REFLECTIONS / REFRACTIONS

University Lowbrow Astronomers

March 2010

Volume 34 Issue 3

Messier Marathon

By John Kirchhoff

The Messier Marathon is the amateur astronomer's equivalent to the proverbial "all nighter" before an important exam. This year I will be participating in my third straight all night attempt to see just how many M objects I can check off my list between sunset and sunrise March 13/14 at Lake Hudson State Recreation Area. Here are a few tips you might find useful if you decide to participate in the Marathon.

1) Location! You will need a dark sky location with an excellent west horizon to catch the early setting objects and an east/ southeast horizon to net the last five M's just before dawn. I have never heard of anyone picking up the last Messier M30, from our latitude in mid March. Every other M can be observed. Lake Hudson offers dark skies and an excellent horizon.
2) Know your Field Of View and orientation of finder to the telescope. I prefer using a Telrad reflex finder because the heads up display and that the view is not magnified or flipped. It's really easy to get confused when you are tired!
3) Practice! It's not too soon to locate the early setting Messier right now while the Marathon is still a

couple of weeks away. One of the most difficult targets is M-74, a face on galaxy in Pisces. You need to be very familiar with it's location and surrounding star fields if you expect to have ANY chance of seeing it in mid March. M-74 tends to blend into the background sky even under good conditions…its' nickname, the Phantom Galaxy, is well deserved. M-77, M-33 and the two satellite galaxies associated with M31, 32 and 110 are also difficult in a not totally dark sky. Two years ago I made my first attempt to muddle through the Virgo cluster for the first time running the Marathon. I was able to do it but it took three tries before I could positively identify all the members of the cluster. It would have been a lot easier to practice ahead of time first! It's too early to practice locating the late risers…M-15, 2, 72,73 …30. Best to try to see them in early April and keep your notes for next year!

4) Rest up, bring snacks and layer up! Two years ago I really ran into a wall after completing the Virgo cluster around 3 am. I was able to recover because I remained warm, had plenty of snacks, and had a good night's sleep the day before. Last year I didn't make it to morning because I had worked late the day before and didn't bring enough clothes. I ended up getting cold by 2 am and was in bed by 3. Coffee, tea and hot chocolate are a must!
5) Have a plan! I use a Messier Marathon Log that I picked up off the Internet that arranges the M's in observing order and Harvard Pennington's "The Year-Round Messier Marathon" book (available from Willmann-Bell). I also use the Orion Deep Map 600 as a backup.
6) Last but not least observe with buddies! Your friends will keep you going when you might want to throw in the towel.

This year I plan on using a pair of 20X80 binos for the Marathon. Binoculars offer great contrast, are less fatiguing on the eyes and the 80's should let me see just about every M on the list.

I hope you find my tips useful and look forward to seeing you out at Lake Hudson March 13/14 for the Marathon .

In Accordance with the rules in the By-Laws this must in the newsletter before final the vote to ratify any changes to the By-Laws.

UNIVERSITY LOWBROW ASTRONOMERS
BY-LAWS AMENDMENT PROPOSAL

The officers of the University Lowbrow Astronomers propose several changes to our By-Laws. This would be the first amendment to be made since the current document was approved by the membership in 2003. One amendment is to correct a wording problem. In the description of the Webmaster's duties the word "newsletter" is used in a place where it should be "website". Obviously, the Webmaster deals with our website, and our Newsletter Editor with our newsletter. The other proposed amendment is to raise the club spending limit without a general membership vote of approval, from $100 to $250. The reason for this is because more than once club members have spent funds exceeding the limit due to time limitations. The money needed to be spent for a club function or property before it was possible to bring it to the next available club meeting for vote. This resulted in post expenditure votes that then became a vote of apology more than permission. This amendment would resolve that issue in nearly all circumstances. These are the exact changes proposed:

University Lowbrow Astronomers Bylaws, Rev. 2, 3/3/03

Page 4, Article IV, Section B, 3, f, 2:

"General expenditures are the ongoing expenses incurred in the fulfillment of the duties of officers and the basic objectives of the Club" **to be changed to** ***"General expenditures are the ongoing expenses incurred by the officers in the fulfillment of their duties and the basic objectives of the Club"***

