

# Gemini

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**Reflections of a New MAS Member**

by Brandon Hamil

Malcolm Gladwell, in his best-selling business book, *The Tipping Point*, says that word-of-mouth is the most powerful form of communication known to humankind. He is spot on. The month of April marked my one-year anniversary of being a member of the Minnesota Astronomical Society. I am thrilled that I joined. Prior to becoming a member, my only interaction with the club was attending a couple of star parties at the Metcalf field. I live in the east metro, and it was convenient. The society's decision to discontinue star parties at Metcalf was the impetus for me to seek out membership. Without those regularly scheduled star parties, I wanted to find a way to have regular interaction with fellow amateur astronomers.



*A daytime photo of Kitt Peak. You can walk around and go inside many of these domes during their guided daytime walking tours.*

My love for astronomy began when I was in high school. I constructed my very own 3" refractor. I used PVC pipe for the optical tube and some car chrome bumper glue to attach the objective lens to the tube. I got a 25mm eyepiece from Edmond Scientific. This little scope was surprisingly good, with a wide field of view. In college I studied economics, but I took an astronomy elective. The lab course associated with the class had us using classic Celestron orange tubes with no electronics. How things have changed since the early 1990s! I loved viewing through those classic C8 telescopes. Unfortunately, my amateur astronomy interest went on a very long pause.

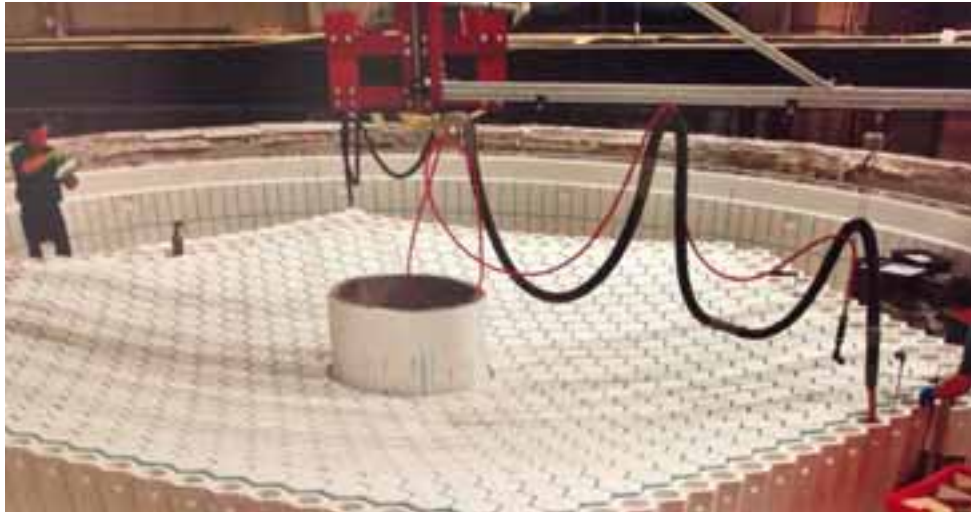
My wife, who is my college sweetheart, encouraged me to reconnect with my love for astronomy a few years ago. We have two children in elementary school, and I had begun watching many science shows with them on TV. There was a strong bent toward programming focused on astronomy-related topics. It is amazing how much learning content now exists for people who strive to gain an understanding of our universe. It is nice to couple my love for amateur astronomy with teaching my kids about science.

My career in the finance world can be very intense, and I found myself not doing anything relaxing at all. My wife encouraged me to get some astronomy equipment because she knew that all things astronomy-related seemed to "sooth

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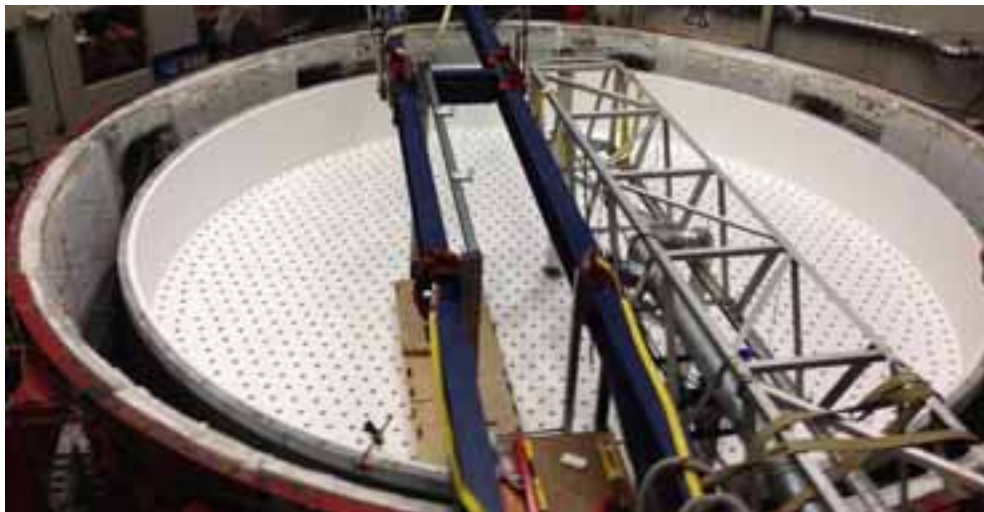
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the beast.” Sometimes astronomy is the only thing I do that is calming. Deciding to buy a telescope made me feel like I was turning my pretend hobby into a real hobby. However, I wasn’t sure how to get going with my purchase. Word-of-mouth from a MAS member was my rescue. My son and I attended a presentation put on by Mike Lynch. During his talk he mentioned several of the places where he buys his equipment. One of those is Starizona in Tucson. This was fortuitous for me. I travel extensively with my job, and I was going to Tucson on a business trip. I visited the Starizona store one evening while on my trip. The place is amazing; they do free evening telescope-viewing in their parking lot. Can you guess what type of equipment was set up there? An 8" orange Schmidt Cassegrain. However, this one was different from what I had used back in college; it had electronics. Dean Koenig, the owner of Starizona, got me set up with everything I needed.



