REFLECTIONS / REFRACTIONS

University Lowbrow Astronomers

Ann Arbor, Michigan

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A Night at EMU's Sherzer Observatory

by Doug Scobel

On the evening of January 26, 2006, a handful of hardy Lowbrows answered Norbert ("Norb") Vance's invitation and visited Sherzer Observatory on Eastern Michigan University's campus. Yours truly was joined by Mark Deprest, Nathan Murphy, and Tom Ryan.

When I arrived, Norb gave me a personal tour of the astronomy rooms and the observatory. Lots of scopes, computers, and other equipment, with the ten inch Astrophysics APO refractor, on a massive Byers mount, all in a huge dome, being the centerpiece. You would never guess that the building had burned almost to the ground in 1989. They matched the old architecture very well, preserving the character of the original building, but without sacrificing modern conveniences, such as an elevator.

Next was the regular EMU astronomy club meeting, which Norb started by giving an excellent talk about Saturn, which would reach opposition the next day. Next was an entertaining liquid nitrogen demonstration, during which he froze a number of objects ranging from a transistor radio to a Twinkie. I was impressed and surprised by the number of students that attended – puts our meetings to shame.

By now it had gotten dark enough and Saturn had risen high enough, so out we all went to observe. The dome was packed with people eager to look through the big scope, so we Lowbrows went to the roof. Besides, it was not even 9:00 pm, so we knew that the views through the big APO would be better later. They had a number of six and eight inch Dobs and small refractors set up. We commandeered a few of them (hey, who's open house is this, anyway?) to show some folks some bright objects, such as Mars, Saturn, M35 or the Double Cluster. I amazed everyone by finding the Eskimo nebula, but that was only because I knew right where to find it after observing it the previous Saturday at Peach Mountain.

After most folks had gotten their fill of the night sky (or cold toes) and went home, we finally moved into the dome. Wow! What views! Saturn was crisp, the ringed world displaying beautiful structure in its rings and delicate banding across its disk. We also looked at the Trapezium area in M42, the great nebula in Orion, at both high and low magnifications. There was so much detail, in particular the myriad tiny stars throughout the nebula, that it defies description. Those are the kinds of views that only a large refractor can deliver!

Speaking for myself and for the rest of the Lowbrows in attendance, here's a big Thank You Norb for your hospitality, and to congratulate you on assembling a first-class astronomy facility at EMU. You have a right to be proud of what you have there. As for the rest of you Lowbrows who were not there, you owe it to yourself to get over to Schezer Observatory the next clear Thursday night – you won't be disappointed!

For more information on Sherzer Observatory, visit http://www.physics.emich.edu/sherzer/history.htm

Important Club Info

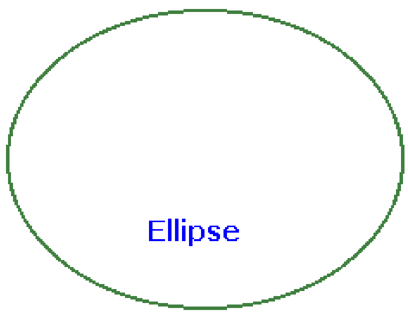
- April 1 – Public Open House at Peach Mt. Observatory starts at dusk
- April 21– University Lowbrow Astronomers' monthly meeting and annual Elections 7:30pm room 130 Dennison Bldg.
- April 22 – Public Open House at Peach Mt. Observatory starts at dusk
- April 29 – Public Open House at Peach Mt. Observatory starts at dusk
- May 19 – University Lowbrow Astronomers' monthly meeting 7:30pm room 130 Dennison Bldg.
- May 20 – Public Open House at Peach Mt. Observatory starts at dusk
- May 27 – Public Open House at Peach Mt. Observatory starts at dusk

Gravity, Part 2: Newton, Hooke, Halley and the Three Body Problem.

by Dave Snyder

The next time you look up at the night sky, consider this: everything you see is moving. We've known for thousands of years that planets move. More recently we discovered that stars move; there are galaxies and they move as well. Gravity explains most of that motion (most but not all).

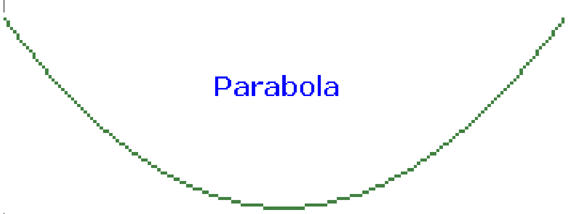
In the beginning Astronomy was only a means to predict planetary motions. The first predictions were made with mechanical devices - they weren't very accurate, but the accuracy slowly improved. Eventually mechanical devices were replaced with mathematical equations. Only equations allowed enough accuracy for Astronomy to become a true science. In this article I will attempt to give a broad outline of how this happened (a complete description would require many equations and many pages, I'm not going to attempt that - if you really want to see equations, see the references).



