University Lowbrow Astronomers
Ann Arbor, Michigan

REFLECTIONS / REFRACTIONS

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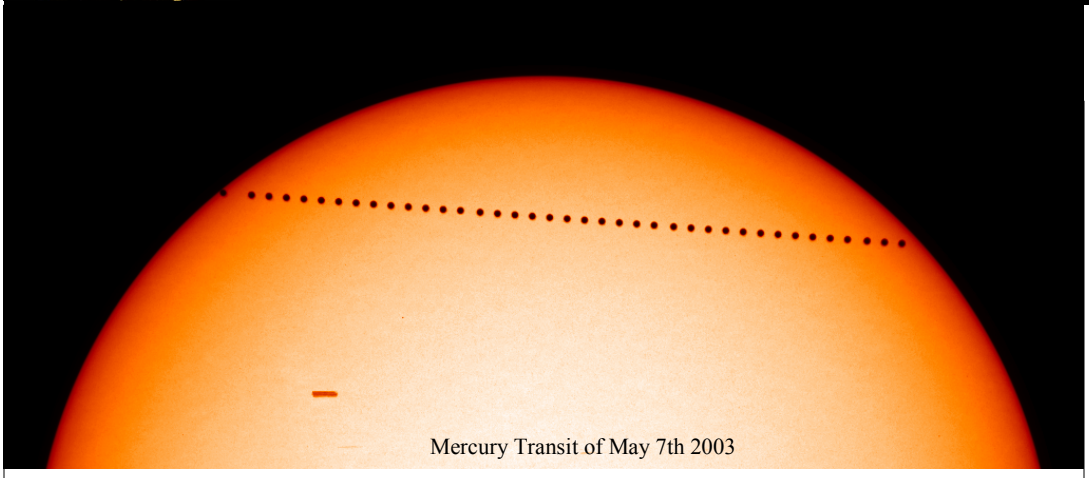
University Lowbrow Astronomers

November 2006
Volume 30 Issue 11



Mercury Transit of May 7th 2003

Inside this issue:

Doug Scobel

Important Club Info

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2006 Transit of Mercury

On Wednesday, 2006 Nov 08, Mercury will transit the Sun for the first time since 2003. The transit or passage of a planet across the face of the Sun is a relatively rare occurrence. As seen from Earth, only transits of Mercury and Venus are possible. There are approximately 13 transits of Mercury each century. In comparison, transits of Venus occur in pairs with more than a century separating each pair.

The principal events occurring during a transit are conveniently characterized by contacts, analogous to the contacts of an annular solar eclipse. The transit begins with contact I which is the instant when the planet's disk is externally tangent with the Sun. Shortly after contact I, the planet can be seen as a small notch along the solar limb. The entire disk of the planet is first seen at contact II when the planet is internally tangent with the Sun. During the next several hours, the silhouetted planet slowly traverses the brilliant solar disk. At contact III, the planet reaches the opposite limb and once again is internally tangent with the Sun. Finally, the transit ends at contact IV when the planet's limb is externally tangent to the Sun. Contacts I and II define the phase called ingress while contacts III and IV are known as egress. Position angles for Mercury at each contact are measured counterclockwise from the north point on the Sun's disk.

Table 1

Geocentric Phases of the 2006 Transit of Mercury

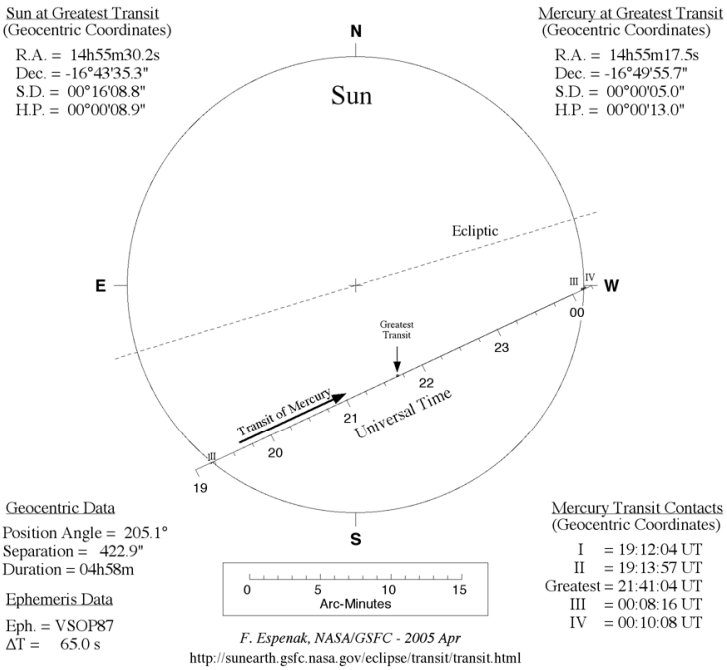
Event	Universal Time	Position Angle
Contact I	19:12:04	141°
Contact II	19:13:57	141°
Greatest Transit	21:41:04	205°
Contact III	00:08:16	269°
Contact IV	00:10:08	269°

