



REFLECTIONS / REFRACTIONS

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University Lowbrow
Astronomers

May 2019

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M42 The Great Orion Nebula

By Brian Ottum Ph.D.



M42 The Great Orion Nebula Continued

I've been looking at the Orion Nebula for 45 years, and taking pictures of it for 30 years. This is my best attempt (so far). My goal was to not overprocess, so as to keep it not too far from the visual impression. The Trapezium area is very bright, and hence the same here. The only "fancy" post processing is layering in a shorter exposure of the Trap area (thank you Awni for the link!). Otherwise, just lots of "curves" in Photoshop.

I'm the "lazy astrophotographer" so I try to keep things as simple as possible. Canon 5DmarkIII (modified) camera on a Taiwanese-made 10" f/5 newt that was optimized for astrophotography. This was one of the last shots I took before upgrading my Paramount MX to a PlaneWave L-350. Total of 4 hours' worth of exposure, in five minute increments.

I'm located in Saline, but the telescope is at Dark Sky New Mexico near Animas. Back in 2014 I installed my rig; and other than the tumultuous change in ownership, it has been a fun ride. My maintenance trips to NM are a joy, especially to escape Michigan's winters. As you may know, I dabble in selling my stuff, setting up an art show booth at Astronomy at the Beach. May 4-5 the Hand's On Museum displayed my big print-on-glossy-metal wall mounts, and taught astronomy by explaining the objects in my shots. My Instagram account "astropicsdaily" has 22,000 followers where I enjoy interacting with young people around the world.

I've learned a few things about having a remote scope that I can share:

- Get everything set up and running in your own backyard, flawlessly, before even thinking of setting it up a couple thousand miles away.
- On-site help is critical. Some simple things need to get quick attention: roof that won't close ahead of a storm, checking to see why a PC won't reboot, plugging a loose cable back in. Other things can wait a few days but require a lot more skill (installing a router, troubleshooting a balky camera, diagnosing internet connection issues).
- A fast and reliable internet connection is CRITICAL. They are hard to come by in places that are DARK. DSL does not usually cut it. Cell phone connections are costly given the data caps. Current 23,000 miles out satellite internet (Hughes, et. al.) has slow latency but OK speeds (OK for a backup). Cable/fiber is required. (The low earth orbit satellite constellations might be a godsend in five years.)
- USB is a four letter word. Unreliable technology. I grit my teeth just thinking about the hours spent trying to get cameras, focusers, mounts to connect (culprit can be either software or hardware).
- Do not buy the latest shiny new product and put it where you cannot touch it. It will likely require lots of troubleshooting or just plain fail. New stuff usually does not have a great manual, and is not always pre-tested to ensure it works in your situation. This also pertains to software. Stick to the tried-and-true, reliable.
- Watch out for operating system updates – they tend to put sand in the gears of your smooth-running machine.
- Get a partner or two. This activity is expensive, when you get things running you have more data than one person can handle, and you need to rotate your maintenance trips.
- Many of us astrophotographers sit behind a computer all day and are not used to big physical work. All my partners and I have shed blood out there in the desert. I got dehydrated not once but twice and had to visit ER's a ninety minute drive away. Dumb.

