

REFLECTIONS / REFRACTIONS

University Lowbrow
Astronomers

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NOVEMBER 2015

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Pony Express, Anyone?

September's Lunar Eclipse

By Brian Ottum



This is my shot of the September 27th lunar eclipse. I had been anxious to capture it because it was the last of our four-in-a-row “blood moons,” with years until the next one. But there’s a story behind this shot. As you know I have a remote control telescope in the high desert near the border of AZ/NM/Mexico. That Sunday, the forecast was iffy for Michigan (no surprise) and very good for the desert. So I logged on an hour before local sunset there in order to get things ready. Immediately, I could see that the Internet connection was sloooooow. Click, count to 10, and the response is seen on screen! So I emailed and called our landlord out there to see if he could fix the problem. I watched on my webcam, and listened as he and a computer expert (via phone) worked hard for nearly an hour to find the source of the outage. No luck. I was stuck with the backup Internet connection which uses Hughes satellites 23,000 miles out there in space. Slow as molasses dial-up speeds, but better than nothing.

At least my webcam was designed to work well with slow connections – I could see and hear my scope operating (albeit with stutters and a 10-20 second lag). So I logged onto the main observatory PC to open the roof. Connection lost. Log back in. Lost again. Grit my teeth. Press “open roof” and hold my breath. Yay, webcam shows roof opening! Then try to log back into my own PC. No dice. After 10 minutes, I was able to see my PC there in the desert revealed painfully slow from the top to the bottom of my screen. Geez, this is maddening. Patience paid off as I was able to turn on TheSkyX, which is a planetarium program that controls the telescope. I put my hands in the air once I saw my scope



move on the screen! But the slowness of the connection prevented normal mouse “drag and click” of the sky view to show the moon. What do I do? I typed “M O O N” in the search box, pressed “GOTO” and counted to ten. The “live view” video from the camera showed blackness. What the heck is wrong now? I could not see the screen clearly, but remembered that I was pointing low in the east. The east wall was blocking my view. So I waited some more, realizing that I had missed the start of totality.

Soon the screen showed that the moon was there, but way to the right side of the frame. Not good. It happened because the initial pointing is not so accurate AND the mount drives at sidereal rate (the stars) and NOT the slower lunar rate. So I tried my usual tweaking to get the moon centered. No dice, due to slowness. Then a lost connection, log back in. Arrrg!

Oh well. Go to Find and type in “M O O N” again and click and count to ten. Great! Moon is now roughly centered. Focus looks good, but let’s try to make it perfect. No dice. Again, the slowness of the connection prevented the more careful operations that require quick feedback. Oh well, cross my fingers and hope focus is good enough.

Now the job is to just take LOTS of images, at lots of settings, and hope something comes out good.

After an exhausting hour of clicking, waiting, being kicked out, going back in, I was able to shut everything down and close the roof. I was excited to see what I’d shot. But there was no

way to get my pictures home! The connection speed would not permit uploading these 20Mb files. So they sat there in the desert. It is a ridiculous path they took to get to this newsletter. I ordered a USB drive from Amazon to be delivered out there 4 days later (as fast as things get delivered in the dry boondocks). New observatory neighbor Wade went in and copied the files to the USB drive, and brought it home with him to Arkansas. When he got home, he had a self-addressed-stamped envelope from me to put it in. I got the USB drive 20 days after the eclipse!

TECHNICAL DETAILS

1 second exposure @ ISO 1600. Canon 5DmarkIII (modified so the reds are a bit more intense). 1250mm telescope (10” f/5 reflector made in Taiwan originally as a dob). All perched on a Paramount MX.

Lowbrow October Monthly Meeting Minutes

Charlie opened the meeting at 7:38PM and introduced Dr. Ed Cackett, from the Wayne State University physics department. Ed gave a talk about "How things fall into Black Holes". It was focused on the current understanding of the mechanism accountable for the extremely bright quasars, which are active galactic nuclei (AGN) objects. Ed was presented with a Lowbrow cap at the conclusion of his talk.

Officers' reports:

President, Charlie Nielsen –

- There have been some concerns regarding the large number of emails received by the club members. The group discussed the issue but no changes to our current communication methods were agreed to.
- We received a Thank You note from the Leslie Science Center for our recent participation there.
- Scio Farms annual event is scheduled for October 23 at sunset.
- Brother Guy Consolmagno is scheduled for our November meeting at Strong auditorium on EMU campus. Charlie requested thoughts about how to publicize this event.