Page 4, Article IV, Section B, 3, f, 3:

Part of text ***"($100)"*** **to be changed to** ***"($250)".***

After IV.B.f.3.c, add the sentence: ***"Special expenditures under $250.00 must be approved by a majority of the club officers, including either the President and/or the Treasurer."*** **This will become IV.B.f.3.d.**

After the above sentence, add the sentence: ***"Since the Treasurer and the President have check signing authority, checks written to either party must be written and signed by the other".*** **This will become IV.B.f.3.e.**

Page 5, Article IV, Section B, 6, a, 2:

"The contents of the newsletter should <u>not</u> be" **to be changed to** ***"The contents of the website should <u>not</u> be"***

The amendment process requires publication in our newsletter at least one month in advance of a vote to be held at a regular meeting, and also that this notice be emailed to the general membership at last one month before that meeting. The vote will be held at our April 2010 meeting. Members may vote at the meeting, but may also submit their vote to our club Treasurer (lizcal@umich.edu) via email prior to that meeting. Please send your vote before the day of the meeting to assure time to count it. These votes will be added to the vote taken at the meeting and a simple majority decides. A copy of the current bylaws is attached for your reference.

Written by Charlie Nielsen, 12/27/2009; rev. 2/21/2010

When Good Mounts Go Bad

By Tom Ryan

I've been thinking about telescope mounts recently, something I haven't done in ten or fifteen years, because I've been considering making one. I realized that I have accumulated a bunch of knowledge about mechanical things over the years, I've seen a lot of things that don't work, and I think I know now what does work well. Besides, I'm not getting any younger, and it would be a shame to pass up an opportunity to put that knowledge to practical use before I forget why I learned it in the first place.

Most of what I know about good telescope mounts comes from having used bad ones. My first decent mount was a cast aluminum equatorial from Skyview Optical in Ohio. The mount had 1.5" diameter solid steel shafts, was locked by 1/2-13 bolts screwing directly down onto the side of the shafts, and it connected to the telescope's cradle by a flange that looked like it was inspired by a plumbing fixture. Bought used, it came with a welded aluminum pedestal with three legs which made it resemble a rocket from the 1950's (a plus!) and cost only $25 (another plus!).

The mount was pretty good by 1968 standards (and is still pretty good when compared to entry level mounts today), but I wanted to improve it. I hacksawed the legs off, and re-mounted them with two bolts each. The top bolt went through through-holes and was secured by a nylon-insert nut, so the leg could rotate on it but not come apart. The lower bolt went though the leg into a tapped hole in the stubs that I left when I cut the legs off. When it was folded up, it would now fit into my car.

The polar adjustment was basically two flat flanges bolted together and held by friction. I added a through-pin to lock it at the correct longitude, and changed the clamping bolt so it used the same hex wrench as the legs (One wrench to rule them all!). I also added needle roller thrust bearings to the polar and declination shafts (just like the Losmandy mounts, but 30 years earlier), and heavily greased them, because I couldn't figure out how to seal them against the elements. The mount sat outside for many years, and the grease worked better than I had hoped, because the bearings still work perfectly today.

One thing I didn't like about the mount was the counterweight. The solid shafts were heavy, but the counterweight was an affront. I felt that good design practice demanded that a device that is intended to be portable should not have dead weights in it. (The 1974 Lincoln Town Car had canisters full of lead shot at each corner of the car to dampen out body shake, but there you go.) I threw away the equatorial axis and mounted a home-made plywood fork on the mount. The mount got a lot lighter and it was easier to use (no polar flip), but a new problem developed; loss of torsional stiffness.

The flanges that adjusted the polar angle and connected the polar axis to the pedestal were basically flat plates, and they had the torsional stiffness of a shoebox with the sides cut down. The whole fork could do a moderately large and fast oscillation, now that the fork moved the center of mass farther from the resisting flanges.