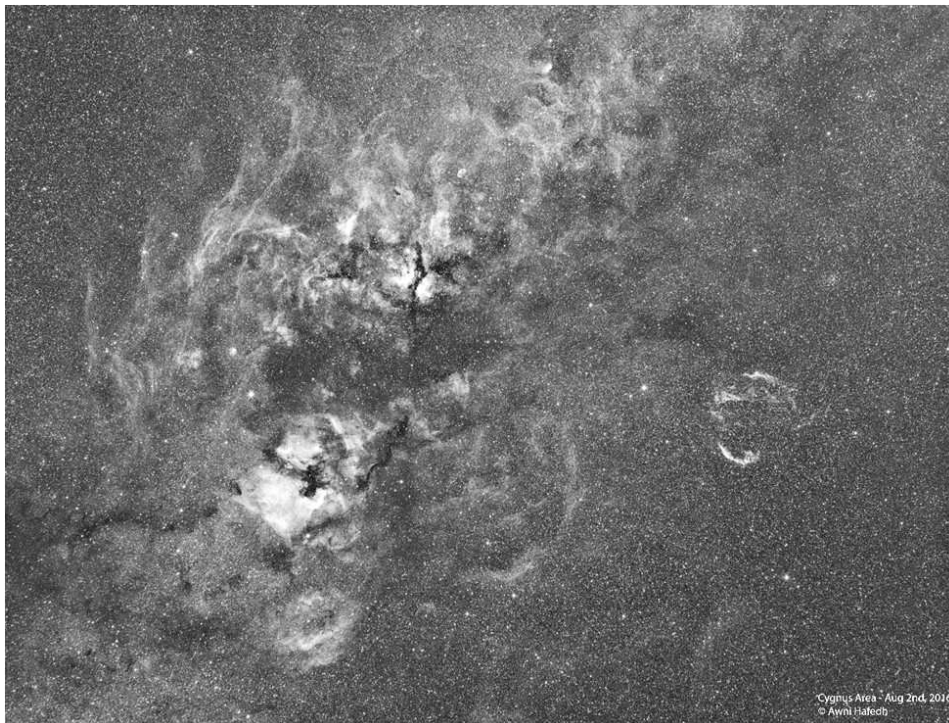
By now, I have imaged all the "greatest hits" available to a medium-focal-length scope. So I'm considering moving the rig to the southern hemisphere where a whole new batch of targets become available. Alternatively, I'm open to partner with others and use their rig.

I'm happy to share my experience or answer any questions folks may have.

Brian D. Ottum, Ph.D.

Cygnus

by Awni Hafedh

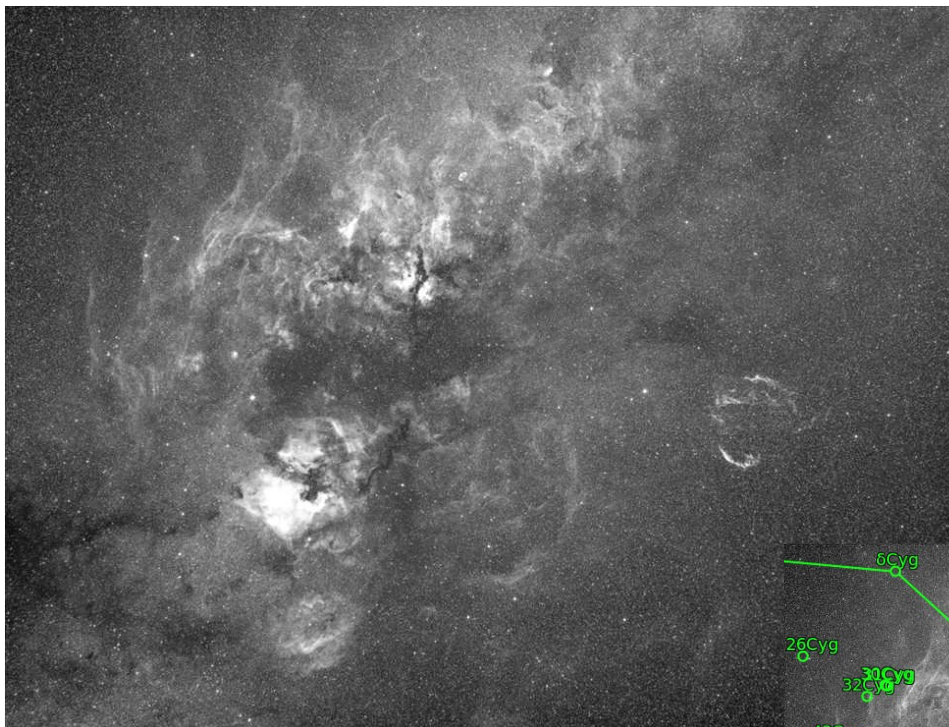


Aug 2nd, 2016 - Cygnus is a prominent constellation in the summer northern sky. Its name means “the swan” in Latin, and it is also known as the Swan constellation. The major DSO visible in this picture are, North America Nebula (NGC 7000), Sadr region (IC 1318), Crescent Nebula (NGC 6888) and Veil Nebula (Western NGC6960 and Eastern NGC6992)

