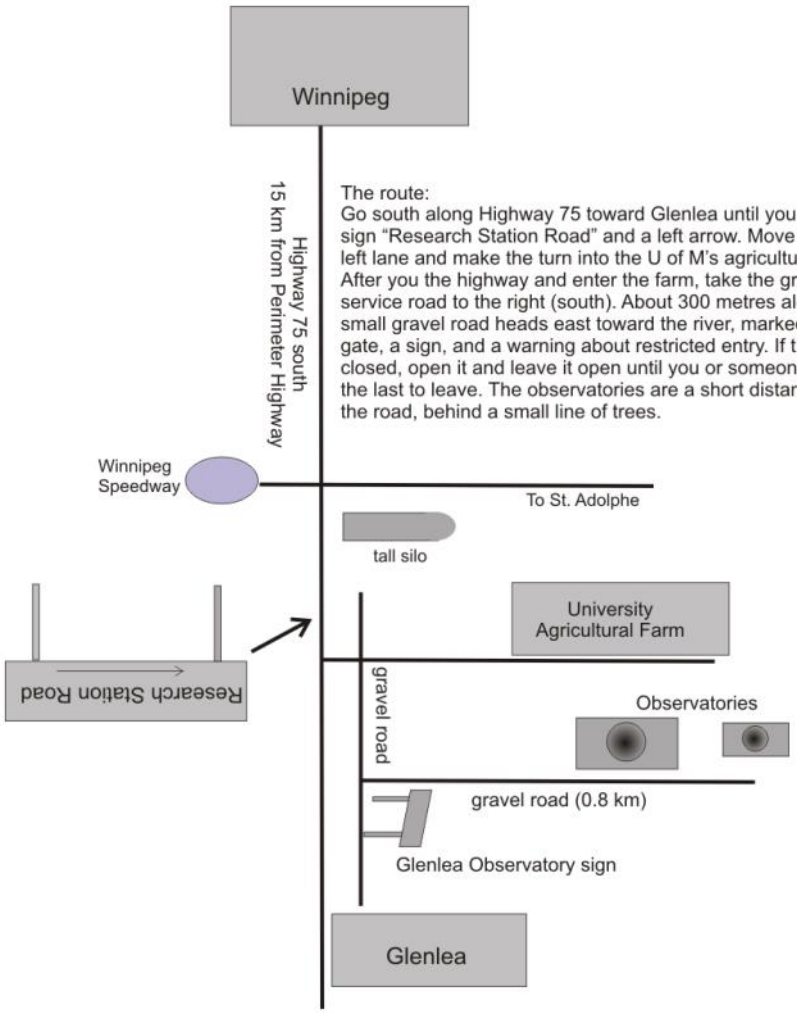
50th anniversary of Apollo 13

"Houston, we've had a problem…"

This April marks fifty years from the ill-fated Apollo 13 moon mission. After an explosion of an oxygen tank caused failure of electrical and life support systems in the command module, the crew used the lunar module as a "lifeboat" while ground control designed and tested the procedures that brought the astronauts safely home.

https://www.nasa.gov/mission_pages/apollo/missions/apollo13.html

Finding the Observatory



The Winnipeg Centre maintains a working observatory and warm room at the University of Manitoba's Research Farm. The observatory contains a 30 cm Meade telescope on a fork mounting. Members of the Centre may sign out the use of this telescope provided they have first taken a short instruction course on its use.

The Meade provides outstanding views of the night sky. Its large aperture collects more than 1800 times as much light as the human eye. It is capable of magnifying more than 500 times under favourable conditions.

The warm room provides a convenient place for members to take refuge from winter temperatures and summer mosquitoes, or to wait out a passing cloud. The building also provides desk space and lighting for planning a night's observing session. A cement pad in front of the warm room and observatory provides a convenient space to place members' telescopes while conducting personal observing programs.

Etiquette requires that you approach the observing site with your headlights off if that's possible on your model of car. Headlights should remain off, but you can still use your parking lights to drive. Proceed slowly, and be careful about parked cars along the road, or people walking. If you cannot turn off your headlights, make a cardboard or garbage bag mask to dim the lights. You might wish to turn around at the end of the road so that you are facing the direction back toward the highway at the end of the evening.

Remember to close the gate if you are the last one to leave.