REFLECTIONS / REFRACTIONS

University Lowbrow Astronomers

AUGUST 2014

VOLUME 38, ISSUE 8

An Amazing View of M 13

The Great Globular Cluster in Hercules

By Brian Ottum

After four months of trying, I finally won the Cloudynights DSLR Monthly Imaging Contest (June).
Here are the technical details:

- *6 hours of total exposures (5 minutes apiece)*
- *Remote control NM scope (to be demonstrated at the November Lowbrow meeting)*
- *10" f/5 Newtonian with Baader coma corrector*
- *Paramount MX robotic mount*
- *Canon 5D mark III modified camera*
- *Autoguided with 4" refractor and Orion Starshoot*
- *Individual frames calibrated and stacked with ImagesPlus*
- *Final tweaking with Photoshop CC*
- *Taken May 31, June 1, June 2*
- *2 hours of exposures were tossed due to clouds, bad seeing, low in sky, gremlins*
- *Field Radius: 0.622 degrees*

Link to the high resolution version: http://www.astrobin.com/103766/

Six hours of total imaging time reveals PGC galaxies down to magnitude 21. Surprising for a 10" Newtonian that started its life as a Dobsonian in Taiwan. This illustrates the sensitivity of the Canon CMOS. This image pushed me to learn more Photoshop techniques, like a layer mask to replace the burned-out core. Controlled from Michigan, scope in New Mexico.

Editor's Challenge: Brian claims PGC galaxies to magnitude 21 are in this photograph. IC 4617 (mv15.19) and NGC 6207 (mv11.6) are easily seen. Send me your chart of what you find. Label the galaxies and include their visual magnitudes. The best one will appear in September's newsletter.

Get 'em While They're Hot

Order Your Swag Now!

By Doug Scobel, Treasurer

There's bad news and there's good news. The bad news is that the club has run out of our most popular size of Low-brow logo T-shirts. The good news is that we'll soon be putting in a bulk order to the printer so we can replenish our inventory, and you can get in on the order! Even better, you have the opportunity to order special sizes and styles, such as toddler sizes and sweatshirts!

All the shirts will be navy blue with our logo printed loud and proud on the front of the shirt:

Logo design by our own Kathy Hillig

Here's all you have to do. Take a look at the table below which shows the available styles, sizes, and prices, let me know what you would like, and I'll include your goods in the order. It's that simple!

Style	Sizes	Price each**	Material	Brand
Toddler T*	2T, 3T, 4T, 5/6T	$10.00	100% Cotton	Rabbit Skins
Youth T*	S, M, L, XL	$10.00	100% Cotton	Gildan
Adult T	S, M, L, XL	$10.00	100% Cotton	Gildan
Adult T*	XXL, XXXL	$12.00	100% Cotton	Gildan
Adult Sweat*	S, M, L, XL	$20.00	50/50 Poly/Cotton	Gildan
Adult Sweat*	XXL, XXXL	$24.00	50/50 Poly/Cotton	Gildan
Adult Hoodie***	S-XXXL	$30.00+ ***	50/50 Poly/Cotton	Gildan

*special order items – you must pre-pay
**pricing not confirmed as of this writing
***hoodie style and pricing still being investigated

Now the fine print:

To get in on the action, send me an email as soon as possible with what style(s) and size(s) you would like. I do not require payment now, **but take note: for anything other than "normal (S-XL)" size adult T-shirts you will have to pay for your items before the deadline for them to be included in the order.** I've checked with the printer and pricing is based on the information I received over the phone. The prices should be accurate, but I cannot guarantee that until we receive an official invoice.

Also, if you have interest in "hoodie" style sweatshirts then please let me know right away. We have two options with the hoodies. We can order the typical style with the large hand-warmer pocket at the bottom, but it would require the small (toddler size) version of the logo. The alternative is a pocket-less version of the shirt with the large logo. **If you would like a hoodie then please let me know which style you would prefer as soon as possible so that I can confirm pricing.** I expect them to run somewhere around $30.00, give or take a few dollars.

I will be providing additional information via email as the deadline approaches, but if you already know what you want, then don't delay. **The deadline for me to receive payment for your special order item(s) will be September 19,** the date of that month's regular meeting. That should give me enough time to get the order in to the printer, and have the shirts available for pick-up at the October meeting. Just as with dues you will be able to pay via cash, check, or PayPal.

Send me your requests now! Don't get caught without your Lowbrow swag!