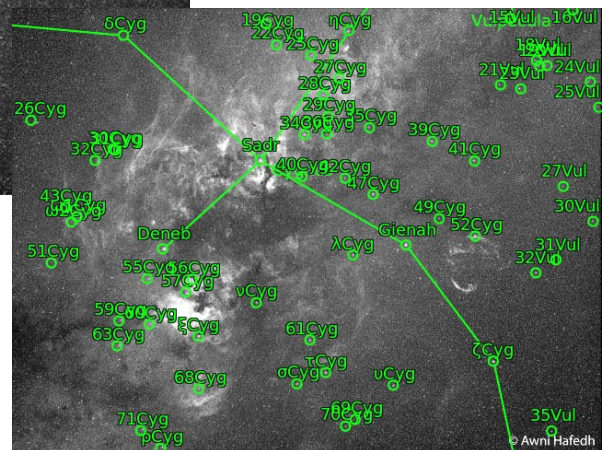
This image was captured with ZWO ASI1600MM-Cool and Rokinon 35mm lens at F/2.0 using Astronomik H-Alpha 12nm filter. I was impressed with the details that I managed to capture, with that said the focus was not that good as well as the whole thing was an experiment to see if this lens is sharp.

There are lots of details in this area and I believe the best way to get all the details is to capture it with 135mm or 85mm lens and then stitch the frames together to create a mosaic.

I've included two versions of the same image, one I tried my best to preserve most of the stars and the second version I tried to remove most of the stars and enhance the nebula, hope you like both.



(Left) Plate solved image



Making a Barn Door for Astro Photography

By Charles Steele

Last year I took some pictures with my new DSLR camera setting on a tripod. I was disappointed in that exposures over 30 seconds showed elongated star images even with a wide angle lens. So I made a Barndoor platform which can move at the speed of the earth's rotation. The barndoor I made last summer was hand operated which means I had to turn a paddle once a minute with my finger. The problem with that is you can bump the tripod in the dark and you spend your time counting seconds to turn the paddle at the correct speed. While I did get some good pictures it proved to be too much of a hassle, so this winter I upgraded to a motor drive. I asked Don Fohey what he would suggest for a motor to drive the unit. He suggested a stepper motor and a Arduino logic board with a stepper drive board to control the speed and direction of the motor. The advantage of stepper motors over DC motors is you can precisely control the speed with DC power supply. The Arduino board has to be programed in C++ computer language. There is an article at <https://fstop138.berrange.com/2014/01/building-an-barn-door-mount-part-1-arduinostepper-motor-control/> on how to wire the Arduino, Easy Drive stepper motor controller and the stepper motor. You have to solder a number of jumper wires then connect the board to your computer to program it. Thank you Don for your help in final wiring and programming. The Arduino electronic parts I purchased from Sparkfun on the internet.

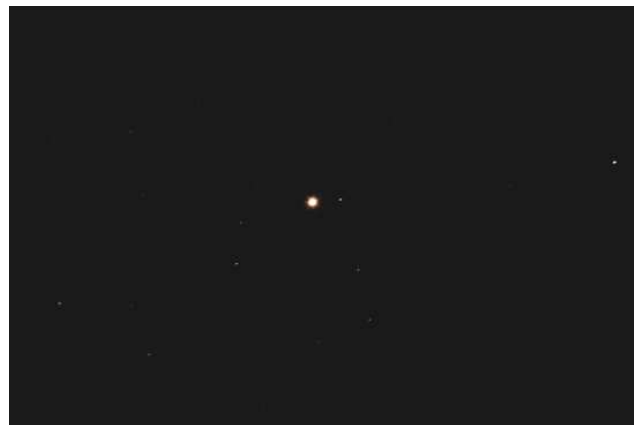


Barndoor with brass hinges on right side. In the middle is a panel with switches to control the motor and red led lights. On the left side is a 3D printed gear which turns at 1 RPM. Hanging below the gear is the stepper motor.



Next to the hinge is a sight hole to line up with the north star. On the top board is a two axis camera mount that I made. Center is a 12V DC power jack. Mounted between the board on the right is the Arduino and stepper board controller

