REFLECTIONS / REFRACTIONS

University Lowbrow Astronomers

January/February, 2016

Volume 30, Issue 1

Come Out and Try the New McMath

By John Manney

A young astronomer peers through the Mark Cray Refrector atop the McMath Telescope *Photo: John Landino*

Decades ago, I brought my family for several visits to Peach Mountain to look through the Mc Math 24" reflecting telescope. I never imagined that I would someday operate that instrument. When I joined the club in 2010, I was interested in operating the Mc Math, but was sure that this privilege was reserved for a few people with exceptional knowledge and skill. I was pleasantly surprised to find that I was welcome, and was soon helping everyone to enjoy their visit to the Observatory.

Our training for the Mc Math is very personal and very "hands-on". One begins with simple but important tasks. While it is possible for one person to operate the Mc Math, it is difficult to concentrate on conversing with the guests while setting up and aiming the telescope. So, the new helper can keep a conversation going so the operator can concentrate on the job at hand. Another important task is to lock and unlock the clutches while the operator holds onto the scope. For young and old observers, ladders may need to be moved and the eyepiece may need to be oriented. These tasks do not require special skills.

New skills are picked up over time: finding objects of interest, positioning the scope, opening and closing the Observatory, and many more. Of all the tasks, the one I have found the hardest has been to aim the telescope at objects which aren't close to familiar stars. I am not a good "star hopper", so I can easily take 10 to 15 minutes to get an object centered in the eyepiece. Although our guests are patient, I do feel pressured when people are waiting for me to get the telescope ready.

With the installation of the new digital setting circles (see the December 2015 edition of *Reflections / Refractions*), aiming the scope is going to be much easier. The readout will tell the operator distance and direction to move the telescope to acquire the object. The object can be brought into the field of view by watching only the readout. Only a little bit of centering may be needed before the scope is ready for the guests.

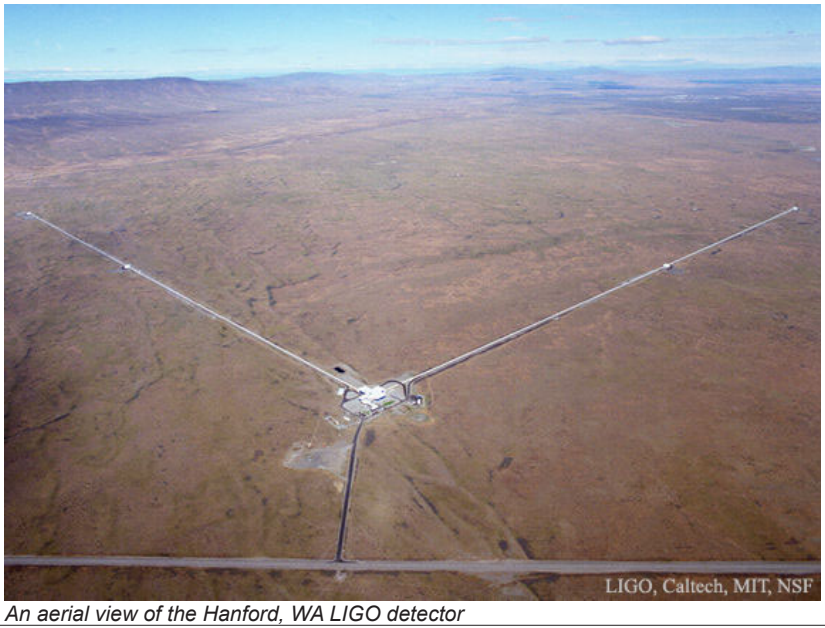
The benefits of the new system are many:
1. A group of guests will be able to see more objects on a visit, since re-aiming the scope will be quicker.
2. We will be better able to work with the scope in awkward positions, such as directly overhead.
3. We will be better able to respond to requests for objects we haven't tried before.
4. And, of course, junior operators will be able find objects quickly and easily.

The McMath in action at a 2015 Open House. The author is standing against the wall at the right. ***Photo: John Manney***

As you may have noticed, this article has a sales pitch to work in the observatory. This is intended! We generally have enough people, but with additional people, we and our guests can have more fun. When crowds are heavy, it is nice to have three Lowbrows in the Observatory.

