

REFLECTIONS AND

REFRACTIONS

OF THE UNIVERSITY LOWBROW ASTRONOMERS

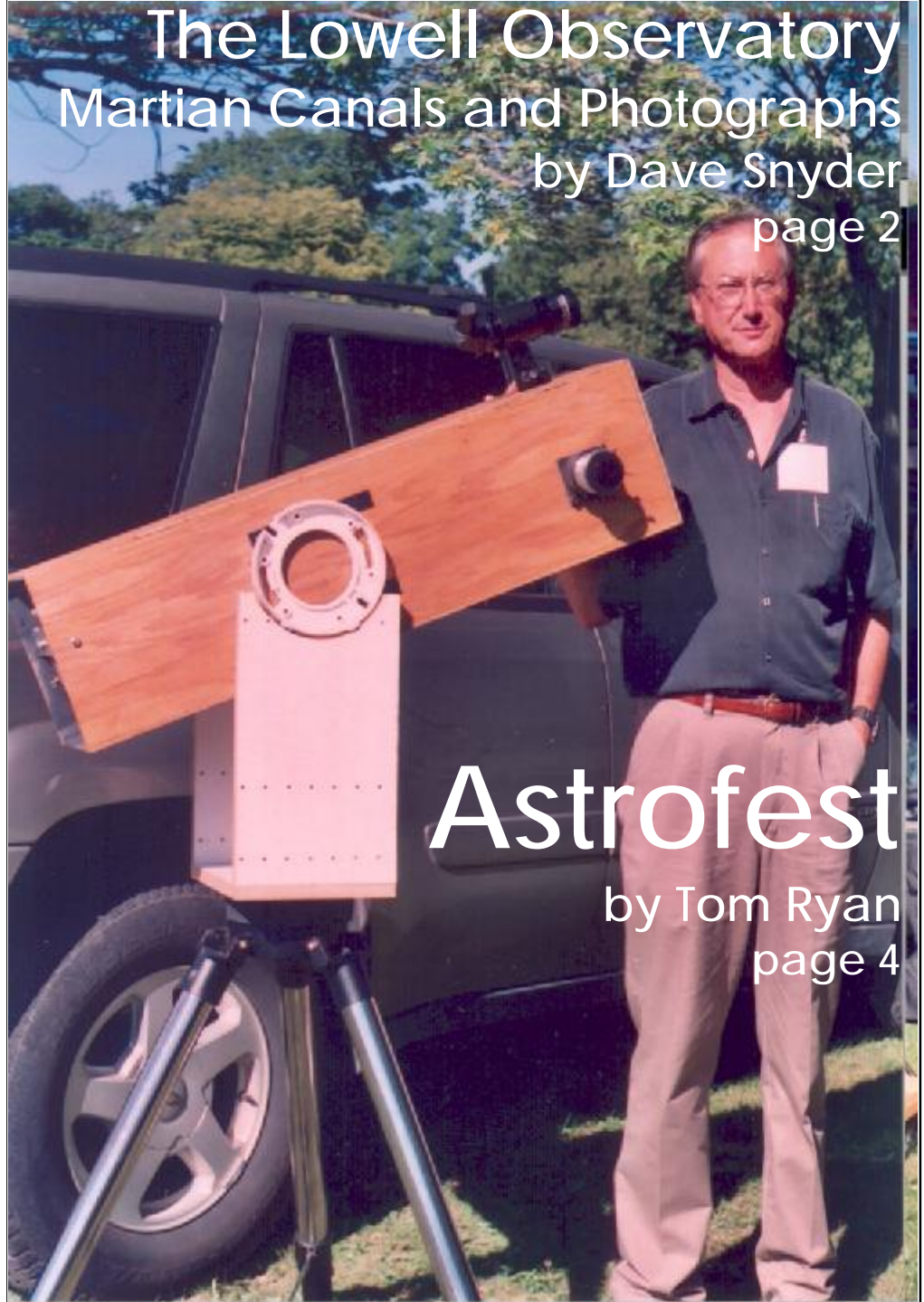
Winter 2003–2004

Upcoming Events

Winter 2003—2004

- **Friday, January 16, Starting at 7:30.** Monthly Club Meeting held tentatively in room 170 in the Dennison Building.
- **Saturday, January 17, (Starting at Sunset)** Regular Scheduled Open House and Star Party at the Peach Mt. Observatory. Weather permitting.
- **Saturday, January 24, (Starting at Sunset)** Regular Scheduled Open House and Star Party at the Peach Mt. Observatory. Weather permitting.
- **Sunday, January 25.** Ford Amateur Astronomy Club / Rider's Hobby Shop Swap Meet. 8 a.m. to 3 p.m. Admission: \$5 at door, \$15 for a table.

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The Lowell Observatory, Martian Canals and Photographs.

by Dave Snyder

A while back, I was doing some research on the history of Mars. There were books in the U-M Science library, and several occasions I went through the stacks looking for material. By happenstance, I found a book that contained something unusual.

Before I explain what was unusual, I need go into a little history. As you probably know, in the late 1800's Percival Lowell (1855-1915) built an observatory near Flagstaff Arizona which became known as the Lowell Observatory. Lowell appointed himself director.

When astronomers of the time observed Mars, some saw lines on the surface. Many people believed these lines were canals, including Lowell. However a few astronomers were skeptical. For example, E. Walter Maunder; in 1903 he asked a group of school boys to draw sketches of Mars. The results of this experiment suggested that the canals might be an optical illusion.

To deal with such skepticism, Lowell asked two of his assistants, Vesto Slipher (1875-1969) and Carl Lampland (1873-1951) to take photographs of Mars. In 1905 there was a Mars opposition and an opportunity. However photographing the surface of Mars wasn't easy. The films at the time were not very fast. Atmospheric distortions cause the image of Mars to move slightly, and without fast film, you are likely to get a blurry image.

Slipher and Lampland were up to the challenge. That May, Lampland had succeeded in taking a set of photos with surface detail. We know that Lampland showed the photos to Lowell and Lowell believed the photos proved the canals were real. We know this because of an announcement printed in the May 28, 1905 *New York Times*:

CAMBRIDGE, Mass., May 27.-
A telegram was received at the Harvard Observatory tonight from Prof. Percival Lowell, Director of the Lowell Observa-

tory at Flagstaff, Ariz., stating that the canals of Mars have been photographed there for the first time.

Several of them appear upon more than twenty negatives.

(This reflects the normal procedure at the time, if you had an important astronomical discovery, you sent a telegram to the Harvard Observatory).

Lowell sent prints to various people. A few days later Garrett Serviss (science writer for the Hearst Newspapers) examined some of the prints. He saw canals, but concluded that "the photographs are so small and the shadings on them so delicate, that it would be impossible to reproduce them in a newspaper."

For this reason the photos never appeared in the *New York Times* or any other newspaper. Reproductions of the photos appeared in a few magazines. People did not see canals in the reproductions. Apparently whatever optical illusion caused people to see canals in the telescopic images of Mars and in the photographs, was not operating when people looked at the magazine reproductions (probably because they were too blurry). This encouraged Lowell's critics, but also made Lowell more determined.

In 1907, Vesto's younger brother Earl (1883-1964) arrived at the Lowell Observatory. Earl proves to be very talented, and produced a number of Mars photographs. Lowell believes some of these photographs show proof of canals. This time Lowell avoids the newspapers. He tries to publish these photos in a couple magazines as proof of his canal theories. But for rather complicated reasons, the photos are not published.

Earl shares Lowell's belief in canals. He continues to believe in them long after Lowell's death. Over the next 45 years Earl takes in excess of 100,000 Mars photographs. Earl believed that some of them showed canals and a few find there way into books or magazines.

About 1960, Earl took 19 of his best "canal" photos along with 11 Mars sketches and made a composite print. I don't know how many copies he made, but he distributed these copies in an attempt to convince others.