VP, Dave Snyder-

- Dr. Eric Bell from U of M, will be the speaker for Saturday Morning Physics, October 17.

Newsletter Editor, Jim Forrester-

- The Newsletter was emailed to members.
- Jim's suggested Open House schedule for 2016 was reviewed and amended to the following:

April 2, 9, 30	July 2, 9, 30	September 3, 24
May 7, 28	August 6, 27	October 1, 29
June 4, 11	September 3, 24	November 5
- **Send articles for the next newsletter**

Web Master, Krishna Rao-

- Krishna reported that Ethan Siegel, our confirmed February, 2016 meeting speaker was recruited via Twitter. His talk will be delivered via "Google Hangout". Krishna expressed some concerns about how this might work: Will this be open to the public? And will it be recorded for future use?

Observatory Director, Jack Brisbin-

- More observatory roof work has been done. Grass has been planted.
- Experience has shown that the public is quite interested in looking through the McMath during Open House events.
- Having enough keys for the gate to Peach Mountain is still an issue. Charlie reported that at least one more key has been promised to the club.
- The demolition of the Curtis Schmidt building on Peach Mountain raised some concerns by some U of M personnel and club members. Member, Doug Nell, told us of some of the good telescope equipment housed there. Jack stated that the Astronomy Dept. will repurpose the equipment to local organizations.

Treasurer, Doug Scobel-

- We have 128 members.
- The treasury is at \$6567, though a portion of it is scheduled to be paid out for the RASC calendars and handbooks that have been ordered by members.
- Oct 16 was the deadline for placing calendar orders.

Open House Coordinator, Jim Forrester-

- Jim reported that the forecast for Oct. 17 Open House is cold, but clearing should occur about 10PM. He had a supporting show of hands from the members. So the Open House will occur.

Member, Douglas Warshow-

- Douglas is coordinating the purchase of Starry Messenger Press 2016 Year-In-Space week-at-a-glance calendars for \$12.95 each. If the quantity increases to 10 items, the price drops to \$11.95.

