# Starscan

Johnson Space Center Astronomical Society

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## Eyepiece Shootout 10, More Power…

Bret Akers and John Kuhl

We had it all planned out…but this time the plan came together. Just like last month, the planets were high in the sky with no significant clouds over Tierra Del Sol. The best part, however, was the seeing. We had one of those special nights where for a few hours we could push the power to ridiculous levels without any image breakdown. So here we go with a comparison of three somewhat high-power eyepieces: The Meade 6.7mm UWA, the 7mm Pentax XL, and the Tele Vue 7mm Nagler Type 6.

**The competitors:**

Last month we reviewed the Meade 14mm UWA, one of those special, must-have eyepieces. This month were taking a look at one of its little brothers, the Meade 6.7mm UWA. Although this eyepiece has been around for a while, it has aged gracefully and still garners good reviews. Comments such as "excellent contrast" and "sharp to almost the edge of field" are common. So what's the line on this eyepiece? It's a 7-layer multicoated, 8 lens element eyepiece with a threaded 1.25" barrel. It's also light at only 6 oz and narrow enough for binoviewing. In addition this eyepiece has a huge 84-degree apparent field of view and is rated as having 10mm of eye relief. How much? About $200. Another small eyepiece in the same focal range is the new Tele Vue 7mm Nagler Type 6. Its field of view is 82 degrees, it has 7 lens elements, and the rated eye relief is 12mm. It also has a 1.25"-only barrel and is fairly lightweight at only 8oz. This is another eyepiece that would work well for binoviewing. Unfortunately, as with most of the new Naglers, it isn't cheap. The street price is about $280. On the other end of the size and weight spectrum is the 7mm Pentax XL. This eyepiece is tall, wide, and heavy at 15oz. You may want to think twice before using it in a binoviewer. Like the others this month, it's a 1.25"-only eyepiece. It has 7 multicoated lens elements including one that uses ED glass. The apparent field of view is 65 degrees and it has 20mm of eye relief, plenty for eyeglass wearers. You can pick one of these up for about $235.

**Testers and observing conditions:**

The 12.5" f/5 Dobsonian was pushed to about 230x with these eyepieces. However, with the great seeing we had, this wasn't even a challenge.

**On-Axis Sharpness:**

Sharp. Sharp. Sharp. That's the general impression we got with these eyepieces. If we were just using the Meade and never saw the Nagler or the Pentax, we would have been happy. However, the Nagler and the Pentax were just a little bit better. Rank: Nagler-Pentax draw, Meade close behind

**Off-Axis Sharpness:**

Off-axis, there was a bit more of a difference. The Meade was clearly the least sharp of the bunch when you got away from the center of the field of view. The Pentax did well and looked pretty sharp all the way to the edge. The Nagler, however, again demonstrated how sharp a wide field eyepiece should be at the edge of the field.

Rank: 1. Nagler, 2. Pentax, 3. Meade

**Contrast:**

With the great seeing, we just had to take a long look at the planets. We decided to use Jupiter as the test subject. With the history of Pentax eyepieces, we expected it to wipe out the other two eyepieces in this regard. Not quite. Both the Pentax and the Nagler proved to be superior to the Meade, but picking a winner was difficult. After a considerable amount of time behind the eyepieces, some interesting trends were becoming evident. Certain details on Jupiter were more evident in the Pentax and others were more evident in the Nagler. If you were to divide the planet into thirds, one third consistently looked better in the Nagler, and the other two thirds looked better in the Pentax. This was really close, much closer then we expected. We're going to call the Pentax the winner on this test, but it is by the narrowest of margins. One other thing was noticed in this test—light scatter. On something as bright as Jupiter, the Pentax scattered noticeably more light than the other two eyepieces. Some may find the extra scatter objectionable, but if you can look past it, you will see more detail with the Pentax.

Rank: 1. Pentax, 2. Nagler, 3. Meade

**Chromatic Aberration:**

All three of these eyepieces did fairly well in this test. It was a wash between the Nagler and the Pentax. Not enough difference to report. The Meade was noticeably worse, but still acceptable.

Rank: 1. Nagler/ Pentax, 2. Meade

**Field Flatness:**

This is another test where they all performed well. The Nagler at one point looked like it could have had an ever-so slightly flatter field than the Pentax. But, we wouldn't bet on it because it was too tough to tell the difference. The Meade followed behind again, but not by much.

Rank: 1. Nagler/ Pentax, 2. Meade

**Light Transmission:**

This test can be a real pain in the neck when you have eyepieces like these three that are all pretty close to each other in performance.