I talked about General Relativity in Part 1 of this article. General Relativity is the most accurate theory of gravity we have, but it is much harder to use than Newton's Theory of Gravity. For that reason Newton's Theory is used for astronomical calculations in most cases. This is the story of how Newton's Theory was developed.

People have known for a long time that planets move, and have been able to make rough predictions, but precise predictions were impossible until Johannes Kepler. In the early 1600's Kepler studied the motion of Mars - after eight years of hard work he produced what we now call Kepler's equation, it showed the planets orbit the sun in ellipses and they move faster when close to the sun - slower when farther from the sun.

Similarly people had a rough understanding of how apples and other objects fall to the earth, but Galileo Galilei was the first person to collect data on falling objects (actually balls rolling down a sloped platform). From these data he produced an equation that showed falling objects travel in parabolas.



While the work of Galileo and Kepler were significant achievements, they left open questions. No one knew how to predict the arrival or motion of a comet. In addition, neither man seemed to make the connection between the motion of the falling apple and the motion of the planets (they were considered to be two different phenomenon with two different equations). Nor could they explain ***why*** apples or planets move the way they did (Galileo viewed Kepler as a rival, and the two did not work together even though they were working on somewhat similar problems at roughly the same time).

The questions remained unanswered for over seventy years. Between 1679 and 1680 Robert Hooke exchanged a series of letters with Isaac Newton. The letters covered a wide variety of scientific topics. In one of the letters, Hooke mentioned a hypothesis that the Sun exerted an inverse square force. Supposedly the Sun pulls on the planets, and this force gets stronger the closer you are to the Sun. Hooke claimed the force caused the elliptical orbits of the planets.

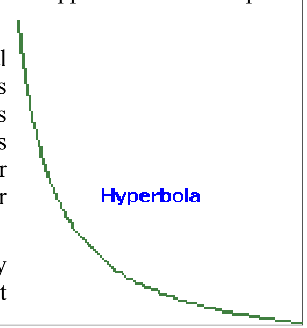
Newton replied he never heard of such a hypothesis. He thought about the problem and soon produced a proof that an elliptical orbit can result from an inverse square force. Newton was a very secretive man and began to view Hooke as a rival. He felt that Hooke didn't have the mathematical skills to produce a proof himself and apparently saw no need to tell anyone that ***he*** had produced such a proof, especially Hooke.

In the meantime, Edmond Halley, a young astronomer with a variety of interests, started examining historical records of comets. Comets have been seen for hundreds of years and previous astronomers had made many observations. In 1682, he observed a bright comet. Halley had collected his comet observations and observations of other astronomers. When Newton found out, he asked Halley for copies. But Halley didn't do anything further with comets (at least not for a while).

A few years later Hooke told Halley about the inverse square hypothesis and claimed he had a proof (it is unlikely Hooke had a proof, but Halley couldn't have known that). Halley viewed it as a challenge, but slowly realized he needed help and so he went to visit Newton.

After this initial meeting, Halley visited Newton frequently, over the course of these visits Newton showed Halley his proof as well as many other unpublished papers. Halley realized there was a gold mine of ideas that no one else knew about. Halley wanted to Newton to publish. Newton was reluctant, but Halley was persistent. With a lot of encouragement from Halley, eventually *The Principia*, Newton's masterpiece was published.

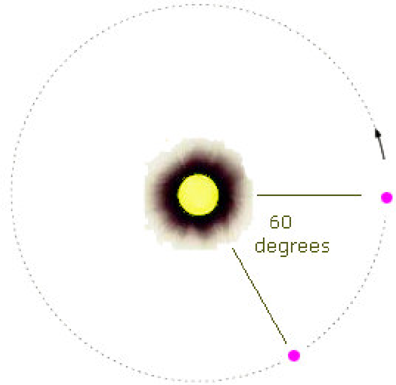
While it covers a variety of topics, for our purposes the most relevant part of *The Principia* is the theory of gravity. Newton assumed there was a gravitational force between every pair of objects (an inverse square force as Hooke had suggested). This force caused the apple to fall and the planets to move around the Sun.



However knowing there is a force is not enough to make a prediction; Newton showed how to take the gravitational force, the equation $F=ma$ and a newly invented mathematical technique called the Calculus to compute an orbit. His technique didn't always produce a result. If you have a system of two objects (say a star with a single planet), it tells us the objects will orbit in an ellipse, a parabola or a hyperbola (depending on the exact conditions). It doesn't give us a result if there are three or more objects. In other words we can't use this approach to compute the orbits in our solar system since there is the Sun, six planets (Uranus, Neptune and Pluto hadn't been discovered yet), ten moons (four for Jupiter and six for Saturn) and an unknown number of comets. Something more is needed.