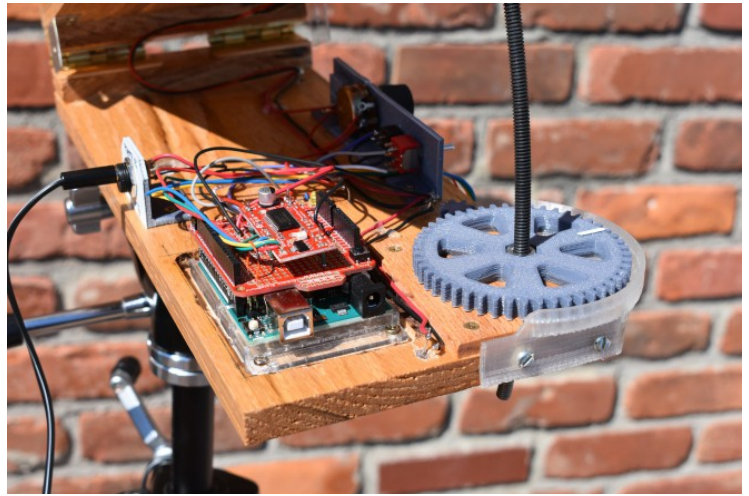
The stepper motor hangs below the bottom board on foam pads to dampen vibrations of the motor. A 3D printed gear attached to the shaft which drives a large 3D printed gear which rotates at 1 RPM. At the center of the gear is a metal nut which engages the curved drive shaft. The drive shaft is a 1/4" dia. threaded rod with 20 teeth per inch, which you can buy at your local hardware store. I bent the rod to a radius of 11.48" which then moves the top board at the sidereal rate to track the stars. With this radius you end up with the same number of teeth completing a full circle as there are minutes in a sidereal day, so moving the shaft one twentieth of an inch per minute gives you the sidereal rate. With a curved threaded rod the motor only needs to run at a constant speed of 1 RPM to maintain the Sidereal rate.



Here is a 5 minute exposure of Arcturus using a 50mm Nikkor lens at f/16 & ISO 400. Star images appear nice and sharp with no apparent elongation. This is a detail of the center 1/3 of the image about 7 degrees across



Here is the camera mounted to the barn door. I found looking through the camera view finder very hard to do especially looking straight up, so I made a direct view finder which clips into the flash shoe of the camera. In addition I have a 5" screen which plugs into the camera and can show some of the bright stars during set up. (Screen mounted on top board.)



The Arduino & stepper control board are mounted in a recess between the top and bottom boards. Here you can see the large 3D printed gear with the nut which drives the curved threaded rod. A 3D printed guard protects the teeth of the gear from getting tangled with other wires while in use. DC power socket connects to a battery which sets on the ground.

to run at a constant speed of 1 RPM to maintain the Sidereal rate. The bottom board is mounted on a sturdy camera tripod. Use a 'T' nut 1/4" x 20 pressed into a 5/16" hole on the bottom board to attach the barn door to your tripod. Use a heavy duty tripod to keep it steady during time exposures

There was some concern at first that vibrations from the stepper motor would ruin pictures. But test have shown that the humming vibration of the motor does not blur the images even using a 200mm lens. I did mount the motor on foam pads hanging below the bottom board to reduce the vibrations from transferring onto the camera platform. I do have similar stepper motors on my 3D printer, which run much quieter with much smaller vibrations. In addition the motor runs very warm (wasted energy) while the 3D printer motors stays cool to the touch, so I wonder if there is a better way to drive the motor. Maybe a future improvement?

In all I spent less then \$160 on all the parts, about half for the electronics and motor. A fun project that is fairly simple to do. I bent the threaded rod around a wood form with a radius of 7.5 inches. There is spring back with the metal even though I used a propane torch to heat the rod. You can buy commercial ball swivel head camera mounts to place on your barn door but to save money I made a simple wooden 2 axis camera mount which allows shooting in any direction. I used a 3D printer to print a number of parts, such as gears, gear guard, knobs, control panel and LED lighting brow to illuminate the control panel.

To set up, you use the tripod head to point and align the unit with Polaris using the sighting hole. As Polaris is off center from true north, you align Polaris to the edge of a ring. Once you have the unit sighted and firmly locked in place with the camera mounted on the top, you are ready to proceed. Aim the camera to what you want to photograph, turn on power to drive the motor and start your exposure. A few nights ago we finely had some clear skies and I took this 5 minute exposure of Arcturus. Seems to work great as the star images are nice round and crisp.

April 6th Open House Report

By Adrian Bradley
(email to members on April 7th)

The open house was a success! We had 65 people attend, along with Lowbrows Jack Brisbin on the McMath, Jim Forrester on the 17.5", Ken Ruble with his 10" don't, Joy Poling with her insight and vast knowledge of celestial wonders, Charlie 'Charles in Charge' Nielsen, Fredrico Spotti (and his wife Elena) with their small but very effective portable astrophotography gear, Krishna Rao showing the night sky to his and family/friends, Kimberly and Lexie Luff who brought Mark Cray's 10" dob and the now famous refractor... (And we took a moment to go visit Mark) and myself. If I missed anyone please let me know!