The Lowest of the Low, Faintest of the Faint

Observing at The Rocky Mountain Star Stare

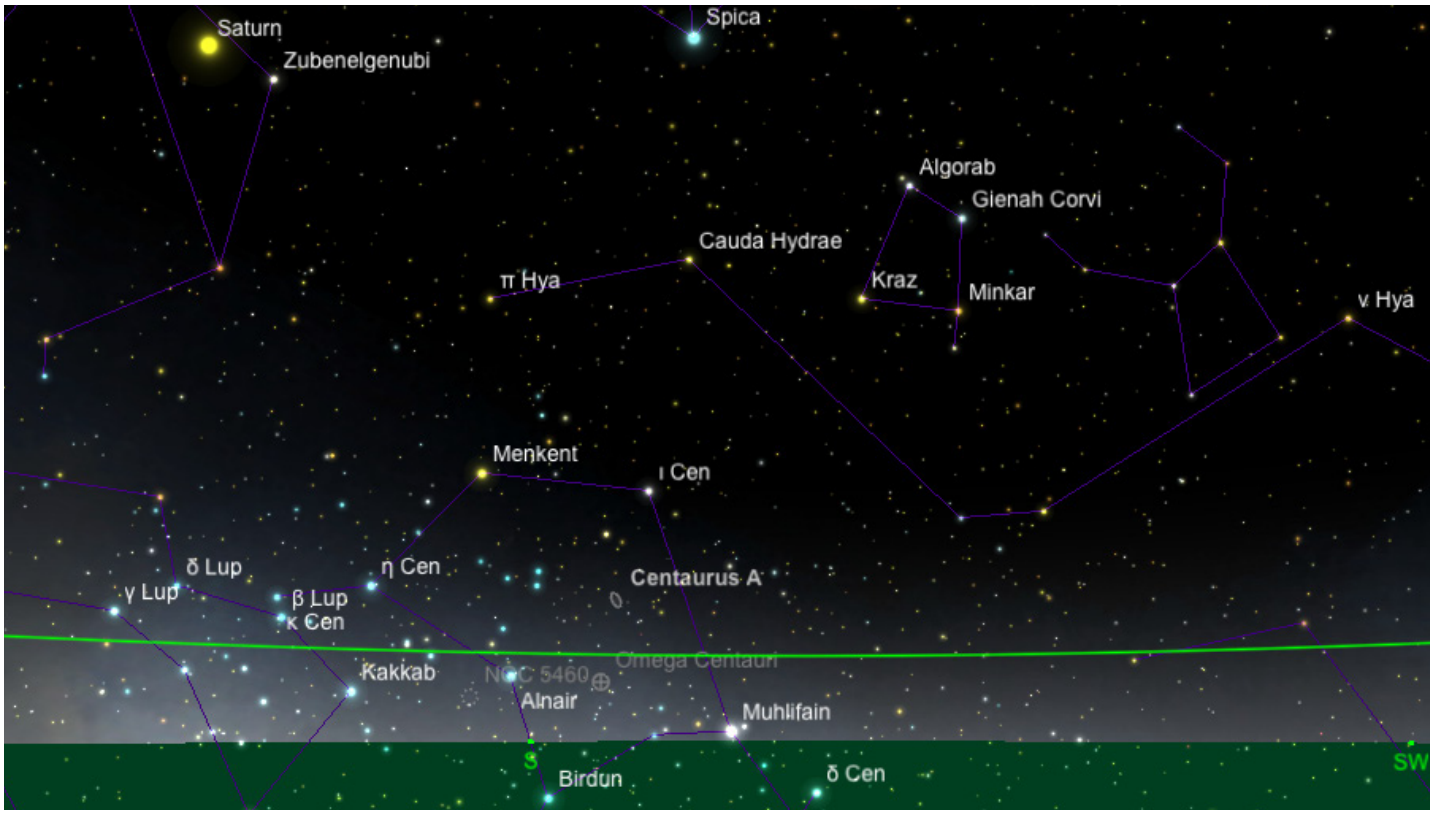
By Nathan Murphy

Among the reasons to travel to far off lands is to escape the light pollution so prevalent east of the Mississippi river in order to see objects too dim or too low in the south to try for from our northern latitudes. For sure, seeing the greatest hits in a dark, dark sky can reveal details and subtleties I miss under our everyday circumstances is great fun. However, the opportunity to glimpse, however slightly, unobtainable southern sights is the reason I keep making the multi-day trips every few years to dark skies 5 or 6 degrees farther south.

The southern sky has a list of greatest hits as long and impressive as our hemisphere. We have M42, they have Eta Carinae. We have M13, they have 47 Tucanae. We have M31, they have the Magellanic Clouds. 2 of the most northerly southern objects that are visible from dark sky sites in North America are Omega (ω) Centauri (NGC 5139) and Centaurus A (NGC 5128).