Having a scope outside the Observatory will give our guests an alternative to waiting in line for the Mc Math. When we have enough help, we can set up the 17.5" Dobsonian on the lawn outside the Observatory (training will be cheerfully provided). We also have an 8" Cave Newtonian reflector, which provides a very sharp planetary views, and a Meade 10" Schmidt Cassegrain.

If our guests have more telescopes to look through, they will probably come back more often, and bring more friends. Having bigger crowds may seem like a potential problem, but we will soon have more workers. After all, most of us Lowbrows started out as Open House guests!



An aerial view of the Hanford, WA LIGO detector

Gravity Waves Detected!

Scientists announced February 11 the detection of gravitational waves last September 14 shortly after the LIGO facilities in Louisiana and Washington State were powered up after a shutdown for upgrades. The collision of two black holes about one billion light years away was interpreted as a rising "chirp" by the instruments. A short article by Lowbrow Dave Snyder along with video links can be found on the Lowbrow Blog: http://lowbrows.blogspot.com/2016/02/gravitational-waves-detected.html

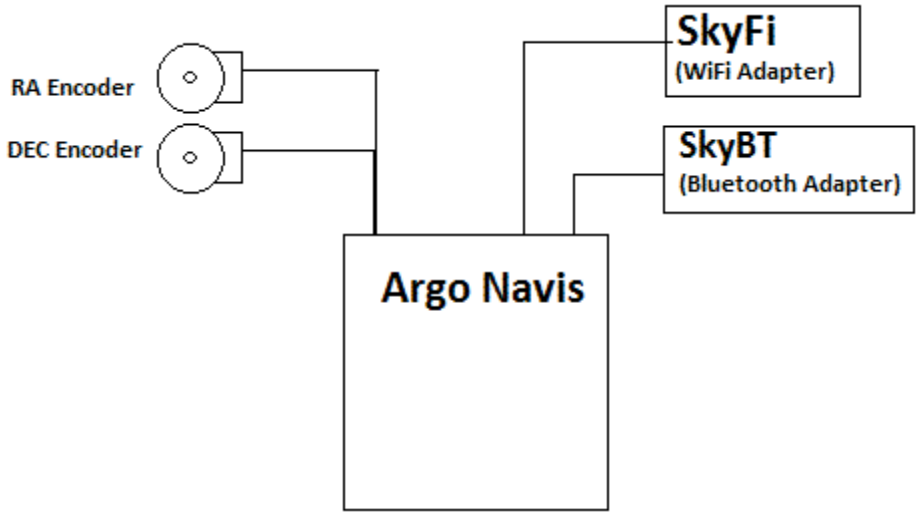
McMath Telescope interface to SkySafari

By Don Fohey and Jim Forrester

The membership voted at the December monthly meeting to authorize necessary expenditures to upgrade the digital encoders on the McMath Telescope and add wireless devices to the Argo Navis computer.

This will provide McMath operators the use of their personal tablets with the McMath Telescopes. The WiFi interface will work with Apple IPAD tablet owners and the Bluetooth interface could be selected by Andriod tablet owners. It would utilize the telescope mount calibration established on the Argo Navis and all telescope star alignment would be performed with the Argo Navis. The Argo Navis can also be used without a tablet. The Argo Navis has two serial ports so both adapters can remain connected. Both adapters are available from and supported by Simulation Curriculum, the vendors of SkySafari.

The manual explains that Argo Navis works with Sky Safari by configuring the serial interfaces as “Meade”. SkySafari would then be configured as “Meade LX200 Classic.”



The encoders, cabling, wireless adapters and the interface between the Argo Navis and Sky Safari on both Android and iOS devices were bench tested by Don Fohey, Dave Jorgensen, Jack Brisbin and Jim Forrester in Don’s basement workshop in Plymouth, MI over two sessions in January. All is ready for installation and hopefully we will have a few consecutive warm days before the first Open House April 2 to accomplish mounting the encoders. The assembly for the R.A. encoder reaction arm will be epoxied in place and requires temperatures above 40^0F for the material to set. The choice for fastening the bracket for the Declination reaction arm is between epoxy and drilling mounting bolt holes in the 80 year old iron and steel of the mount itself. The iron and steel of that era becomes harder and in some cases more brittle as it ages making the group of us pause a bit before making the decision.

SkyFi uses a 12volt power source available from Simulation Curriculum. SkyBT is powered by a battery or a commonly available 5Volt power cube. The input DC power requirements are 5 Volts @ 300ma or greater. SkyBT’s DC input jack accepts a standard center- positive plug of size 4.0mm OD x 1.7mm ID. NOTE: Use only NiMH batteries with the power cube.

