

REFLECTIONS / REFRACTIONS

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University Lowbrow
Astronomers

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Night Sky Network

Belinda Lee, Coordinator

Happy New Year! I'd like to get this New Year started with lots of Night Sky Network events, but I'll need your help! The Night Sky Network, NSN has provided us with tool kits with which we can do a variety of community outreach events.

But, those events do not have to strictly be tied to the tool kits. What is most important is giving out information on the NSN and that can be accomplished by including there website on any handouts that are given out. My personal goals are greater involvement with kids and with teachers. To meet those ends I'll be contacting local schools as well as teacher colleges with science programs. If you can help with contact names please let me know.

On a greater scale we all are involved in some type of outreach even if it is to let a friend or neighbor take a look through our telescopes. If we can share the website with them we can log those activities as events.

You're probably wondering what benefit it gives to the club. By getting people interested in look into the heavens perhaps we can change our communities approach to how the streets are lighted. We can spark the next great scientist. Okay so let me get a little more tangible we can earn cool stuff for the club like pins and other stuff. But, to learn more take a look at the NSN website: <http://nightsky.jpl.nasa.gov/index.cfm>

And if you would like to login as a participant let me know and I can set you up with an ID and password.

If you do something that might count as an event please let me know! I'd be glad to go over what you did and see if it qualifies as an event! I'll even log it for you.



LOWBROWS HELP SCOUTS WITH MERIT BADGES

By Charlie Nielsen

On December 4th, 2007 a group of Lowbrows came together to help some Cub Scouts earn a merit badge. The event was held at Knox Presbyterian Church at Scio Church and Wagner Roads.

After I was contacted about this event, I sent a recruitment email out to the general membership, and several of us replied. I also asked for a team leader since I was concerned about how much time I would have available to manage this event properly. Long term Lowbrow, Brian Ottum stepped up to the plate and bravely volunteered. Brian put a great program together that directly gave the scouts the knowledge that was required for the mission at hand. The Lowbrow team consisted of this author, Brian Ottum, Arthur Suits, Belinda Lee, Yasu Inugi, and Lee Vincent.

The event started around 7:00 PM with Brian showing the scouts a slide show presentation. That lasted about 15 minutes and then the scouts returned to the gymnasium, where three tables were set up. The first table had scopes and some binoculars. Belinda had her excellent Questar 90mm Duplex, Lee had an Orion Star Blast 4.5 inch DOB, and I provided my Orion 90mm Short Tube Refractor. The table was staffed by Belinda and Lee. At this station the scouts learned about the different types of telescopes, and took their turns focusing them. We had images of Jupiter, Saturn, and M42 taped to an opposite wall in the gym. We discovered the atmosphere was very steady that evening, and our tracking was dead on. We laughed at the concept of clouds. If that was not enough to ensure viewing, we were in a house of God. Anyway, before the scouts left that station they had to draw an arrow on a diagram showing which end to look through for a refractor, and a Newtonian. They had to write down how they focused the telescope or binoculars.



At station 2 the scouts were shown some models of the scale of the solar system, and had to answer some questions. This station was staffed by me, aka: Charlie, and Yasu. Brian had provided a honey dew melon to represent the sun, and then had various marbles, seeds, and a grain of sand to show the scale of the 8 planets, and poor Pluto, compared to the Sun. Yasu calculated the relative distance for Mercury, Venus, and Earth. He taped the models of those planets to chairs and we placed them in the gym at the correct distance from the melon; I mean Sun. We had the scouts go out to the chairs and look back at the Sun to give them an idea how



big space really is. The deliverables from the scouts were drawing a diagram of the solar systems and labeling the planets. They were supposed to do this for asteroids and comets as well, but Yasu and I blew that part. Easy now there Mr. Newsletter Editor, we did talk about comets! After they drew the diagram, they were asked as a group, several questions relating to solar system objects as well as other things such as red giants, galaxy, star, comet, meteor, black hole, etc. We talked about one of these objects until one of the scouts shouted out the correct answer. They then checked that answer off the list.

