

REFLECTIONS / REFRACTIONS

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University Lowbrow
Astronomers

February 2011

Volume 35 Issue 2

Lowbrow Schedule of Events

Compiled by Charlie Nielsen, Belinda Lee & Mark S Deprest

- **Friday, February 11, 2011 – Special Session:** 6 to 9 PM, observing at the U of M Botanical Gardens. Theme is colors of stars and nebula for more info contact cdnielsen1@aol.com
- **Friday, February 18, 2011 – ULA Meeting:** Mark Deprest (University Lowbrow Astronomers): “No Charge Astronomy, Part 2.”
- **Saturday, February 19, 2011 – SMP:** (10:30AM, Room 170 Dennison, U-M Central Campus). Saturday Morning Physics. Professor Nilton O. Renno (U-M Atmospheric, Oceanic & Space Sciences): “The Discovery of Liquid Saline Water on Mars.”
- **Monday, February 28 – Sunday, March 6, 2011 – Winter Star Party** held at West Summerland Key, FL – Lowbrows Attending- Robert Wade for more info: <http://www.scas.org/wsp.html>
- **Thursday March 3, 2011 – Special Session:** 2 to 4 PM, Astronomy presentation at Bach Elementary School for more info contact cdnielsen1@aol.com
- **Saturday, March 5, 2011.** *May be cancelled if it's cloudy or too cold.* (Starting at Sunset). [Open House at Peach Mountain](#)
- **Saturday, March 12, 2011 – FAAC Astronomy Expo & Swap:** held in Livonia, MI for more info see the flyer on page 8 of this newsletter.
- **Friday, March 18, 2011 – ULA Meeting:** David Levy (Jarnac Observatory): Skype discussion, My History of Comet Hunting.
- **Saturday, March 26, 2011 – Special Session:** 9 AM to 4 PM, U of M Exhibit Museum, presentation and display about water in our solar system for more info contact cdnielsen1@aol.com
- **Saturday, March 26, 2011.** *May be cancelled if it's cloudy or too cold.* (Starting at Sunset). [Open House at Peach Mountain](#)
- **Saturday, April 2, 2011.** *May be cancelled if it's cloudy.* (Starting at Sunset). [Open House at Peach Mountain](#)
- **Saturday, April 16 – Sunday, April 17, 2011 – NEAF:** NorthEast Astronomy Forum & Telescope Show at Suffern, NY – Lowbrows Attending – Clayton Kessler for more info: <http://www.rocklandastronomy.com/NEAF/index.html>
- **Friday, April 15, 2011 – ULA Meeting:** Elections and Swap Meet.
- **Friday, April 29 – Sunday, May 1, 2011 – Lowbrow Spring Star Party:** CLEAR II in Atlanta, MI (very dark site) with a cloud-out date listed below – Lowbrows Attending – Mark Deprest, Dipankar Maitra, Brian Ottum, Doug Scobel, Don Fohey, Dave Snyder ... and any other Lowbrows interested.
- **Saturday, April 30, 2011.** *May be cancelled if it's cloudy.* (Starting at Sunset). [Open House at Peach Mountain](#)
- **Saturday, May 7, 2011.** *May be cancelled if it's cloudy.* (Starting at Sunset). [Open House at Peach Mountain](#)
- **Tuesday, May 17, 2011 – Special Session:** 8 to 11 PM, Observing at Camp Hazelwood for Hazel Park Schools for more info contact cdnielsen1@aol.com