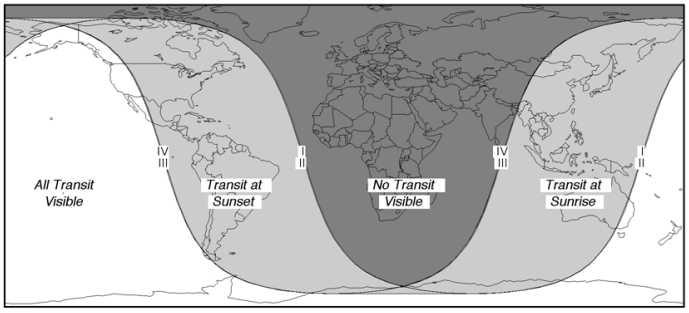
Table 1 above gives the times of major events during the 2006 transit. Greatest transit is the instant when Mercury passes closest to the Sun's center (i.e. - minimum separation). At this time, the geocentric angular distance between the center's of Mercury and the Sun will be 423 arc-seconds. Figure 1 on page 2 shows the path of Mercury across the Sun's disk and the scale gives the Universal Time of Mercury's position at any instant during the transit. The contact times are listed along with the celestial coordinates of the Sun and Mercury at greatest transit. Since the contact times are geocentric they are only correct for an observer stationed at Earth's center. The contact times for any given location may differ from the geocentric times by up to a minute. This is due to the effect of parallax since Mercury's 10 arc-second diameter disk may be shifted up to nearly 13 arc-seconds from its geocentric coordinates depending on the observer's exact geographic position

Figure 1

Transit of Mercury: 2006 Nov 08

Greatest Transit = 21:41:04.2 UT J.D. = 2454048.403521





The University Lowbrow Astronomers together with the Ann Arbor Hands-On-Museum will be hosting a "Sidewalk Astronomy / Public Outreach" event, on November 8th. The obvious feature of this event will be the Mercury Transit of 2006. The Lowbrows will have a number of telescopes set-up with proper solar filters on the sidewalks in downtown Ann Arbor for public viewing of the event. The Hands-On-Museum will be showing a live "web-cast" of the event and present a number of 'hands-on' projects for their patrons, including a scale model of the inner solar system.

If you want to see this event you will need a telescope equipped with a solar filter and about 50x to 100x, as Mercury is about 192 times smaller than the Sun (from our point of view) and can not be seen without optical aid against the glare of the Sun. A pin-hole projection set-up may not show the disk of Mercury as a small black spot crossing the face of the Sun due to its very small angular size of 10 arc seconds.

For a great simulation of the event, check out this website:

http://shadowandsubstance.com

For a live Web-Cast of the event, check out this website:

http://www.exploratorium.edu/transit/

For information on how to make a projection type viewer for safely observing this event, check out this website:

http://www.exploratorium.edu/transit/how.html#optical

A Review: Coronado P.S.T

By Mark Deprest

Hello all, it's been a while since I sat down and wrote an article for the Lowbrow's Newsletter. Certainly not because of nothing to say, but more that I haven't had a lot of extra time and the fact that all of you have been coming thru so wonderfully providing articles and images enough to fill the newsletter with only a little prodding from me. Thank you all.

Well, the 2006 Black Forest Star Party is over and although the weather may have kept the observing to a minimum, don't think for a moment that the Lowbrows came away disappointed. I for one can't remember when I had as much fun, I haven't laughed so hard or enjoyed myself more in longer than I care to mention. And I don't think I am the only one that feels this way, but there are others that are writing articles about the BFSP 2006, and I'll leave that to them.