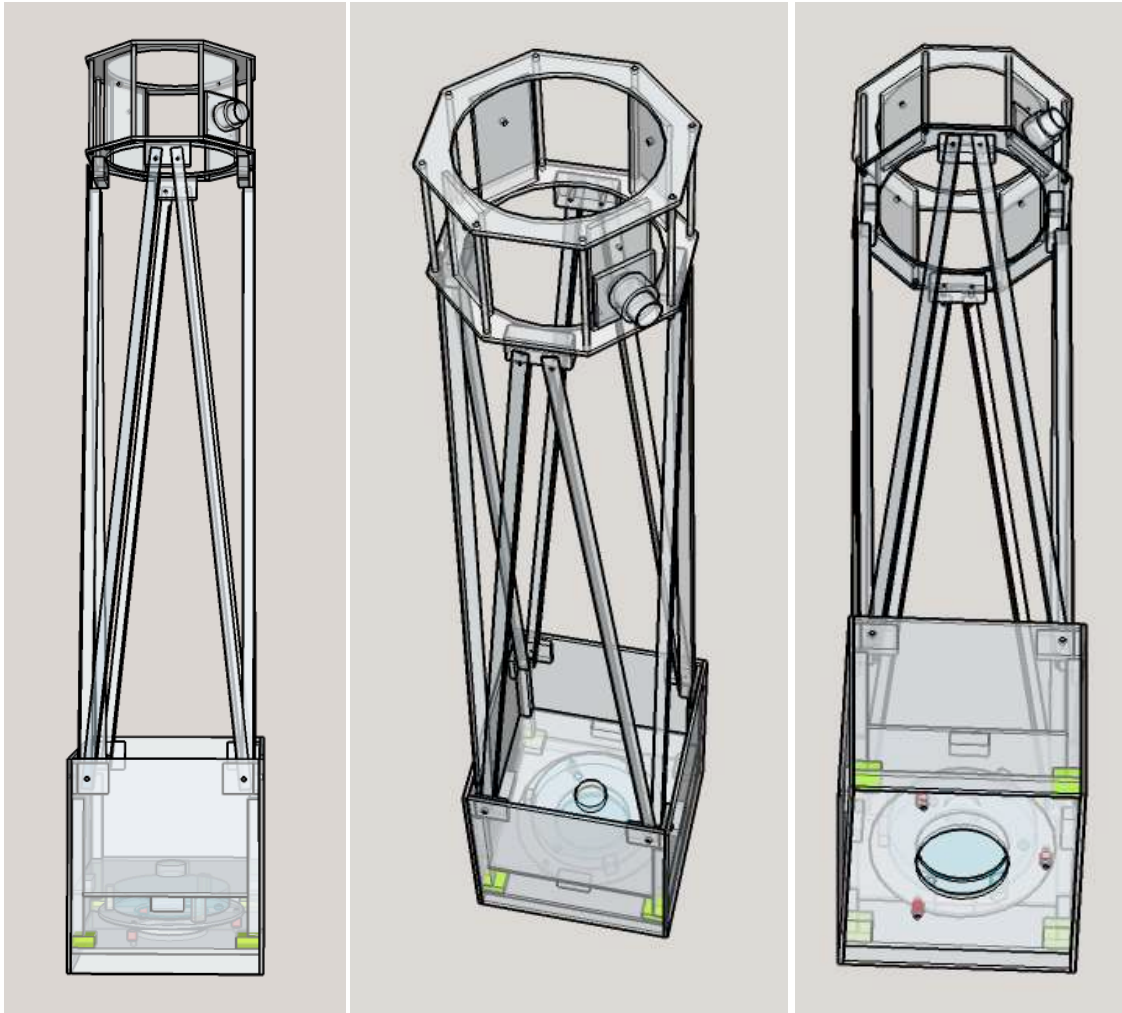
Meeting was adjourned at 9:18PM

Submitted by VP, David Jorgensen

Don's New 8 Inch Scope:

Dobsonian Design Tools

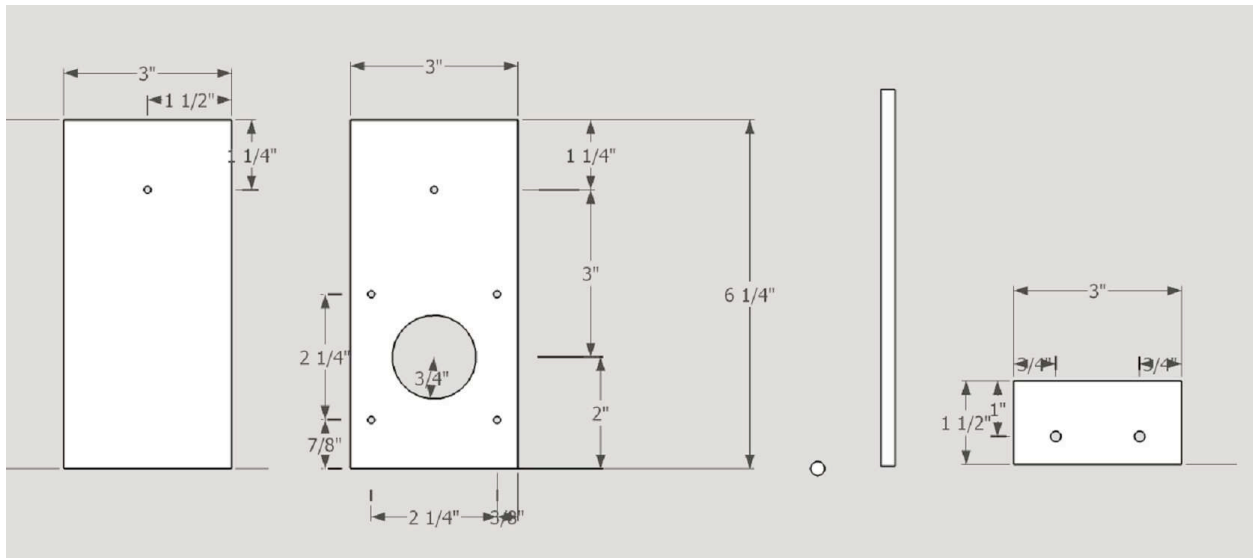
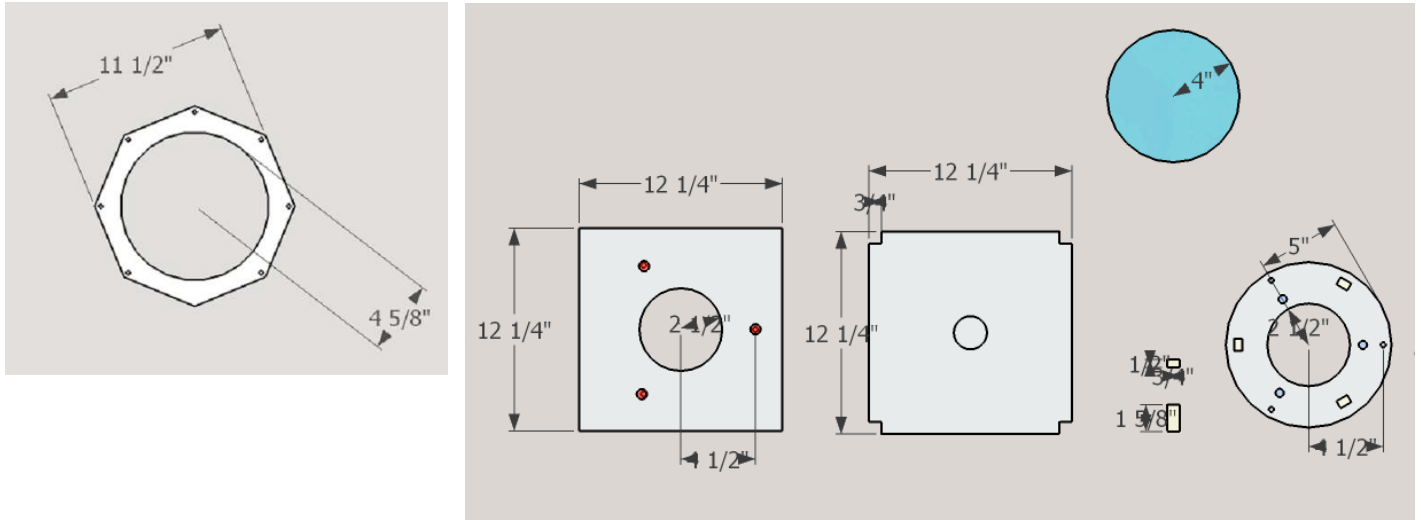
By Don Fohey