*The University of Arizona's Steward Observatory Mirror Lab builds giant telescope mirrors using a honeycomb design.*

My C8 scope arrived in the late spring of 2010, and I instantly loved it. The following summer, I took nearly every one of my friends in the Twin Cities out to the countryside and set up my scope. None of them had ever looked through a real telescope before. Thank goodness for GoTo technology that allowed me to showcase the night sky. I did not know what I was doing, but the scope's electronics kept me going. Doing astronomy by yourself can be tough; I did it solo for two years. Thanks to joining MAS, I now realize that astronomy is a team sport. When it comes to observing, the more folks you have, the better off you are.



*This enormous piece of equipment is used to polish a giant mirror that will be used for the Large Survey Synoptic Telescope.*

This past year has led me to an even deeper love for astronomy, thanks in part to MAS. The new member special interest group, led until recently by Steve Emert and now by Dave Falkner, was a perfect entry path for me. Since it meets on Saturdays, I am often in town to attend the meeting and typically do so with one of my children. The meetings are a safe place to ask questions and take in presentations. The biggest boost I have gotten has been on field trips to MAS facilities. One night we met at the Joseph J. Casby facility in Belwin.

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I had never been there before, and I was thrilled that it is close to where I live. Dave led this field trip with the express purpose of teaching us to star hop. I had never shut my telescope's electronics off before—to the chagrin of some of our non-electronic purist members. To me, doing astronomy without electronics is like doing finance without a calculator. Yes, I can manually plug in formulas on paper, but why bother? Nevertheless, Dave told me to trust him and give it a shot.



*This is a photo of a giant empty oven that rotates like a giant carousel when they are casting new mirrors. It is like a spinning oven that produces a huge 27foot-wide piece of Pyrex glass.*

Throughout the night, I worked through a list of objects that Dave and Steve wanted us to find. To my surprise, I was able to locate some on the list. Star hopping turned out to be kind of fun. The bigger point is that it allowed me to begin learning the night sky. I discovered that the biggest drawback to GoTo electronics is that one never gains much knowledge of the night sky. I remember thinking one time at the Cherry Grove Observatory that so many of the members really know the night sky. I wondered how many years and how much time it took for them to gain that knowledge. It seemed overwhelming to me. I shared that concern with Dave over the winter. He decided this year, along with Marcus Tuepker, who has taken Steve Emert's place as co-chair of the beginner's group, to have our group do the Astronomy League's observer program without electronics. They said that one of the stated goals of the program is to teach us to plan our observing session and better learn the night sky. I will give this program a shot.

Word-of-mouth has led to some wonderful adventures for me. Last summer I was at a Cherry Grove observatory party and had a talk with Vic Heiner, the site manager. He shared with me how he had just gotten back from the Lowell Observatory in Flagstaff. He told me how that facility does tours of the 24" Alvin Clark & Sons refractor used by Percival Lowell to study and render his sketching of Mars. The Lowell Observatory is also famous for being the location where Clyde Tombaugh made his discovery of Pluto. They have a special tour just on that topic.

Two weeks after the conversation with Vic, I found myself in Phoenix attending a conference. A planned business dinner one evening was canceled, and I thought of Vic's experience. I pulled out my smart phone to see where the Lowell Observatory was relative to my location in the northern part of Phoenix. It was only a couple of hours away. I darted to the hotel parking lot, hopped

into my rental car, and two hours later I was observing through various Lowell telescopes, including the 24" refractor. I was amazed at how fantastic the night sky looked. Lowell is on a mountaintop but within the city limits of Flagstaff, yet I was able to see the Milky Way as clear as a bell because of the dark skies. One of the staff members pointed out how Flagstaff has strict light ordinances. It sure is nice to observe without light pollution.



*This is an empty frame standing vertically. It will be lowered flat when they are ready to pour glass-making materials*

There is a similar word-of-mouth story I want to mention. Last year, Dave told me that he had gone to Tucson to observe the transit of Venus; this past January he presented on this topic at the club's monthly meeting. I took Dave's recommendation, and this past December I was able to visit Kitt Peak. It is our national observatory and operates 24 optical telescopes, the largest collection in the world. They have daytime tours and a nighttime program that is phenomenal. At nearly 7,000 feet, dark-sky viewing through a half-meter Richey-Chretien is an experience like no other. I was also able to visit the Steward Observatory mirror lab. This is where they make the giant mirrors that go into research telescopes around the world. The lab is located under the University of Arizona's football stadium. When I toured the lab they were working on an 8.4 meter diameter mirror going to Chile. It will be part of the Large Synoptic Survey Telescope project to survey one-third of the entire night sky every evening. After three nights they will have surveyed the entire sky and can see what has changed. My tour guide commented that many new projects are happening in Chile because of the dark skies, dry air, and much less government regulation than in the United States.

Now that I am beginning my second year of membership in MAS, I have a few basic things I hope to accomplish this year. One is to visit Onan, our flagship facility, which I have never visited, and to visit LLCC. I also plan to tackle the Astronomy League's program for beginners—in particular, the Northern Constellation program. Learning the night sky will take a while. However, I take comfort in something I read in one of Malcolm Gladwell's more recent books: *Outliers: The Story of Success*. In that book he profiles various athletes, musicians, and people at the absolute top of their profession. The one commonality they all seem to have is practice. It often takes ten years to get really good at something. I have nine years of observing to go.