Ironically the same year that Earl died, 1964, Mariner 4 made the first successful flyby of Mars and takes numerous photographs. When the photographs are analyzed, there was no evidence of canals.

Ok, lets go back to the Science Library. I was looking through the stacks and noticed two copies of a 1962 book by Earl Slipher. I knew that Earl was one of Lowell's assistants, so I took them both to a table and looked through them. There were reproductions of a number of Earl's Mars photographs. When I got to page 163, I noticed a photograph, but it was not a reproduction. A photograph had been glued onto the page. It was Earl's composite of 30 Mars photos/sketches.

I checked page 163 of the other copy. It had the reproduction of the composite, nothing was glued into this copy. This was a bit odd, so I looked more carefully at these books. The book with the photograph glued onto page 163 had a sticker inside the front cover. I've seen these stickers before, they signify a book was a gift to the U-M library. This one said it was a gift from the "Lowell Observatory."

A reasonable guess is Earl glued prints of his composite into copies of his book and sent them to various locations, including U of M. He worked at the Lowell Observatory until his death, which explains the sticker. There is a possible explanation for why Earl chose U of M to receive one of the copies. Earl made a number of his Mars observations at the Lamont-Hussey Observatory in South Africa in the 1950's. And the Lamont-Hussey Observatory was operated by the University of Michigan for many years, including the period when Earl made his observations.

I went back and read the text on the previous page, page 162. The second paragraph was particularly revealing. Slipher states that the

History of the canal problem shows that every skilled observer who goes to the best available site for his observations has had no great difficulty of seeing and convincing himself of the reality of the canals. I am not aware of a single exception to this.

Even some with small telescopes, when they journeyed to suitable places in the proper latitudes of the Earth, have met with convincing success.

This sounds similar to statements Lowell made. However, it is not hard to find observers who did not see Martian canals and it isn't reasonable to dismiss all of them. The best example was the astronomer Edward Barnard. Barnard and Lowell were good friends who respected each other. Barnard was one of the best observers of the time, but Barnard was never able to see canals.

This might have been difficult for Lowell to explain, a good observer (Barnard) who couldn't see canals. However Lowell was never short of explanations. According to Lowell, only people with "acute" vision were able to see the canals. He explained that Barnard had "sensitive" vision which allowed him to see dim objects, but not fine details on bright planets. It is unfortunate that Lowell never considered a better explanation, that the canals were optical illusions.

For further reading, these are the references I used in constructing this article:

May 28, 1905. "Photograph Mars Canals." *New York Times*.

(The Lowell Observatory Website <http://www.lowell.edu/>).

Hoyt, William Graves. 1996. *Lowell and Mars*. Tucson Arizona: University of Arizona Press.

Sheehan, William and O'Meara, James Stephen. 2001. *Mars: The Lure of the Red Planet*. Amherst, New York: Prometheus Books.

Slipher, Earl C. 1962. *The Photographic Story of Mars*. Edited by John S Hall. Cambridge Massachusetts: Sky Publishing.

This is the book I was talking about. Note that only some copies have a photograph glued onto page 163.

Snyder, Dave. April 2001. "An Observational History of Mars, Part 1." *Reflections of the University Lowbrow Astronomers*.

May 2001. "An Observational History of Mars, Part 2." *Reflections of the University Lowbrow Astronomers*.

Astrofest 2003

by Tom Ryan

Sometimes, in the depths of winter, it's good to be reminded that there is, indeed, a summer, and a time when Astronomy can be done easily and in comfort. In my opinion, the best time to be outdoors is late August. Astrofest takes place in early September, and it makes for an almost perfect mini-vacation.

Astrofest is a large gathering of amateur astronomers, organized by the Chicago Astronomical Society, and held at a Girl Scout Camp near Kankakee, Illinois at the end of summer. The latest one took place on Thursday, Friday, and Saturday, September 18, 19, and 20, 2003. Amateur astronomers get together south of Chicago for relatively dark skies and to compare notes on telescope making. Astrofest is not noted for its dark skies, as are the Texas Star Party and the Black Forest Star Party, nor for the steady air of the Winter Star Party in the Florida Keys. It is not the hard-core hardware event that is the Riverside get-together, but is rather a hybrid, where telescope makers join with observers for a more moderate experience.