Producing an exact solution for Newton's equations with more than two objects became known as the three body problem. Newton didn't know how to solve the three body problem, he realized it was difficult (in fact he claimed it was too difficult for humans to solve). From the time of Newton up to the present, many people have studied it; some progress was made and a few specialized solutions were discovered.

The easiest to explain involves a star and two planets. Assume that both planets are in the same elliptical orbit around the star. If the two planets are separated by 60 degrees, the planets will remain in the same orbit following Kepler's equations separated by 60 degrees.



A few other solutions have been discovered. (I will not go into them here as they are harder to explain). However they are all special cases: of the numerous possibilities in the real universe, only a handful have an exact solution. It is unlikely that there ever will be an exact solution that applies to the real universe. This seems to imply we cannot compute the motion of anything.

But it isn't hopeless; there are four general approaches. I'll start with the first of these approaches (in future articles I will discuss the other three). Start with an exact solution (usually a two body solution but sometimes a three body solution). Then ask: what happens when additional bodies are added? We can't get an exact solution, but we can approximate it by pretending the additional bodies "perturb" the motion of the other bodies. While I won't go into the details, it is possible to calculate approximate orbits in this way (these approximate orbits are frequently very close to the correct result, so close the difference is often too small to be measured).

Different procedures are used for the three common cases: the planets, the moon, and comets. The procedures are similar; the biggest differences are caused by two facts: comets have more eccentric orbits than planets, and comets sometimes get close to the sun or a planet (usually Jupiter). The eccentric orbits and the close approaches make computations more complicated.

Newton made the first attempt to calculate the orbit of a comet. Halley used Newton's technique and the observations of a comet to compute its orbital elements (a set of six numbers). Once the orbital elements are known, it was possible to obtain a Kepler orbit. (Getting good orbital elements can be tricky, inaccurate orbital elements will lead to inaccurate orbits). Halley repeated this for a number of comets and by 1705 he had determined that the comets of 1531, 1607, and 1682 had very similar orbits (as I mentioned above, Halley saw the comet of 1682). He concluded they were different apparitions of the same comet that took 76 years to orbit the sun (we now call it Halley's comet). This proved at least one comet had an elliptical orbit. In time the orbits of other comets were computed. We now know that most comets travel in ellipses, but a few travel in parabolas or hyperbolas.

Jupiter and the other planets will perturb the Kepler orbit for a comet. Perturbations slowly shift orbital elements over time. Halley was the first to notice that Jupiter perturbed a comet. There is no known way to precisely calculate the effect, but over the next hundred years techniques to approximate perturbations were invented and slowly improved. These techniques were applied to both comets and planets. The fact that comets underwent perturbations was clear, but irregularities in the orbits of Jupiter and Saturn were noticed as well. These irregularities were accounted for by perturbations between these two planets as well as a new planet, Uranus. Using perturbation analysis and another technique (variation of the arbitrary constants), by 1800 astronomers were able to account for most of the irregularities of comet/planet/moon orbits. Even if you knew the orbital elements for a comet or planet, the orbital elements will need to be updated if you track the object ! over several months or longer. (There is no known way to calculate accurate orbits over extremely long periods, say a billion years or longer).

However there still were some issues. Tiny discrepancies in the orbit of the Moon couldn't be accounted for. Starting with Newton and continuing up to this point, all calculations assumed that planets and other bodies were perfect spheres. Once astronomers realized that this oversimplification was the problem, the Moon's orbit made sense (in brief - interactions between the Moon and the Earth's oceans affect the Moon's orbit). There also were tiny discrepancies in the orbit of Uranus and of Mercury that weren't understood. These issues were also resolved eventually (with discovery of Neptune and General Relativity).

In part 3 of this article, I plan to give other examples on how Newton's Law of Gravity is used.

The following references were used to prepare part 2.

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Diacu, Florin and Holmes, Philip. 1996. *Celestial Encounters: The Origins of Chaos and Stability.* Princeton, New Jersey: Princeton University Press. [*Can you predict the orbits of the planets over billions of years?*]

Ferris, Timothy. 2003. *Coming of Age in the Milky Way.* New York: Perennial, an imprint of Harpers Collins Publishers *[historical information on Kepler, Galileo, Halley and Newton].*

Hawking, Stephen. 2004. *The Illustrated on the Shoulders of Giants: The Great Works of Physics and Astronomy.* Philadelphia, Pennsylvania: Running Press Book Publishers *[historical information on Kepler, Galileo and Newton].*

Halley, Edmond. *A Synopsis of the Astronomy of Comets.* Translated from the original, printed at Oxford. London, 1705. Based on information from English Short Title Catalogue. Eighteenth Century Collections Online. Gale Group. (Gale Document Number CW107356038).