- **Friday, May 20, 2011 – ULA Meeting:** Rudi Lindner (History Department, University of Michigan): “Keep Watching the Skies! The Rise, Flight, and Fancy of Flying Saucers.”
- **Tuesday, May 24, 2011 – Special Session:** 8 to 11 PM, Observing at Camp Hazelwood for Hazel Park Schools for more info contact cdnielsen1@aol.com
- **Thursday, May 26 – Sunday, May 29, 2011 – CSSP:** Cherry Springs Star Party at Cherry Springs, PA – Lowbrows Possibly Attending – Chris Sarnecki, Clayton Kessler for more info: not available at this time.
- **Friday, May 27 – Monday, May 30, 2011 – Lowbrow Spring Star Party:** CLEAR II (cloud-out) in Atlanta, MI (very dark site) – Lowbrows Attending – Mark Deprest, Dipankar Maitra, Brian Ottum, Doug Scobel, Don Fohey, Dave Snyder ... and any other Lowbrows interested.
- **Saturday, May 28, 2011.** *May be cancelled if it's cloudy.* (Starting at Sunset). [Open House at Peach Mountain](#)
- **Saturday, June 4, 2011.** *May be cancelled if it's cloudy.* (Starting at Sunset). [Open House at Peach Mountain](#)
- **Friday, June 17, 2011 – ULA Meeting:** Ed Ting (Scope Reviews Dot Com): Skype Virtual Meeting: Topic to be announced.
- **Saturday, June 25, 2011.** *May be cancelled if it's cloudy.* (Starting at Sunset). [Open House at Peach Mountain](#)
- **Saturday, July 2, 2011.** *May be cancelled if it's cloudy.* (Starting at Sunset). [Open House at Peach Mountain](#)
- **Thursday, July 14, 2011 – Special Session:** 7 PM to 11 PM or so, Leslie Science and Nature Center, observing for young urban campers for more info contact cdnielsen1@aol.com
- **Friday, July 15, 2011 – ULA Meeting:** Norbert Vance (Director, Sherzer Observatory, Eastern Michigan University): Tour of the new EMU Planetarium. This meeting will take place in the Science Complex on the campus of Eastern Michigan University.
- **Friday, July 15 – Sunday, July 17, 2011 – MWAIC:** MidWest Astro-Imaging Conference at Elgin, IL – Lowbrows Attending – Clayton Kessler for more info: <http://www.mwaic.com>
- **Saturday, July 30, 2011.** *May be cancelled if it's cloudy.* (Starting at Sunset). [Open House at Peach Mountain](#)
- **Thursday, August 4, 2011 – Special Session:** 7 PM to 11 PM or so, Leslie Science and Nature Center, observing for young urban campers for more info contact cdnielsen1@aol.com
- **Saturday, August 6, 2011.** *May be cancelled if it's cloudy.* (Starting at Sunset). [Open House at Peach Mountain](#)
- **Friday, August 19, 2011 – ULA Meeting:** Tom Trusock topic to be announced
- **Friday, August 26 – Sunday, August 28, 2011 – BFSP:** Black Forest Star Party at Cherry Springs, PA – Lowbrows Possibly Attending – Mark Deprest, Robert Wade, Nathan Murphy, Brian Ottum, Chris Sarnecki, Doug Scobel, Don Fohey, Dave Snyder, Clay Kessler for more info: <http://www.bfsp.org/starparty/index.cfm>
- **Friday, August 26 – Sunday, August 28, 2011 – AHSP:** Almost Heaven Star Party at Spruce Knob, WV – Lowbrows Possibly Attending – Mark S Deprest, Brian Ottum, Robert Wade, Clayton Kessler for more info: <http://www.ahsp.org>
- **Saturday, August 27, 2011.** *May be cancelled if it's cloudy.* (Starting at Sunset). [Open House at Peach Mountain](#)
- **Saturday, September 3, 2011.** *May be cancelled if it's cloudy.* (Starting at Sunset). [Open House at Peach Mountain](#)
- **Friday, September 16, 2011 – ULA Meeting:** Bob Berman (Adjunct Professor of Astronomy at Marymount Manhattan College): Skype Virtual Meeting: “Light and Color in the Universe.”