See you under the stars. 🌌

## My Recent Astronomy Inventions

by Dick Jacobson

I enjoy stargazing, but what really gets my juices flowing is thinking of ways to make telescopes and other equipment work better and building things that have never been built before. In this article I will describe some unusual astronomy equipment that I have recently designed and built. I believe that some of these inventions provide a glimpse into the future of amateur astronomy; others might be just plain weird. You decide for yourself. I assure you that all of these devices work pretty much as intended and solve problems often encountered by observers.

At the Northern Nights Star Fest in August 2012, I gave a show-and-tell presentation of the four projects described here. None of these inventions is totally original except maybe the last one, but each has some features that are very unusual and maybe unique in the world.



*The 14" Newtonian with seven focusers at Cherry Grove Observatory.*

In this article I won't go into a lot of detail about how these projects were constructed. I'm neither a machinist nor a master craftsman. Anyone who is reasonably handy with tools and has a fairly well equipped home workshop should be able to build these projects. With a few exceptions, most of the materials are available at local hardware stores or at Discount Steel in Minneapolis. Please contact me if you'd like more information.

### Equatorial Newtonian with Seven Focusers

In 2001 I bought a 14" Newtonian from Discovery Telescopes and ever since then have been rebuilding and remodeling it, trying out many new ideas. Originally the scope was a barebones solid-tube Newtonian on a Dobsonian alt-azimuth mount. Today all that's left of the original telescope are the mirrors and their supports. The most unusual feature of this telescope is a rotating secondary cage that carries seven focusers. The cage acts as a turret that lets me switch eyepieces in two seconds without moving from my observing position.

I got the idea for this device during an on-line discussion with a few other MAS members. Some of us had been trying out the new 100-degree field eyepieces from Tele-Vue and Explore Scientific. These eyepieces offer spectacular views but are very heavy and can create balance problems when mounting and dismounting them from a Newtonian. In discussing how to cope with the balance problems, one idea was to mount the eyepieces on some kind of turret. Eyepiece turrets have been used on

refractors for many years; there are some in use on the Schmidt-Cassegrains at Eagle Lake Observatory. But it was hard to see how a turret could work on a Newtonian. (Long-time MAS member Bill Volna has built some three-eyepiece turrets for Newtonians.) I kept trying to think of other ways that the eyepieces could move on a turret. One possibility was for the eyepieces to move around the axis of the tube.

I had already built rotating eyepiece sections for three telescopes, so the idea of mounting the eyepieces on a rotating secondary cage came to mind immediately. After thinking it over for several hours, I convinced myself that it was something I could accomplish.

This project was made possible at reasonable cost by some fairly new technology in the form of Lazy-Susan rings. Picture a pair of very strong aluminum rings, one inside the other, with a groove between them that's filled with ball bearings. You can put a load of hundreds of pounds on the ring and rotate the load with almost no friction; I measured about one percent. I first became aware of these about 8-10 years ago when I used one to build a rotating eyepiece section for my 14" scope. Although they have some shortcomings, as I will discuss later, they open up a lot of possibilities for telescope-makers.

With the Lazy Susan at the very top of the tube, the main truss and spider are fastened to the inner non-rotating ring of the Lazy Susan. An octagonal plywood tube carrying the seven focusers is fastened to the outer ring, creating a ring of eyepieces that rotate around the fixed secondary mirror. I mounted a finder on the eighth facet of the octagon.



*Detail of seven-focuser rotating secondary cage on the 14" Newtonian.*

To keep the cost and weight down, I used helical focusers for six of the seven focusers. The seventh is a conventional knob-type focuser and carries my bino-viewer. Helical focusers are ideal for this application because I always use the same set of eyepieces; only a slight focusing adjustment is needed.

Some type of click-stop mechanism is required so that each eyepiece is aligned on the same object as you rotate it into position. To accomplish this I built a simple detent mechanism fastened to the top of the Lazy Susan. Eyepiece alignment has not been a significant problem. As long as I'm careful not to move the tube, the object usually stays in view when switching eyepieces.

When thinking about an innovation, it's important to give some thought to its disadvantages. The most serious disadvantage

with my rotating secondary cage is weight. Without eyepieces, the cage weighs 25 pounds, and my heavy eyepieces and binoviewer add another 10 pounds. To balance all this, I had to add 50 pounds of counterweight behind the main mirror. The entire tube now weighs 140 pounds, about double its previous weight. As you may have guessed, this burden created problems with my lightweight equatorial mount. More about that later.



*Detail of rotating secondary cage. Inner ring of Lazy Susan is fastened to the truss tube. Outer ring is fastened to the octagonal cage holding the eyepieces.*

After weight, the next most significant problem is dew. When using a conventional telescope, I keep my eyepieces in a little six-pack-sized cooler, where they stay reasonably warm and dry. With eight eyepieces (including the two on the binoviewer) sitting out in the open getting cold, a lot of power is required to keep them free of dew or frost — I estimate about one amp at 12 volts under typical conditions. This amount of power would drain a small battery pretty quickly. My solution was to mount three sealed lead-acid batteries behind the main mirror where their total weight of 15 pounds helps to balance the scope. Power is delivered to the rotating secondary cage through a brass strip that contacts one of eight brass screws, one on each facet of the octagon. Above each focuser is an audio jack where a heat strip can be plugged in. This system works well but took about a month to build in my spare time, about half of the total construction time of the cage. I estimate that the batteries should have enough power for about 20 hours of anti-dew heating.