Don's articles about making the mirror and construction of the scope are in the January 2015 and August 2015 issues of *Reflections*.

I wanted a 3D design tool to detail each components and put them together into a final assembly before a saw cut a single piece of wood. I used Sketchup by Trimble which was formerly Google Sketchup. <http://www.sketchup.com/>

SketchUp comes in two versions. Make (free and for non-commercial use) and a Pro version (paid and for commercial use). I found the Make or free version to have all the functionality needed. A 3D design tool can be frustrating to use without first going through training. I spent hours going through the online training material without skipping any of the lessons! The training is very good. If you start using the tool without the training, you will be frustrated trying to do things the way you think they should work rather than using the techniques provided in the tool. There is also a very good online reference to answer that "How do I do it?" question. One advantage of the 3D tool is the ability to rotate objects and look at them from any point of view. Page 5 has samples of the details created and the test fit used to see if all the parts went together.



Sample part details

Sample Newt-web Output Dimensions

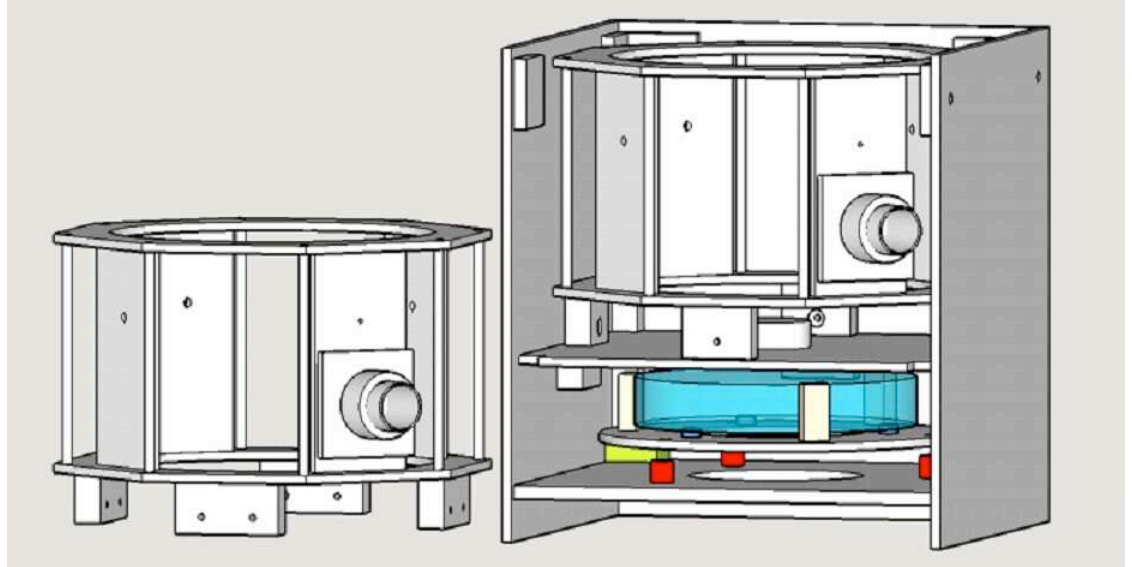
Unit of Measure	inch	Diagonal Offset	0.049
Primary Mirror Diameter	8.000	100% Illumination Diameter	0.515
Focal Length	60.800	75% Illumination Diameter	1.052
Focal Ratio	7.600	Front Aperture Diameter	9.012
Tube Inside Diameter	9.250	Mirror Face to Focuser Hole	52.800
Tube Thickness	0.125	Focuser to Front End of Tube	6.000
Focuser Minimum Height	3.000	Mirror Face to Back of Tube	4.500
Focuser Inside Diameter	1.250	Tube Length	63.300
Focuser Extra Travel	0.250		
Focuser Camera Travel	0.000		
Diagonal Minor Axis	1.500		