Rank: 1. Pentax, 2. Nagler, 3. Meade

**Coatings:**

No surprise here. Once again the Pentax is king. They are smooth and dark…really dark. Next is line is the Nagler with the Meade coming in last.

Rank: 1. Pentax, 2. Nagler, 3. Meade

**Eye Relief and Comfort:**

Once again the Meade came in third, but it's not at all hard to use. The other two eyepieces are just easier. We had to debate quite a bit before deciding on the winner for this test. Both the Pentax and the Nagler had ample eye relief, unless you wear glasses in which case the Pentax is a slam-dunk. Both the Pentax and the Nagler were fairly forgiving with head placement. The Nagler was a bit less forgiving, but it was probably due to its wider apparent field of view. However two things pushed the Pentax over the top. The first was the ease of focusing. It just seemed to take less time to properly focus the Pentax. The second was the crazy eyecup design on the Pentax. Although it can be a pain to get the eyecup in the right position for you, once it's there you can simply rest your brow against it and observe for long periods of time with little fatigue. You can't do that with the Nagler or the Meade.

Rank: 1. Pentax, 2. Nagler, 3. Meade

**Conclusions:**

So which eyepiece won this shootout? As soon as the test was over, we asked each other and couldn't decide if the Nagler or the Pentax was better. If you look at the number of category wins, the 7mm Pentax XL seems to be the easy choice. But, it's not that easy. Many of these tests were like splitting hairs, with the differences between the two eyepieces marginal at best. If you want the widest field, go with the Tele Vue 7mm Nagler Type 6. If you want a slightly better value with more eye relief, go with the Pentax. If you want to use a binoviewer, go with the Nagler. If you want to see the absolute last bit of detail that you'd probably have to wait for exquisite seeing to notice, go with the Pentax. They are that close. By the way, the Meade is a good eyepiece, too. Its only problem is that it's just not quite as good as the others.

**Note:** The opinions expressed in this review are solely those of the author(s) and do not constitute an endorsement by the San Diego Astronomy Association.

## Frisbees in Space

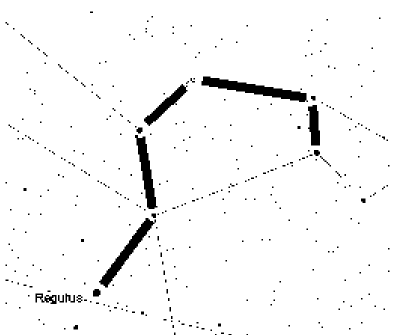
Dr. Tony Phillips

When Pete Rossoni was a kid he loved to throw Frisbees. Most kids do--it's pure fun. But in Pete's case it was serious business. He didn't know it, but he was practicing for his future career in space exploration. Grown-up Pete Rossoni is now an engineer at NASA's Goddard Space Flight Center. His main project there is figuring out how to hurl spacecraft into orbit Frisbee-style. The spacecraft are small--about the size of birthday cakes. "This wouldn't work with big satellites or heavy space ships like the shuttle," notes Rossoni. But a cake-sized "nanosatellite" is just right. Nanosatellites--nanosats for short--are an exciting new idea in space exploration. Ordinary satellites tend to be heavy and expensive to launch. The cost alone is a deterrent to space research. Nanosats, on the other hand, can travel on a budget. For example, a Delta 4 rocket delivering a communications satellite to orbit could also carry a few nanosats piggyback-style with little extra effort or expense. "Once the nanosats reach space, however, they have to separate from their ride," says Rossoni. And that's where Frisbee tossing comes in." a nanosat off the back of its host rocket. "It's a lot like throwing a Frisbee," he explains. "The basic mechanics are the same. You need to impart the spin and release it cleanly--all in about a tenth of a second." (The spinning motion is important because it allows the science magnetometer to measure the surrounding field and lets sunlight play across all of the Nanosat’s solar panels.) The ST5 nanosats are designed to study Earth's magnetosphere--a magnetic bubble that surrounds our planet and protects us from the solar wind. But their primary goal, notes Rossoni, is to test the technology of miniature satellites. "We haven't done anything like this before," says Rossoni. Soon, however, the concept will be tested. A trio of nanosats is slated for launch in 2004 on the back of a rocket yet to be determined. The name of the mission, which is managed by JPL's New Millennium Program, is Space Technology 5 (ST5). Can groups of nanosats maintain formation as they fly through space? Will their internal systems- miniaturized versions of full-sized satellite components satisfy the demands of both the harsh space environment and critical science measurements? Is Frisbee-tossing as much fun in orbit as it is on Earth? ST5 will provide the answers. Read about ST5 at http://nmp.nasa.gov/st5. Budding young astronomers can learn more at:

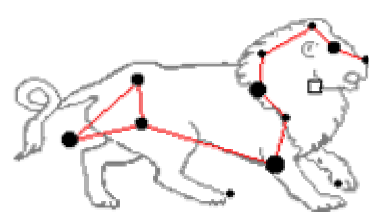
http://spaceplace.nasa.gov/st5/st5_tortillas1.htm

## Leo the Lion

Scott Baker



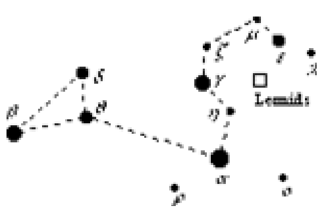

The Constellation of Leo, the lion, is now in our Spring sky. Leo lies



just to East of Gemini and Cancer, both recently discussed here. To find it, look due south, around 10:00PM in March, 9:00 PM in April and 8:00 PM in May, and find the most recognizable feature of the constellation, the big sickle. The 21st brightest star in the sky, Alpha Leonis or “Regulus”, anchors the base of the sickle. Regulus, which is 69 light years distant, was given it's current name by the Polish astronomer Nicolaus Copernicus (1473-1543). Copernicus saw Regulus as the Heaven's Guardian, one who regulated all things in the heavens, thus "Regulus". The ancients called Regulus by a different name "Cor Leonis", meaning "The Lion's Heart". As with many constellations, peoples around the world, in diverse civilizations, saw the same objects in the sky. The Syrians knew Leo as Aryo, the Persians as Ser, to the Turk, Artan and to the Babylonians, Aru, all meaning "Lion." The Egyptians felt that the world was created during a time when the Sun rose in Leo, near a star known as "Denebola", which means "Lion's Tail".

The Greeks, probably from their travels in the Middle East, saw it as a lion as well and attached this tale to how it came to be... Hercules' (you do all remember him right?), was to perform 12 labors. His first labor was to kill the Nemean lion, a ferocious beast that descended to Earth, in the country of Corinth, from the moon, on a meteor (more on meteors in a minute). The Nemean lion terrorized and ravaged the countryside of Corinth and couldn't be destroyed by mortal man, because, it was said that the lions hide was so tough, that not spear or weapon could penetrate it. The beast was not hard for Hercules' to find, near it's lair, a cave with two entrances. Hercules', to trap the lion, blocked the rear entrance and entered the front in search of the lion. After locating the lion, and having his arrow bounce off the lions chest, realized the stories of it's impenetrable hide were true. Grabbing the lion around the neck, he choked it to death, by ramming his fist down it's throat. Hercules', having completed is first task, used the lion's skin to make a mighty shield, that nothing could penetrate. The Goddess Hera, angry that the lion had been slain, raised the lion up, high in the sky, where today, he can be seen as the constellation Leo, the lion.

The constellation of Leo marks the western edge of the area known as "The Realm of Galaxies", an area of the sky that is heavily populated with galaxies, lying mostly in the constellations of Virgo and Coma Berenices. Leo itself contains five nice galaxies, all of them Messier objects, which are visible with smaller telescopes. M65, M66, M95, M96 and M105 are all within the reach of a 2" and larger telescope. The other thing Leo is famous for is the Leonid Meteor Shower, remember, the Nemean lion descended to Earth on a meteor. The Leoinds are a meteor shower that occurs every year around November 19th and are the result of dust and debris left behind by the comet Tempel-Tuttle. The meteors appear to come from the region of the sky (the radiant) in Leo, thus they are called the Leonids. With the recent pass of the comet in 1998, the shower has been replenished and has given very good displays for meteor watchers. The comet returns every 33 years, so the showers will slowly dwindle, until replenished again in 2031.