Because the winter circle was still high enough in the sky, we had our first feature of the Orion Nebula during an open house in a year. We also went through the open clusters in Gemini and Auriga (M35-38). As Leo rose to the South, all of the Galaxies in that region were also on display (M105 and it's NGC companion).

Of course I can't forget the man made objects that visited us. We got a great look at the International Space Station as it passed high overhead. Awni Hafedh, yes you told me about it so I will include you in this report even though other Lowbrows and guests knew it was coming too. Other man made stellar objects included Comet Delta, Comet United, M737, a Binary Pulsar (most guests mistook it for M747), and the Ann Arbor Nebula.

I took a few night shots and so did a photographer who showed up with two cameras and some wide angle lenses. We also had someone bring their telescope and after packing up, he mentioned his desire to join our club. So more memberships may be coming. We told him to join us at a meeting and pay his first dues then.

Lowbrows, we lucked out. In a forecast that was dreary and looked bad up to the time the sun set, I made the brave call to push ahead with the open house. The skies cleared and we had an unexpected great time out there! (I wonder if Mark Cray told God himself to clear the skies for us... Thank you, Mark)

Due to fatigue we decided to start shutting down around midnight. Let's hope for a good forecast for April 27th. And for more Lowbrow support!!

Leslie Science/Nature Center Event (April 27th)

By Adrian Bradley
(email to members on April 28th)

Federico Spotti and I attended the Leslie Science and Nature Event. We had about 20 rambunctious kids and a rainy sky, so we set up our scopes indoors to demonstrate how they worked. With such short attention spans, we were spending a lot of time making sure that the kids weren't climbing on our scopes!

We also spoke to the parents once they got there, and made sure that they had one of our brochures. We also restocked the brochures that were in that main building. Of course I forgot pictures(!!!) but overall it was a wonderful event. We made the most of the bad weather and did what we could. The counselors seemed to appreciate us coming and will likely call us back for their next space-themed event.

April 27th Open House Cancelled Due To Rain

Member Photos



(Left NGC2264) Clay Kessler wrote to members on March 18th.

Subject: "Shot from March 8th" "Here is one I am still working on. 60, 180 sec luminance frames through the 127 using the 1600mm-c. I need more exposure and more on the OSC frames as well. Still here is what I have."

(Right) Doug Bock wrote in an email to members on April 7th.

"The luminous blue variable LBV 2019abn was captured in my image this past April 3, 2019. It was initially thought to be a supernova. This object was first identified in January, 2019 in the Whirlpool galaxy M 51.

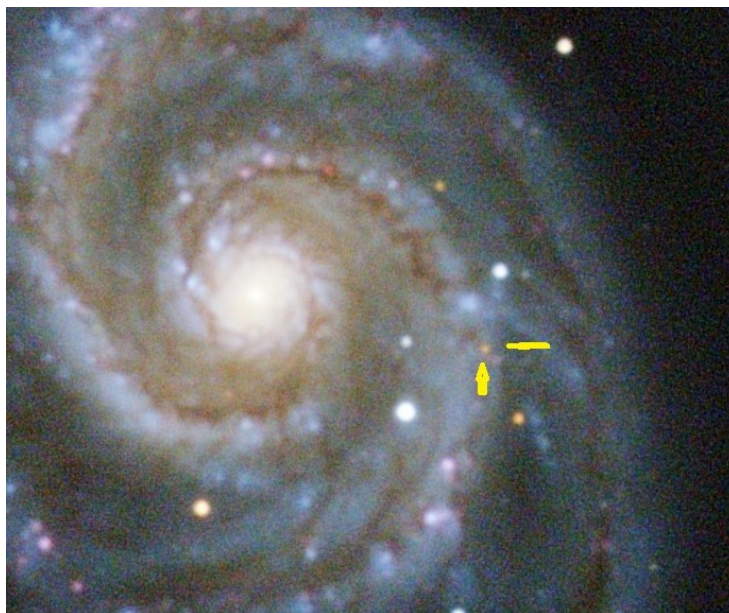
10" f/8 RC

ZWO asi071mc one shot color

36 x 300 second subs

Zoomed in, cropped and object identified."