Another disadvantage is that the eyepieces are about 1.5 inches farther from the diagonal than they would be normally. The reason is that the truss is inside the secondary cage, so additional clearance is needed. The additional distance from the diagonal means that the fully illuminated field of view is reduced slightly. The fall-off of brightness is not noticeable, and I don't consider it a significant problem.

It takes a few minutes longer, and a little more effort, to assemble this scope than it would normally. But the time and effort are more than paid back during the observing session, when you can change eyepieces quickly and effortlessly.

Now that I've had over a year to use the multi-eyepiece cage, I can report that I'm very pleased with the results. I like to try out a lot of eyepieces to get the best view when observing deep-space objects, and this accessory makes observing a lot more enjoyable. For lunar/planetary observing it's not nearly as useful. I usually use the binoviewer for this purpose and stick with whatever

magnification works best under the conditions.

Aside from the seven-focuser monstrosity at the top, maybe the most unusual feature of the 14" Newtonian is the equatorial mount. Telescope-makers, amateur and professional, seem to have largely given up on equatorial mounts for portable Newtonians larger than about 10" diameter. I think this is unfortunate. Equatorials are ideal for star-hopping because they move naturally along the north-south and east-west axes of the sky, the way stars are plotted in an atlas. If you want to move one degree west and two degrees north of a particular star to find an object, you can do it using your hands, eyes and brain without electronic assistance. Tracking an object at high magnification is easy, with or without the assistance of a motor. There is no awkwardness when pointed straight up (no "Dobson's Hole").

Alt-azimuth mounts (Dobsonians or Dobs) have come to dominate the market because they are relatively compact, lightweight, simple and cheap. These are important advantages, but my design for an equatorial scope nearly matches a Dob in weight and size. It is definitely not as simple to build and would cost more if available commercially, but if you add in the cost of an electronic drive system or an equatorial platform for your Dob, it might balance out.



*The rotation mechanism for the entire 14" truss tube. This consists of a Lazy Susan attached to a square aluminum frame.*

There are three design features that make my equatorial work well: a fork that is narrow but deep front-to-back; a polar axis shaped like a pyramid; and a rotation mechanism built into the tube. The tube's declination axis is supported by a structure that is sort of a cross between a traditional fork and a Dobsonian-style cradle. MAS member Bill Kocken came up with the term "Dob-equatorial" to describe it. I was inspired with the idea of making a Dob into an equatorial by just tipping the azimuth axis over so it points north. Unfortunately, it's not as simple as that, and I've spent the last 15 years refining the idea, using 10", 14" and 20" Newtonians. My narrow-fork design is still a work in progress, but I'm very pleased with its stability, compactness and light weight. Historically, fork mounts have employed a massive steel shaft for the polar axis. This is fine for a scope permanently mounted in an observatory, but its weight impairs portability. Many more recent scopes, particularly catadioptrics, employ a disk-shaped fork base, and that's what I have used until recently. A big wooden disk has good stability but is quite large and heavy and requires a strong, tilted base. To improve further upon both the shaft and disk designs, some large scopes have a cone-shaped

polar axis. This is an ideal design, but a large, strong cone is a difficult shape to fabricate. To simplify construction, my latest design replaces the cone with a pyramid.



*The main 14" mirror inside its open truss support structure*

Think of holding a pyramid upside-down, resting on its apex, and then letting it tip over about 45 degrees. Attach a large, strong ring to the base of your tipped-over pyramid and support the ring on rollers at two points. A third support point, the southern tip of the polar axis, is at the apex of the tipped-over pyramid. Now you have a polar axis that is stiff, lightweight, and needs only a compact triangular base to support it. The ring is my favorite piece of new telescope technology, a Lazy Susan.

Anyone who has used a Newtonian on an equatorial mount has found that it can be nearly impossible to reach the eyepiece in certain tube positions unless the tube can be rotated. Every rotating tube that I've ever seen uses either a pair of rings or else a box-like structure to support the tube. Instead, my design uses just a single ring (yes, another Lazy Susan), which is an integral part of the tube. You can get by with just a single ring because these Lazy Susans are built incredibly well, with absolutely no slop or wobble. As long as the ring itself is securely mounted on a stiff tube or frame so it cannot bend, there is no noticeable vibration. To re-position the eyepiece, you just grab the tube on opposite sides and turn it. With a little care, it's easy to keep the object in view at high magnification while turning the tube.

Using a Lazy Susan for the rim of the polar axis creates an interesting possibility for combining a motor drive with hand motion. On most scopes, if you want to have both tracking and manual motion, you need either a hand controller to override the drive or some type of friction clutch so hand motion can overpower the motor. A Lazy Susan offers the possibility of keeping the motor drive completely independent of the hand-turned motion. On my 14" scope, the southern tip of the axis is simply a bronze bearing. The outer rim of the polar axis rests on two roller bearings, while the motor turns the inner and outer

rings of the Lazy Susan with respect to each other. In effect, I have two concentric polar axes. However...

Remember those shortcomings I mentioned earlier? Although this seems like an ideal way to build a polar axis, there is one problem. These Lazy Susans don't work nearly as well when they are tipped over. The bearings are not true ball bearings with the balls held in place by races. Instead, the balls run loosely in the tracks between the rings. When the Lazy Susan is tipped over, the balls tend to jam together and the friction increases abruptly.

Early on in my experiments with this scope, I tried to use a Lazy Susan as a polar axis simply by holding it rigidly tipped over. I found that the uneven friction made it unacceptable for a hand-turned polar axis. Next, I tried clamping the rings together and mounting the bearing on rollers. This produced a much smoother hand-turned motion, but there was still no motor drive. Instead of motorizing one of the rollers, I decided to see if I could build a drive that was strong enough to overcome the large and uneven friction of the Lazy Susan.