The first tool I used was Newt-web which was used to establish all the major dimensions including the location of the focuser.

It is more complicated than you first think to dimension your tube, secondary holder position and precise focuser location. Using the mirror focal length you must compute the exact position for your focuser. This seems easy at first until you start sketching it. Newt-web from

FIT TEST

Stellafane comes to the rescue. (<https://stellafane.org/tm/newt-web/newt-web.html>)



There are plenty of instructions explaining everything that needs to be taken into consideration. I used their tool and at first light my image was in the center of travel of my focuser. The important design number in the table is the "Mirror Face to Focuser Hole" dimension of 52.8 inches.

I used excel to calculate the balance point to insure it would have room to swing thru the base and to design the attachment point of the altitude mount. I weighed all the components on hand and used data sheet values for those I did not. Weights of wooden and metal parts were calculated based on material densities. The balance point is computed by taking the sum of the torques divided by the sum of the weights. It came out remarkably close until I added the flocking. I forgot to take into account the weight of the flocking on the secondary cage, which was significant. Weight was added to the bottom of the mirror box to counter the weight of the flocking.

	Qty	Area	Thickness or length	Volume cu. inch	Material Density	Weight oz	Location from Bottom	Torque about zero	Balance Point
Lower Cage Octagon	1	43.12	0.25	10.78	0.42	4.48	55.25	248	17.20
Upper Cage Octagon	1	43.12	0.25	10.78	0.42	4.48	62.00	278	
Cage Dowel (1/4)	8	0.05	6.75	0.33	0.46	1.23	58.56	72	
Spider Plate 1	4	19.50	0.25	4.88	0.42	8.11	58.56	475	
Spider and Holder	1					2.70	58.56	158	
Eyepiece Holder	1					2.20	57.30	126	
Red Dot Finder	1					7.10	60.13	427	
26 mm Eyepiece	1					4.20	57.30	241	
Secondary Mirror	1					1.30	58.56	76	
Upper Truss Block	4	4.50	0.75	3.38	0.27	3.67	54.50	200	
Truss Angles	8	64.50	0.06	4.03	1.55	50.05	33.50	1677	
Mirror Cover Blocks	4	2.00	0.75	1.50	0.27	1.63	5.00	8	
Mirror	1					87.40	3.75	328	
Lower Truss Block	4	4.00	0.38	5.41	0.42	9.00	12.70	114	

	Qty	Area	Thickness or length	Volume cu. inch	Material Density	Weight oz	Location from Bottom	Torque about zero	Balance Point
SideA	2	171.50	0.25	42.88	0.42	35.67	7.00	250	
SideB	2	178.50	0.25	44.63	0.42	37.13	7.00	260	
Back Plate Block	4	2.25	0.75	1.69	0.27	1.84	1.75	3	
Mirror Guides	3	2.06	0.75	1.55	0.27	1.26	3.75	5	
Mirror Plate	1	58.90	0.25	14.73	0.42	6.13	2.75	17	
Back Plate	1	130.43	0.38	48.91	0.42	20.35	1.19	24	
	Baltic Birch	oak	pine	Alum.					
lbs/cu inch	0.026	0.029	0.017	0.097					
oz/cu inch	0.416	0.464	0.272	1.552					
Cage Center		55.128							

[Doug's Deep Sky Challenge:](#)

Scratching At "Fleas"

By Doug Scobel

Breaking news! Pegasus, the winged horse, has fleas!