This year, the Lowbrows were represented by Jack Brisbin and me. Since the event makes it a policy to admit 998 other people, there was plenty to see and do. Incidentally, if you decide to go next year, information about the event can be found on the Chicago Astronomical Society's website, and I recommend registering early, because admission at the door is \$100 per adult. (This is obviously some kind of Darwinian tax). Since both Jack and I had pressing work schedules, we traveled separately and agreed to meet up at the event sometime on Friday.

Driving there is a very straightforward, though boring, process; a boon for someone like myself who gets lost two blocks from home. I packed my toothbrush and red flashlight (telescopes are optional) and took I-94 to US-80 to I-57 to Kankakee. From there I followed the directions on the map and pulled into the camp just as it was getting dark. The organizers met me at the gate, verified that I prepaid my admission, and handed me an info package containing a list of the scheduled events, general instructions for getting around, and some vendor advertising. I turned out my car's lights and proceeded cautiously to a parking space.



I like to park my car in the grassy parking lot near the gate at the west side of the observing field. The treed parking area is 50 yards from the RV's, cars and tents which occupy the field, and is quieter and more private than camping on the field or in the cabins. This is important, since I sleep in my car (a habit I cultivated in college). When Doug Nelle and I first started going to Astrofest, we rented space in one of the unheated cabins which are scattered around the east side of the observing field. However, two consecutive years of sharing a very small space with a very loud snorer soon convinced us to seek other accommodations. Doug bought a camper, and I just slept in my car.

When I stepped out of my car into the dark, I was greeted by the sound of grasshoppers and the low murmur of astronomers at work under brilliantly lit starry skies. Since it was the end of a five hour drive, the first thing I did was to work my way across the field (it is set up with lanes like a giant parking lot, except the parking spaces have tents and telescopes in them) to the restrooms, while trying to note any extraordinary telescopes I passed on the way.

The restrooms are off by themselves behind the cabins, and are dark (remember the red flashlight?) out of consideration for the observers. They also have cold, and occasionally not so cold, running water for washing up. The camp is rustic, but not Stone Age. There's a building for the men, and a separate one for the women.

For the first part of the night, I walked the field, up one lane and down another. I was looking for groups of observers waiting in line for a view through some interesting telescope, and when I found one, I'd join in and listen to what they had to say. Usually, the people were talking about the view through the scope, and eventually the line would end at the eyepiece and I could compare what they said to what I saw.



It's possible to learn an awful lot about telescopes, both individually and in general, by this technique. Telescopes vary tremendously, and a person can get a lifetime of experience in a place like this. Want to look through a Questar? There were five of them there, all in a group, and their owners were all happy to show off their instruments. AstroPhysics refractors? There are new ones from the vendor waiting to be sold, and older models, no longer made, in private hands. Living with them for a few years has given their owners a perspective on their strengths and weaknesses, and they are happy to share their experiences. Starmaster scopes, Coronado filters, Tinsley Cassegrains, Cave Astrolas; they're all here and available for evaluation.



There are also amateur built scopes to look through. Amateurs have produced some of the most interesting and inventive designs at Astrofest. There are a few telescopes which look as if their builders did not have a talent for design, but most of the home built scopes incorporate clever and effective ways of getting starlight into the eye for extended periods of time. One of the most interesting things I learned by looking through a lot of scopes is the fact that the quality of both professional and amateur optics can not be predicted by its source. There are very good and very bad optics in both camps. AstroPhysics quality has been uniformly excellent, but it was equaled in an amateur's trischiefspiegler, and approached by many others. Similarly, there are some surprisingly poor performers in the professional ranks.

There is, also, often a disconnect between an optical design on paper and one that is actually built. Sometimes this is due to workmanship, as was the case when I looked at the build of a Jose Sasian design with a toroidal corrector, and sometimes it is due to things that the optical design program doesn't model or predict. The Houghton telescope looks very good on paper, but when it was capably built as a prototype by Roland

Christian of AstroPhysics, it did not seem to perform well. "Too much glass" was the verdict. Sometimes, only the trying will tell, and at Astrofest, you can try before you buy.

