

# CONSTELLATION

The Official Publication of the Bucks-Mont Astronomical Association, Inc

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VOL XVIII, NO 11/12

NOVEMBER/DECEMBER 2003

Scott Petersen, Editor

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## President's View

### **Eleven Things BMAA Members Should Know**

*- by Antoine Pharamond*

With all the new members lately, I thought it would be a good idea to give an overview of the club and its inner workings. Anyone with questions is encouraged to contact me or any of the officers.

**Meetings** – There are two meetings each month, both held at the Peace Valley Nature Center. At 8:00 pm on the 1<sup>st</sup> Wednesday is the General Membership meeting. This meeting is open to all members, as well as the public. A minimum amount of time is spent on business issues, and a maximum on astronomy related topics. We always discuss transient phenomena, and when possible, someone gives a talk on optics or imaging or whatever. Weather permitting, this meeting usually ends in an observing session in the parking lot. This is a great place to bring your astronomy or telescope questions. There's always someone available to help with scope alignment and setup. In December, the general meeting doubles as our holiday party, where everyone brings munchies, awards are given out, and fun is had by all.

The second meeting, at 8:00 pm on the 3<sup>rd</sup> Wednesday, is the Executive Committee meeting. This meeting is closed to the public, but all members are encouraged to attend. This is where we discuss issues and make decisions relating to the operation of the club. Only in extreme cases do we bring an issue up for a vote at the general meeting.

Note that for both meetings, we use the side entrance to the building. The front door remains locked. Walk around to the right of the building, where you'll find a door leading straight to the meeting room.

Minutes from both meetings are usually posted on the BMAA website by the end of the month.

**Starwatches** – These are BMAA's public outreach events. About 30 starwatches are scheduled each year with local schools, township parks and nature centers. The purpose of these events is to generate and further public interest in astronomy. Starwatches are organized and run by the Starwatch Chair, currently Vice-President George Reagan, but telescope support from the membership is needed. To be helpful, all you need to do is keep your scope pointed at something in the sky. George will do most of the talking, so you don't need to be an "expert". We ask each member to attend at least one starwatch during the year. You're likely to find it quite rewarding to show kids and adults celestial wonders they didn't even know existed.

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**'NASA Space Place' column inside on pages four and seven**  
**'Tips' column inside starting on page five**

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**Wednesday, December 3 at 8:00p - BMAA General Meeting at Peace Valley**  
**Wednesday, December 17 at 8:00p - BMAA Business Meeting at Peace Valley**  
**The next BMAA General Meeting is scheduled for Wednesday, January 7 at 8:00p**

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**BMAA MESSAGELINE - 215/579-9973**

**email: [info\[at\]bma2.org](mailto:info[at]bma2.org)**

**website: [www.bma2.org](http://www.bma2.org)**

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**Bucks-Mont Astronomical Association, Inc**

**2004 Calendar of Events**

**StarWatch Chairman: George Reagan, 215/741-3701 [StarWatch@bma2.org](mailto:StarWatch@bma2.org)  
Information Line - 215/579-9973**

For directions, visit the BMAA website <http://www.bma2.org> or contact George Reagan.  
Please call the information line at 215/579-9973 before you leave for any event.

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**Submission deadline for articles is the 15th of the month prior to publication.**

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# Assessing SDV-XII

- by *Bob Black*

Stella Della Valley XVII was, by most measures, a big success. Anyone walking the observing field on Friday night could get a sense of the large attendance. Total attendance reached 135 persons, with 102 camping overnight on Friday. The skies were relatively cooperative on Friday night, with steadily improving seeing after 1 AM Saturday. Those of us who stayed up late were treated to the season's first good look at the winter constellations, as well as Saturn and Jupiter. Our newly acquired fourteen inch Newtonian proved its worth as both an observing and public relations tool, with many people gathered around to enjoy the sky tours being conducted by Antoine and Alan P.

While this year's Stella Della may be behind us, perhaps now is a good time to pause and reflect upon BMAA's premier annual event. Stella Della Valley was originally envisioned at a time when there were few alternative star parties here in the Northeast. The closest alternative star party was Stellafane in Springfield, Vermont. That was the situation back in 1986 when the first Stella Della came to pass, but the same cannot be said today in 2003. A quick "back of the envelope" survey indicates at least seven significant star parties from central Pennsylvania through New York and New England. Some of these newer star parties, including Black Forest and Mason-Dixon, have grown substantially larger than Stella Della Valley in just a few years. The amateur astronomy community is indeed fortunate to have so many nearby star parties to choose from today.