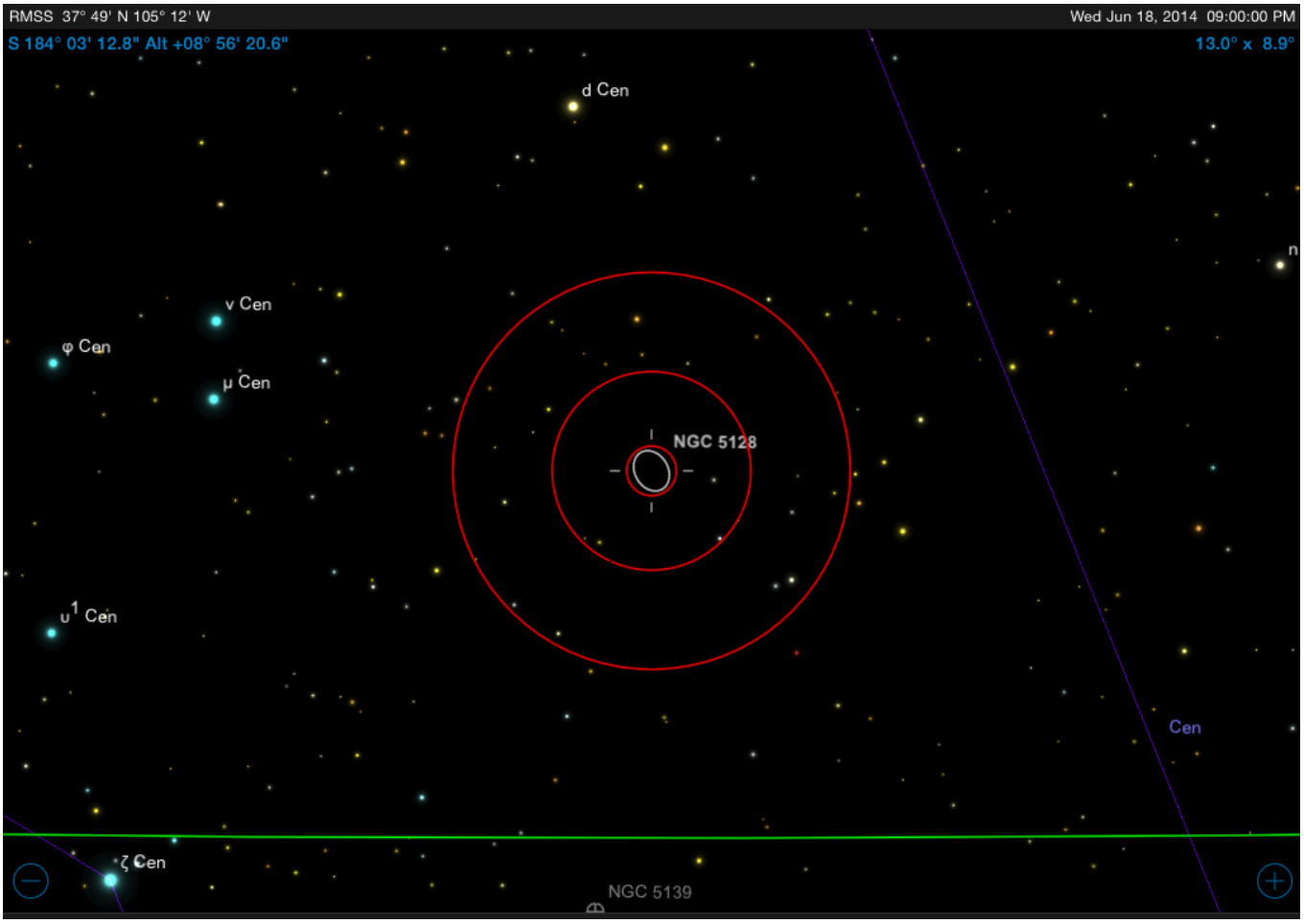
The Rocky Mountain Star Stare (RMSS) is hosted by the Colorado Springs Astronomical Society. They bought a large plot of land in the Sangre de Cristo Mountains in southeast Colorado. The site is roughly 38 degrees north latitude - a full 4 degrees south of Ann Arbor, and 5 degrees south of Madison. In preparation for attending RMSS, I checked what was going to be above the horizon, and lo and behold, both ω Centauri and Centaurus A were going to be a hand's width above the horizon. Depending on the southern view, it looked like I might have a shot at both.