Mars was near opposition, and it got the most attention that night. The air was not particularly steady until quite late, but the sky was very clear. Dan Mitchell of Bloomington, IL, brought his 24" f/4.3 Starmaster with a Zambuto mirror for its first light, and I spent quite a bit of time admiring the design and workmanship which enabled him to have a transportable 24" telescope.



About the time the Pleiades rose over the trees, I decided to pack it in for the night. A clear sky can make for a very cold night, and when I got to my car, I discovered that I had forgotten to bring either a sleeping bag or blankets. I have heard that a man can freeze to death faster in a car than in the open, and while I haven't personally tested the latter, I very nearly did the former. By the time the sun lit up the eastern sky, I think I had gotten about fifteen minutes of very unrestful sleep.

The only good thing about being unable to sleep is it got me to the showers first. A few years ago, Camp Shaw-Waw-Nas-See installed showers with hot water, and if you are one of the first five people to use them, there is actually hot water coming out of the tap. As we know, hot water, and not private property, is really the foundation of civilized society, and that day I was able to start off as a member of the human race. Groggy, but a member.

Breakfast at the trunk of my car followed (the milk for the cereal didn't need special refrigeration), and as the sun rose, I could see the tents on the field for the first time. Every year Astrofest seems to grow in size and colors. There were banners flying from some of the tents, there were signs out in front of campers announcing the names of the occupants, there were even street signs at the intersections. Peo-

ple were preparing breakfasts or lining up in front of the mess hall where they could get a regular breakfast, if they had signed up for it.



I headed over to the east side of the field, where the tables and tents for the swap meet were being set up. I, of course, am a hardware junkie, and I didn't want to miss out on any of the best stuff that was being dredged up from some guy's basement on the stern recommendation of his wife.

There were tents full of surplus optics, old books, astro art, T-shirts and meteorites. There were bits and pieces of things that had once worked, and could again, but whose present owners had moved on to new and equally improbable projects. There were commercial vendors and lots of Russian optics at very (suspiciously?) low prices. I was almost immediately offered a deal on a 6" Russian Maksutov, a very nicely finished scope with a "flip" diagonal/finder, for \$250. The seller, who, I suspect, imports these directly from a relative of his in Russia, said that there was just a little astigmatism in the image, but he was sure it was due to a misaligned something, and that a little effort on my part would make it perfect, and would I consider buying it for \$200? I promised to think about it and moved on to the next booth.

Someone there was selling a 5" minor axis, 1/8 wave diagonal mirror for \$275, and I briefly considered buying it for the club, so we could turn the 24" into an f/4 Newtonian/Cassegrain with a rotating secondary cage, but common sense seized me by the collar and moved me further down the row. You see how it goes? They're not selling junk at these places. They're selling dreams, and like a gambler, I'm addicted to the idea of the next big win. The next big find. My only defense against this dark side of my nature is to bring very little money with me. It's not a perfect defense. In the past, I bought a 26" Cervit mirror blank here by going into town and arranging

for a second mortgage on my home at a bank. I would have bought a second blank (the guy had two), but I have a very small house. Happily, though, that deal eventually turned out well, although it took three years to resell it as part of a project. This year, I was content to buy a circular polarizer for \$10. Oh, the fun you can have with optics!

The optician Ed Jones was sitting behind a card table with some beautifully polished lenses on it. He was selling them as null lenses for testing parabolas. They were priced very low for what they were, but they were not selling well, probably because so few people make optics any more. He was also selling a copy of an optical design program called OSDP, but it was DOS based, and while it worked, most guys have moved on to Zemax. I spent some very enjoyable time talking to him about making optics. He works for a company in Ohio that makes production optics, and described the advantages of diamond laps for fining glass, and we talked about our current projects for a while.