Doug Bock



Upcoming Events

DATE	EVENT	LOCATION	
Saturday May 4th.	Open House	Peach Mt. Observatory 10280 North Territorial Road	Coordinator Charlie Nielsen Volunteers Needed.
Friday May 17th 7:30pm	Monthly Meeting	ROOM 2306 Mason Hall.	Br. Guy Consolmagno via SKYPE
Saturday June 1st	Open House	Peach Mt. Observatory 10280 North Territorial Road	Coordinator TBD, Volunteers Needed.

University Lowbrow Astronomers
 Monthly Club Meeting Minutes *April 19, 2019*

President Charlie Nielsen called the meeting to order at 7:35PM. He introduced Dr. Claude Pruneau of Wayne State University. His presentation was titled Physics for Future Presidents, Transportation and Energy Production. The presentation was wide ranging, starting with the basic concepts of energy, work, and power. He compared the merits of each source of energy, covering costs, historical and present production and future availability. Also reviewed per capita and per country energy consumption both historically and future projections. He then reviewed current and new technologies describing how our future energy requirements may be accommodate. The presentation concluded about 8:35pm with a general discussion following.

Elections-- Nominations

President: Charlie Nielsen	Vice President: Dave Jorgensen
Treasurer: Doug Scobel	Vice President: Adrian Bradley
Observatory Director: Jack Brisbin	Vice President: Jim Forrester
Web Administrator: Krishna Rao	Vice President: Joy Poling
Newsletter Editor: Don Fohey	

Kurt Hillig made motion the nominations be approved as officers by acclamation. The motion passed with a unanimous show of hands.

President Charlie Nielsen-- explained that he has been overwhelmed responding to the number of request for support of various activities. He will hold an officers meeting to discuss a future process to deal with these request.

He had received no response to an email to members asking for help with the Ann Arbor Schools STEAM Event Saturday May 18th. He asked the members present whether the club could support the event. The general consensus among the members was that the event should be declined.

Charlie next asked for help for the Peach Mt. Open House, with a Cub Scout Pack possibly attending, and the Leslie Science and Nature Center (LSNC) Star Party both on Saturday April 27th. Adrian Bradley said that he would be at and manage the LSNC event. Jack Brisbin said he would be at the Open House and would run the McMath Telescope. Charlie explained that he would try to manage the Peach Mt. event and may encourage via email someone else to volunteer as coordinator. A May 4th Open House coordinator is also required.

Charlie conducted SKYPE testing with Brother Guy, who is in Arizona, to prepared for his remote presentation to us at our May 17th meeting.

Treasurer Doug Scobel-- reported a membership of 156 and a treasury balance of \$8116.

He also explained that our shirt and hat inventories are low. The vendor he used before has our art work and a requires a minimum order of 100 items. A motion was made to authorize him to place an order of his selection for shirts, caps and special order items not to exceed \$2000.00. The motion was approved.

Observatory Director Jack Brisbin--The April 6th open house was a success. He hosted members of the Ann Arbor Optical Society of America/Optical Society University of Michigan (AAOSA/OSUM) and reviewed with them a 1941 journal article "A New Test for Convex Surfaces" which explains the testing used on the McMath telescope secondary mirror. The Observatory is in good condition after the winter. The Argo Navis unit, stored in a heated box, maintained it's settings.

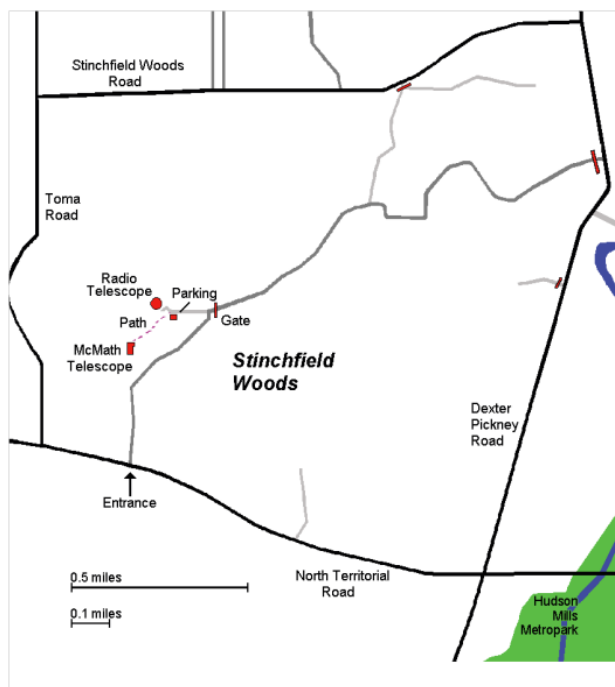
This year Camp Burt Shurly will run for 8 weeks from June 23rd to August 16. There was some discussion as to whether there were enough willing Lowbrows to support other activities and all 8 weeks of the camp. The event co-coordinator, Brian Ottum, was not present so the discussion was tabled. Jack has Red Rubyolith sheets for sale at \$1.00 each.