I was pondering this problem when Lowbrow Roger Tanner asked me to build him a mount for his 17" f/4.5 Newtonian. It was big, but because Roger is a very smart guy, and because he designed it, the mount was lightweight and very stiff. Roger introduced me to the idea of efficient mechanical design, and I'll be forever grateful for that. It caused me to learn enough about putting the right material in the right places to enable me to design machine tool frames a few years later.

Roger also talked about the stiffness of fork mounts, but that didn't hit home until I made a pedestal mount for another Lowbrow's C8. I discovered that the forks on a Celestron C8 have different deflections in different directions. That means that if you look through the telescope at Polaris and rotate the mount around the polar axis, your view through the telescope will trace out an ellipse on the sky. (Imagine your polar axis is a wooden yardstick pointed at Polaris, and your telescope is a brick on the end of it. Now rotate the yardstick about its long axis and watch the deflection.) This has got to play havoc with long exposure photography, or even with finding things in the sky, since 0 degrees declination does not stay the same when you are looking East, South, and West.

Another thing I learned from Roger was the correct way to mount a worm gear on a shaft. Roger wanted to keep the gear he had from his old mount, but wanted to mount it correctly on the new mount I was making for him. I had recently mounted a worm and worm gear on a Refractor mount for another Lowbrow, and I found it extremely difficult to get the gear centered well enough so the worm would seat tightly enough in the gear threads to eliminate backlash, and yet not so tightly that the worm would bind up on its way around the gear. I solved the problem by mounting the worm on a spring-loaded pivot with limit stops to keep it from popping out of the gear teeth, but that was a very expensive method, and it permitted play in the gear train if you applied enough torque to the telescope to cause the worm to ride up the gear teeth. The 24" telescope's declination axis drive on Peach Mountain uses a split worm, also spring loaded, to eliminate backlash, but its effectiveness is similarly limited to a certain level of torque, or imbalance. I felt the design could be better, but didn't know how to improve it.

Roger explained that Byers mounts used Nylon inserts between the worm gear and the shaft. The inserts bore directly on the shaft, eliminating the clearance slop and the resulting inaccuracy that must be included in any metal-to-metal design, and they were sized so that they acted like very stiff springs. This meant that any tendency to bind would be absorbed by slightly squashing the Nylon. A Byers gear with this feature will rotate 360 degrees without backlash and without binding. It is, if I may say so, a work of genius.

(I later used the principle to get a patent on fiber optic connectors that were an order of magnitude more accurate than any previously designed.) It is true that the Byers 812 mount had the fault of running steel ball bearings in a race machined directly into the aluminum housing*, and because the stresses were not well controlled, had a distressing tendency to generate a pile of aluminum flakes among the balls, with the attendant loss of tracking accuracy. This hiccup does not change the fact that Byers is a God of mechanical engineering.

This brings us to Lowbrow Brian Close's mount, an Astro-Physics 800. Brian lives in Bozeman, Montana, where it gets so cold your spit freezes before it hits the ground. Good skies, but cold. So cold, in fact, that the Astro-Physics aluminum worm gear shrank (as many things do in this kind of cold) down onto the stainless steel shaft of the Astro-Physics polar shaft, and locked there. Through the clearance gap, through the grease, through the oxide films on the metals, the surfaces moved, and the two parts forgot, in places, that they were supposed to rotate independently.

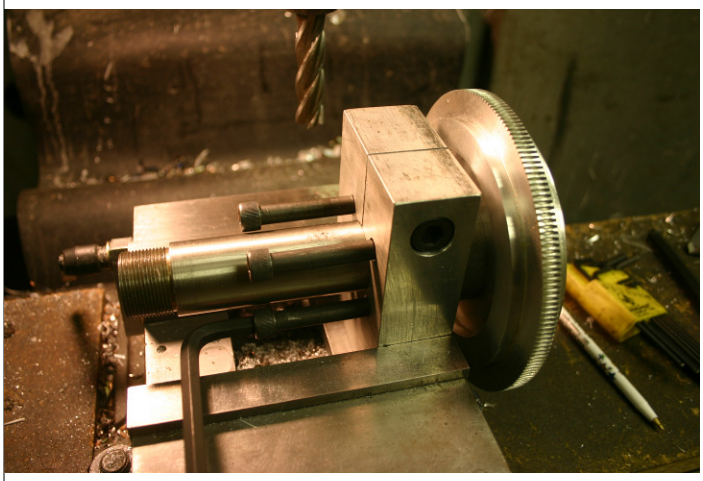
Brian tried to get them to do what they were supposed to do by moving his mount to the next object in the sky, but only caused Very Bad Things to happen at their interface, and more Bad Things happened where the worm interacted with the worm gear teeth.