The green line is pretty close to where the mountains formed the horizon once it was dark enough to see d, μ and v Centauri. They were all at the edge of naked eye visibility. Centaurus A (NGC 5126) should be a few degrees above the peaks, but sadly ω Centauri was going to be just behind the mountains. So it goes.

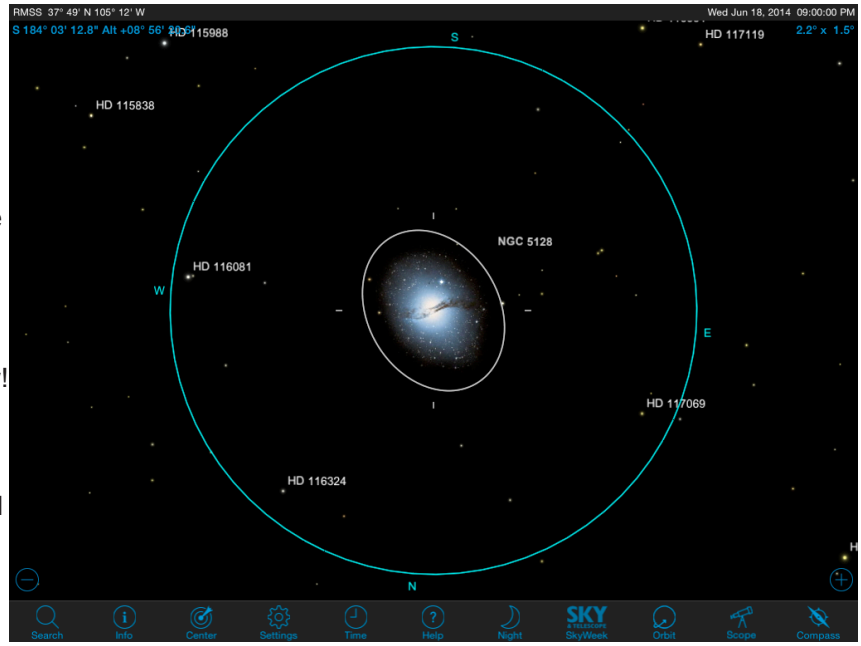


Rocky Mountain Star Stare / June 18, 2014 / 9:00 PM
All charts constructed in Sky Safari

I first tried to dead-reckon on Centaurus A with the Telrad, but quickly found that the twilight glow and poor transparency that close to the horizon rendered Centaurus A invisible even with 13" of Doug Scobel figured aperture. I put the Telrad circles where I thought the galaxy should be, and scanned the area within 1° of where Centaurus A should be at low power (47x) to no avail. I was going to need to star hop.



Starting with μ and v Centauri, I worked my way west using Sky Safari to check my field every 2 degrees or so. I worked for about 10 minutes to where I thought Centaurus A was, only to bump the scope and have to start over. Keep in mind that even with Papa Smurf (fabulously baffled 13.1 inch solid tube Dobsonian reflector), limiting magnitude in the eyepiece was only 8 or 9. Centaurus A is m6.8, but spread out over nearly ½° - low enough surface brightness that I could not resolve it even at 47x with a 1.8° field of view!



After roughly half an hour, I confirmed to myself I had the correct field. I had the small double to the ESE, and HD 116081, 324, and 117069 in my field of view. The blue circle is the view using the 20mm Explore Scientific eyepiece – 75x, 80' true field.

Now my scope was essentially horizontal, and I was sitting on my observing chair set about 6" above the ground. This was a similar setup to that when I was chasing galaxies in Fornax at Okie-Tex with my Portaball. There, I was sitting on the ground, with the upper ring in my lap.

Pardon the digression, but here is a good time to talk about observing techniques. Some of us are inclined to find the limits of what can be observed visually. This requires not simply looking into the eyepiece, but (as we say) Observayt'n. I've learned many things while out with the Lowbrows:

--Be very careful and protective of your dark adaptation. Gaining full adaptation takes hours, and you can lose it a single bright flash. It involves not just the relaxing of the iris to its full extent, but the chemical reaction that takes place on the retina.
--Take time to find a comfortable sitting or standing position if at all possible. That's why our observing chairs are adjustable! You want the rest of your body and brain to be relaxed, so you can focus on using your eye to see what you can.
--At the eyepiece, breathe slowly and deeply to calm your brain, and let your eyes relax. Don't hyperventilate, but take in plenty of oxygen. Don't hold your breath. You'll find that the difference between a hurried look at the eyepiece, and a relaxed observation is very noticeable in terms of limiting magnitude. Do not discount this!
--Open both eyes, and cover your non-observing and non-dominant eye with your hand. Observing with both eyes open is even more relaxing for your viewing eye. I learned from John Causland to keep an eye patch in my observing toolbox to make this even easier.
--Use averted vision. There is a blind spot at the center of your vision where the cones are concentrated, and there are fewer rods. Directing your focus just off from where you expect the object to be helps the light fall on the more sensitive part of your retina.
--Move your focus around in the field of view. Rods are most sensitive to movement and contrast. Small changes in where you are looking (again, not quite at the object) can help you pick out something dim or small in the eyepiece you didn't see before.