- **Saturday, September 24 – Sunday, October 1, 2011 – OTSP:** Okie-Tex Star Party at Kenton, OK – Lowbrows Possibly Attending – Mark Deprest, Nathan Murphy, Brian Ottum, Chris Sarnecki, Clayton Kessler for more info: <http://www.okie-tex.com/index.php>
- **Saturday, September 24, 2011.** *May be cancelled if it's cloudy.* (Starting at Sunset). [Open House at Peach Mountain](#)
- **Saturday, October 1, 2011.** *May be cancelled if it's cloudy.* (Starting at Sunset). [Open House at Peach Mountain](#)
- **Friday, October 21, 2011 – ULA Meeting:** .Topic to be announced
- **Friday, October 21 – Sunday, October 23, 2011 – Lowbrow Fall Star Party:** CLEAR III in Atlanta, MI (very dark site) with a cloud-out date listed below – Lowbrows Attending – Mark Deprest, Dipankar Maitra, Brian Ottum, Doug Scobel, Don Fohey, Dave Snyder ... and any other Lowbrows interested.
- **Saturday, October 22, 2011.** *May be cancelled if it's cloudy.* (Starting at Sunset). [Open House at Peach Mountain](#)
- **Friday, October 28 – Sunday, October 30, 2011 – Lowbrow Fall Star Party:** CLEAR III (cloud-out) in Atlanta, MI (very dark site) – Lowbrows Attending – Mark Deprest, Dipankar Maitra, Brian Ottum, Doug Scobel, Don Fohey, Dave Snyder ... and any other Lowbrows interested.
- **Saturday, October 29, 2011.** *May be cancelled if it's cloudy.* (Starting at Sunset). [Open House at Peach Mountain](#)
- **Friday, November 18, 2011 – ULA Meeting:** Topic to be announced
- **Saturday, November 19, 2011.** *May be cancelled if it's cloudy or too cold.* (Starting at Sunset). [Open House at Peach Mountain](#)
- **Saturday, November 26, 2011.** *May be cancelled if it's cloudy or too cold.* (Starting at Sunset). [Open House at Peach Mountain](#)
- **Friday, December 16, 2011 – ULA Meeting:** Topic to be announced

Norris says, "Neow, what's all this hoopla about Sirius, the DOG star?"

*And remember what David Levy says, "Comets are like cats, they both have tails and they both do what **they** want to!"*

*Image submitted by:
Elizabeth Calhoun*



IT'S MOVING!

By Brian Ottum

Yes, all astronomical objects (moons, planets, stars, galaxies) are moving. But it is very rare for you to actually see something moving as you stare into the telescope eyepiece. The moons of Jupiter move, and are especially cool to watch as their shadows move across the face of Jupiter or when a moon emerges from the shadow behind Jupiter. Similarly, prominences on the sun blow out from the surface, dissipate and fall back down. Finally, close-approaching comets move against the background stars. However, these three movements are not super exciting to me because they are so slow that you don't really see them move much as you are looking through the telescope. You notice that things are not the same after looking away for a minute or two, then looking back through the telescope.

On the other extreme, all telescope users have seen Earth satellites and space junk zipping through the field of view. It is quite startling. [These have degraded many an image of mine.] These objects are rather close to us and moving fast. So their "angular motion," or rate of motion relative to the background stars, is zippy. Again, I don't find these to be exciting because they move so fast that it's impossible to comfortably track and watch them.

Have you ever been watching the sky and seen something slowly crawl across the field of view, moving relative to the stars? This has randomly happened to me several times. I'm not sure, but I believe these are small pieces of space junk that are in geosynchronous (or near-geosynch) orbit. I'm totally fascinated by them, but know they are nearly impossible to seek out and find. Maybe when the satellite-tracking websites increase their coverage to the thousands (heavens-above.com) we can find these mysterious objects.

The moving objects that I find most exciting to hunt down are near-Earth objects (NEO's). These are asteroids that cruise closely past Earth. If they are projected to come really close, they are called Potentially Hazardous Asteroids (see spaceweather.com). These chunks of rock are moving at 30,000 miles per hour. They range from the size of a small house to miles in diameter. They are zooming past the earth every few days. However, 99% of them are so faint that we cannot see them in our amateur telescopes.