Meeus, Jean. 1998. *Astronomical Algorithms, 2nd Edition*. Richmond, Virginia: Willmann-Bell, Inc *[computing planetary orbits].*

Moulton, Forest Ray. 1970. *An Introduction to Celestial Mechanics, 2nd Revised Edition.* New York: Dover Publications, Inc *[computing planetary orbits].*

Newton, Issac. 1999. *The Principia, Mathematical Principles of Natural Philosophy.* Translated by I. Bernard Cohen and Anne Whitman, assisted by Julia Budenz. Preceded by "A Guide to Newton's Principia" by I. Bernard Cohen. London, England: University of California Press. [This is a translation of the 3rd edition of *Philosophiæ Naturalis Principia Mathematica* (or if you prefer English, *Mathematical Principles of Natural Philosophy*) written by Sir Issac Newton, 1726. It can be referred to as simply *The Principia* and describes Newton's Theory of Gravitation among other things. *The Principia* has a well deserved reputation as difficult to follow. Early translations used archaic terminology. This translation is somewhat easier to read. The first half of the book gives a history of Newton including his interactions with Hooke and Halley, and how the *The Principia* came into being].

First Light

By Michael Radwick with images by John Causland

Everyone knows that feeling - the anxious anticipation experienced between the time you purchase or build new optics, and the time you actually get to use it for the first time. For me, it started with a mild case of aperture fever about a year ago…

I think there is no such thing as a mild case of this disease. It creeps up on you when friends, family, and even co-workers show up on clear nights, and let you look at the sky with their newest toys. I just knew I had to upgrade from my 90mm Maksutov-Cassegrain telescope. I started dreaming about those big 'scopes some of you possess, and started shopping around. Originally, I thought about a 200mm (8 inch) telescope. But then the fever grew worse, and I knew I had to have a 250mm (10 inch) 'scope. As the days went by, I started dreaming even bigger. Yep, in my minds eye, I saw myself toting around a 460mm (18 inch) scope before I finally said to myself: **How am I going to move such a monster in my little car**? I also started saving my pennies, for I realized this was going to be a major purchase. I realized that there would be a second purchase in my immediate future – A new car of course.

About 6 months ago, I decided that I was going to buy a StarMaster telescope. Many factors went into the decision: I considered portability, ease and time needed for setup and teardown, and ease of use. I also liked the fact that you could have digital setting circles and computer-controlled go-to and track installed. The ability to switch back and forth between computer-controlled and traditional hand-guided star-hopping modes without resetting the computer was a big plus. The fact that another club member owns a large StarMaster did not hurt, since I could see what the telescope looked like, and how it worked firsthand. I also knew I would have many questions when the telescope arrived, and there is nothing better then knowing that help is only a soft shout away as you fumble around in the dark. My biggest concern was whether or not my current (1.25 inch) eyepieces would work in the new scope, and if my web-cam could be used. I'll say more on this a little later.

In the end, the really tough decision was the aperture. I simply could not decide between the 16 inch versus the 14.5 inch telescope. I asked many of you what you considered better, and why. Your answers included factors such as weight, cool-down time, differences in light-grasp, etc. But one thing was not mentioned that eventually swayed me: the height of the eyepiece when the telescope is pointed straight up. I do not want to climb a step-latter to observe. I'm far too clumsy, I am afraid I would fall down one night, and damage the telescope (never mind damage to myself). The eyepiece on the 16-inch model is too high, but 14.5 inch is "just right". I don't have to bend over, nor stand tippy-toe to see. Hopefully, I won't shrink too much as I get older.

On Saturday, Dec 10, I sent my first email to StarMaster with a couple of minor questions. I figured that I would see a response on the following Monday, but I was in no hurry. But in fact Rick Singmaster (proprietor of StarMaster) called me at home that very night (a Saturday!) at about 7:30pm local. Even though his shop is in Kansas, and thus a couple of hours behind us, this is still pretty late. Rick answered all my questions and concerns very quickly. We spent about over hour on the phone, discussing things I had not considered (such as collimation). Truly, Rick enjoys talking about astronomy; I was impressed by this personal touch.

The following Monday (Dec 13), I placed an order for a 14.5 inch telescope, with almost every option. I was pleasantly surprised when they indicated it would take 60 to 90 days for the telescope to be built. I expected a much longer wait, but Rick indicated that the last set of mirrors he had ordered (but had not yet arrived) included a 14.5 that had not been sold yet. I was to get the last one in the set; the next person ordering a telescope will wait about twice as long.

In the universe I live in, I generally expect anything I order to take much longer than expected. Still, I figured I would have the new toy sometime in the spring, just as the winter clouds became a memory. So imagine my very great surprise when an email arrived on January 12, indicating that my 'scope had been completed and tested! Only *one* month after being ordered! I was told that the telescope would be ready to ship in about a week (they were waiting for a new digital-setting-circles computer). On Monday, January 30, I was notified that the telescope had been shipped, and should arrive in about 4 days. Exactly 4 days later, the telescope arrived, on time.