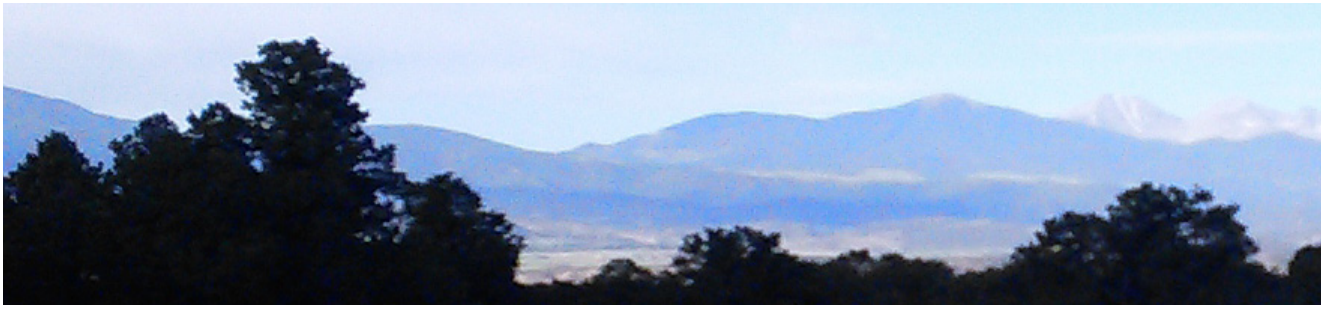
You can gain up to 0.5 in limiting magnitude by doing these simple exercises, which can mean the detection and confirmation of something dim – or in this case, of low contrast – and seeing nothing at all. Ask any of the crew of visual observers. Mark Deprest has made a habit of picking out diffuse comets in less-then-ideal skies and part of his success is by the use of these techniques.

So once I worked through all the careful observing techniques, I was eventually able to discern Centaurus A by first noticing the dust lane. It was an ever-so-darker division between 2 equally diffuse and barely brighter blobs on either side. By focusing on the edge of the dust lane, the galaxy was easier to discern.

Jim (or was it Chris?) was able to confirm the galaxy, and by the time I sat down to sketch it, the mountains were in my eyepiece and Cen A had effectively set.

Centaurus A is a showpiece for southern skies. While the view was disappointing, the chase was fun – exactly the sort of thing I enjoy about star parties.

Stay tuned for more adventures from RMSS – including comet observing in twilight!



The view from Camp Lowbrow: Nathan nailed Centaurus A through the gap in the mountains near the center of the photo. Photo: Jim Forrester

If You're in the Neighborhood

Must See Space/Science Museums

By Christopher Sarnecki

Here are some space and science museums that you might want to consider as you travel around the county. They may be obscure, but they are worth your attention if, like me, you enjoy space and science.

Air Force Space and Missile History Center, Cape Canaveral, FL

Air Force Space and Missile (AFSM) History Center is not to be confused with the Air Force Space and Missile Museum at Cape Canaveral Air Force Station (CCAFS), whose access is now limited to bus tours from Kennedy Space Center (KSC). That museum tour is the one that allows visitors to see actual rocket launch sites, but the tours originate from KSC and charge $25 per adult. The recently opened AFSM History Center is an extension of the museum, and admission is free to the public. The AFSM History Center is located outside the south gate of CCAFS. The AFSM History Center has historic information and displays for each Launch Complex at Cape Canaveral Air Force Station. If you like space launch history, this is the place to visit. While this is a small museum, it is packed with photos and space artifacts from the CCAFS.