ASTEROID NY40 ENCOUNTER

Back in the summer of 2002, the astronomy press was abuzz about an asteroid that was going to come close to us. The half mile in diameter rock was to pass just a bit further than the moon's distance from Earth! The weather that Saturday looked pretty iffy for Ann Arbor. But I decided that I was not going to miss it. I got my Sky & Telescope finder chart and telescope ready. At about dinner time, it became obvious that I was going to get clouded out. So I checked weather websites and saw that a clear hole was going to be over the center part of lower Michigan. I announced to my family that I was going on a last-minute trip. Amazingly, my wife and 13-year old son and 9-year old daughter said they wanted to come along on this adventure. We piled everything into the van and took off for the Lansing area. I had never been to the Fox Park Observatory SW of Lansing. So despite a printed Mapquest map, I still got a bit lost. We arrived at sunset. I was expecting to see several other amateurs there to witness the big event. But no one ever showed; even to open the big roll-off roof observatory.

I set up the 12.5" Starmaster dob next to the observatory, on the mowed grass. My kids ran around and played games while my wife unhappily slapped mosquitoes. As darkness fell, I used the finder charts to star-hop to the general area. Then I waited for it to get dark enough to see the 9th magnitude field stars and the asteroid itself. More mosquito slapping. I will never forget when I spotted that moving "star," cruising past other stars. I was hooked! It was really cool to project the path and see the stars ahead that might be "hit" by the asteroid. I don't think I removed my eye from the telescope for more than a minute during the 90 minutes we were there. The family took a peek, saw the moving object, and quickly resumed their activities (themselves unmoved by the experience). As clouds rolled in by midnight, we were on our way home. Snores were heard.

FAST FORWARD TO OCTOBER 2010

In 2003, astronomers analyzing the Lowell Observatory LONEOS images found a tiny streak. Using other images and radar, they calculated an orbit. On Friday the 29th, the 1800' diameter rock was going to pass just a million miles from earth! This is just 5 times further away than our moon. Sky and Telescope's website had the information. So I fired up TheSky program, downloaded the orbital data, and plotted the finder charts. On that Friday, I spent about 3 hours printing fancy dotted finder charts, doing research and planning my adventure to see the flyby. (Yes, I was obsessed.)

The weather that day was perfect, so I put out a notice to the Lowbrows...

Lowbrows,

Don't know if you've heard, but something is amazing is happening in the Michigan skies tonight. Asteroid 2003 UV11 is passing very close by. For a 600 meter rock, 1.2million miles is pretty close (about 5 moon-earth lengths).

Almost NOTHING moves while you look at it in the eyepiece. This is the exception. The rock is scooting past at 2.5 arc-seconds/hour, meaning it could cross the full moon in just 12 minutes!

The asteroid is magnitude 12.2, but fading so fast that it is 15.3 tomorrow night. So catch it tonight.

Mag 12.2 is not easy to find. Use your own charting software for a more wide angle view of Pegasus. The calibration star is SAO 107280/HIP 106720, mag 7.25. The asteroid will pass just 20 arc-seconds from this star at 9:16.75pm tonight.

Brian

Bob G. replied and said he'd meet me at Lake Hudson to observe this [exciting] event. Maybe I was the only one excited, because no one else was there. I set up the scope, got out my finder charts, and waited for darkness. Unfortunately, high clouds moved in. Clouds were quite thick to the south where the "winged horse" (Pegasus) and asteroid were to appear.

Undaunted, I star hopped from the bright Pegasus stars that shone through the clouds to the rough location where the magic was to happen. I waited. Then I saw some 11th magnitude stars on the chart very near to where the 12th magnitude asteroid was to be. Nothing. I waited more, but had to switch to another close-up chart because the asteroid was moving so fast. I started to get worried that I would miss it. I just could not find it. Then it occurred to me that the high clouds were obscuring the faintest stars. If I could not see anything fainter than about 12, then I'd never see the asteroid. After about an hour of intense searching, I nearly gave up.