I am writing a review about my latest telescope; The Coronado P.S.T. (Personal Solar Telescope), which I won at the 2006 BFSP! That's right, I won it at the star party and that's not the only thing won by a Lowbrow. As a matter of fact, the Lowbrows did pretty well in picking up prizes in the "Chinese-raffle" of door prizes. Doug

Scobel won the Meade DSI pro CCD camera, and Yasu Inugi walked away with a Moonlite Crayford focuser! Not too shabby!

I have a 5" f/5 refractor on a Meade LXD55 EQ mount with "GoTo" capabilities, and a full aperture "White-Light" solar filter for this set-up. So, "piggy-backing" the PST on this set-up would be ideal. Let me give you the specifications on the Coronado PST, so you know what it is that I'm talking about. *First caveat: This is all brand new to me and although I have looked through John Causland's 60mm Coronado, I really don't know a lot about H-alpha solar astronomy.

Coronado P.S.T. specifications:

- Aperture 40mm
- Focal Length 400mm
- f/ ratio f/10 (duh)
- Bandwidth <1.0 angstrom (very narrow) centered on 6562.8 angstroms
- Thermal Stability 0.005 angstrom/C (not sure what this means, but I think it's good)
- Blocking Full Blocking >10^-5 from EUV to far IR
- Price $499.00 retail

I know what you are thinking, $500 for a 40mm telescope that you can only see one object in … why would anyone get one? Well, I have only had a chance to look through mine for a few hours, but I can honestly say that I understand how Coronado sold over 90,000 of these little beauties. Now, let me state that I did not pay $500 for mine, but having it now and experiencing the views through it … I would be tempted to shell out that kind of cash.

The scope that I won came with a $65.00 case and a 20mm Kellner eyepiece. The case is very nicely made and seems sturdy enough to last for a number of years. The scope is firmly held in place by die-cut non-abrasive foam with room for the optional "MALTA" mount and two additional eyepieces. The optional MALTA mount is a table top altitude / azimuth tripod and mount system designed for the PST. Although, I already have a very stable platform to "piggy-back" my scope to, this $130 option is makes the scope a great grab and go scope. The 20mm Kellner eyepiece that came with the scope is of high quality and provides flat field views at 20x. The sun appears as a rather small magenta colored disk in this eyepiece, only with careful focusing and close scrutiny are the prominences visible. I have found that my 6mm, 9mm & 15mm Expanse eyepieces give me the best images, so far. Coronado offers a line of eyepieces that are specifically designed for their scopes and are said provide high contrasting images, and the word on the Yahoo Forum is that although nice, well manufactured eyepieces, most people are not spending money on these eyepiece if they already have other eyepieces that come to focus. *Second caveat: Short focal length Naglers have a problem coming to focus in the PST. I'll have more to say about the focusing later

The PST came packaged in the case and very securely at that, in fact I had some difficulty in removing the scope the first time. So, I removed a couple of pieces of the die-cut foam to make it a little easier to get the scope in and out of its case for future use. After extricating the scope from the foam and its case and giving it the "once-over" for scratches, loose or missing screws or parts, I wanted to read the instruction manual. I looked in the case, in the box, and under the foam. I couldn't find the instruction booklet anywhere; I had the warranty paperwork and a little one page tri-fold full-color leaflet … could this be the manual? Yep, this is the instruction manual and of the six columns that could have been used for instructions, only two were used and one third of one of those columns was the Scope's Specifications. Now, don't take this the wrong way, but I would have thought there would be a little more to the instructions. As I read through the instructions and examined and worked each of the components discussed, I was impressed at the simplicity and conciseness of the instructions. They were adequate and informative. Okay, I guess Coronado figures that if you have $500.00 plus, to spend on a 40mm scope that can only be used to see one object, you must already know what you're doing. As such the instructions are scope specific and do not go into a lot of basic stuff that you know already, instead they explain the nuances of H-alpha scopes and how to "tune" them to achieve the best contrast using the adjustable tuning mechanism. This is a rotate-able knurled knob that makes fine adjustments to the internal "Etalon" filter most likely similar to a pair of polarizing filters. The one page tri-fold instruction manual also lists and defines the type of features visible with a H-alpha scope, of which they list six different features;

1. **prominences** - which are projections of H-alpha emissions seen off the limb of the solar disk,
2. **filaments** – which are prominences seen against the face of the Sun,
3. **active regions** – localized transient volume of solar atmosphere where **plages, sunspots, and flares** maybe observed,
4. **plage** – a patchy H-alpha brightening on the solar disk,
5. **sunspots** – small dark "cooler" areas which appear, grow and dissipate,
6. **flares** – which are sudden eruptions in the solar atmosphere lasting minutes to hours.