Station 3 was held down by Arthur. He was using a PC to show the scouts observatories and their locations, while explaining why they were in those locations. Arthur also talked about what amateur and professional astronomers do, and what school subjects would help them get a job in astronomy. To complete this step, the scouts needed to write the answers to the previous questions, and locate 3 observatories on a map of North America. Brian also helped at this table at times.



The scouts broke into three groups as soon as they went to the tables, so they did not all start at just one. This helped the flow of the 35 to 100,000 scouts that participated, though the number was closer to the lower one. After 20 minutes at the first table a whistle was blown, and they had to move to a different table. After visiting all 3 tables, they turned in their papers. Finally, each one had to describe at least one thing that they had learned in this exercise. No doubt due to the enormous capacity of the Lowbrows present to teach, coach, help, nurture, and guide these young minds, they all passed. Ok, just thought I would blow our own horn. But really, this event was a big success. Just before the scouts left, the scout leaders had them gather in a group and do a hip, hip hurra for the Lowbrows. Again, Brian put a very nice program together on a pretty short time frame, and supervised it well. Thanks for a job well done to him and the other Lowbrows that made sure this happened. The scout leaders seemed pleased and impressed, and will be showing up with the crew for an open house soon. Soon; in relation to how soon we may actually get weather to do an open house. The whole event ran 2 hours at most, so it was very efficient. This was yet another example of one of the things that this club does very well, and many of us enjoy doing it. There will be plenty more to come, so next time think about joining in and discovering what I mean.



Included in this article are several pictures from the event. If the Lowbrow group shot is published, I apologize for not seeing Arthur leave before I could stop him. I think you will find the images pretty self-explanatory.

Fall 2007 Saturday Morning Physics

by Dave Snyder

photos by John Causland and Mike Radwick

This fall, we had another term of Saturday Morning Physics, this time there were a variety of topics: Photography, Lighthouses, History of Astronomy, Tissue Engineering, Mammoths/Mastodons. I'll briefly discuss some of these topics.

Photography

Brad Orr (Professor of Applied Physics at UM) gave a set of talks on photography. He started by discussing camera lenses; how they work, and some of associated distortions. He then talked about exposure and explained how to get the right exposure: you need to balance shutter speed, aperture and film speed.

Among other things, Brad showed that for hand held photography under typical conditions, the shutter speed (measured in seconds) always must be less than one over the focal length of the camera lens (measured in millimeters). So for a 50mm lens, you need a shutter speed less than 1/50 second. Otherwise you will get a blurry image.



To demonstrate this, Brad mounted a small red laser on the side of a camera (see photo above, the laser is on the right). He pointed the camera at the wall; the image of the red laser was visible and it seemed to vibrate within a small area. This showed that Brad at least couldn't hold the camera steady. (No one else can either). From experiments like this, we can quantify the extent of these involuntary hand motions and derive the relationship between focal length and shutter speed.

John Causland was intrigued by this, and thought that this might be modified into a "point and shoot camera" for astrophotography.

In most cases professional photographers use tripods to hold cameras steady. Brad did not discuss astrophotography, but mounting the camera to a telescope or on a tripod is essential for most astrophotography since normally the shutter speed will be longer than the maximum for a hand-held shot.