Recollections on the Design and Construction of the Angell Hall Observatory

By Chris Sarnecki

I visited our Lowbrows web site just after the New Year to read up on the talk for the January club meeting, and saw we had two presentations. The first caught my eye:

1) Pat Seitzer (Research Professor, University of Michigan Astronomy) and Mel Drumm (Director of the Ann Arbor Hands-On Museum): "The Fate of the Old Angell Hall Telescopes (a 10-inch refractor and a 15-inch reflector)."

Just over 20 years ago, I was involved in the design of the Angell Hall Observatory while working with the Detroit architectural/engineering firm that was leading the renovation of Angell Hall at the time. I recalled I had photographs of the 10-inch refractor and a 15-inch reflector installed in two rather large roof top observatory domes. What was fascinating about the photos was both scopes where still installed in their respective domes adjacent to piles of demolition debris as the dome demolition proceeded around them. Now don't get me wrong. The Astronomy Department had yet to remove the scopes, but had safely removed the optics from the scopes prior to the start of demolition. I thought to locate the photos and bring them to our meeting for our collective review and discussion. Well, I never did find the photographs, but I did find a presentation I made to the club some 20 odd years ago on the then new Angell Hall observatory. I thought I'd resurrect this material and develop it as an article for *Reflections* before this information went the same way of the missing photographs. (At our January meeting, Professor Seitzer informed me, he has the photographs. Seems I gave them to him years ago.)

Before we get started, it should be noted that the original presentation was done using a 'slide' projector. For our younger members who may not know what I'm talking about, a slide projector is a now defunct and obsolete device used to project slides (a kind of photo negative) of photographs on to a screen at the front of a classroom. At the risk of coming off as an old fuddy-duddy, no, we didn't carry around gigabytes of electronic information in our pockets on a device the size of a pack of cigarettes that connected wirelessly to an overhead projector. Every time someone wanted to give a presentation complete with photographs and diagrams, we had to haul out a slide projector that weighed 10 to 20 pounds from the AV department, bring it to the classroom/conference room, load it with slides, and hope the projector's lamp wouldn't explode or burn out during the presentation. Life was a lot more exciting in those days. Well, I located my trusty old slide projector, turned the machine on, listened as cooling fan squeak to life after not being used for (you guessed it) 20 years, all the while hoping the only lamp I had, would not burn out. As luck would have it, the beast worked, and I managed to extract some information from it.

Intermission

Some winter warmers to take the chill out of the air:

Expedition Stout, Bell Brewery, Inc., Comstock, MI - This 10.5% ABV hearty imperial stout is right up at the very top of my best brew list. A sipping, not chugging this beer is required, otherwise you'll be getting a hearty headache.

Big Eddy Cherry Dopplelschwarz, Jacob Leinenkugel Brewing Co, Chippewa Falls, WI - Dopple what??? No time to explain here, but the taste is a very nice fermented dark cherry without being overdone.

Black Butte Porter, Deschutes Brewing, Bend, OR - I take exception to the label art. That's no black butte. I've seen the black butte from Okie-Tex, so I know what I'm talking about. As for the taste; oh, Founders Porter. Why did I ever forsake you?

This story begins in 1993 when our firm was well involved in the design for the renovation of Angell Hall. What many of the general public might not be aware of, the architectural and engineering re-design of a building such as Angell Hall can take many months if not over a year, when one factors in all the owner review meetings for the various design stages of such a large project. The project involved complete replacement of the mechanical, electrical, communication infrastructure for the building, as well as re-roofing, building envelope upgrades (think all new windows, stone/facade repairs), some interior work and site work upgrades. Almost lost in all this was the renovation of the small fifth floor Astronomy Department classrooms and the replacement of the two antiquated observing domes/telescopes with a single state-of-the-art student observatory with a modern computer controlled teaching telescope.

At the time, I was a member of the Lowbrows for maybe all of two years and still quite green as amateur astronomers go. I wasn't a member of the design team working on the Angell Hall project, but I did watch my colleague's work with much interest. The head designer was, like myself, an amateur astronomer but was even far less experienced in general observing, the night sky, and telescopes than I was. He would often ask me what I thought about this or that issue relative to the design of the observatory structure and other questions about telescopes in general. Soon he said, "We gotta get you assigned to this project", and before I knew it, I was assigned to the project to work specifically on the observatory as a kind of drive-by consultant. Working with our team, the owner (the University's Plant Extension office), and the University's Astronomy Department, I developed the preliminary design drawings and working drawings for the observatory and the roof-top student observing scopes. Now as you can imagine, I had landed on a dream job. I would have gladly paid my boss for the right to work on this project!