I guessed that it might be difficult to build such a drive, and I was right. (Boy, was I right!) This may be the most frustrating project I've ever undertaken. The idea was simple: The motor would turn a worm, which would turn a worm gear attached to a roller. The roller would press against the outer ring of the Lazy Susan and turn it with respect to the inner ring. The biggest problem was getting enough friction between the roller and the outer ring. After many failures and over a year of tinkering, I finally solved the problem. I could go on for several paragraphs describing all the other problems that arose, but I'll spare you the details. Suffice it to say that the drive is now working reliably and pretty close to my expectations. It's not accurate enough for high-power imaging but works great for visual observing. At 444x, the highest magnification that I normally use, it keeps the object near the center of the field for several minutes at a time.

Despite the problems I had building this drive, I still believe it is an excellent design that is especially convenient for visual observing. I'm currently rebuilding my 20" Newtonian using the 14" as a model. I'll be making some changes to the design of the mount and drive that I expect will avoid most of the problems that I encountered in the 14" project.

With this scope I think I have proven that it is possible to build a big equatorial Newtonian that performs well and is only slightly larger and heavier than a Dob. It could eventually become a model for a third generation of large, portable Newtonians — the first generation being the giant German equatorials of the 1950s, and the second generation the compact alt-azimuth design of John Dobson. To make my design popular, it might take an energetic individual like Dobson or Dave Kriege of Obsession Telescopes. I am neither a Dobson nor a Kriege and have no plans to go into business building telescopes. Maybe one of you will take up the challenge!

*To Be Continued.* 🍷

## MAS Patron Members

MAS offers a patron membership to those members who wish to contribute a little extra to help support MAS activities. Patron memberships are established by constitution at 2-1/2 times the regular membership rate—currently \$70 annually for a patron membership. The \$42 additional contribution is tax-deductible. It is used to fund equipment acquisitions, facility improvements, further outreach activities and more. We would like to thank the following patron members as of July 7. █

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## Sixth Annual Camping with the Stars

By Dave Falkner

On Friday afternoon, July 12th, the partly sunny sky had a mishmash of clouds and blue sky, threatening viewing conditions for the first night of the Sixth Annual Camping with the Stars. This popular MAS annual event was held the weekend of July 12-14 at the newly updated Eagle Lake Observatory (ELO) at Baylor Regional Park near Norwood-Young America. Dave Falkner, president of MAS, kicked off the weekend on Friday at 7:00 p.m. by welcoming everyone, followed by a presentation on the Eagle Lake Observatory. He gave a virtual tour of the buildings and the telescopes housed there. All of the presentations given over the weekend were done in our new, air-conditioned HotSpot classroom, which turned out to be the perfect, mosquito-free venue. What a great addition to this wonderful facility!

After Dave completed his virtual tour of ELO, Bob Kerr gave an interesting presentation on meteors, talking about the difference between meteors, meteoroids and meteorites, as well as the composition of different types of meteorites. Bob also talked about impact craters on Earth, the Moon, and elsewhere in the solar system.

When we walked out at the end of Bob's presentation, we were surprised to see that all but the far northwestern sky had cleared. As the Sun set we were treated to great views of the Moon, Venus and Saturn. As the evening darkened we were treated to more deep-sky objects, but the menacing cloudbank kept encroaching from the northwest. The 100 or so guests enjoyed viewing objects until the clouds overtook the sky around 11:15 p.m. We closed up shop for the night, hoping for a better day on Saturday.



The campers in the ball field adjacent to the observatory and those in the Baylor campgrounds were in for a rough night. Thunderstorms and torrential rains dumped about four inches of rain overnight, making it a tough night to sleep.

Morning light brought an end to the rain, but the skies were still overcast. Stargazers were praying that the clouds would part and we would be able to get some solar viewing in as well as another evening of stargazing, but forecasts were not promising.

The afternoon events began at 2:00 p.m. with the Nerdery Aeronautic and Space Alliance release of their stratospheric camera. This small amateur astronomy club consists of employees from the Nerdery, a web development company in Bloomington. As part of their 10th anniversary, they released a weather balloon filled with helium and carrying a payload which included a camera set to take pictures continuously as the balloon ascended.

They released the balloon at 2:20 p.m., and a special tracker onboard allowed us to track the position and altitude of the balloon over the next three-and-a-half hours. After heading in a generally easterly direction, after a couple of hours it took a turn to the west, and when the balloon eventually popped it had ascended to an altitude of 117,000 feet and was located northwest of Hutchinson. As the payload parachuted back to solid ground, the chase crew went after the device, hoping to bring back the video and play it at CWTS. However, as of nightfall the geo-

locator had failed to activate, and their search for the package came up empty-handed. They hoped to renew their search on Sunday and retrieve the balloon payload.

At 3:00 a perennial favorite, Colin Kilbane (the mad scientist), broke out his cornucopia of bubbling potions and wacky chemical reactions, which kids love and adults find quite fascinating. He followed that by offering a rocket-building seminar in the campground and even launched a couple of homemade rockets.

At 4:00 Jake Hairrell gave his presentation on "How Big is Big," showing scaled comparisons of how large objects are in the universe and talking about the age of the universe and how we determined this number.

At 5:30 we had another popular perennial event, the Beginners Special Interest Group (B-SIG) potluck picnic. MAS provided the hot dogs and hamburgers, while those attending CWTS brought a dish to share. Over 80 hot dogs and hamburgers were cooked by grill-masters Mark Job, Bob Benson and Dave Falkner. No one went away hungry, and as we ate our fill the sky began to lighten.