The scope arrived in 7 big boxes. The pieces were so well packed that it took me 3 hours to open every box, remove all the bubble-wrap, and take inventory. StarMaster takes no chances; everything arrived in pristine condition. Do you know that "new car" smell? I was floating about in my living room on the "new telescope" smell (which actually smells a lot like curing lacquer). I spent the rest of the day putting the scope together, and making sure the electronics worked properly (everything was fine).

Still, when things start going too well, the universe will throw something at you to counter-balance the affect. For astronomers, this means clouds. Lots of clouds. Endless night after cloudy night. Two days after the telescope arrived, Mother Nature provided us with 4 inches of snow. I had to rearrange my family room to create space for the scope. I used the time to assemble, collimate, disassemble, reassemble, and re-collimate. After all, practice makes perfect, and I did not want to waste time on the next clear night. Every night I looked outside wishing it would clear up. On February 7th, a brief hole opened up in the late afternoon, so I rushed home to gather "first light".

The opening in the sky lasted only a couple of hours, yet this was enough time for me to set the scope up, rush through collimation, and point it at the moon. My neighbors noticed right away, and came by to talk, and to see what I was up to. All I wanted to do was to observe, but one must be polite. Nonetheless, the view of the moon was truly outstanding. I could easily see features in the twilight of the setting sun that I could never have seen in my little 90mm. But I could also see that the image was not equally sharp in the entire field of view. So I took a quick look at Mars. And found that poor Mars looked more like a comet than a planet. I decided to check collimation, and yes, I had done a poor job. Unfortunately, the clouds rolled back at this point, so I had to pack things up.

Those of you who spend hour after hour under an open sky searching for faint fuzzies know that Mother Nature is often very whimsical. She is sometimes a harsh mistress. So it was on Valentines Day that the next usable opening occurred in the sky. How cruel, to choose between one love and my better half on this day. My better half won, of course. But I am fortunate that she is an understanding woman. Lisa indicated that I could observe from the driveway until she came home from work. On this particular evening, it turned out she was kept at work, so I had plenty of observing time.

I took my time collimating the scope. The first target: Rigel. At very low magnification, I could see that my effort paid off – I could very easily see its companion (a magnitude 6.7 star about 9 arc-seconds from the brilliant 0.1 magnitude primary) and there were no funny streaks. Next, I pointed the scope at M42. It was still too bright to see the nebula, but my goal was to look at the trapezium. Again, a perfect image. Although I was using low power (about 73X), I could easily see all six stars. Those stars were perfect pinpoints.

I spent the next 90 minutes hunting the sky, mostly looking at various open clusters. I did take a moment to return to Mars, and found the red planet to look as good as could be hoped for. Finally, I pointed the telescope at my favorite object, Saturn. All I can say is *wow*. You will have to wait for the next Open House to see what I mean.

Thirty-three … Almost

By Mark S Deprest

Michigan astronomy ain't easy; you got to work for it. You have to be willing to give up a little sleep now and then just to find a few hours of clear skies. Michigan astronomy in the winter?? Forget about it! The few clear nights or early mornings are usually frigid and windy and if you do get a "nice" night where the winds are less than double digit knots and the temperature is greater than single digits, you will probably be dealing with a full moon!

So, when I saw that the early morning hours of Sunday, February 26, 2006 promised to be clear and Comet C/2006 A1 Pojmanski would be at its brightest and rising in the east about 1.5 hours before sunrise. There was only one thing to do … set the scope up at Leslie Park, in northeast Ann Arbor, at about 04:30.

In case you weren't aware of it, I have this thing about comets. I guess it's like an obsession, if there is a comet that is visible in the sky, I must see it! I find that my passion for observing comets is like an unquenchable thirst, as soon as I hear that a new comet has been discovered, I start to follow its progress thru the inner solar system. And if it gets bright enough to be seen in moderate size telescopes, (just about 13th magnitude or brighter) I start to plan my next observing session. With one aim, to catalog an observation of that comet! To date; I have cataloged 32 different comets that started with Hyakutake in 1996. I am fascinated by them, and the fact that we can see them at all is simply incredible. Here is an object that might be a couple of dozen miles in diameter, comprised of a tenuously held together collection of "left-overs" from the beginnings of the solar system, locked in deep freeze, and not getting much closer to the earth than a couple million miles, and yet can sometimes be bright enough to be seen in broad daylight without the use of a telescope, if you don't find that amazing then there is something seriously wrong with you and I hope for you a speedy recovery!