Further down the way, I ran into Jack. He had his newest scope set up and was selling some items on a table next to it. He showed me some of the things he had bought, and I showed him the polarizer. His scope is a very interesting design. It has a coma corrector in it, made with off the shelf optics. The design appeared in one of the last issues of Telescope Making a few years ago, I think, and Jack bought the lenses and built the thing. He was having some trouble getting it to work, and we decided that the mirror was probably placed too far back in the tube to enable the coma corrector to operate at the best position. Coma correctors are designed to work at a certain distance from the focus, and this one couldn't get there until Jack remounted his primary.

By this time, people were lining up in front of the mess hall for lunch, and Jack and I decided to go into Kankakee and find something to eat, since neither of us had signed up for meals. The Astrodog stand wasn't in evidence this year, so a restaurant meal was it.

Kankakee is a very pleasant town, somehow reminiscent of my own home town in the 1950's. It has a number of good places to eat, and Jack and I stopped at one where we had eaten in a previous year. The food was good, the company and conversation excellent, and we returned to the camp restored and ready to explore the field by the light of day. The scheduled talks after lunch weren't of interest to either of us this year, so I grabbed my camera to get pictures of some noteworthy scopes I had seen the previous night and any interesting new ones.



One of the first scopes to catch my eye was made by Mark Cabaj of the T.C.C.A of Bloomington, Illinois. Its mount was entirely made of aluminum, and at first, I thought Mark must be a machinist, but he told me that he was actually a junior high school teacher, and had made the mount himself, using only a table saw and drill press. The mount was amazing, and Mark said that he had plans to make it even better next year.

I crossed the field to get a picture of Dan Mitchell, and ran into a group of people looking at the noonday sun through some small refractors. When I looked through one of the scopes, its owner, Steve Sands of the St. Louis Astronomical Society, told me that the refractor was a TMB from Williams Optics. He said it was a 4" f/8 Fluorostar triplet with a 90 mm Coronado filter attached to it. The Coronado filter includes an etalon with a 0.6 nm band pass, and can be tilted to shift the pass wavelength in order to view dopplered material. Steve did this for me while I looked through it, and the view changed from the best resolved solar prominences I have ever seen, live or on film, to the second best view of solar granulation (I did some work for a solar astronomer while an undergraduate at the U of M) I have ever seen. The resolution was incredible. Even with the heat of the field boiling around us, the details on the sun appeared tack sharp. I had seen one of these filters at As-



trofest the previous year, and at the time was surprised that someone would think that they could make money selling what appeared to me to be a very technical piece of space hardware. Obviously, I didn't look through it at the time, or I would have realized how desirable these things are when coupled to a good telescope.

There were other good scopes on the field, but they had been there in previous years, and their owners had not changed them in any obvious way. Jack and I headed back across the field to look at the photo entries in the Astrophoto contest, and as we passed the table where the Maksutov had been for sale that morning, I saw that it was gone. The seller rejoicingly told me that he had sold it for \$300, and that I was really stupid for passing it up. In a thick Russian accent, he said I would regret it forever, and I must be an idiot for not seeing such value. But actually, I was so delighted with his naked display of a kind of pure capitalism that is found only in immigrants from formerly communist countries, that I told him I was genuinely glad he got such a good price for it. I think that made two of us.



On the north side of the mess hall is a smaller field, where people can set up if they want to pay for electricity. There, Dan Joyce of the Chicago Astronomical Society had set up his 18" JMI scope. He used to work in the Adler Planetarium Optical Shop, teaching people how to make a telescope. He has his own shop now, and is doing freelance work. He is a tremendously talented optician. He figured Don Parker's 16" mirror, the one that is used to take those breathtakingly sharp pictures of planets from Florida, and he figured the mirror in his JMI. I looked through it a year or two ago, on a night when we had really good seeing. The mirror is very, very good. I told him I was figuring a large, fast mirror at the time, and he generously described some of his methods for figuring mirrors. Because of his high standards, he won't work on thin mirrors, but if you need an excellent mirror at a very reasonable price, he's the one to call.