# In Search of Alien Oceans

Patrick L. Barry & Dr. Tony Phillips

A robotic submarine plunges into the dark ocean of a distant world, beaming back humanity's first views from an alien ocean. The craft's floodlights pierce the silty water, searching for the first, historic sign of extraterrestrial life. Such a scenario may not be as fantastic as it sounds. Many scientists believe that Jupiter's moon Europa conceals a vast ocean under its icy crust. If so, heat from the moon's interior-which would keep the ocean from freezing solid-may also drive sub aquatic volcanoes and hydrothermal vents. On Earth, such deep-sea vents provide chemical energy for ecosystems that thrive without sunlight, and some scientists even suggest that Earthly life first got started around these vents. So a warm Europan ocean spotted with thermal vents could be a natural incubator for life. That's why some scientists hope that someday we will send a probe to Europa that could bore through the ice and explore the ocean below like a submarine. To plan for such a mission, scientists would first need to put a camera in orbit around Europa. By looking for places where water has welled up to fill the spindly cracks that riddle Europa's surface, scientists can estimate where the ice is thinnest-and thus easiest to bore through. That mission scenario presents a problem, though. Europa orbits Jupiter inside the giant planet's punishing radiation belts. Continuous exposure to such high radiation would damage today's scientific cameras, making the information they gather less reliable and perhaps ruining them completely. That's why NASA is designing a more radiation-tolerant CCD that could be used on a mapping mission to Europa. A CCD (short for charge-coupled device") is a digital camera's chip-like core, which converts light into electric signals. "We've seen the effects of this radiation during the Galileo mission to Jupiter," says JPL's Andy Collins, principal investigator for the Planetary Imager Project. "Galileo has orbited Jupiter for many years, dipping inside the radiation belts only for brief intervals. Even so," he says, "we've seen clear signs of damage to its instruments." By using the hardier CCD's developed by the Planetary Imager Project, a future probe could remain in Jupiter's radiation belts for many months, gathering the maps scientists will need to finally get a peek behind Europa's icy veil. And who knows, maybe there will be something peeking back! To learn more about the Galileo mission to the Jupiter system, visit http://www.jpl.nasa.gov/galileo

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## Product Review: BAADER AstroSolar Safety Film

Ron Dinkins

I recently purchased some BAADER AstroSolar Safety Film™ to build a solar filter for my telescope. I was looking for an inexpensive filter to begin my Astronomy League Sunspotter Certificate Observing Program and found the film described on the Internet. I purchased it from Astro -Physics at www.astro-physics.com. The price was only $30.00 for an 8 x 11 inch sheet of density 5 visual-use safety film. They also sell a density 3.8 photography only film, as well as larger 20 x 40-inch sheets of each density. The 8x11-inch size was more than enough to make a filter for my 6-inch scope, 50-mm finder scope, and my 60-mm quick look scope. Fabricating the mount for the film is very easy and the instructions are included with the film and are also on the website. Basically, you wrap a strip of stiff cardboard about 1½-inches wide around the top outside of your scope. You want the ring t o be snug but not too tight. Then glue the ends to form a ring. Next, wrap another strip of cardboard about 1 inch wide around the outside of the first ring. Glue this ring’s ends together as well but make sure you can get the outer ring off after the glue has set. After everything has dried, leave the first ring on your scope tube and take off the second ring. Lay the solar film flat over the first ring and then slip the second ring back down over the film and first ring. Tug on the edges to get the film smooth but don’t stretch it. A slightly loose but wrinkle-free fit is what you want. Trim off the excess film around the edges leaving about ¼ inch sticking out. Then take packing tape or such and tape around the second ring to secure the film. Presto, you’re done!

The views through my 6-inch refractor with the film were very pleasing. The sun itself is a neutral light gray in color with a black sky. Sunspots are darker gray, nicely detailed, and sharp edged. Penumbral fibril lines inside the sunspot penumbra can be traced back to the umbra spots. Individual white facular lines are easily observable near the limb independent of any sunspot penumbra. Also, on days of good seeing, individual singular sunspots and granulation are visible across the face of the sun. Even with my 60-mm quick look scope, sunspots are easily seen with fibril lines and interconnecting facular evident. Overall, I would give this solar film an A+. It performs as promised with a price well below that of quality glass solar filters. The film itself is pretty tough to cut or tear and should last a long time if reasonable care is taken. Even small pinholes can be repaired with a black permanent marker without affecting performance. If you want a good solar filter for an inexpensive price, you will be happy with BAADER AstroSolar safety film.

*Astro-Physics, Inc., 11250 Forest Hills Rd., Machesney Park, IL 61115-8238, (815) 282-1513

## World Travelers

Andy Oliver San Angelo Amateur Astronomy Assc.