After supper Dave Falkner was back in HotSpot, giving his presentation on "The Giants of Astronomy." He talked about how the great astronomers Ptolemy, Copernicus, Tycho Brahe, Kepler and Galileo changed our vision of the solar system from





Earth-centered to Sun-centered, starting a revolution which completely changed how we see the universe.

Following Dave's presentation, we had the door prize and raffle drawings. The first prize of an Orion StarBlast telescope was won by Wyatt Jones, and the second prize of Celestron StarMaster 15x70 binoculars was won by Katherina Cohrs. A number of other attendees won prizes of MAS shirts, ball caps, mugs and books, and a hat and buffet donated by Unhinged Pizza in Norwood.

MAS merchandise was also given away in the raffle drawing, with the second-place prize of Celestron StarMaster 15x70 binoculars going to Brian Mitchell and the grand prize of an Orion StarQuest 8" Dobsonian telescope complete with a padded carrying case going to Hampton Velarde. With the help of MAS volunteers, the StarQuest telescope was set up outside of the Onan Observatory, and Hampton was able to view several objects through it, including the Whirlpool Galaxy (M51).

Once again the sky cleared as we approached sunset, and we were treated to views of Venus, the Moon, Saturn and other objects. The video feed from the Onan Observatory to the classroom was up and running, and at one point we had a spectacular view of the Whirlpool Galaxy on the big screen in HotSpot.

Around 10:30 Dave Falkner conducted a green laser tour of the night sky on the plaza, and shortly thereafter stargazers were treated to a -4 magnitude Iridium flare in the western sky. But clouds were beginning to encroach from the west, and by midnight the sky had become overcast and we were done for the night.

While there was some rain Saturday night, it was much gentler with no thunderstorms. Sunday morning brought overcast skies with donuts, juice and coffee in the HotSpot classroom. The donuts were quickly devoured by the campers, especially the children. Merle entertained a small group of campers in HotSpot, showing some images he had taken and talking about the objects. The Sun peaked out from behind clouds from time to time, so we were able to do some solar viewing. A few of the remaining campers stopped by the observatory to view a couple of large solar prominences through the H-alpha scope. One by one the campers packed up and left and the 2013 CWTS came to a close.

Many thanks to the MAS volunteers who came to help and gave great presentations. Several of the public who attended remarked on what a wonderful facility we have, with top-notch equipment and knowledgeable members. Despite the weather-limited observing time, this year's Camping with the Stars was another great success. *Photographs by Merle Hiltner, Ben Huset and Father Brown.*



## MAS Board Minutes for May and June

By Roxanne Kuerschner, secretary

### May

**Update on Budget/Accounting:** The new program is making organizing the budget much easier. The accountant still needs to be paid. It is still to be decided what is appropriate for the Onan fund to pay for on the Eagle Lake Observatory project.

**Spring Astronomy Day:** It will have to be at a different time, as we lose money on it every year. One possibility is to make it a raffle, not all giveaways. Fall Astronomy Day will be the same.

**Northern Nights Star Fest:** Greg will check with Long Lake Conservation Center about the percent that should come back to MAS from NNSF. **MAS Surplus Equipment:** This was sold for

\$390.50. **Cherry Grove Observatory Update:** Vic is waiting for the costs of the electrician and the motor and drive-unit. Once those are done, he will get receipts to Chris. **Sylvia Casby**

**Observatory and Classroom:** The soffits are up; painting needs to get done on the exterior. Donation boxes will be at both observatories and the classroom. A projector has been purchased for the HotSpot. **Astronomy Day Review:** The weather was cold again. Even though there were about 80 people who attended, we may have to rethink the date and hold it later in the season. LLCC Cart: The purchase of the cart has been approved; it is being made.

**Forum Organization:** It has been brought to the board that the organization of the forums is confusing. The MAS announcement forum is for formal announcements by the board or forum master. The MAS discussion forum is for discussions about MAS.

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## Directions to the Star Party Locations

For maps and further details about the sites, please go to our website at [www.mnastro.org/facilities](http://www.mnastro.org/facilities).

### **Baylor Regional Park and Eagle Lake Observatory**

To reach Baylor Regional Park, head west on Minnesota Highway 5, through Chanhassen and Waconia, to the town of Norwood-Young America. Turn right onto Carver County Road 33 and continue approximately two miles north. Baylor Regional Park is on the right side of the road, marked with a prominent sign. When entering the park, stay to the right and follow the road approx 1/4 mile.

When visiting the Baylor Regional Park, MAS members are requested NOT TO PARK OR DRIVE on the grass. There is a drive up to the observatory which can be used for loading or unloading or handicapped parking only.

For an alternate route from the southern suburbs, take U.S. Highway 212 west to Norwood-Young America. Turn right at the second traffic light onto Carver County Road 33. Continue two miles north to the park entrance.

### **Cherry Grove**

Cherry Grove is located south of the Twin Cities, in Goodhue County, about 20 miles south of Cannon Falls. To reach Cherry Grove, head south on Highway 52. On 52 about six miles south of Cannon Falls, and just past the Edgewood Inn, is a large green highway sign for Goodhue County Rd. 1 "WEST". Turn right, and follow County 1 straight south for about sixteen miles until you arrive at a "T" intersection with County A. The observatory is immediately at your right, nestled in the shoulder of the "T". Parking is permitted on the site, or along the road, preferably County A.