Much of the design program was developed with contacts of the Astronomy Department through endless e-mails and long telephone conferences, all duly recorded in memos and properly filed in the job folder for future reference. The Astronomy Department indicated their intent to acquire a new 16-inch classical cassegrain (Ritchey-Chretien reflector), pier mounted scope from DFM Engineering, a manufacturer of research grade telescopes for institutions of higher learning. DFM also had expertise in design and coordination of automated observing domes. The Astronomy Department intended the purchase of an 18-foot diameter observatory dome from Ash Manufacturing, a mid-western company specializing the manufacturing of observatory domes. An 18-foot dome for such a little 16-inch telescope you say? Since the observatory and telescope was to be a teaching tool for the Astronomy Department, space was needed to bring a whole classroom of students on to the the observing platform. The telescope and dome/shutter was to be remotely controlled from the department's classroom on the floor below the observatory. The students were to use the Angell Hall set-up to train in the remote control of CCD imaging so they could eventually move up to the University's larger telescopes and other observatories scattered around the globe.

In reviewing the roof-top observatory of Angell Hall, located in central Ann Arbor, my colleagues and I thought this is no place for serious observing of the celestial sky. Not only was the ambient light pollution as significant issue, the site was surrounded by several buildings much taller that Angell Hall. That's where we learned about this thing called to as 'turf'. It seems

at a large institution such as a university, if a department is in possession of a portion of any building, structure, or ground it is assumed to be their 'turf'. It would take heaven and hell to get a department to give up its claim to their turf. Besides the Astronomy Department students liked their central campus location. The Astronomy Department additionally charged us with limiting localized light pollution and protecting occupants of the roof top observatory against accidental falls. As luck would have it, the fifth floor roof at Angell Hall had massive stone and masonry parapets approximately 5-feet above the roof surface. That would become our fall protection; and, did help in screening localized sources of light pollution (think exterior building security lighting).

There was one other 'turf' concern. On the floor just below the roof was an existing mechanical room housing a large air handler. Since we were replacing all mechanicals, a new locomotive size air handler was scheduled to be placed here. In new construction, with modern expectations for more heating and air conditioning volume, this unit would grow in size till it expanded through the the roof. If you have visited the Angell Hall observatory, you might have noticed a large louvered box sticking out of the roof behind the dome and roof access stair. This mechanical 'turf' had one more concern. A large locomotive size air handler can, and does, induce a significant amount of vibrations in to a building's structure. The mid-1920s concrete structure of Angell Hall is by today's standards considered a robust building structure, but try as we might, no amount of vibration control could completely attenuate the air handlers vibrations to the building's structure. This was to become what Pat Seitzer, U of M Astronomer, and one of the Astronomy Department's member of the design team, called "the only observatory constructed next to an active volcano". At an open house, hosted by the Student Astronomical Society a number of years ago, I had a chance encounter with a representative of Plant Extension. I mention that our project Mechanical Engineer confirmed that the large air handler could be turned off for up to four hours during an open house, and this would have little effect on the building's environmental conditions during that time. After all, open houses happen at nighttime when most of the building is unoccupied anyway. I'd hope that our telescope view of a slightly vibrating Saturn was incentive enough to follow up on the air handler issue, but I'm not aware this has been done.

Coordinating the support for modern computer controlled telescope on top of a five story building was an initial concern for everyone. As any Lowbrow knows, a telescope needs to be firmly supported on the ground, but there was no way we were going to support the new telescope to ground through a five story building. DFM had encountered this problem before. The solution was to build a large steel box beam (a beam that has a cross section in the shape of a box), and support it on multiple roof beams. It seams the telescope could accommodate movement on the vertical access (note all roof beams move up and down very slightly due to added weight such as snow loads, and people) without becoming lost in space. What the telescope could not accommodate was something called 'torsional movement' (i.e. - a rotating telescope pier).