The historical reasons for organizing Stella Della may no longer be valid, but could it be true that there are no valid reasons to continue with Stella Della Valley into the future? This may appear to be a rather silly rhetorical question in light of this year's success, but then many of you may remember that Stella Della Valley XVII (2002) almost didn't happen as a result of this very question. Reflecting upon this year's experience, we should all take away at least two things. First, the attendance suggests that Stella Della Valley continues to serve a public need. The number of new faces present this year was especially encouraging. Second, we should all recognize that BMAA as an organization is clearly capable of hosting a major star party. Odds are that we expend the same if not more organizational energy than our peers who organize Black Forest or Mason-Dixon. We could execute a much larger star party if we elected to do so.

Let us conclude with some thoughts about the future of Stella Della Valley. The original reasons for hosting Stella Della are no longer valid, and now would be a good time to re-evaluate our reasons for hosting this event. We know that we are capable of successfully hosting a star party, but perhaps the operative question is "why should we?" Planning for the future requires that we address this and other questions. Moving forward on the path towards Stella Della Valley XVIII, we should start by establishing the Mission, goals, and objectives for the event. This process will begin in earnest with the November exec meeting. Persons interested in the future of Stella Della Valley are encouraged to actively participate in the planning process for next year and beyond.

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- *BMAA member Bob Black did a fine job coordinating everything this year as SDV chairman.* [-ed]

## Stardust

- by *Patrick Barry and Dr Tony Phillips*

Philosophers have long sought to "see a world in a grain of sand," as William Blake famously put it. Now scientists are attempting to see the solar system in a grain of dust-comet dust, that is.

If successful, NASA's Stardust probe will be the first ever to carry matter from a comet back to Earth for examination by scientists. It would also be the first time that any material has been deliberately returned to Earth from beyond the orbit of the Moon.

And one wouldn't merely wax poetic to say that in those tiny grains of comet dust, one could find clues to the origin of our world and perhaps to the beginning of life itself.

Comets are like frozen time capsules from the time when our solar system formed. Drifting in the cold outer solar system for billions of years, these asteroid-sized "dirty snowballs" have undergone little change relative to the more dynamic planets. Looking at comets is a bit like studying the bowl of leftover batter to understand how a wedding cake came to be.

Indeed, evidence suggests that comets may have played a role in the emergence of life on our planet. The steady bombardment of the young Earth by icy comets over millions of years could have brought the water that made our brown planet blue. And comets contain complex carbon compounds that might be the building blocks for life.

Launched in 1999, Stardust will rendezvous with comet Wild 2 (pronounced "Vilt" after its Swiss discoverer) on January 2, 2004. As it passes through the cloud of gas and dust escaping from the comet, Stardust will use a material called aerogel to

capture grains from the comet as they zip by at 13,000 mph. Aerogel is a foam-like solid so tenuous that it's hardly even there: 99 percent of its volume is just air. The ethereal lightness of aerogel minimizes damage to the grains as they're caught.

Wild 2 orbited the sun beyond Jupiter until 1974, when it was nudged by Jupiter's gravity into a Sun-approaching orbit—within reach of probes from Earth. Since then the comet has passed by the Sun only five times, so its ice and dust ought to be relatively unaltered by solar radiation. Some of this pristine "stuff" will be onboard Stardust when it returns to Earth in 2006, little dusty clues to life's big mysteries.



NASA's Stardust mission will capture dust from comet Wild 2 and bring them back to Earth for study.

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To learn more about Stardust, see the mission website at [stardust.jpl.nasa.gov](http://stardust.jpl.nasa.gov). Kids can play a fun trivia game about comets at [spaceplace.nasa.gov/stardust](http://spaceplace.nasa.gov/stardust).

*This article was provided by the Jet Propulsion Laboratory, California Institute of Technology, under a contract with the National Aeronautics and Space Administration.*

## Observing Tips

# Some notes on optical quality and a quick star test

- by *Bernie Kosher*

While this has been written up in previous articles, several people have asked for further info, also, this article is more “what do I look for” and is intended for the critical planetary observer to test what one has. So here goes.

Why is it that some scopes show crisp, round images of stars while others show blobs? Why do some show good stars but are “soft” or lack contrast on planets?