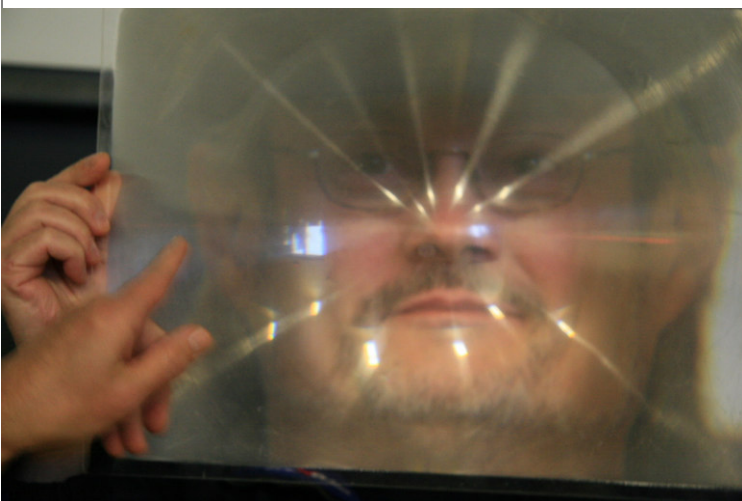
Brad discussed a few other topics including automatic focusing, digital cameras and the properties of light.

Lighthouses

James Woodward (Lampist, The Lighthouse Consultant, LLC) gave a set of talks on lighthouses. Mr. Woodward starting with campfires lit on a beach; prehistoric people used the campfires to find their way home. Mr. Woodward described such fires as the first lighthouses. He described a number of improvements, including the Fresnel lens. The Fresnel lens was developed in the early 1800's and allows most of the light from a burning lamp or electric bulb to be sent in a horizontal beam (not as focused as a laser, but focused enough to produce a bright point of light visible a few miles from shore). A Fresnel lens is a complicated assembly with many pieces of glass mounted on a frame. The materials used to mount the glass break down in UV light and were a maintenance headache. They are not great at forming an image, but are a relatively inexpensive way to make a large lens.

He also discussed more recent innovations. The beam from modern lighthouses (from 1800's onward) rotate. As the speed of ships increased, it became necessary to increase the rotation speed. Before the invention of the ball bearing, this was difficult to accomplish. The idea of floating the Fresnel lens and bulb on a pool of mercury was developed. This worked well, however there were a couple problems. The fact that mercury was toxic has been known for a long time, and it certainly was known at the time, but mercury's use was not well regulated until more recent times. Some workers and other people near the mercury pool occasionally got sick. Secondly, mercury vapor interacts chemically with other metals, including steel, resulting in corrosion. Over time, this caused significant problems in some cases.

Many old mercury lighthouses have been converted to use a system using ball bearings to rotate the lamp. This removes mercury and the problems associated with mercury.



After World War II, it became possible to manufacture Fresnel lens with a single piece of plastic. This reduced both production and maintenance costs. Charlie Nielsen (left) shows a plastic Fresnel lens.

History of Astronomy

Owen Gingerich (Professor Emeritus of Astronomy and History of Science, Harvard) gave a presentation entitled "Four Myths of the Copernican Revolution."

As you might guess from the title, Dr. Gingerich presented four myths and explained why they are not

true (to prepare this article, I borrowed some of Dick Sider's notes).

1) Pre-Copernican models used epicycles. There were so many epicycles, that the system collapsed because it was too complicated. Copernicus solved this problem.

Not true. Pre-copernican models used only one epicycle per planet (and one for the sun and one for the moon). It was slightly inaccurate, but that didn't seem to bother anyone until the time of Tycho Brahe. And no one thought it was too complicated. The Copernican system also had epicycles, again one per planet. So it didn't solve the problem of epicycles.

2) Copernicus' system greatly improved the accuracy of predicting the positions of the planets.

Not true. Since Copernicus assumed that the orbits were circular, his system had roughly the same accuracy as previous systems.

3) Tycho Brahe had daily records of the position of Mars. Kepler used those records to deduce that the orbit of Mars was an ellipse.

It's an oversimplification to say Tycho was only interested in collecting data and Kepler was only interested in theory. Tycho had a number of ideas, and to test these ideas he collected position measurements of Mars, but not daily; rather he collected this data primarily along key sections of the orbit. Tycho's data on Mars and other objects was much more accurate than anything previously collected. Because of this increased accuracy, the errors caused by using circular orbits could no longer be ignored. Tycho wanted to solve this problem himself, but after some delay he finally gave his Mars data to Kepler. Kepler's task would have been easier with daily observations, but he was able to use the data he had to deduce that the orbit of Mars was an ellipse.