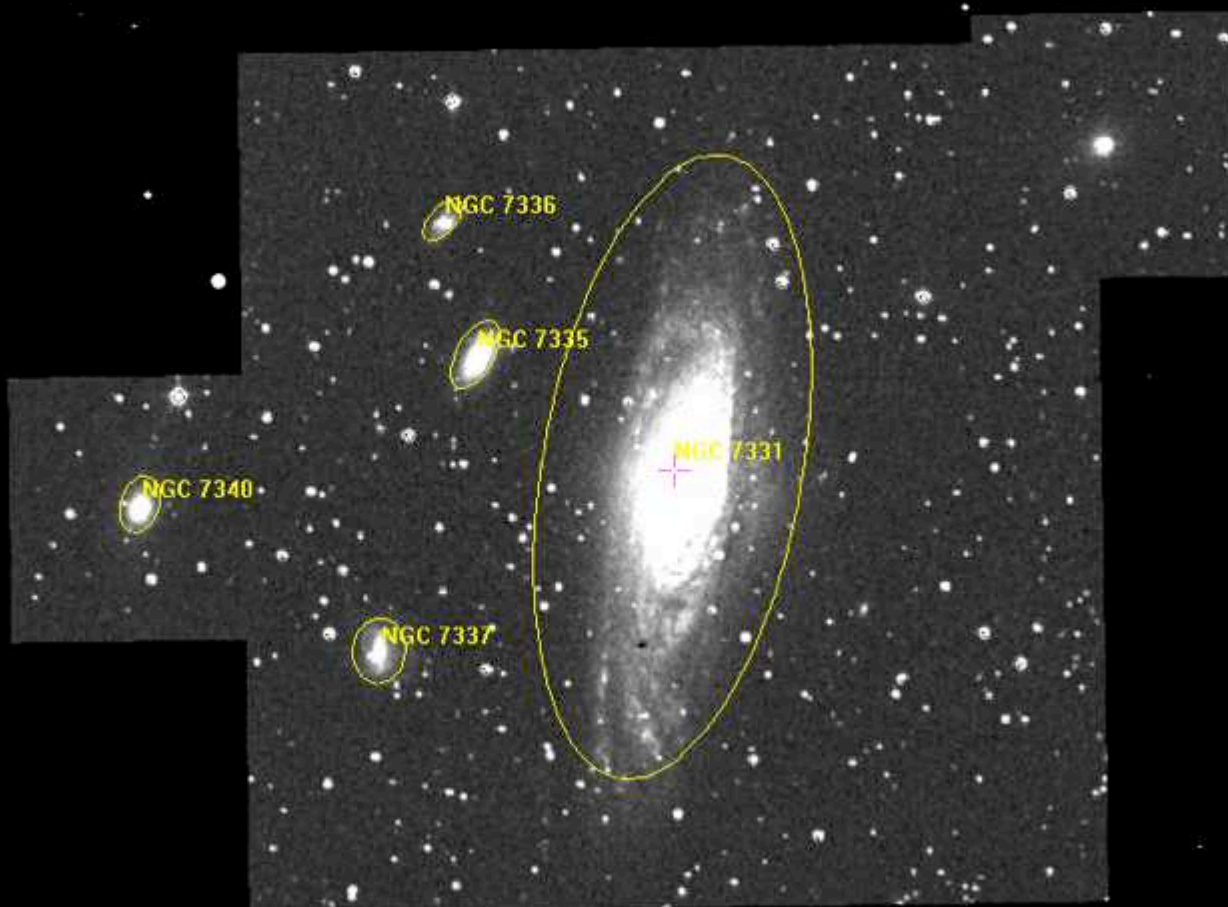
You think I'm joking, don't you. I can tell you that he indeed does have fleas - and I've seen them with my own two eyes. Or at least my right, dominant eye. But I have seen them. And I'll bet some of you have seen them too.

The so-called fleas about which I am speaking are some small galaxies near the relatively bright (about 10th magnitude) spiral galaxy NGC 7331, in Pegasus. NGC 7331 is a fine example of a spiral galaxy. It is type Sb, about 50 million light-years away. It is fairly inclined to our line of sight making it look quite elongated. To my eye, in a larger telescope at medium power its appearance resembles that of the great Andromeda galaxy M31 when viewed in binoculars.

While NGC 7331 is a fine sight all by itself, for me what makes it more intriguing to look at is the handful of background galaxies that lie in close proximity to it. These background galaxies are sometimes referred to as its "fleas". They are small, definitely not bright, and present a pretty good test of your optics, seeing conditions, and your observing skills. But they are definitely worth the trouble to seek out, as they provide a nice backdrop for the main galaxy. Seeing three, four, or even five galaxies in a single view is a wonderful reward for your efforts.