Now, lets get to the scope's performance, "first-light" had to wait for a week (boy, doesn't that sound typical with a new scope) as my 5" f/5 refractor was on loan to John Causland and it was the next Saturday before I could get it back. My idea was to "piggy-back" the PST on the 5" using the ¼ 20 tapped hole in the base of the PST and the ¼ 20 screw for the camera attachment on the top of my tube rings. Then put the "white-light" filter on the 5" and align the PST up with that and be able to view and show the Sun in two different formats; "white-light" and H-alpha. With a little tweaking and a couple of spacers I was able to get the two scopes aligned.

The PST has a very cool little Sun finder device built right into the base / focus housing, which they call the "Sol Ranger." The "Sol Ranger" consists of a small pin hole in the front face of the base and a small semi-opaque window on the top of the base near the eyepiece holder and when properly aligned on the Sun an internal mirror projects a little circular spot of light on the center of this window, even John Causland thought it was very cool!

For my first look at the Sun in the PST, I used the supplied 20mm Kellner eyepiece, and although the image was crisp with good contrast, the low power 20x image was just too small to show any real detail, my 15mm Orion Expanse seems to work best as a wide field starter eyepiece with good detail, but if you want to get up close and personal break out the 9mm or 6mm Orion Expanse eyepiece which effectively double the power and size of the magenta colored disk and now the finer detail that one would expect becomes visible. I could see prominences, filaments, and an active region surrounding a fairly large sunspot with a number of plages around it. The 40mm aperture means that 80x is about the upper limit of practical usable power, my 15mm, 9mm and 6mm Expanse eyepieces seem to work the best and both come to focus. I mentioned this issue before about certain eyepieces not coming to focus; the PST has a fixed eyepiece holder and an internal diagonal to direct the light path up through the eyepiece.

Focus is achieved by rotating a knob at the bottom rear of the base / focuser housing which moves a "Pentaprism" forward and back inside this housing, in much the same way as a SCT moves the primary mirror back and forth to achieve focus. Due to the limited travel of this system certain types of eyepieces may not come to focus, so keep your Naglers in their containers. High quality Kellners, Plossls and Expanse eyepieces all come to focus with excellent views. The manual warns, "… that it can take time to 'train' one's eye for H-alpha viewing," and it does take a little practice and tweaking to squeeze out some of the finer details, but this is no different than any other observing, the more time you put into it the better you become.

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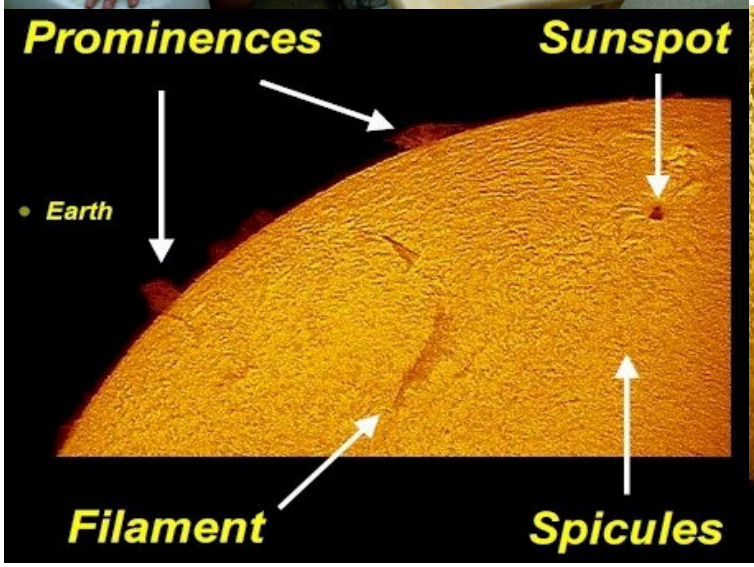
The Good	The Bad
Incredible views	Size (40mm is just not enough aperture)
Size and portability	Instruction manual
Craftsmanship and quality	Limited focuser travel
Packaging and mechanics	Price of $700.00 including case & MALTA
Winning it (about a $700 Prize)	