Nearby was Terry Clinard, who owns OptiCraft Engineering. This was his first time at Astrofest, and I wanted to meet him. Roger Tanner, of the Lowbrows, had bought his first big mount from him many years ago. Roger told me that the only machine tool he saw at OptiCraft was a drill press, and the pillow block and aluminum plate mount had some problems supporting his 6", despite having shafts on the order of 2" in diameter. When I looked at it, I told Roger that I had to give OptiCraft credit. A man has to be pretty bold to locate a precision gear by three flat head screws. Nevertheless, when Roger asked me to rebuild his mount to carry his 16", I was surprised to find that we were able to reuse the original mount's big aluminum worm gear and those three flat head screws. The rest of it, though, was sold for five cents a pound.



Next to Dan was a large red telescope with a 20" mirror, and a guy named Dave Otto was trying to get an interferogram of the mirror. This was an incredibly optimistic undertaking under the circumstances, but Dave is a nice guy, and obviously talented, because I saw fringes through the interferometer. Last year, he and I disagreed about the optical design of his interferometer, but it turned out that his design, while not pure, should produce a fairly accurate picture of his particular mirror's surface. Dave and some friends are grinding a 40" fused silica mirror (the same blank that Norm Oberle, Jim Thomas, and I had back in 1970 for the LEAP project) for amateur radial velocity studies. There is a web site at <http://spectrashift.com>, if you want to see a truly interesting and ambitious undertaking.

Dinner time came and went. I headed over to see Detlef Schmidt, the owner of Starlight Instruments, Inc., to see if he was giving away his excellent "Feather Touch" focusers at his vendor's table. He wasn't, but I can wait a while. His focusers are machinist's dream, and they work well, too. I promised to buy one, when I'm next shopping for a focuser. He's a perfectionist and the design will only improve with time.

After dinner, the door prizes were drawn in the mess hall and announced over the loudspeakers. You had to be present to win, but only a fraction of the people could fit in the building, so most of us gathered around outside to hear if our names were called. There were a lot of prizes, ranging from the glorious to the mundane. It took about ninety minutes for Jack and me to discover that neither of us were winners (what was that?), but we were entertained by the mad rush of the winners to get into the building to claim their prizes before the crowd counted down to zero and drew another lot. If the prize was a good one, the crowd could count pretty fast.

By the time all of the prizes were given away, it was dark enough to tell that it wasn't going to be a great observing night. Jack and I hung around for a while to look through the scopes which were still being used, but after a couple of hours, about half the people had packed up, and Jack decided to join them and head back to Michigan. I wanted to get some sleep before starting back, so Jack lent me a blanket from his truck and saved me from a)Freezing to Death or b)Driving into a Bridge Abutment While Asleep at the Wheel. Thanks, Jack. See you next year at Astrofest.