I was out looking at the stars one night and thinking of the unimaginable distances a person would have to travel to reach some of them. I never have been much on traveling, but I was reminded of a sign I saw once:

**Life on earth is expensive, but it does include a free trip around the sun.**

That started me thinking about how we travel through space while firmly planted on earth, sort of like the old song that says "take a trip without ever leavin' the farm." Once each day here in Texas, even if we never get out of bed, we travel about 24,000 miles as our planet rotates on its axis. Every day. And as we travel around the earth's core, we are speeding merrily along on an ecliptic around the sun at a distance of 93 million miles. Using pi times twice the radius, I get 584,040,000 miles around the sun. Multiplying our daily 24,000 miles times 365 days, I get 8,760,000 miles. Then I added them together for a total of 592,800,000 miles per year that the average human being travels through space, not counting what we actually travel on the ground. That's over 1.6 million miles each day. Is it any wonder we always seem tired? (just kidding) Looking at my situation: I'm 41.5 years old. That means I've traveled over 24.6 billion miles in my lifetime, and will probably do that many more before I'm through. I guess with all that traveling, I only hope I can take in all the sightseeing!

## After a decade, TOPEX/Poseidon adventure sails on

**NASA NEWS RELEASE**

It's been sailing the blackness of space now for a decade: a silent sentinel, watching over the world's oceans, looking for signs of the mysterious El Nino and La Nina phenomena whose cantankerous dispositions wreak havoc on our weather. TOPEX/Poseidon, a joint NASA-French Space Agency mission to study ocean circulation and its effect on climate, turned 10 on Saturday. Some 46,763 orbits after launch on an Ariane 42P rocket from the Guiana Space Center in Kourou, French Guiana, this spacecraft, designed to fly three to five years, continues to precisely map the surface height of 95 percent of Earth's ice-free oceans every 10 days. In doing so, it has revolutionized the study of Earth's oceans.

Best known for its ability to monitor the progress of large-scale ocean phenomena like El Nino, La Nina and a long-term ocean feature called the Pacific Decadal Oscillation that waxes and wanes every 20 to 30 years, this longest-running Earth-orbiting radar mission has amassed some impressive achievements. Its continuous data on sea surface height, wind speed and wave height have given us a new understanding of how ocean circulation affects climate. The satellite provides input for long-term climate forecasting and prediction models. TOPEX/Poseidon produced the first global views of seasonal current changes. It maps year-to-year changes in upper- ocean heat storage. The satellite has improved our understanding of tides, producing the world's most precise global tidal maps and demystifying deep-ocean tides and their effect on ocean circulation. It monitors global mean sea-level changes, an effective indicator of the consequence of global temperature change. Its data are input into atmospheric models for forecasting hurricane seasons and individual storm severity. And the satellite has improved our knowledge of Earth's gravity field.

"TOPEX/Poseidon has revolutionized the ocean sciences," said Dr. Lee- Lueng Fu, TOPEX/ Poseidon project scientist at NASA's Jet Propulsion Laboratory (JPL), Pasadena, Calif. "For the first time, the great pulse of the oceans -- ocean eddies, seasonal cycles and year-to-year climate signals -- has been mapped with unprecedented accuracy, yielding fundamentally important information for testing ocean circulation models." "TOPEX/Poseidon data help forecast short-term changes in weather and longer-term climate patterns," said JPL oceanographer Dr. William Patzert. "Ocean currents flow around highs and lows of oceanic pressure, distributing the Sun's heat across the globe and releasing It back into the atmosphere as water vapor, which is returned to the oceans and land as rain or snow. Understanding the oceans' behavior is the key to forecasting climate change."

Nearly 400 science users worldwide apply TOPEX/Poseidon's data in a variety of ways. Fishermen use the data, along with sea-surface temperature imagery, to locate fish. Satellite altimetry is used to identify key habitats for other marine animals, which can then be tracked and studied. Maps from TOPEX/Poseidon data help sailors and commercial ships chart their courses. Offshore oil operators and cable- laying vessels use knowledge of ocean circulation patterns to minimize impacts from strong currents. Marine biologists use the data to monitor and assess coral-reef ecosystems sensitive to ocean temperature changes. The mission can even track ocean debris. Jason, TOPEX/Poseidon's follow-on, was launched December 7, 2001, carrying updated versions of the same instruments. That joint U.S.- French mission, which will continue building a long-term database, is currently in a six-month scientific validation phase. TOPEX/Poseidon's longevity has given scientists the opportunity to fly Jason in a parallel orbit, doubling the amount of data now being collected. The tandem mission will enable improved detection of ocean eddies, coastal tides and currents. Planning for TOPEX/Poseidon began in 1979, when NASA started planning the TOPEX mission, while the French Space Agency was planning Poseidon. The two agencies formed a single mission in 1983. JPL manages the U.S. portion of TOPEX/Poseidon and Jason for NASA's Earth Science Enterprise. JPL is a division of the California Institute of Technology in Pasadena. Research on the Earth's oceans using TOPEX/Poseidon and Jason and other space-based capabilities is conducted by NASA's Earth Science Enterprise to better understand and protect our home planet.