4) Galileo's observations proved that the earth and the other planets orbited the sun.

Not true. Galileo showed that there were four moons orbiting Jupiter, but none of his observations proved anything one way or the other for the question: do the planets orbit the sun? Such a proof would wait for the work of Newton.

More...

I've presented only a very brief outline of what was discussed during these lectures, if you want more details go to http://www.lsa.umich.edu/physics/seminars/smp/previous/Fall_2007/

There will be another set of talks starting in February. Most of the talks are on astrophysics or cosmology. The schedule can be found at <http://www.lsa.umich.edu/physics/seminars/smp/>



Left to right: Dave Snyder, Brad Orr and Mike Radwick.

Current Astronomy Events in Southeast Michigan (January 2008-April 2008)

The following lists events hosted by the University Lowbrow Astronomers, plus a few selected events hosted by other organizations. All events are hosted by the Lowbrows unless otherwise indicated. Events hosted by the Lowbrows (with the exception of monthly club meetings) may be cancelled if conditions are unusually cold or if it is cloudy. If in doubt, call (734) 332-9132 after 4PM the day of the event to determine the status. Follow the links for more information about each event. Events listed below are free of charge (unless indicated otherwise).

- **Saturday, January 12, 2008.** *May be cancelled if it's cloudy or too cold.* (Starting at Sunset). [Open House at Peach Mountain.](#)
- **Friday, January 18, 2008.** (7:30PM). [Monthly Club Meeting.](#)
- **NEW Saturday February 2, 2008.** (10:30 AM). [Saturday Morning Physics](#) (hosted by the University of Michigan Physics Department). Professor Gus Evrard (Physics, UM). "Adventitious Machinery: Our Heritage as Amplified Noise."
- **Saturday, February 2, 2008.** *May be cancelled if it's cloudy or too cold.* (Starting at Sunset). [Open House at Peach Mountain.](#)
- **NEW Saturday February 9, 2008.** (10:30 AM). [Saturday Morning Physics](#) (hosted by the University of Michigan Physics Department). Professor Sera Cremonini (Physics, UM). "What is String Theory Anyway?"
- **Saturday, February 9, 2008.** *May be cancelled if it's cloudy or too cold.* (Starting at Sunset). [Open House at Peach Mountain.](#)
- **Friday, February 15, 2008.** (7:30PM). [Monthly Club Meeting.](#)
- **NEW Saturday February 16, 2008.** (10:30 AM). [Saturday Morning Physics](#) (hosted by the University of Michigan Physics Department). Sera Cremonini (Physics, UM). "String Theory: What is It Good For?"
- **Saturday, March 1, 2008.** *May be cancelled if it's cloudy or too cold.* (Starting at Sunset). [Open House at Peach Mountain.](#)
- **NEW Saturday March 8, 2008.** (10:30 AM). [Saturday Morning Physics](#) (hosted by the University of Michigan Physics Department). Dr. Elena Rasia (Physics, UM). "Modeling the Cosmos—Observations and Simulations."
- **NEW Saturday March 15, 2008** (10:30 AM). [Saturday Morning Physics](#) (hosted by the University of Michigan Physics Department). Professor Samuel C. C. Ting (1976 Nobel Laureate, MIT) "Encounters with Modern Physics."
- **Saturday, March 15, 2008.** *May be cancelled if it's cloudy or too cold.* (Starting at Sunset). [Open House at Peach Mountain.](#)
- **Friday, March 21, 2008.** (7:30PM). [Monthly Club Meeting.](#)
- **NEW Saturday March 29, 2008** (10:30 AM). [Saturday Morning Physics](#) (hosted by the University of Michigan Physics Department). Emeritus Professor Lawrence W. Jones (Physics, UM). "Cosmic Rays."
- **NEW Saturday April 5, 2008** (10:30 AM). [Saturday Morning Physics](#) (hosted by the University of Michigan Physics Department). Professor Dragan Huterer (Physics, UM). "Dark Energy and the Accelerating Universe."