The environmental conditions (indoor climate control) inside the observatory was also of prime consideration to the user. The environmental goal set up by the Astronomy Department was the interior of the observatory should maintain dehumidified air, controlled at the mean temperature of the outside ambient air, at any time of the day or night, all year around. Well, that was a very optimistic goal when one considers issues like the project budget. There was a lot of cost effective things that were done to come close to achieving the environmental goal. The metal thin wall construction of the observatory base and dome reduced the heat sink effect from its sunny roof top location. The exterior of the building was painted white to assist in limiting solar heat gain. Manual louvers where placed high on all the side walls of the structure to improve natural ventilation. Mechanical heating and cooling was added inside the observatory to assist evening out excessive temperature swings from the weather outside. A thin low R-value, closed cell insulation was added to the underside of the dome to limit the development of unwanted condensation on the underside of the dome. A recommendation was made to add mechanical ventilation that would pull warm air away from the observing platform so as to pull cooler night time air through the dome shutter as a way to help steady the air at the telescope.

There were numerous other issues that needed to be addressed in wrapping up the design of the Angell Hall observatory. A small elevator connected the roof and observatory with the classroom on the floor below to address accessibility issues. About a dozen metal telescope piers, wired with power and data, were installed on a slip resistant roof surface adjacent the the dome. High white lighting and low red lighting was placed inside the observatory and at the student telescope piers on the roof. I had only one face-to-face meeting with the then chair of the Astronomy Department, Hugh Aller. Nervous that I might not measure up the the user's expectations on technical issues related to observatory design, I prepared myself as best I could. Well into this meeting the chair asked who I was, as he was apparently pleased with my efforts so far. I responded that I was a member of the (notorious) University Lowbrows Astronomers! It seems that my brief tenure as a Lowbrow had paid off. When time came to determine the colors for the interior of the observatory, the user indicated that the overall interior should be dark, "like a U of M BLUE"; and, provide a light color for safety markings on steps, railings, and changes in floor elevation "like a U of M MAIZE". So there you have it. One of my career highlights is up there on the roof of Angell Hall for all to see, but you'll need to stand back from the building at about 100 yards to see it.

Astronomy on Tap!

By Jack Brisbin

January 12 was my first time to Astronomy on Tap and I will return. The topic for this event was Black Holes, one of the strangest objects in the Cosmos. The pictures (right) were all taken at Coner O'Neils in Ann Arbor and you can enjoy a traditional Irish dinner and indulge in that famous tradition "Science is even better with Beer". But they also offered coffee, tea and soft drinks.

The lectures where conducted by U of M faculty; Dr. Mateusz Ruszkowski and Dr. Elena Gallo. Pictured on the right is Dr. Ruszkowski during his talk on Black Holes. The picture at center shows the students taking the stage. The students took over and held a question and answer session. They also passed out cards so you could write a question. They did great on answering all of the questions. The same was done a second time after Dr. Gallo's lecture on Black Holes. This gave the audience a chance to get involved in the discussions. I wonder how many students took this opportunity to ask questions that might be on an exam...?

If you submitted a question your card was saved for a raffle. Astronomy related pictures and other items were the prizes. There was also a discussion on the "Black Hole Burp" this has nothing to do with food or beer. Astronomers have noticed gigantic waves of gas being "burped" by a massive black hole. If you were at the lecture you would have gotten a more scientific explanation. The picture on the lower right shows standing room only so leave a little early to get a good seat and place your order. So, what are you going to do? Stay home and watch TV!
BE THERE..!!

Cloud Patterns of Southeastern Michigan

By John Manney

Although the topic of cloud cover has been researched from many points of view, the unique cloud patterns of Southern Michigan have not been reported in detail. Understanding them will make for more satisfying viewing times. Here are some cloud formations which haven't received a lot of attention:

Adfligens (unrelenting) is responsible for the majority of the lost opportunities for star watching. It consists of steady cloud cover greater than 75%, and is easily detected in the daytime. *Adfligens* can persist for longer than four weeks. Weather forecasts should not be consulted excessively (i.e. more than six times per day). Fixation on forecasts can lead to irritability and mood disorders. Countermeasures: Internet telescope rental, preparation of observation lists, buying more gear and writing an article for your club newsletter.

Fenestram Umbra (the Window Shade) occurs on nights of unusually good transparency and seeing. *Fenestram Umbra* consists of a solid bank of clouds approaching rapidly from the West. Usually, *Fenestram Umbra* transitions into *Adfligens*. *Fenestram* can approach so quickly that it is first observed in the eyepiece. The window shade pattern can be seen on satellite imagery, but the actual ground speed is often much greater than anticipated. Countermeasures: always plan for an object in the East which can be located quickly. This eases the shock of the early session termination.