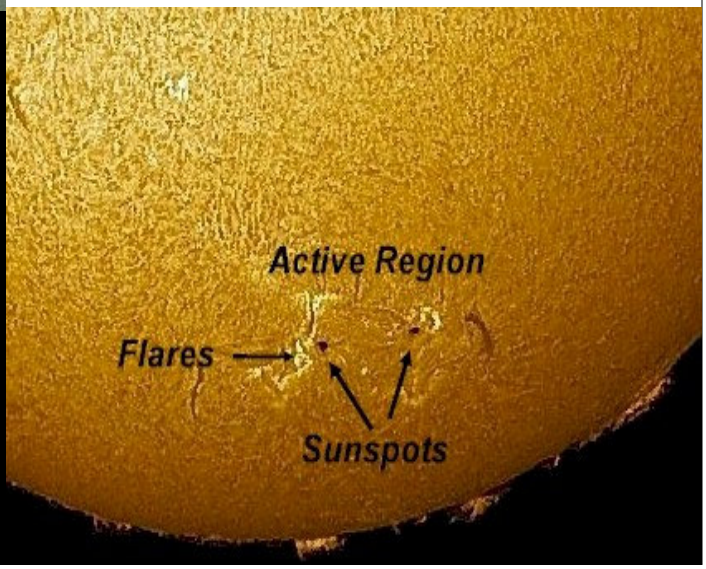
Bottom line:

Our star is incredibly dynamic and always changing, until I spent some time observing it with this scope, I had no idea how dynamic. Observable changes can be seen happening on a time scale measured in seconds and minutes. John Causland says that the novelty will wear off, and it maybe true that the novelty of a new scope that affords views of an old target in a new way may wear off. However, I don't think that witnessing the dynamic nature of the Sun unfolding before your very eyes will ever be anything but awe inspiring and fascinating. If you can afford one and want to add solar astronomy to your astronomical experience, get a Coronado PST it is truly a WINNER in my book.

One foot note the time that I first wrote this article, I purchased a "Mini-EQ mount and Astro-Track drive from Orion. This is a light weight table-top equatorial mount with a single axis electronic clock drive that gives me the ability to have a portable, tracking platform with a grab and go scope. Kind of the best of all worlds.

All of the feature in the Images below can be seen in the Coronado P.S.T.





Clear *and* Moonless?

or, The Moon Really Does Suck

by Doug Scobel

Like it or not, we amateur astronomers are dependent on the weather. And living in Michigan, surrounded by the Great Lakes, the weather is a not a good thing on which to depend. We seem to have more than our fair share of cloudy nights, which is understandable considering we're surrounded by water.

We deep sky (and comet) observers have it even worse. If your favorite quarry is both faint *and* fuzzy, then you not only need a cloudless sky, but also, a *moonless* sky. This basically cuts the number of available observing nights in half. And few of us can go out observing at a moments notice; the complications of real life, such as family and social commitments, and that necessary evil called "work", reduce the number of available nights to do our favorite activity to a very small number indeed.

Now to the subject of this article. If you've been observing as long as I have, then I'm sure that you'll agree that we have many more clear nights with an interfering moon than we have without it. You know what I'm talking about. When the moon isn't in the picture we'll go two weeks with nothing but clouds. Then as soon as the moon reaches first quarter, we'll have several perfectly clear nights over the next two weeks, giving us beautiful views of that big, bright, stinkin', dark-sky-spoiling orb. Then just like clockwork, after last quarter, the clouds return, and the cycle continues ad-infinitum. It's enough to make you want to get rid of your big Dob and take up double star (sorry, Chris) or (gulp!) lunar observing, for crying out loud! The scientist in us tells us that it can't possibly be – that it's simply coincidence. But in your heart of hearts you know it to be true.