Have you ever wondered what \$25 can get you these days?



No, your eyes are not deceiving you, \$25 dollars could have bought and shipped this to your front door. Yes, you are looking at 65mm ED refractor! If you were watching your emails around December 19, 2007 you would have seen one from Doug Scobel that told you of an opportunity to purchase this OTA directly from Bill Burgess of Burgess Optical. Well, there was a couple of caveats that came along with this offer.

1. There is a collimation issue with the lenses (which should be fixable with 3 set screws and 3 holes tapped into the lens cell)
2. It is an Optical Tube Assembly (OTA) only! No focuser is included (however, Bill is offering a very nice 2" R & P w/1.25" adapter that will fit this OTA for \$29 + \$5 shipping) see picture below.

At the time of this article, I know of 4 Lowbrows that took advantage this offer and I promise to keep you all informed as to how these scopes get to fully functional 65mm ED Backpacker Refractors!

Finished and fully functional 65mmED Backpacker

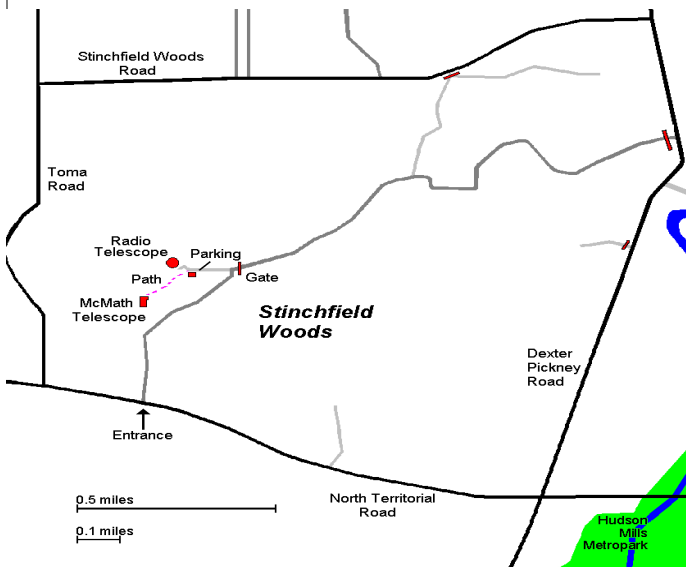
Focuser being offered for \$29



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 Astronomer c/o Yasuharu Inugi

**1515 Natalie Lane #205
Ann Arbor, MI 48105**

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.

Telephone Numbers

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	Ken Cook	(734)769-7468
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Newsletter Editor:	Mark S Deprest	(734) 223-0262
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Webmaster	Dave Snyder	(734) 747-6537

Lowbrow's Home Page

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

Email at:

Lowbrow-members@umich.edu

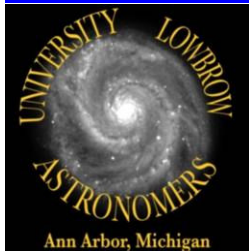


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Reflections & Refractions



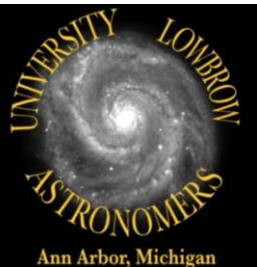
Website

www.umich.edu/~lowbrows/



This is one of the last images that I took using the “Slooh” remote telescopes and imaging located in the Canary Islands. For more info on this unique astronomy resource go to: www.slooh.com I’ve been using Slooh for about 2.5 years now and this is an example of the results you can get. Visit my Slooh webpage at: <http://www.myslooh.com/Jafo55>

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Check your membership expiration date on the mailing label