Lets get back to the wee hours of Sunday, February 26, 2006 and Comet C/2006 A1 Pojmanski, which was discovered in the southern hemisphere and has been brightening rather quickly as it moved toward perihelion (closet approach to the sun) on February 22, 2006. As it rounds the Sun it moves into the northern hemisphere, we should get a good look at the first comet discovered this year, which may be bright enough to see with unaided eyes. According to the latest magnitude estimates the comet should be at its brightest (5.2 magnitude) between February 22nd and March 2nd which coincidently coincides with the dark of the moon, how utterly fortuitous!

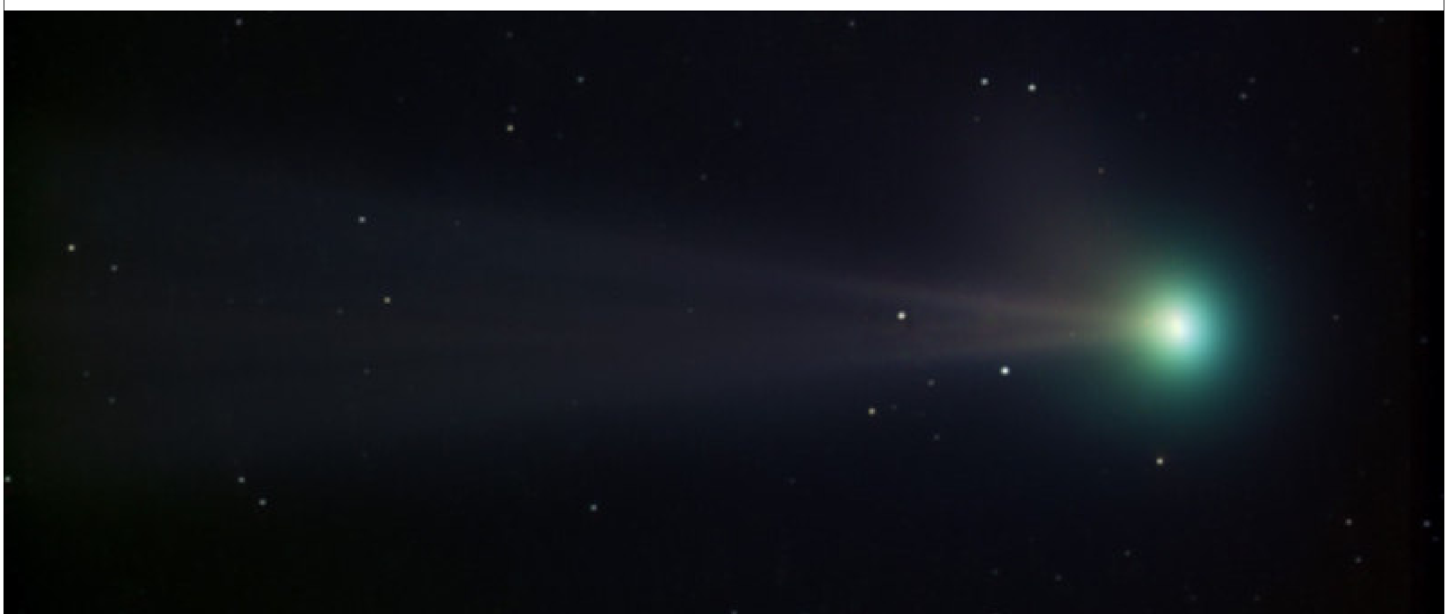
I should be able to pick up my 33rd comet fairly easily, except for the fact that I live in southeastern Michigan and as I explained earlier, astronomy during the Michigan winters is even more tenuous than a comet's composition! But the weather reports for Sunday morning were very promising; the Clear Sky Clock was predicting clear skies for Ann Arbor from 01:00 thru 09:00! AccuWeather was also calling for clear skies, albeit rather cold and breezy. Okay, real cold and kinda blustery. Alright, alright "frickin' frigid" and windy, are you satisfied! But if you're an astronomer in Michigan your tolerance for lower temperatures is greater, right? Well, we'll answer that question a little later.

Now, when I go hunting for comets, I do a fair amount of "prep" work after all, "proper planning prevents poor performance!" Saturday, February 25th, I printed off my finder charts using the latest comet elements, and I checked my figures twice. I decided to use my 5" f/5 refractor on it's equatorial mount with "goto" capabilities, mainly because I was worried about the low altitude of the comet and the windy conditions, both factors are not good for the 12.5" dob. So I checked my batteries and made some minor adjustments to the Equatorial mount. And I checked the weather throughout the day on Saturday and the forecast was improving all day long. This is great, and I went to bed early in anticipation of clear skies at 03:30 when I planned on waking.