These background galaxies are roughly ten times farther away than NGC 7331, putting them at about half a billion light-years away. While there are nine or more of them, only three are more-or-less readily visible in medium-sized instruments under decent skies. As a bonus, there's one more that presents quite a challenge visually.

The three "easy" fleas are NGC 7335, NGC 7337, and NGC 7340. All three lie just east of their larger companion, and are of visual magnitudes 13.6, 14.6, and 13.9, respectively. Being about ten times more distant than NGC 7331, their angular size is about a tenth its size too, with dimensions of 1.3' x .06', 1.1' x 0.9', and 0.9' x 0.6', respectively. Now you know why I put quotes around the word "easy". They are anything but. You'll need to crank the magnification up to 200x or more to get a decent glimpse of them. In medium-to-large apertures NGC 7331 shows pretty good detail at this magnification, but you'll be hard-pressed to see much more than a featureless glow from these other three.



NGC 7331 and its "fleas". Chart created in Guide 8.0.

Once you've located NGC 7331, NGC 7335, the brightest and largest flea, is pretty easy to spot. In larger apertures and at high magnification under a dark, steady sky, it may even reveal a little bit of detail. Next easiest is NGC 7340. It's almost as bright but a little smaller, giving it a similar surface brightness. So if you use adequate magnification and you can see NGC 7335 then you should be able to spot 7340 too. NGC 7337 is more than half a magnitude fainter than the other two, and its angular size lies between theirs. This gives it a lower surface brightness, meaning it will present quite a challenge in smaller apertures and/or less than ideal sky conditions. But I have observed it in my 13" from Lake Hudson and darker venues, so if you have a similar-sized scope or larger then it's worth going after even under our local light-polluted skies.

But like I said, those are the easy ones. Try as I might, I've failed in all previous attempts to see any more than these three fleas. Until this year's Black Forest Star Party, that is. Yes, I've now logged a fourth flea, NGC 7336. At magnitude 14.6 and a diminutive 0.9 by 0.4 arc minutes, it is both small and faint. It had always eluded me. But this year's BFSP provided a couple really steady and transparent nights of observayting pleasure, and this fourth little flea finally showed itself. It wasn't much to look at, just a faint, tiny smudge visible only with averted vision. But it was there in my 16-inch Dob-Newt at 236x. Yippee!

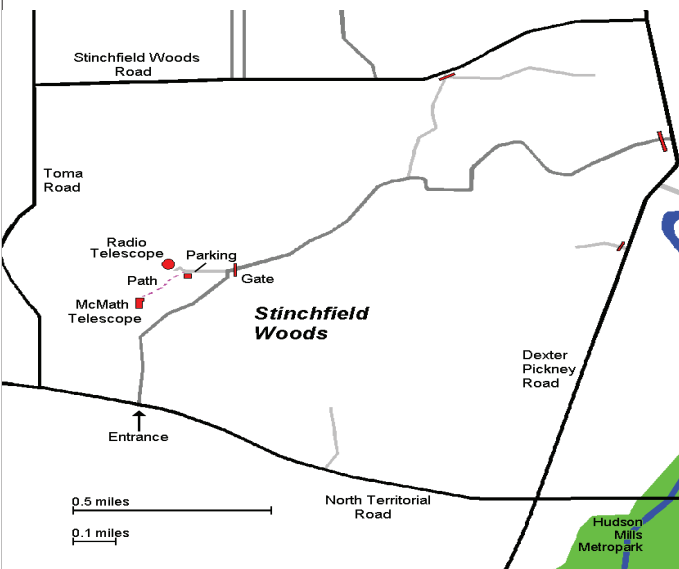
Curiously, both NGC 7337 and NGC 7336 are listed at magnitude 14.6 visually, but I find NGC 7337 much easier to spot. It might be because there is a faint star just barely offset from its nucleus, which may add just enough light to make it more conspicuous.

There's still time this fall to try scratching out NGC 7331 and its fleas. Pegasus should still be situated high enough in the sky for a good view, so next time you're out give it a try. As always, I'd like to know - what do you see?

Places & Times

Monthly meetings of the University Lowbrow Astronomers are held the third Friday of each month at 7:30 PM. The location is usually Angell Hall, ground floor, Room G115. Angell Hall is located on State Street on the University of Michigan Central Campus, between North University and South University Streets. The building entrance nearest Room G115 is the east facing door at the south end of Angell Hall. A club observing session at the Peach Mountain Observatory, weather permitting, often follows the meeting.