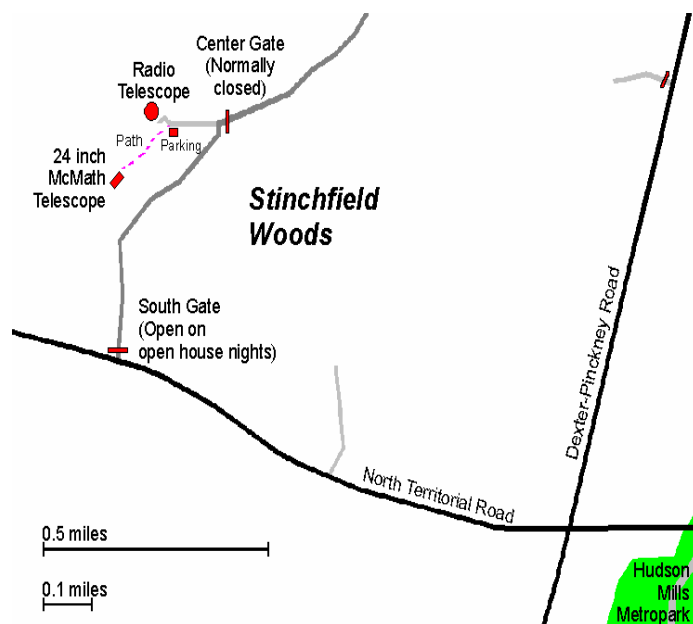


About the University Lowbrow Astronomers

The University Lowbrow Astronomers is a club of Astronomy enthusiasts which meets on the third Friday of each month in the University of Michigan's Physics and Astronomy building (Dennison Hall, Room 130 or 807). Meetings begin at 7:30 PM and are open to the public. Public star parties are held twice a month at the University's Peach Mountain Observatory on North Territorial Road (1.1 miles west of Dexter-Pinckney Road; further directions at the end of the newsletter) on Saturdays before and after the new Moon. The party may be canceled if it's cloudy or very cold at sunset. For further information call (734) 480-4514.

Places and Times

Dennison Hall, also known as The University of Michigan's Physics and Astronomy building, is the site of the monthly meeting of the University Lowbrow Astronomers. It is found in Ann Arbor on Church Street about one block north of South University Avenue. The meeting is held in room 130. Monthly meetings of the Lowbrows are held on the 3rd Friday of each month at 7:30 PM. During the summer months, and when weather permits, a club observing session at Peach Mountain 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 inch telescope which is maintained by the Lowbrows. The observatory is located northwest of Dexter. The entrance is on North Territorial Road, 1.1 miles west of Dexter-Pinckney Road. A small maize-and-blue sign marks the gate. Follow the gravel road one mile to a parking area near the radio telescopes. Walk along the path between the two fenced in areas (about 300 feet) to reach the McMath telescope building.

Public Star Parties

Public Open House/Star Parties are held on the Saturday before and after each new Moon at the Peach Mountain Observatory. Star Parties are canceled if the sky is cloudy at sunset or the temperature is below 10 degrees F. Call 4332-9132 for a recorded message on the afternoon of a scheduled Star Party to check on the status. Many members bring their telescopes and visitors are welcome to do likewise. Peach Mountain is home to millions of hungry mosquitoes - bring insect repellent, and it does get cold at night so dress warmly!

Amateur Telescope Making Group meets monthly, with the location rotating among member's houses. See the calendar on the front cover page for the time and location of next meeting.

Membership

Membership dues in the University Lowbrow Astronomers are \$20 per year for individuals or families, and \$12 per year for students and seniors (age 55/+). This entitles you to the monthly REFLECTIONS newsletter and the use of the 24" McMath telescope (after some training).

Dues can be paid at the monthly meeting or by mail to this address:

Mike Garrahan
7676 Grand Street
Dexter, MI 48130

Magazines

Members of the University Lowbrow Astronomers can get a discount on these magazine subscriptions:

Sky and Telescope: \$29.95 / year
Astronomy: \$29.00 / year

For more information contact the club Treasurer. Members renewing subscriptions are reminded to send your renewal notice along with your check when applying through the club Treasurer. Make the check payable to "University Lowbrow Astronomers".

Newsletter Contributions

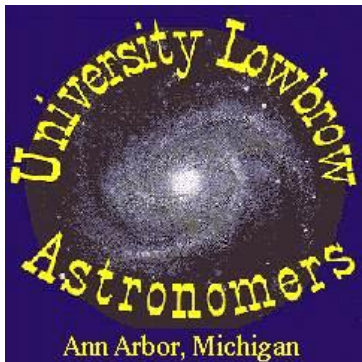
Members and (non-members) are encouraged to write about any astronomy related topic of interest. Call or Email to Newsletter Editor at: John Ryan (734) 662-4188 john_edward_ryan@hotmail.com to discuss length and format. Announcements and articles are due by the first Friday of each month.

Telephone Numbers

President:	Charlie Nielsen	(734) 747-6585
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Lowbrow's Home Page
<http://www.umich.edu/~lowbrows/>

*Swap meet at
Astrofest 2003. Photo by
Tom Ryan.*



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Lowbrow's WWW Home Page:
www.umich.edu/~lowbrows/

Check your membership expiration date on the mailing label.