At 03:30 when my alarm went off, I looked out my window and clear skies is what I saw, with stars bright and crisp, this was going to be a good day! So, I put on my "thermal longies" and grabbed the rest of my cold weather wear and went downstairs. When I got downstairs I check the skies again … still clear. I could see Jupiter shining brightly in the south and I was happy. I figured I had plenty of time to get over to my observing site, so I made a pot of coffee and ate some yogurt and a granola bar. While I was waiting for the coffee to finish, I checked the weather on the computer; the forecast was holding clear skies just for me and my quarry! As I left the house I looked up and saw wonderfully clear skies filled with bright stars, and one little wisp of a cloud moving swiftly to the south-southeast, hardly enough to worry about. When I arrived at Leslie Park, (a scant 2 miles from my house) I noticed a few more of those wispy low floating nebulae, quickly moving south-southeast and disappearing. It was 04:30 and time to start setting up, I would be hunting down Comet C/2006 A1 Pojmanski in less than an hour and a half, so I needed to get busy. I got the scope set up and polar aligned by 04:45 and the sky was still pretty clear, except for a couple of medium-sized puffy clouds off to the northwest. The batteries needed to be warmed up as the temperature was about 10 degrees and with the wind it was probably -10 degrees. And I was a little chilled too, so into the SUV with the batteries and me to warm up a little bit. It was 05:15 time to set up the alignment on the "goto" and do a little observing, so as I am hooking up the batteries and powering up the "goto", I noticed a rather large cloud moving in from the north-northeast. And I just managed to complete my two star alignment, as the cloud covered the sky. But all was not lost, this cloud was moving fast and I could see a clearing to the north, I just needed to be patient. By 05:30 that clear sky the weather reports promised was not looking as great as it was a half hour ago. Fifteen minutes later and the sky once again was clear, this was more like it. I took a quick look at Jupiter thru the scope and made sure no one had come along and painted it purple or anything, no worries it was still there and its usual color. Then I pushed a couple of buttons and the scope slewed its way over to Venus; just about 10 degrees above the horizon. One of the reasons I like observing at Leslie Park is the low horizon, even though it not as dark as Peach Mt., it does have great horizons. My comet was 8.25 degrees due east of Venus and just about to clear the trees … when from out of the north east came a sky covering cloud and Venus disappeared! Okay, don't panic, it could clear in a few minutes … maybe … I still have time, it's not going to start getting light for at least another … fifteen minutes. I'll just be patient … just a few minutes more … and … maybe a few more. Come on! Cloud get moving … this just ain't fair! But I need to remember that Michigan astronomy can be disappointing at times and I need to keep my perspective. I looked all around me and I couldn't find anything that resembled a clear patch of sky, and now I could see the first orange light of the sun reflecting off the bottom of the cloud that was blocking my view of Comet C/2006 A1 Pojmanski! I waited patiently for 15 more minutes hoping for some quick clearing, but Michigan astronomy in the winter is sometimes very disappointing, and I needed to be a good sport about it. After, all I did get a quick look at Jupiter and Venus … the heck with this good sport crap! I'm pissed and I'm cold and I want my Comet, I want it , I want it, I WANT IT!!!!

Okay, I'm better now, and as I put the last of my telescope and other observing equipment into the SUV and the sun poked up over the eastern trees the sky became crystal clear, a beautiful winter's dawn lit up the sky and the stars and comet will have to wait for another time to be observed by me.

Oh yeah, do you remember me insinuating that Michigan astronomers have a greater tolerance for frigid temperatures … I think that's only true if you manage to see what you froze your butt off for, because it definitely didn't hold true for me and my frozen butt, I was COLD!!!!



Comet C/2006 A1 Pojmanski this is why I froze my butt off! *Image by R. Jay GaBany on March 3, 2006*

As per the Club's By-Laws

The Treasurer's Report by Kathy Hillig

University Lowbrow Astronomers 2005 Balance Sheet

Expenses		**Income**	
Telephone bills	$11.95	Dues @ $20 (72)	$1,440.00
	$11.95	Dues @ $12 (24)	$288.00
	$11.95		
	$11.95	Donations	$547.00
	$11.95		
	$11.95		
	$11.95		
	$11.95		
	$11.95		
	$11.95		
	$11.95	Calendars & OH	$1,179.00
	$11.95		
Moons - Observatory expenses	$95.50	**Total Income**	$3,454.00
Moons - mileage for Chicago	$258.11		
Wadsworth - mileage for Chicago	$234.50		
Hillig - stamps & accounting pad	$9.62		
Hillig - stamps	$11.00		
Int'l Dark Sky Assoc.	$50.00		
GLAAC - pamphlet printing	$42.40		
Clear Sky Clock			
Newsletter expenses	$307.37		
RASC-calendars & OH	$854.50		
		Current account balance (3/1/2006)	$4,877.90
Total Expenses	$2,006.40		

Nominees for Officers 2006

President	Charlie Nielsen
Vice-Presidents	Jim Forrester
	Nathan Murphy
	Kurt Hillig
	Bobby Grusczynski
Treasurer	Kathy Hillig
Observatory Director	D. C. Moons
Webmaster	Dave Snyder
Newsletter Editor	Mark S Deprest
O. D. Emeritus	Percival Lowell

Elections for officers will be held at the April monthly meeting and nominations are open until elections. Elections are usually by show of hands unless the position has multiple nominees, then it would be by written ballot, in accordance with the by-laws.