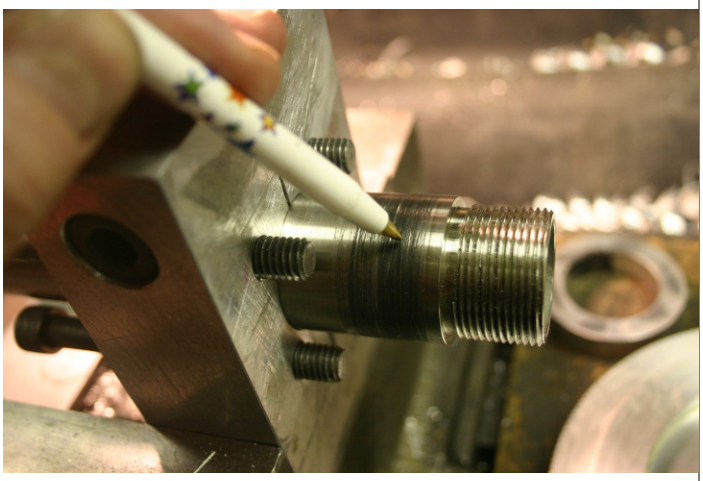
After deciding that he was done observing for the night, Brian sent the parts to me for repair.

The surfaces between the two parts had galled so badly that they couldn't easily be separated. I couldn't use a hydraulic press to push the shaft out of the gear, because the shaft is made from free-machining stainless, which is very soft, and the threads for the polar scope on the end of the shaft made the wall thickness so thin it would have collapsed under pressure. I therefore made a pinch-clamp that gripped the shaft without marking it, and used screws which bore against a spacer to progressively push the gear off the shaft.

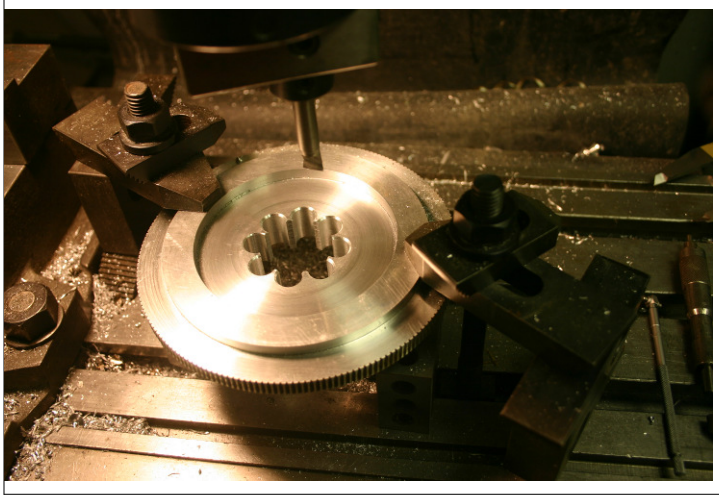
* This gave the Byers 812 mount a very large and stable polar axis bearing, before it disintegrated. Losmandy mounts are limited to the biggest needle thrust bearing available at low cost, which is 3.5” in diameter.

I turned down the polar shaft in a lathe by a thousandth of an inch or so to remove the grooves and the raised score marks on the shaft.





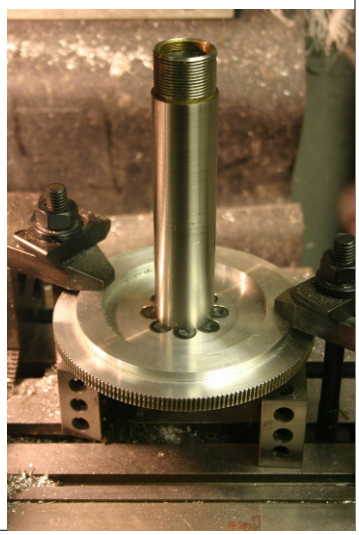
Next, I bored out holes in the gear so the Nylatron GS rods could be press-fit into place. Nylatron GS is a molybdenum-disulfide infiltrated Nylon that is self-lubricating, and so never needs grease.