Meeting adjourned 9:40pm. Submitted respectfully by Don Fohey

Places & Times

Monthly meetings of the University Lowbrow Astronomers are held the third Friday of each month at 7:30 PM. The location is usually Angel Hall, ground floor, Room G115. Angell Hall is located on State Street on the University of Michigan Central Campus between North University and South University Streets. The building entrance nearest Room G115 is the east facing door at the south end of Angell Hall.

Peach Mountain Observatory is the home of the University of Michigan's 25 meter radio telescope and McMath 24" telescope which is maintained and operated by the Lowbrows. The entrance is addressed at 10280 North Territorial Road, Dexter MI which is 1.1 miles west of Dexter-Pinckney Rd. A maize and blue sign marks the gate. Follow the gravel road to the top of the hill to a parking area south of the radio telescope, then walk about 100 yards along the path west of the fence to reach the McMath Observatory.



Public Open House / Star Parties

Public Open Houses / Star Parties are generally held on the Saturdays before and after the New Moon at the Peach Mt. Observatory, but are usually cancelled if the forecast is for clouds or temperature below 10° F. For the most up to date info on the Open House / Star Party status call: (734) 975-3248 after 4pm. Many members bring their telescope to share with the public and visitors are welcome to do the same. Mosquitoes can be numerous, so be prepared with bug repellent. Evening can be cold so dress accordingly

Lowbrow's Home Page

<http://www.umich.edu/~lowbrows/>

Membership

The University Lowbrow Astronomers membership dues are \$30 per year for individuals or families, \$20 per year for students and seniors (age 55+) and \$5 if you live outside of the Lower Peninsula of Michigan. Membership entitles you access to our monthly Newsletters on-line at our website and use of the 24" McMath telescope (after some training). A hard copy of the Newsletter can be obtained with an additional \$18 annual fee to cover printing and postage. Dues can be paid at the monthly meetings, by PayPal, or be check made out to University Lowbrow Astronomers and mailed to:

The University Lowbrow Astronomers

P.O. Box 131446

Ann Arbor, MI 48113-1446

Lowbrow members can obtain a discount on these magazine subscriptions:

Sky & Telescope - \$32.95/year or \$62.95/2 years

Astronomy - \$34.00/year, \$60.00/2 years or \$83.00/3 years

For more information about dues or magazines contact the club treasurer at: lowbrowdoug@gmail.com

Newsletter Contributions

Members and non-members are encouraged to write about any astronomy related topic. Contact the Newsletter Editor: Don Fohey donfohey@gmail.com to discuss format. Announcements, articles and images are due by the 1st day of the month as publication is the 7th.

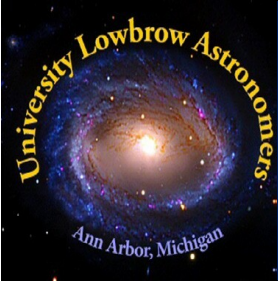
Telephone Numbers

President:	Charlie Nielsen (734) 747-6585
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	Jim Forrester (734) 663-1638
	Joy Poling
	Dave Jorgensen
Treasurer:	Doug Scobel (734) 277-7908
Observatory Director:	Jack Brisbin
Newsletter Editor:	Don Fohey (734) 812-3611
Key-holders:	Jim Forrester
	Jack Brisbin
	Charlie Nielsen
Webmaster	Krishna Rao

A NOTE ON KEYS: The club currently has three keys each to the Observatory and the North Territorial Road gate to Peach Mountain. University policy limits possession of keys to those who they are issued. If you desire access to the property at an unscheduled time, contact one of the key-holders. Lowbrow policy is to provide as much member access as possible.

Email to all members

Lowbrow-members@umich.edu



University Lowbrow Astronomers



Member Club



Astronomical League Member Society
#201601, Great Lakes Region

University Lowbrow Astronomers
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