All photos provided by the author

Bradbury Science Museum, Los Alamos, NM

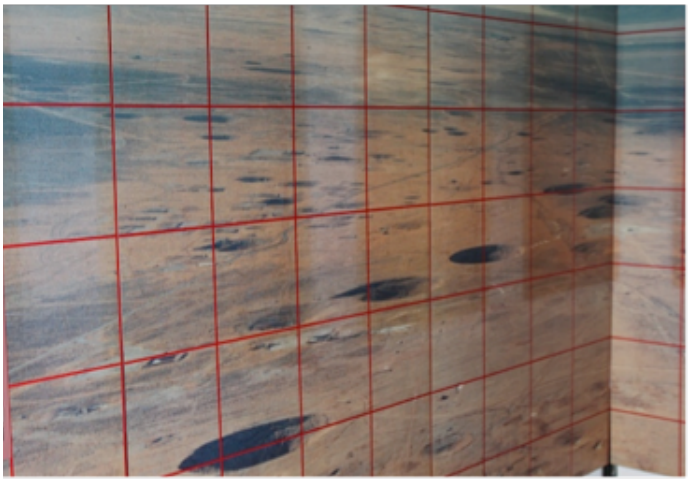
The town of Los Alamos is home to the Los Alamos National Laboratory. The *Frommer's Travel Guide* indicates the Los Alamos National Laboratory has an annual budget of $2 billion, operates 2100 facilities, and employs about 11,000 folks. The lab is one of the world's primary scientific labs with a focus on nuclear weapons research, super computing, theoretical physics, and other sciences. It is also the nation's only plutonium processing facility.

The town of Los Alamos has the highest per capita of Ph.D's in the country at 22 percent of the town's population. No wonder that when we arrived on a back road from the nearby Bandelier National Monument that we were met with a military style checkpoint. Normally I'm not the type of person that would even consider approaching a checkpoint, but I was here to visit the science museum and noticed a sign indicating 'Visitors Welcomed'. The friendly guard gave us directions to the museum and we were on our way.

The Bradbury Science Museum is the primary public facility for the Los Alamos National Laboratory and has detailed exhibits documenting the World War II Manhattan Project which developed the atomic bomb. The museum focuses on the impact of how that project affected the then small town of Los Alamos and it's people. History buffs will enjoy the movie

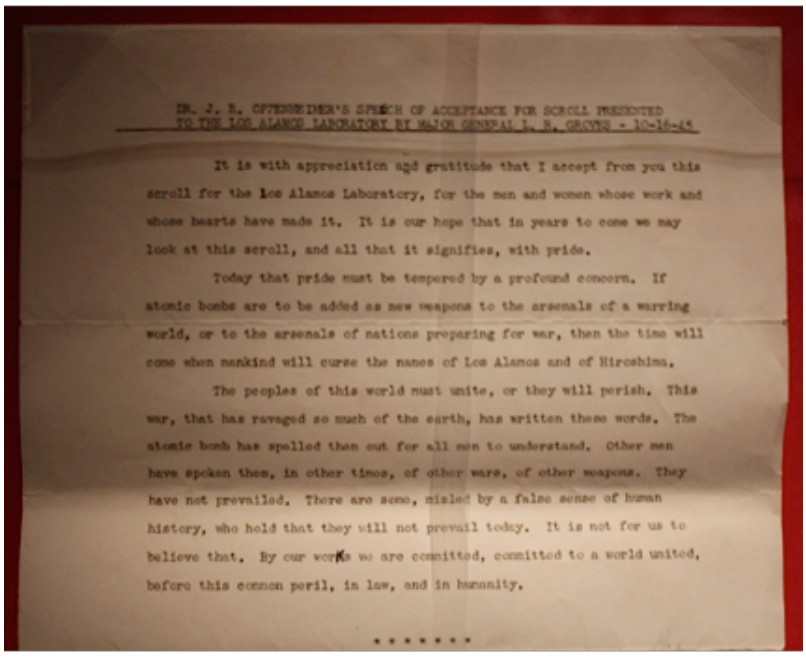
The Town that Never Was, which shows how during a time of national war-time secrecy, the Manhattan Project operated in this small obscure community. Other exhibits focus on high energy development, weapons research, and nuclear weapons stockpile stewardship. New interactive exhibits feature nanotechnology, super computing, and space sciences. As this museum is funded by the government, one can imagine it has a pro weapons research profile.

Models of the Little Boy and Fat Man atomic bombs. ("Skinny Guy" standing behind Little Boy is not a WWII artifact, but the author.)



Not a picture of the craters of the Moon, but an overview of our nation's underground nuclear weapons test site in the desert of Nevada.

Some of the information presented in the Bradbury Science Museum is sobering to think about. My thoughts reminded me of a document displayed in the State of New Mexico History Museum in Santa Fe. It's from speech in 1945 made by Robert Oppenheimer, Director of the Manhattan Project, in which he cautions us on potential concerns of the atomic bomb on mankind's future. A text of his speech follows below:



DR. J. R. OPPENHEIMER'S SPEECH OF ACCEPTANCE FOR SCROLL PRESENTED TO THE LOS ALAMOS LABORATORY BY MAJOR GENERAL L. R. GROVES - 10-16-45

It is with appreciation and gratitude that I accept from you this scroll for the Los Alamos Laboratory, for the men and women whose work and whose hearts have made it. It is our hope that in years to come we may look at this scroll, and all that it signifies, with pride.