Next, I pressed the rods into their bores, carefully centered the gear, and bored a new hole for the polar axis.

The result was a shaft that pressed into the bore without any play, and Brian reports that the reassembled mount now works fine. Which is a relief. I'm not Ed Byers, and it is never too late to overlook the obvious and screw something up.

Now that I've practiced on mounts for six Lowbrows, I'm thinking it's time to make a mount for me.



An Evening with Brother Guy Consolmagno

By Jason Maguran

I was really looking forward to hearing Brother Guy Consolmagno speak last November, after hearing such rave reviews from fellow Lowbrows. I made the trip out to Ann Arbor on Sunday afternoon, only to find an empty auditorium. After looking around a bit, figuring that I possibly had the wrong location, I tried calling a couple of Lowbrows, to no avail. I headed home, only to later discover that I had mixed up the date in my mind, and was exactly one week too late. Oops! I didn't know if I would have another opportunity to see Brother Guy, since a trip from the Vatican is such a long one for him to make.

Brother Guy during his presentation at EMU on February 17, 2010.

I know, because I was there once. See, I was living in Frankfurt, Germany back in 2001. I was there for a six-month work assignment. While there, my wife, step-son and I spent much time visiting many different countries and cities, one of which was the Vatican. Vatican City is a landlocked sovereign city-state whose territory consists of a walled enclave within the city of Rome, Italy. It is its own country, with an area of approximately 0.17 square miles and a population of just over 800 people. And to think that, in addition to such famous places as St. Peter's Basilica, the Sistine Chapel, and the Apostolic Palace, they had the space to build an observatory? Wow, now that's a wise use of land!

Trip to Rome, just outside of the Coliseum, and about 1km from the Vatican.

As they say, "When in Rome, do as the Romans do."

First of all, I was surprised to see such a turn out, as the auditorium in the student center of Eastern Michigan University was almost full; I would say, approximately 300 people. I was pleased to see the familiar faces of several fellow Lowbrows. Brother Guy began with showing us a video of his interview by Stephen Colbert on the Colbert Report, which was absolutely hilarious. For those of you who missed it, you can view it on-line at: *www.colbertnation.com/video/tag/Guy+Consolmagno*

Brother Guy showing a piece of Martian meteorite to Pope Benedict XVI.

His talk was about the latest book from the Vatican, "*The Heavens Proclaim: Astronomy and the Vatican.*" It talks about such topics as: The history of the Vatican Observatory, the mention of stars and other celestial bodies in the Bible, the peaceful coexistence of science and religion, the Catholic church's position on science and astronomy, and many others. I very much enjoyed his witty and profound insights into human nature, and the way people perceive and interpret science and religion. One of my favorite quotes of his was, "Studying the universe is a great way to remind yourself that there's more important things in life than what's for lunch." Afterwards, Norbert Vance invited us back to Sherzer Hall for refreshments and a tour of the observatory and astronomy department.

Norbert Vance giving Brother Guy a tour of the observatory at Sherzer Hall.

Attention Lowbrows!!

The spring fashion season is almost upon us and it's time to give a thought to your observing gear. I"m not talking eye-pieces or filters, but GEN-U-INE University Lowbrow Astronomer t-shirts and sweatshirts!

We're making plans to initiate a run of Lowbrow apparel as has been done in the past. This isn't pre-ordering but a survey of general interest.