About 10:15pm, the cold was getting to my fingers. But I would not take my eye from the eyepiece. Finally, the clouds dissipated and I could see every single 13th magnitude star on my charts. But I had nearly run out of charts and still not found the asteroid. If I did not find it soon, then I'd never find it because I had no chart.

Eureka! I could plainly see a star continuously moving against the background stars. It was amazing to see it make super close approaches to stars and then crawl past them. Bob was also impressed. We were able to follow the asteroid for 45 minutes. The coolest view was in the 300x eyepiece, so you could actually watch the movement. Eventually, we decided to look at Jupiter and some good deep sky objects. I tried to go back and find the asteroid at midnight, but there was no way since I had no finder charts. But the effort was definitely worth it!

THE FUTURE

I always check spaceweather.com for upcoming asteroid flybys. But nothing is scheduled to be brighter than magnitude 14. If any of you hear of any good flyby's coming up, be sure to let me know. I'll be happy to take fellow observers on my next adventure.

P.S. My son has just finished adding my astropix to my website. He did some cool programming that allows "zooming" up close. Please take a look and give me constructive criticism. <http://www.ottumresearch.com/personal.html>

Testing a Coulter Secondary Mirror

By Tom Ryan

The Lowbrow Astronomy Club has been acquiring telescopes the way my eighty-four year old father acquires income; that is, through no personal effort of its own. People give their old telescopes to the club, perhaps in the hope that they can be recycled or reused, and a decent respect to the opinions of the contributors requires that we should attempt to carry out their intentions.

One of the telescopes which was donated to the club was an older 17.5" Coulter Dobsonian. It had the requisite red cardboard tube and hastily made primary, weighed a ton and was almost completely unusable by today's standards. The club voted to do what it could to revive it and to put it into useful service, and to that end, Doug Nelle, Jack Brisbin, and I have been getting together for the past year or so to drink beer... er, I mean, to work on refiguring the primary mirror, with the hope that the telescope might end up being better than it was when it fell into our hands.

We had a lot of fun refiguring the primary mirror, and we think that it now may be about as good as we can make it without taking it back to a sphere again. (Fortunately, the bar that Coulter set for figure quality was mercifully low, and can be easily improved upon if one is willing to put time into the effort.) Our progress in primary mirror refiguring will be the subject of a future article, but that article is not yet ready, and the one that you are reading is, so we are publishing this one first.

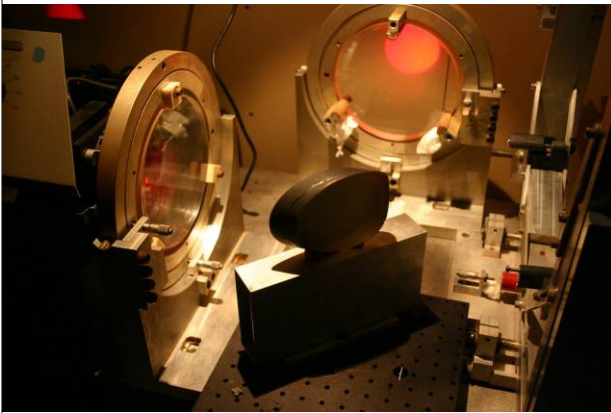
We tested the primary mirror in a number of ways, including the Foucault test, the Ronchi test, the spherical interferometer test, the double-pass Foucault test, and the double-pass interferometer test. None of these tests made us better opticians, but it is possible to test and to drink beer simultaneously, so a lot of testing got done. One unfortunate outcome of all this testing was the discovery that the tests tended to disagree with each other to some degree, and all of them had shortcomings when it came to telling us if the mirror would give good images when pointed at a star. Therefore, we decided to do that test, too.