Now up to this point in time I've tried to tell myself that there can't be any such correlation between the phase of the moon and the clarity of the sky, but my wife Debi has set me straight. She calls it her "Theory of Dispensation", and it goes something like this. When the moon is within a week either side of being full, there are two compounding (or is that confounding?), physical forces. First, the moon exerts a stronger than normal gravitational pull on the water vapor in the air. Second, there is the light pressure from all that reflected sunlight. The extra gravity sucks the bulk of the clouds right out of the air, and the added light pressure blasts away any remaining water molecules. The result is a perfectly clear, but moonlit, sky. Between last and first quarter, the earth blocks the majority of the moon's gravity and light and the clouds are free to make their return appearance, as they invariably do.

And why shouldn't moon have just such an effect? It has a lot of other effects about which we're already aware. The obvious one is the ocean tides. Fishermen have for decades relied on so-called sol-lunar tables to predict times when fish are more likely to be active. Workers at hospital emergency rooms will tell you that there is a higher frequency of accidents during the days preceding and following the full moon. And need I even mention the Wolf Man?

You may be chuckling to yourself, but I'm writing this on Halloween night. The moon is a couple days past first quarter, and it's the most beautiful, clear, yet washed-out, moonlit sky I've seen since, well, a month ago when the moon was nearly full. And need I remind you of the cloud/rainouts at this year's Black Forest Star Party and Great Lakes Star Gaze? I rest my case.

Will you see Debi's theory published in Sky and Telescope, Scientific American, or even the National Inquirer? Probably not. But until I come up with a better theory, I won't argue with her. The evidence is overwhelming.

[Coming next time – Debi explains all about black holes. Stay tuned!]

Special Lowbrow Info

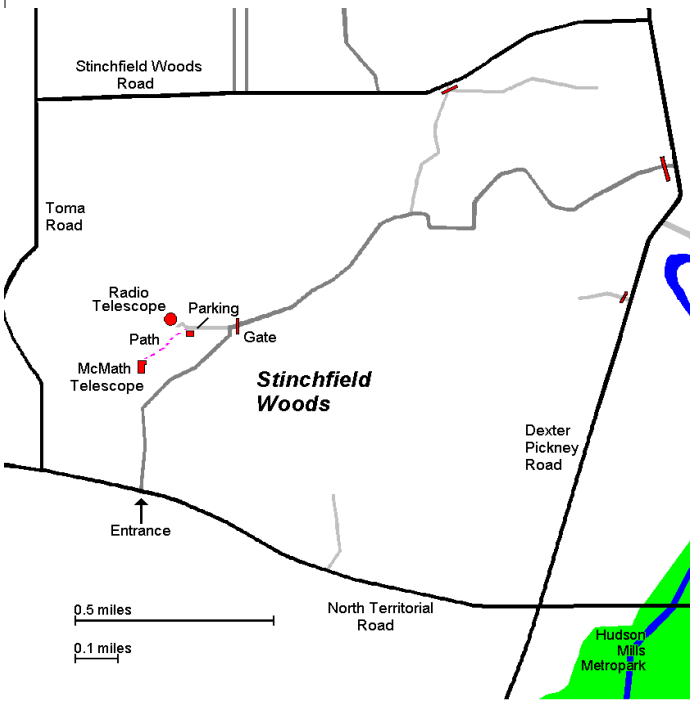
- **Saturday, November 4, 2006.** (10:30 am). Saturday Morning Physics. (Hosted by the University of Michigan Physics Department). Eli Rykoff. "Apocalypse Maybe: Speculative Doomsday Scenarios for the End of the Earth."
- **Wednesday, November 8, 2006.** (2 pm to sunset). Observe the 2006 Mercury Transit. (Hosted by the Hands-On Museum and the University Lowbrow Astronomers). A Mercury transit occurs when the planet Mercury travels directly between the Sun and the Earth. On average they occur once every eight years (that is an average, the interval between two transits can be shorter or longer). This event will take place rain or shine. If it is cloudy, you can observe the transit remotely at the Hands-On Museum. If it is clear, there will be telescopes set up to observe the transit (the location will be outside near the Hands-On Museum). [This event is still being planned. To learn about the Hands-On Museum, see the web site http://www.aahom.org/].
- **Saturday, November 11, 2006.** (10:30 am). Saturday Morning Physics. (Hosted by the University of Michigan Physics Department). Eli Rykoff. "Apocalypse Maybe: Speculative Doomsday Scenarios for the End of the Earth."
- **Friday, November 17, 2006.** (7:30 pm). Monthly Club Meeting.
- **Saturday, November 18, 2006.** (10:30 am). Eli Rykoff. Saturday Morning Physics. (Hosted by the University of Michigan Physics Department). "Apocalypse Maybe: Speculative Doomsday Scenarios for the End of the Earth."
- **Saturday, November 18, 2006.** *May be cancelled if it's cloudy or too cold.* (Starting at Sunset). Open House at Peach Mountain.
- **Saturday, November 25, 2006.** *May be cancelled if it's cloudy or too cold.* (Starting at Sunset). Open House at Peach Mountain.
- **Friday, December 15, 2006.** (7:30 pm). Monthly Club Meeting.