Crassum et Tenues (Thick and Thin) is a layer of haze which forms and dissipates in cycles of 5 to 30 minutes. During the "thick" phase, unseasoned observers can be tricked into packing up. This is followed by a "thin" phase of exceptional transparency. As many as 4 "Thick and Thin" cycles have been observed in a single hour. No advance detection techniques have been identified. The scientific community hasn't accepted the reality of *Crassum et Tenues*. It is argued that there is no evidence for its existence, other than anecdotal reports from amateur observers who are sleep-deprived. Countermeasures: Do not use white lights when packing up, and look over your shoulder often.

Bonus Nocte (the Bonus Night) occurs after cloud cover is predicted by all major weather services. It is not a cloud pattern; rather it is an unexpected absence of cloud cover. It is usually detected when taking out the trash or locking up for the night. Up to two hours of clear sky can occur. Observing under *Bonus Nocte* can be very productive, if anxiety about *Fenestram Umbra* can be resisted. Countermeasures: Every 30 minutes, look out the window or go outside. (This behavior can look odd, so it is best to explain it before questions arise.)

This list is by no means exhaustive, since specialized study of Southern Michigan cloud patterns is in its infancy. We look forward to the benefits which will come from further research.

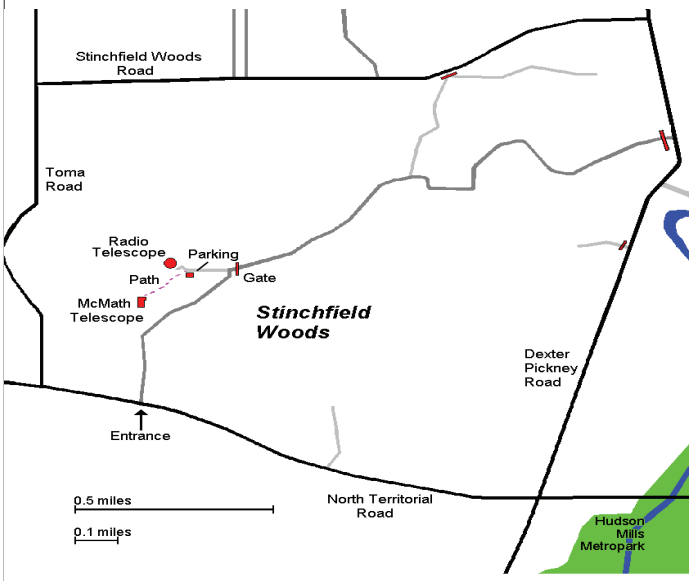
***Monthly Club Meeting*--Friday, March 18, 7:30 PM**, Room G115 Angell Hall, Ann Arbor. Speaker: Vivienne Baldassar (PhD student, University of Michigan Astronomy): ""Teeny super massive black holes."

***Open Houses on Peach Mountain*--**April 2 and April 9, 8:00 PM-Midnight. May be cancelled if cloudy.

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 Angell 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. A club observing session at the Peach Mountain Observatory, weather permitting, often follows 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, maintained and operated by the Lowbrows. Located northwest of Dexter, MI; the entrance is off North Territorial Road, 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 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 $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.

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 $18 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

P.O. 131446

Ann Arbor, MI 48113

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

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

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

For more information contact the club Treasurer at:

lowbrowdoug@gmail.com

Newsletter Contributions

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

Call or Email the Newsletter Editor: **Jim Forrester (734) 663-1638 or** jim_forrester@hotmail.com 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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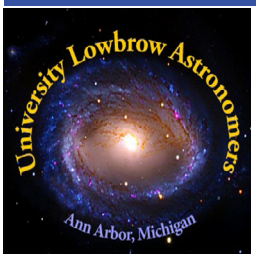
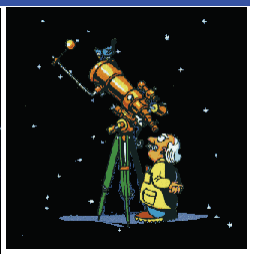
Reflections & Refractions





Website
www.umich.edu/~lowbrows/

Observatory Director Jack Brisbin obtained this comment during a recent interview with a resident of Peach Mountain.

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