To test a mirror using a star, you basically need to build the entire telescope. Jack has put together a close facsimile of a telescope tube using spare lumber and old telescope parts that he had lying around and from taking apart the Coulter in the first place, and

Doug has pointed out that, if we use all the old Coulter parts, we'll be back at square one, but Jack says this is not the intent of his construction, and if the mirror star tests well, then we'll do a better job with the tube. Doug is intent upon replacing the secondary with one that is smaller, lighter, and has a better figure, but we can't justify spending money on this if the primary mirror is no good. So, we have to use the old secondary mirror when star testing the primary mirror, and that means the secondary mirror needs to be better than the primary mirror, otherwise its own errors will swamp the errors of the primary mirror.

This might seem to be a serious problem, especially given the less-than-stellar reputation that Coulter secondary mirrors have, but I felt it is something we can work with. We have the technology. We can test it.

There are several perfectly good ways to test the flatness of a telescope's secondary, or diagonal, mirror. Probably the best one is to find a really, really good sphere (and really good spheres can be found), place it where the primary mirror is normally located in the telescope, and do a Foucault test at prime focus. Unfortunately, I didn't have a really good sphere. Fortunately, I did have a really good interferometer.



Interferometric testing involves three primary things, apart from the interferometer itself. You need a good reference surface against which to compare your test surface, the test and reference surfaces need to have similar reflectivities, and you need to isolate everything from vibrations in the ground. The vibrations were isolated by an optical bench, the reference surfaces were made by the late Karl Mueller and were therefore essentially perfect, but the reflectivities of the uncoated reference plate and the aluminized diagonal were as different as zero and one (or, really, 4% and 88%).

I solved this problem by bouncing the light off a second, uncoated reference flat. This reduced the intensity of the beam that probed the diagonal to $0.88 \times 0.04 \times 0.88 = 0.03$, which is close enough to the 0.04 intensity of the reference beam as to allow enough cancellation between the two beams to get some contrast in the fringes. They don't fully cancel to black, though, in this setup.

Modern interferometers are less bothered by this problem of different reflectivities and by vibrations, because they do a lot of image processing on the fringe image before presenting it to the viewer. I, however, don't have one of these devices, and I'm not yet willing to sell my house to get one, so I have to make do with slightly more complicated test setups.

The requirement that the light bounce off an uncoated surface had the beneficial effect of making it bounce off the diagonal mirror twice, which effectively doubles its surface errors. In the picture above, the light comes out of the interferometer on the left and travels to the right. (The interferometer's cover is off. I was adding an internal CCD camera to it.) The emerging light strikes the first reference flat on the left, and the reflected reference beam returns to the interferometer. The transmitted light, constituting the probe beam, passes through the reference element, strikes the 4" minor-axis diagonal in the middle of the picture, reflects off at a 45-degree angle to the second reference flat, then 4% is returned to the diagonal, which then reflects it back into the interferometer, where it combines and interferes with the reference beam.

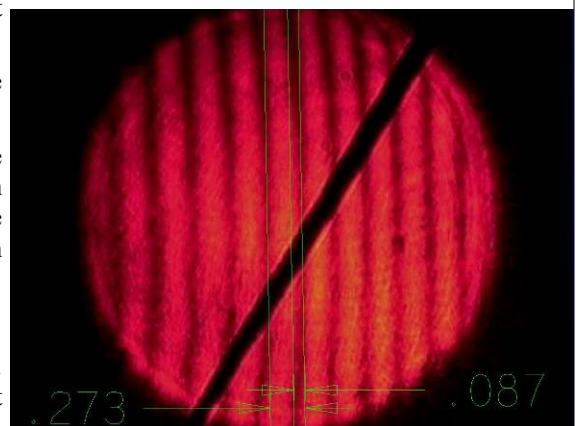
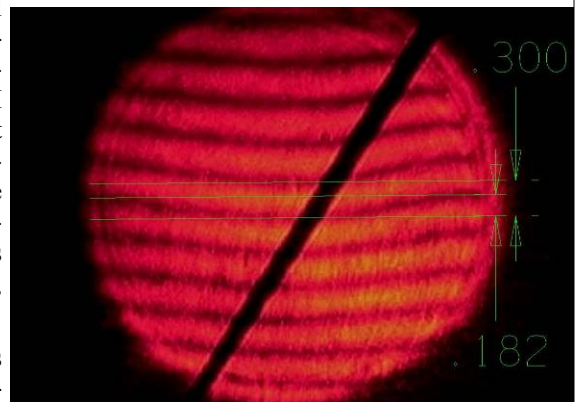
The diagonal mirror was measured in two directions. The short-axis results appear in the image below. The image has a tapered black bar cutting diagonally through it. This is an artifact of the interferometer, and I hope to correct it in future images, but for now, it should just be ignored.