### **Metcalf**

Head east from St. Paul along Hwy. 94. Exit at Manning Avenue ( exit #253) Turn south (right turn) and then almost immediately turn left onto the frontage road (Hudson Road S). Continue east on the frontage road for about 1.5 miles. Turn right onto Indian Trail, checking the odometer as you turn. Follow Indian Trail south for just about 1.1 miles, where you'll see an unmarked chain-link gate on the right, opening onto a dirt driveway with slight up-slope. This is the entrance to Metcalf.

Belwin / Joseph J Casby Observatory

Head east from St. Paul along Hwy. 94. Exit at Manning Avenue ( exit #253). Turn south (right turn) and then almost immediately turn left onto the frontage road (Hudson Road S). Continue east on the frontage road about 3.4 miles until Stagecoach Trail South, then turn right onto Stagecoach Trail and go east about 2 miles until reaching Belwin Conservancy on your left at 1553 Stagecoach Trail South. From the Belwin driveway entrance, travel about 500 feet and turn left at the gate. Travel about 1/4 mile through the woods until you emerge at the parking area near the classroom building and the Joseph Casby Observatory.

### **Long Lake Conservation Center**

#### **From Western Twin cities**

Take I-94 west to Rogers/MN 101. Go north/right on MN 101 through Elk River, where MN 101 becomes USA 169. Continue north on US 169 approximately 90 miles to Aitkin. At stoplight in Aitkin, turn east/right onto US 169/MN 210 and go out of town eight miles. Then turn east/right, following MN 210 toward Duluth. Proceed seven miles. A large green highway sign marks the turn off 210 to Long Lake Conservation Center. Turn north/left on County Rd. 5. After three miles, turn east/right on gravel County Rd. 88. It is approximately one mile to the LLCC gate. Follow signs to parking and unloading areas.

#### **From Eastern Twin cities**

Go north on I-35 to Finlayson/Exit 195. Turn west/left and go one mile to County Rd. 61 and MN 18. At stop sign turn right/north and go two miles. Follow MN 18 west/left and continue 19 miles to MN 65. Turn north/right on MN 65 and proceed 30 miles to McGregor. Intersect with MN 210 and follow 210 west/left (through McGregor) for seven miles. A large green highway sign marks the turn off MN 210 to Long Lake Conservation Center. Turn north/right on County Rd. 5. After three miles, turn east/right on gravel County Rd. 88. It is approximately one mile to the LLCC gate. Follow signs to parking and unloading areas.

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The suggestion is to combine announcements and discussions into one thread or rename the MAS announcements for star parties and events and leave the MAS discussions alone. The web committee should discuss this and let the board know the new names. Clayton will contact the committee. **Explore Minnesota:** Greg has added material to the Explore Minnesota website about MAS. **Website:** The web team needs to change the links to go to the Eagle Lake Observatory page, not Onan. Greg will make a description of bad links and send that to the web team. **Membership Application Process Change:** Anyone who gets a membership application should send the application to Steve and give the money to Chris. This will alleviate the issue of missing applications. All people need to fill out an application; no money should be accepted without an application to go with it. **Use of HotSpot for Overnight Sleepovers:** There is the thought of using the HotSpot Classroom for overnight star party sleepovers for groups, similar to what the zoo does. Ron Schmitt brought forward the suggestion. The Eagle Lake Observatory Committee will discuss this; the insurance company needs to be

contacted regarding liability and safety issues before this can be approved. **Billy McLaughlin for Dedication:** Ron Schmitt suggested that we hire Billy McLaughlin for the dedication of the Eagle Lake Observatory. At this time we do not have a budget for this. **DSL for Eagle Lake Observatory:** Mark got a deal for \$30 less per month and double the speed at Eagle Lake Observatory with Century Link. **Astro League Elections:** MAS does get a vote for the Astro League elections. If you have a write-in, send it to Greg and he will send it in. Our society gets one vote as a whole. **Dues for Astro League:** The bill needs to get paid. Chris will take care of this. **2017 Total Solar Eclipse:** There was discussion about having the National Astronomy Conference when the eclipse is happening.

### **June**

**Update on Budget/Accounting:** Chris is tracking down the check from LLCC for Northern Nights Star Fest. He will fill out the form for the tax-exempt certificate. The Eagle Lake Observatory budget is getting lower. Merle will provide a "to-do"

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# Minnesota Astronomical Society 2013 Star Party Schedule

Friday Date	Sunset:	Twilight at:	Completely dark from:	Completely dark to:	Moon % Illuminated	Eagle Lake public night	Cherry Grove	LLCC Weekend	Notes
Aug 02	20:39	22:47	22:47	03:05	12%		X	X	
Aug 09	20:29	22:31	22:31	04:03	11%	Aug 10	X		
Aug 23	20:06	21:58	never	never	87%	Aug 24			
Sep 06	19:40	21:25	21:25	04:55	3%	Sep 07	X	X	Northern Nights Starfest #5: Sep 4-8
Sep 13	19:26	21:09	01:07	05:06	67%	Sep 14			
Sep 27	18:59	20:39	20:39	00:38	40%	Sep 28	X	*	
Oct 04	18:45	20:25	20:25	05:36	0%		X	X	Fall Mini-Messier Marathon at CG and LLCC
Oct 11	18:32	20:11	00:08	05:45	53%	Oct 10			Fall Astronomy Day
Oct 25	18:08	19:48	19:48	23:24	57%	Oct 26			
Nov 01	17:57	19:38	19:38	06:12	2%		X	X	
Nov 08	16:48	18:30	22:10	05:21	39%	Nov 09			
Nov 29	16:29	18:16	18:16	04:37	27%	Nov 30			Special Event - Comet ISON
Dec 06	16:26	18:14	21:08	05:52	24%	Dec 07			Special Event - Comet ISON
Dec 20	16:28	18:18	18:18	20:00	87%	Dec 21			Special Event - Comet ISON

LLCC nights indicated with an “\*” instead of an “X”. We will be sharing the facility with other groups. Not all of the lights will be extinguished.