Saturday, December 16, 2006. *May be cancelled if it's cloudy or too cold.* (Starting at Sunset). Open House at Peach Mountain.

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 Kathy Hillig

7654 W. Ellsworth Road
Ann Arbor, MI 48103

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

Sky & Telescope - $32.95 / year

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

For more information contact the club Treasurer. Members renewing their subscriptions are reminded to provide the renewal notice along with your check to the club Treasurer. Please make your check out to: "University Lowbrow Astronomers"

Newsletter Contributions

Members and (non-members) are encouraged to write about any astronomy related topic of interest. Call or Email the Newsletter Editor: **Mark S Deprest (734)223-0262 or msdeprest@comcast.net** to discuss length and format. Announcements, articles and images are due by the 1st day of the month as publication is the 7th.

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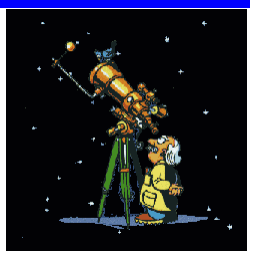
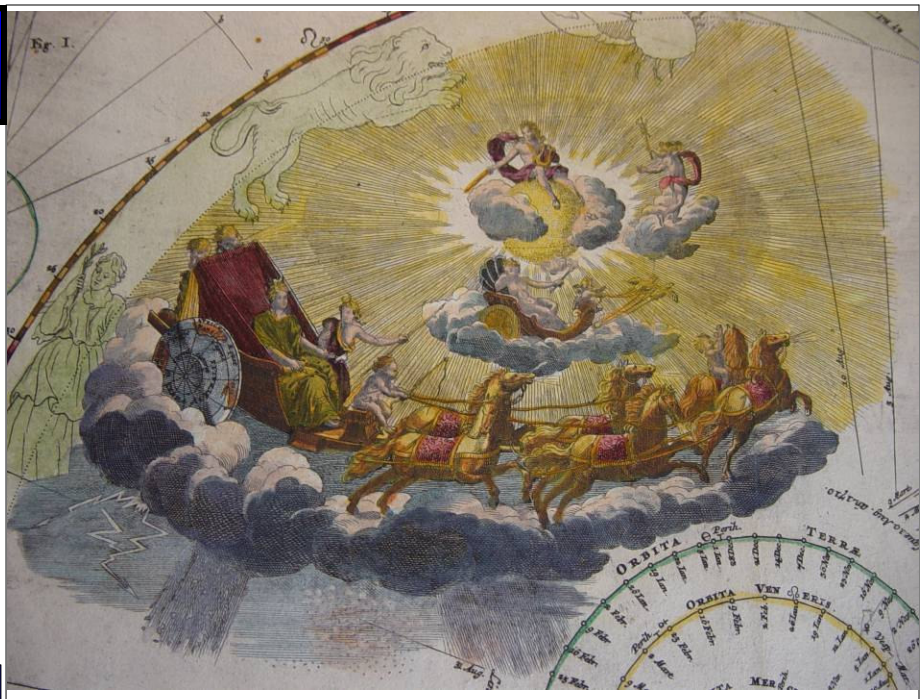
Reflections & Refractions



Website
www.umich.edu/~lowbrows/



In 1742, Johann Doppelmayer features transits of Mercury and Venus in *Atlas Coelestis* while describing phenomena associated with the inferior planets

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Check your membership expiration date on the mailing label