Current base pricing is as follows, should we opt to return to our previous t-shirt printer:

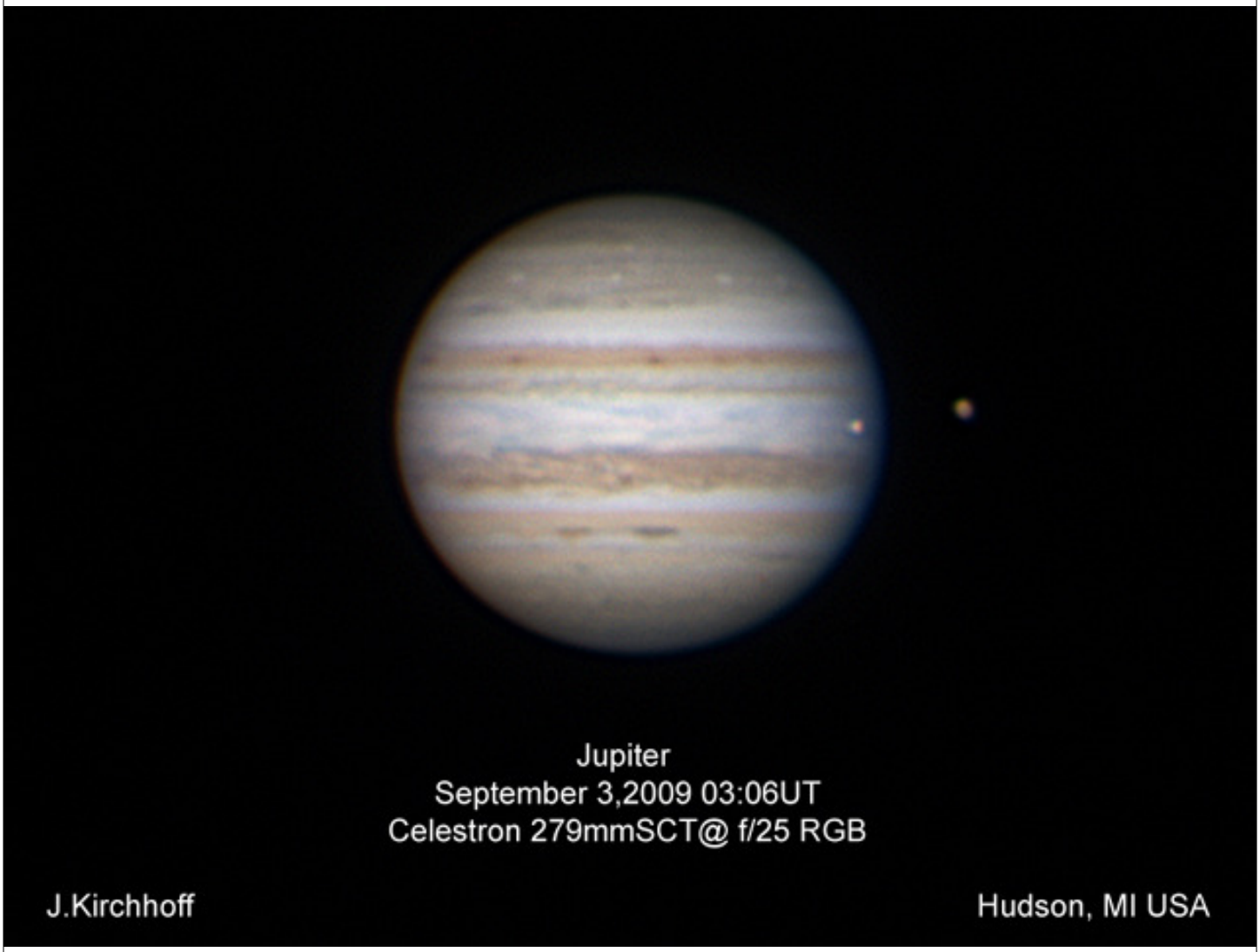
100% Cotton shortsleeve tees = $5.93

50/50 blend 9oz crewneck sweatshirt = $14.35 80/20 blend 10oz hooded sweatshirt = $26.45

XXL size tee shirts add-$1.30 each, XXXL size add $1.70; XXL size sweatshirts add $3.00, XXXL size add $3.50.

Children's sizes are available as well.