Today that pride must be tempered by a profound concern. If atomic bombs are to be added as new weapons to the arsenals of a warring world, or to the arsenals of nations preparing for war, then the time will come when mankind will curse the names of Los Alamos and of Hiroshima.

The peoples of this world must unite, or they will perish. This war, that has ravaged so much of the earth, has written these words. The atomic bomb has spelled them out for all men to understand. Other men have spoken them, in other times, of other wars, of other weapons. They have not prevailed. There are some, misled by a false sense of human history, who hold that they will not prevail today. It is not for us to believe that. By our minds we are committed, committed to a world united, before this common peril, in law, and in humanity.

* * * * * * *

Dr. J. R. Oppenheimer's speech of acceptance for scroll presented to the Los Alamos Laboratory by Major General L. R. Groves 10-16-45:

"It is with great appreciation and gratefulness that I accept from you this scroll for the Los Alamos Laboratory, and for the men and women whose hearts have made it. It is our hope that in years to come we may look at this scroll and all that it signifies, with pride.

Today that pride must be tempered by a profound concern. If atomic bombs are to be added as new weapons to the arsenals of a warring world, or to the arsenals of the nations preparing for war, then the time will come when mankind will curse the names of Los Alamos and Hiroshima.

The people of this world must unite or they will perish. This war that has ravaged so much of the earth, has written these words. The atomic bomb has spelled them out for all men to understand. Other men have spoken them in other times, and of other wars, of other weapons. They have not prevailed. There are some misled by a false sense of human history, who hold that they will not prevail today. It is not for us to believe that. By our minds we are committed, committed to a world united, before the common peril, in law and in humanity."

Intermission:

Anchor Porter, Anchor Brewing Co., San Francisco, CA. - Sweet caramel goodness with a slight smoky middle and a very dry ending for this classic beer.

Black Toad Distinctive Dark Ale, Josephsbrau Brewing Co., San Jose, CA. - Refreshing. A stout like ale, yet light on the pallet

Hammer & Sickle Russian Imperial Stout, Renegade Brewing Company, Denver, CO., - Pours dark and thick like motherland's best crude. In Amerika, I thinks they call this 10W40. Finskie aroma of best blackest coffee. Me tongue it's happy place.

Laboratory of Atmospheric and Space Physics (LASP), University of Colorado Boulder

On the U of C Boulder eastern campus is a modern building with a largish satellite dish in front that is home to LASP. Some of you may recall our previous connection with LASP from the January, 2014 REFLECTIONS article on The Launch of MAVEN. During this trip, we met up with the MAVEN rocket scientist Dale Theiling and his lovely wife for a look at the LASP aerospace museum, which is open to the public; and, personalized tour the back-of-house facilities for spacecraft instruments construction/testing and satellite mission operations center (open to the public tours by appointment). First things first. I, of course, asked how is MAVEN doing during it's current travel to Mars? "MAVEN is doing fine" Dale indicated.

We then toured the aerospace museum which is packed full of representative examples of LASP space instruments work over the decades (since 1948). LASP involvement in space instrument design/construction has seen their work visit all 8 planets and Pluto. A big part of their mission is training students in the construction and monitoring of satellite instruments. My favorite exhibits are the 1/10th scale models, made by a longtime LASP staffer, of some famous satellites.

Next up was a tour of the back-of-house facilities for spacecraft instruments construction/testing and satellite mission operations center. We saw facilities for the construction and testing of satellite instruments. These instruments must go through severe testing that simulates a rocket launch and the hazards of space itself. They shake it, freeze it, and simulate the vacuum of space before these components are considered ready to send to NASA only to have NASA do it all over again. It's a wonder these instruments survive their manufacturing before they make it to launch. Next up we viewed the Mission Operations Centers (MOC). MOCs monitor spacecraft traveling to their mission location and while on their assigned location. These rooms have giant flat screen monitors with spacecraft information displayed and lots of computer workstations for a given spacecraft. I notice each MOC has one of those popular '8-Ball' toys placed under the large flat screen monitors. I quizzed our host about this. He indicates that MOC operators can be somewhat nervous about their assigned charge. Letting the 8-Ball give you some options can do a lot to take some of the stress out from a difficult situation. One of the more amazing things about LASP's MOC is that students are trained and involved in much of it. It turns out that LASP likes to sign up Juniors so they can be involved for many years as opposed to grad students who may be graduating soon. Last up, we viewed a class-10,000 clean room that doubles as a satellite clean assembly room. While it hasn't been used as such, it is just another example of the facilities available to LASP in pursuit of their work.