The diagonal appears round in the image because it is at a 45 degree angle to the beam, just as it is in a telescope.

Note that there are three lines drawn across the image. The two lines with the greatest separation represent the distance between adjacent fringes. The line in the middle represents the deviation of one of the fringes from flatness, and the interferometer is set up so that a vertical dip in the lines represents a depression on the diagonal. The fringe line sags by $.182/.300$, or 0.607 fringes.

If we swing the fringes around so they are vertical, we get the following image:

This time, the fringe deviates from flatness by $0.087/.273$, or 0.319 fringes. Clearly, the diagonal mirror has different curvatures in different directions. It



looks like the bottom of a canoe, or the inside surface of a football. We call this astigmatism, and it is not uncommon when polishing optics which are not round.

But how bad is this diagonal? Let's walk through this. If the diagonal were being measured against a flat test plate, and was not in a situation where the light bounced off of its surface twice, then the fringes would be separated by one-half of a wavelength of Helium-Neon light, which is .6328 microns. The surface would then have a sag of $0.607 \times 0.5 = .304$ waves in one direction, and $0.319 \times 0.5 = 0.160$ waves in the other direction.

However, the double-pass arrangement makes the surface errors look twice as large as they really are, so we can say that the surface is 0.152 waves out in one direction, and 0.080 waves out in the other. Not bad, it would seem. One-sixth wave and one-twelfth wave, in different directions.

Unfortunately, we really only care about the quality of the wavefront, and surface errors on a mirror have a 2X effect on the wavefront. That means we are back to wavefront errors of about one-third and one-sixth waves in different directions.

Doug pointed out that a diagonal doesn't need to be absolutely flat to work well. It only needs to be smooth, and this diagonal is fairly smooth. The problem is that it contributes at least one sixth wave of astigmatism to the wavefront, and since we think the primary mirror is a good deal better than one-sixth wave, it will be hard to come to any firm conclusion when star testing.

However, we'll do the star testing anyway. We might learn something, and Jack found a new microbrewery whose products require investigation.

University Lowbrow Astronomers

Meeting Minutes from Friday, January 21, 2011

January 21, 2011 Officer meeting minutes

Possible March speaker David Levy pending club approval of \$300 honorarium. David's presentation topic is to be decided by the club. In addition, Scott Roberts is donating to the club an eyepiece if we mention Explore Scientific during the presentation.

February presenter Mark Deprest "No Cost Astronomy".

Open meeting speaker slots June and August through December.

Arthur Suits possible June speaker follow up by Belinda.

Hugh Allen possible presentation followed up by Jason.

Liz is heading up the newly founded Ann Arbor IDA Chapter. The chapter will do introduction to club in the newsletter along with regular updates.

Treasury balance \$6945.08

Adjourned 19:03

The meeting was called to order at 19:38 by President Charlie Nielsen.

Charlie introduced Jeff Masters, Ph.D.

Jeff Masters presented "The Future of Severe Weather".

Business section of meeting:

Mark Deprest made a motion to approve a \$300 honorarium for David Levy, our March guest speaker. The motion was seconded by David Snyder. Motion was approved by unanimous "show of hands" vote.

A discussion was held about what format/subject David Levy's presentation would be of most interest to the club. A show of hands indicated that it should be a discussion of David's personal observing style and his history of comet discovery.