Peach Mountain Observatory is the home of the University of Michigan's 25 meter radio telescope as well as the University's McMath 24" telescope, maintained and operated by the Lowbrows. Located northwest of Dexter, MI; the entrance is off North Territorial Road, 1.1 miles west of Dexter-Pinckney Rd. A maize and blue sign marks the gate. Follow the gravel road to the top of the hill to a parking area south of the radio telescope, then walk About 100 yards along the path west of the fence to reach the McMath Observatory.



Public Open House / Star Parties

Public Open Houses / Star Parties are generally held on the Saturdays before and after the New Moon at the Peach Mountain observatory, but are usually cancelled if the sky is cloudy at sunset or the temperature is below 10 degrees F. For the most up to date info on the Open House / Star Party status call: (734)332-9132. Many members bring their telescope to share with the public and visitors are welcome to do the same. Peach Mountain is home to millions of hungry mosquitoes, so apply bug repellent, and it can get rather cold at night, please dress accordingly.

Membership

Membership dues in the University Lowbrow Astronomers are \$30 per year for individuals or families, \$20 per year for students and seniors (age 55+) and \$5 if you live outside of the Lower Peninsula of Michigan.

This entitles you to the access to our monthly Newsletters on-line at our website and use of the 24" McMath telescope (after some training).

A hard copy of the Newsletter can be obtained with an additional \$18 annual fee to cover printing and postage. Dues can be paid at the monthly meetings or by check made out to University Lowbrow Astronomers and mailed to:

The University Lowbrow Astronomers

P.O. 131446

Ann Arbor, MI 48113

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

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

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

For more information contact the club Treasurer at:

lowbrowdoug@gmail.com

Newsletter Contributions

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

Call or Email the Newsletter Editor: **Jim Forrester (734) 663-1638** or jim_forrester@hotmail.com to discuss length and format. Announcements, articles and images are due by the 1st day of the month as publication is the 7th.

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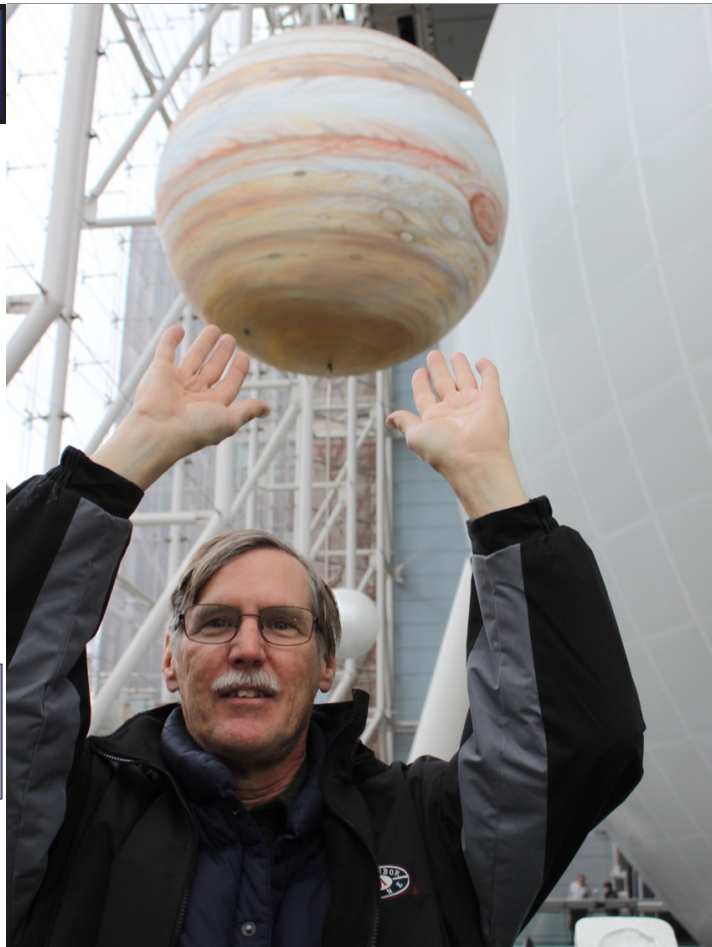
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Reflections & Refractions



Website

www.umich.edu/~lowbrows/



The legendary Atlas has nothing on our Chris Sarnecki. The Greek Titan only held up our puny Earth. Chris, though (on a visit to the Hayden Planetarium), made light of the mightiest of planets, JUPITER!



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