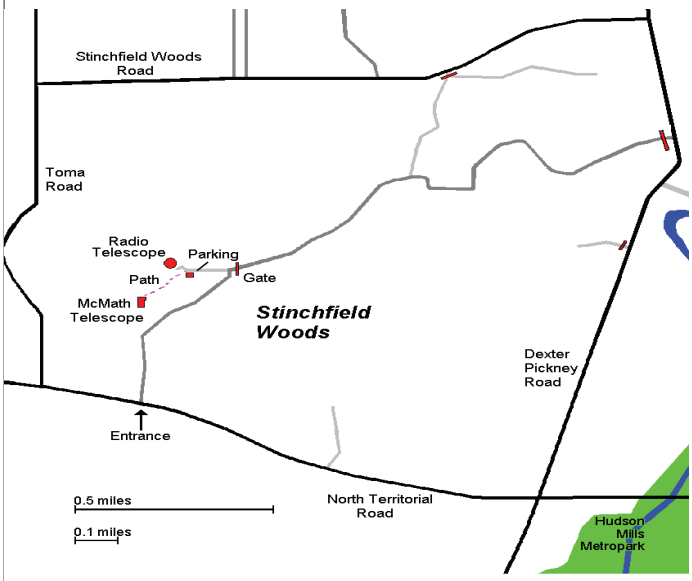
Left: A couple of the scale models of the Voyager and Galileo satellites. Note the high gain antenna (large dish) of the Galileo satellite is damaged, exactly as was unfurled in space.

Right: A view of the museum. Shown is a sounding rocket with a solid fuel booster (white).

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 $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.

Telephone Numbers

President:	Charlie Nielsen	(734) 747-6585
Vice Presidents:	Dave Snyder	(734) 747-6537
	Dave Jorgenson	
	Don Fohey	
	Ken Ruble	
Treasurer:	Doug Scobel	(734)277-7908
Observatory Director:	Jack Brisbin	
Newsletter Editor:	Jim Forrester	(734) 663-1638
Key-holders:	Jim Forrester	(734) 663-1638
	Fred Schebor	(734) 426-2363
	Charlie Nielsen	(734) 747-6585
Webmaster	Krishna Rao	

Lowbrow's Home Page

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

Email at:

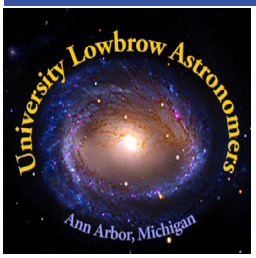
Lowbrow-members@umich.edu

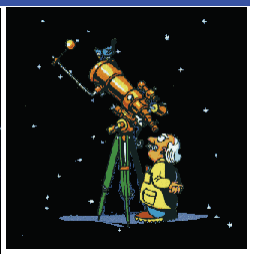
University Lowbrow Astronomers

University Lowbrow Astronomers
P.O. Box 131446
Ann Arbor, MI 48113

lowbrowdoug@gmail.com

Reflections & Refractions





Website
www.umich.edu/~lowbrows/

Lowbrow Calendar

Friday, August 15: ***Monthly Club Meeting. 7:30 PM*** Room 807 Dennison Speaker: Kevin Iott (design engineer from PlaneWave Instruments): "PlaneWave Instruments: A Top-Down Approach to Innovation, Integration, and Manufacturing." (Note: This is our last meeting in Dennison. ***The September meeting will be held in room G115, Angell Hall.)***

Saturday, August 16: ***Observing at Brighton Recreation Area. 9:00 PM.*** 6360 Chilson Road, Howell, MI. Meet at Chilson Pond behind the park headquarters.

Saturday, August 23 and Saturday, August 30: **Open Houses at Peach Mountain.** Begins at sunset. May be cancelled if cloudy.

September 12--October 12: **"Unseen."** This is a multi-media exhibition in which over 50 local, regional, national, and international artists and scientists explore the thresholds of visibility, revealing crucial, unseen phenomena that impact, inform and enrich our daily lives. Lowbrow Brian Ottum has four of his astrophotography images in the show. **Ann Arbor Art Center, 117 West Liberty, Ann Arbor, MI** ***10AM - 7PM Monday-Friday, 10AM - 6PM Saturday, 12PM - 5PM on Sundays.***

University Lowbrow Astronomers
P.O. Box 131446
Ann Arbor, MI 48113