Interested? Let me know. Liz Calhoun {lizcal@umich.edu} or {734.213.2908} Lowbrow Treasurer

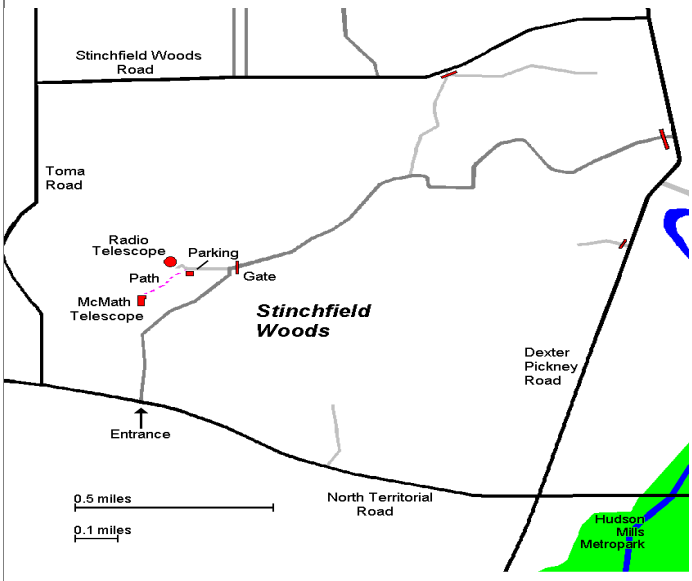


Here is an incredible image of Jupiter taken by our friend and colleague John Kirchhoff!

Places & Times

Dennison Hall, also known as The University of Michigan's Physics & Astronomy building, is the site of the monthly meeting of the University Lowbrow Astronomers. Dennison Hall can be found on Church Street about one block north of South University Avenue in Ann Arbor, MI. The meetings are usually held in room 130, and on the 3rd Friday of each month at 7:30 pm. During the summer months and when weather permits, a club observing session at the Peach Mountain Observatory will follow the meeting.

Peach Mountain Observatory is the home of the University of Michigan's 25 meter radio telescope as well as the University's McMath 24" telescope which is maintained and operated by the Lowbrows. The observatory is located northwest of Dexter, MI; the entrance is on North Territorial Rd. 1.1 miles west of Dexter-Pinckney Rd. A small maize & blue sign on the north side of the road marks the gate. Follow the gravel road to the top of the hill and a parking area near the radio telescopes, then walk along the path between the two fenced in areas (about 300 feet) to reach the McMath telescope building.



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 Mountain observatory, but are usually cancelled if the sky is cloudy at sunset or the temperature is below 10 degrees F. For the most up to date info on the Open House / Star Party status call: (734)332-9132. Many members bring their telescope to share with the public and visitors are welcome to do the same. Peach Mountain is home to millions of hungry mosquitoes, so apply bug repellent, and it can get rather cold at night, please dress accordingly.

Membership

Membership dues in the University Lowbrow Astronomers are $20 per year for individuals or families, $12 per year for students and seniors (age 55+) and $5 if you live outside of the Lower Peninsula of Michigan.

This entitles you to the 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 $12 annual fee to cover printing and postage. Dues can be paid at the monthly meetings or by check made out to University Lowbrow Astronomers and mailed to:

The University Lowbrow Astronomers

c/o Liz Calhoun

P.O. 4465

Ann Arbor, MI 48106

Membership in the Lowbrows can also get you a discount on these magazine subscriptions:

Sky & Telescope - $32.95 / year

Astronomy - $34.00 / year or $60.00 for 2 years

For more information contact the club Treasurer. Members renewing their subscriptions are reminded to provide the renewal notice along with your check to the club Treasurer. Please make your check out to: "University Lowbrow Astronomers"

Newsletter Contributions

Members and (non-members) are encouraged to write about any astronomy related topic of interest.

Call or Email the Newsletter Editor: **Mark S Deprest (734)223-0262 or msdeprest@comcast.net** to discuss length and format. Announcements, articles and images are due by the 1st day of the month as publication is the 7th.

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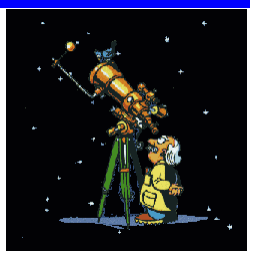
Reflections & Refractions



Website
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Check your membership expiration date on the mailing label