## The Case for an Observatory

Doug Kniffen

Every amateur astronomer should have some sort of observatory. The reason is time. Most people are so busy that it isn't possible to find much more than an hour to do some observing. Even in an urban area an observatory, with all necessary equipment ready for use, will provide new opportunity to observe.

There are two primary advantages to a dome compared to other types of personal observatories; environmental moderation and, consequently, improved deep sky observing ability. The later benefit is the most important. This particular dome advantage is realized through greater dark adaptation. While obvious to the urban amateur, few observers are aware that even the darkest rural sky will limit the degree of your low light perceptive ability.

The stars themselves will prevent full dark adaptation. In a rural location, a dome will facilitate observing extended objects a full magnitude fainter than possible with the same instrument used in a run-off roof type structure. The dark adaptation benefit would be greater at an urban site.

A well-designed dome will both moderate the wind and reduce nocturnal dampness. Not all domes adequately accomplish these two tasks. Since I have not had the opportunity to observe within one of the newer plastic domes, some of the succeeding comments may not be relevant when applied to this type of material. If thermal equilibrium, with ambient conditions, is achieved then metal domes can become uncomfortably damp and cold, especially on nights with little or no wind. Despite the maintenance and longevity considerations, wood is arguably a superior choice of material for amateur domes. The personal comfort factor may be the most important, but the drastically lower cost of material and requisite tools should not be easily dismissed. My whole observatory (pictured) project cost less than $2000 dollars over the winter of 1992/93. Most small observatory buildings, not just domes, are not well designed regarding ventilation. If inadequate airflow is a problem, both temperature and humidity will become higher than the outside air during the day. In addition to the potential problems of perpetually damp equipment, it may take many hours to cool off the building at night. Such local disturbances to seeing don't impair visual observation very much, but they may become important if imaging celestial objects. My dome was deliberately designed to provide adequate ventilation. Only rarely does the temperature difference exceed 4 degrees and, despite wood construction, the relative humidity difference doesn't vary by more 6% between the inside and outside of the building. Several times per year (very hot very humid days with absolutely no wind) I use electric fans to help cool the building at night.

With adequate ventilation, the building will be drafty, but wind is moderated. In my observatory, any breeze less than 5 mph will pass through relatively unimpeded. When outside wind speed exceeds 50 mph the draft inside is strong enough (10 to 12 mph) to blow papers off the desk and across the floor (the dome may also turn in the wind above 50mph). Finally, local non-thermal turbulence can be caused by wind velocity. With an obstruction to airflow, such as a wall or dome, there is always a change in velocity relative to unobstructed air flowing nearby. This change will create swirls, eddies and shear layers that distort light passing through them. The higher the difference in flow velocity across a given area, the greater the distortion. A dome will cause less turbulence than a wall (run-off roof) at most wind speeds. There does exist a difference between domes at relatively high wind speeds. Informal experiments with scale models demonstrated the advantages of using a first level geodesically expanded dodecahedron. A conventional smooth dome will generate strong shear down wind due to the even acceleration around the dome. My particular dome was designed with a simplified geodesic expansion method that I developed (I removed 95% of the math, and 99% of the confusion compared to the original geodesic design method). An expanded dodecahedron offers an improvement over a conventional dome regarding turbulence caused by the building. This shape of the dome is round enough that it doesn't act like a sail, and pointed enough that it doesn't create as much lift as a smoother dome.

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| Librarian | Lisa Lester |
| Scientific Expeditions | Paul Maley |
| Newsletter Editor | Bob Taylor |

## Special Interest Groups

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|---|---|
| Film Photography | Ed Malewitz |
| CCD Photography | Al Kelly |
| Telescope Making | Bob Taylor |
| Astronomy Fundamentals and Observing Awards | Triple Nickel |
| Binocular Observing | Leslie Eaton |
| Solar | Jim Morrison |
| Planetary | Antonio Oliva |
| Deep Sky | Paul Hannagrif & Ken Lester |
| Light Pollution | Bob Hammond |
| Variable Stars | Dick Miller |
| Optics | John Gordeuk |
| Public Education Chairman/Scouting | Brian Zemba |
| Origins | Christopher Mendell |