Meeting was adjourned at 21:50.

Minutes recorded by Mark Deprest, and typed (with minor editing) by Charlie Nielsen on January 23, 2011.



Astronomy Expo & Swap

8th Annual

Saturday March 12, 2011 9:00 am – 4:00 pm
@ Holy Cross Lutheran Church, Livonia

Days Activities

Astronomy Discovery and Attendee Participation

10:00 am Astronomy 101 – G Hansen

11:00 am Binocular and Small Scope Observing - J Frisbie

Workshops – Free Form Q&A

1:00 pm Before Observing – Eyepiece, mirror, lens cleaning, Imaging and CCD equipment, the GEM and AltAz tracking, electronics in Astronomy, reference books and star charts, Solar filters, observing logs and software, what to take to star party & observing

2:00 pm Observing Site – Site etiquette, Go To Mounts, Using the Intelliscope, Collimation how to, star hopping and session tips, imaging manipulation software, using scopes and telescopes for maximum session rewards

Featured Subjects

10:00 am Starting off Right in Astronomy – T Trusock

11:30 am Einstein's Legacy – L Halstead

1:00 pm New Possibilities, ? New Neighbors – K Bjorkman

2:00 pm Panoramic Image of the Night Sky – A. Mellinger

Planetarium Lectures @ 10, 11, am & 1, 2 pm

Food Provided by Leda's Coney Island
(Pitas, salads, coney, rice pudding, hot/cold drinks)

Admission: \$5 at the door.

Table Fee for Resellers: \$15 in advance or \$20 at the door.

Doors open at 8 AM for table/vendor set up.

Site Located at: 30650 Six Mile Rd, Livonia, 48152

Make checks payable to: FAAC P.O. Box 7527, Dearborn, MI 48121-7527

Vendors, Manufacturers, Commercial contact Tom Blaszk at: key_string_guy@yahoo.com
OR Doug Bauer at: DougBauer@comcast.net,



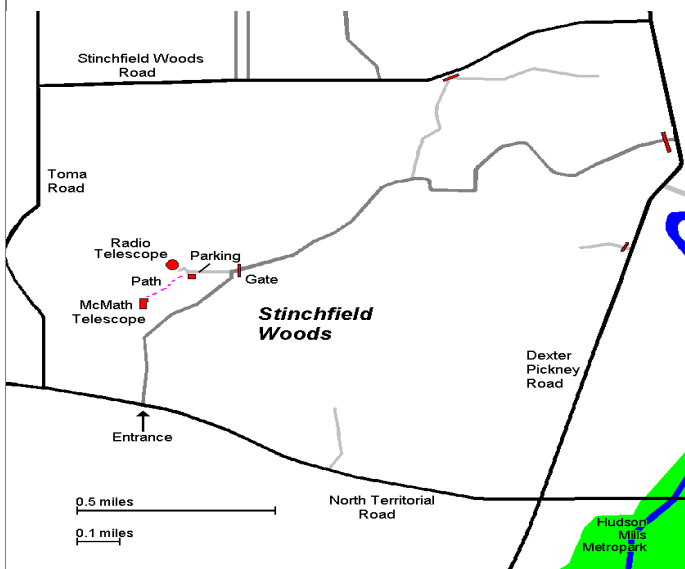
Great Red Spot
Astronomy Products
WWW.GreatRedSpot.Com
Telescopes • Lasers
Accessories



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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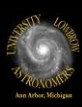
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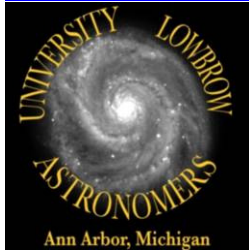


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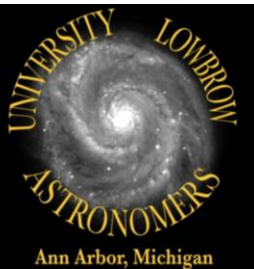
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