This schedule is subject to change. Please check the MAS online calendar at [www.mnastro.org](http://www.mnastro.org) for a complete schedule of all MAS events. Cherry Grove Star Parties are held on Friday nights, with Saturday reserved as the backup night if Friday is cloudy. LLCC Star parties are held on both Friday and Saturday night. Eagle Lake public nights are held on Saturday nights only.

The **Casby Observatory at Belwin** is available to MAS members who have completed the Belwin Orientation and training to use at any time. We will not have scheduled star parties at Casby. To reserve the observatory for yourself, please post your request on the Casby Observatory Keyholders discussion forum.

The **Metcalf Observing Site** is available to MAS members at any time. We do not have organized, scheduled star parties at Metcalf. Feel free to head out there whenever you wish.

The **Eagle Lake Observatory** holds regularly scheduled public nights. You are welcome and encouraged to bring your own observing equipment to these events. All other nights the observatory is available for trained members use. To reserve the observatory, go to the Eagle Lake reservation calendar at <http://www.mnastro.org/onankey/reservations/reserve.php> Before heading out, Please check the Eagle Lake reservation calendar to verify if there is a outreach event scheduled.

In 2013 daylight saving time begins March 10 and ends on Nov 3.

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list with costs projected for the next meeting. The budget program will be set up to reflect the budgets of each site. **Cherry Grove Update:** The electrical work is done, inspected and paid for. The roof drive is installed and paid for. The Mathis mount is not installed at this time. Cherry Grove seems to be nearing the end of construction; they need to make sure all reimbursements are covered. A safety feature may need to be added, as it seems possible that the roof will hit the Mathis mount if the telescope is not parked correctly. **Sylvia Casby Observatory/Hot Spot Classroom:** The doors are installed and painted and the power screen and projector are installed. There have been discussions with the park about the walkway. Merle will make the necessary modifications to satisfy the park board. MAS would like to not have a path from the parking lot to the Sylvia Casby Observatory, but from Onan to the Sylvia Casby instead to improve the foot traffic. The design of the patios in front of the classroom and Sylvia Casby is also being modified. Merle will work up a budget on the cost of materials for the concrete work. **Forum Organization:** The MAS discussion forum will be reconfigured to include MAS announcements and MAS discussions. A new star parties forum will be added. Both of these will be readable by the public. **Gemini:** Mark is still researching the cost savings of doing

the *Gemini* mailings differently. **Public Overnights at Eagle Lake Observatory/Hot Spot Classroom:** This is still being discussed; the insurance company has not gotten back to the board about liability. **Joseph J. Casby Alarm System:** A new system needs to be put in at Joseph J. Casby, as it is currently motion-sensored and is going off unnecessarily. A break-in sensor on the doors and windows would be a better option. Dave has contacted Bob Benson to get this changed. The calling tree for break-ins will also be changed so Belwin does not get calls about the observatory. MAS will pay for the sensor replacement. We will check to see how much this increases the monthly fees. Belwin will most likely pay for that increase. **Astro League Payment:** We must make the payment as soon as possible. **Camping with the Stars:** Registering is at about 62. If we are giving away less than \$1,500 of goods, we do not need a raffle permit. Speakers are lined up. **BSIG Picnic:** MAS buys hamburgers, hotdogs and buns. Mark will get the food: 100 burgers, 50 hotdogs, ketchup, mustard, pickles, silverware, charcoal. There are no door prizes yet. **Northern Nights Star Fest:** We need to put information on the website about this event. Clayton will make sure it gets done. Merle will put it on the home page.



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### August 2013 Volume 38 Number 4

Your MAS membership expires at the beginning of the month shown on your *Gemini* mailing label. Send your payments to the MAS Membership Coordinator at: Minnesota Astronomical Society, Attn: Membership Coordinator, P.O. Box 14931, Minneapolis, MN 55414. Make checks payable to MAS or you can pay by PayPal on the MAS web page. The current annual membership dues and subscription fees are: \$28 for regular membership (\$60.95 including a *Sky and Telescope* subscription discounted to the annual member subscription rate of \$32.95); \$70 for patron membership (\$102.95 including *Sky and Telescope* subscription); \$14 for student membership (\$46.95 including *Sky and Telescope* subscription).

### To Renew Your *Sky and Telescope* Subscription

New subscriptions to *Sky and Telescope* at the MAS member discount must be sent to the MAS for group membership subscription processing. Send new subscriptions with your MAS membership to the attention of the Membership Coordinator at the MAS at the Post Office box address shown on the back cover of the *Gemini* newsletter.

You may mail your subsequent subscription renewal with payment directly to *S&T* or renew via phone with Sky Publishing at 1-800-253-0245. This method is especially beneficial to those who wait until your subscription is about to expire before renewing *S&T*. If you wish, you may still submit your *S&T* subscription renewal to the MAS when you renew your membership in the MAS and we will enter your renewal on your behalf just as we always have done.

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### How to Subscribe to MAS e-mail Distribution Lists

The MAS uses web Discussion Forums and e-mail distribution lists for timely communications. We highly recommend you subscribe to the MAS general distribution email list.

To subscribe to the MAS e-mail list visit: <http://lists.mnastro.org/mnastro/listinfo/> and follow the subscription instructions.

There is a general list (MAS), several Special Interest Group (SIG) lists and other lists for special purposes. Archives of the lists are also available by visiting the listinfo page for a specific list.