Officer Positions available: President—1; Vice-Presidents—3 or more; Treasurer—1; Observatory Director—1; Webmaster—1; Newsletter Editor—1; O. D. Emeritus—1 (must be dead to serve).

Remember, it takes a lot of extra effort and time to keep this club and equipment operating as smoothly as it does. There are many people that, voluntarily give that effort and time. The officers and members of the committees deserve our thanks and appreciation.

If you are interested in being an Officer or performing one of the many volunteer positions it takes to keep this club moving forward, please contact Charlie Nielsen at: cdnielsen1@aol.com or (734) 747-6585.

Hours and Events at Sherzer Observatory

The observatory is open on *clear* Thursday evenings from September through April (academic year) following Astronomy Club meetings, and at select times during spring/summer terms (May through August). The observatory is operated by Physics & Astronomy staff and student volunteers from the EMU Astronomy Club . The club meets on Thursday evenings at the observatory in Room 402 Sherzer. Call (734) 487-3033 or check the club web page for an update of open houses and general public observing hours. Group tours can be arranged by contacting Mr. Norbert Vance in the Department of Physics and Astronomy at (734)487-4146.

Norb Vance has lots of toys to play with!

Top right—Norb with 10 inch f/14 Astro-Physics Apochromatic refractor!

Middle left—an arsenal Dobs, SCTs, and other optics for public star parties!

Middle right—a fully equipped “Astro-Lab” with a Planetarium Projector and mini dome.

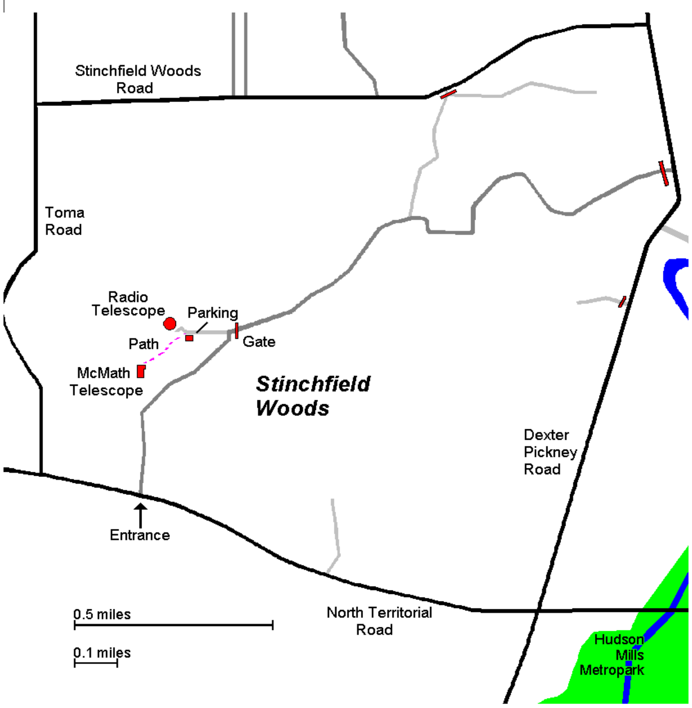
Bottom left—a beautifully restored 6 meter dome to house a rock-solid modified Byers equatorial mount.

All images by Tom Kasper

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, and $12 per year for students and seniors (age 55/+). This entitles you to the monthly Newsletter and use of the 24" McMath telescope (after some training). Dues can be paid at the monthly meetings or by check made out to University Lowbrow Astronomers and mail 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 - $29.00 / year

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

Newsletter Contributions

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

Telephone Numbers

President:	Charlie Nielsen	(734) 747-6585
Vice Presidents:	Jim Forrester	(734) 663-1638
	Bernard Friberg	(734) 761-1875
	Bob Grusczynski	(734) 461-1257
Treasurer:	Kathy Hillig	(734) 663-8699
Observatory Director:	D. C. Moons	(586) 254-9439
Newsletter Editor:	Mark S Deprest	(734) 223-0262
Key-holders:	Bernard Friberg	(734) 761-1875
	Fred Schebor	(734) 426-2363
	Charlie Nielsen	(734) 747-6585
	Mike Radwick	(734) 453-3066
	Paul Walkowski	(734) 662-0145
Webmaster	Dave Snyder	(734) 747-6537

Lowbrow's Home Page

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

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University Lowbrow Astronomers

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Reflections & Refractions

Website
www.umich.edu/~lowbrows/

Sherzer Observatory and Auroras—read Doug Scobel's article on the front page and see more images of this wonderful observatory on page 8.

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Check your membership expiration date on the mailing label