We are not trying to knock manufacturers. Bear in mind that some scopes, especially short f ratio ones, should not be held to the same standards as a long focus planetary scope. The manufacturers are caught between price considerations and attaining a reasonable level of quality. If the vendor guarantees a certain level of performance, then it should be achieved. If that level is not achieved, the buyer should consider sending it back. But remain fair and do not expect a \$300 dobsonian mounted Newt to perform as well as a \$3000 Astrophysics.

First off, let's get on the same page as far as the quantifying number used by optical workers.

The standards are given in wave errors. This should be a hard and fast number, but in reality, is far from it. A general guide is the + wave standard established by Lord Rayleigh. But what does this mean?

The term “diffraction limited” is also used and will be touched on.

Rayleigh's standard refers to a + wave total error at the wavefront, which is to say at the focal plane. The standard also goes on to state the curve must be smooth and the optical surface free of ripple both large and small scale. One assumes the surface to be free of cosmetic defects such as; abrasive pits, edge chips, bubbles and glass flaws.

This standard, if adhered to, will provide fine images in your scope, but is not nearly good enough for the critical planetary observer.

Sadly, many of the commercial scopes one sees are not even up to this level. While they perform adequately, a comparison with a really fine set of optics leaves them behind. Sometimes far behind. Even more so, there is no real way to quantify the errors just by visual check. An experienced observer, skilled in the star test originally described by Rev. William Ellison and greatly expanded by Richard Suitor (Star Testing Astronomical Telescopes, Willman-Bell, 1994) can guess at the approximate wave error. Suffice it to say that a scope passing the star test should perform well.

Suitor also uses the “wobbly stack”. Since the image we perceive is affected by agents outside the scope, it is imperative that the optical quality be of the highest order to deliver the maximum resolution and contrast. Some of these factors are; the state of the atmosphere, the state of the observers eye and physical condition, limitations of monocular vision, limitations due to the wave nature of light, limitations due to secondary mirrors or optics and any accessories, including eyepieces. There are others which can affect the perceived image, but you get the idea. Throw in the inevitable heat and thermal effects.

Since we have picked + wave at the wavefront as a good standard, it becomes obvious this cannot be achieved if the main objective, whether mirror or lens, limits the final wave error to + tolerance. Any one of the “wobbly stack” will contribute to image degradation, and send the quality beyond our set tolerance. So the better the objective, the better the overall performance...regardless of outside factors. Thus, if the atmosphere is a bit unsettled, the high quality scope will always outperform the lesser one.

Since I have stated that you cannot quantify the error with a simple test, just what does one do?

The only effective method is trial. Compare the scope with a known good one. Admittedly, a poor night will not allow full testing and qualification of the optics.

On those rare nights of steady air, with the scope fully at thermal equilibrium, a truly fine optic will deliver an image that takes ones breath away. One will feel that if he could only hold his hand steadier the focus would improve even further.

An indifferent set of optics, on the other hand, will never quite come to a truly sharp and high contrast focus. You may find the focus is the same over quite a range of eyepiece travel. It will not ‘snap’ into focus.

An interesting sidelight. I have noticed that in a very high quality scope slightly out of focus, there may appear to be several images of a planet slightly offset from each other. I have never noticed this in a poor one.

And a simple star test. Anyone can do this, and I recommend you try it on every scope you can, using a high quality eyepiece magnifying at least 30 to the inch. Thus, in a 4-inch scope use at least 120X and more if the scope will stand it. Usually this power will show enough errors to immediately disqualify a poor scope, but is not critical enough for a planetary one.

Interestingly enough, the wave error contributed by diffraction caused by a secondary mirror and the color error of a doublet lens is about the same. However, the out of focus blue and red of a doublet are barely perceived by the observer, and the brain seems to have a remarkable ability to process out color errors. I find the images in a refractor much more stable and contrasty than in a Newtonian reflector with a 25 percent diameter secondary mirror.

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However, and this is a big however, a Newtonian of long f ratio and with a secondary 20 percent or less the diameter of the main objective produces images which must be seen on a good night to be appreciated. These scopes rival refractors using ED glass and cost far less. They are more affected by thermal and ground seeing, of course, but are absolutely color free.

So here's a quick star test.

Rack the focuser outside of perfect focus far enough to show about ten rings. If the scope does not show rings at all, throw it at the nearest fire hydrant. Sorry, got carried away. If the scope does not show these extrafocal rings, it is going to be useful only for general stargazing, and will fail badly on planetary contrast and will not show the faintest pinpoints of stars. Note also, the center of the image will be dark due to the obstruction caused by the secondary in a reflector using a secondary.

After checking the rings we will go an equal distance inside focus.

The image should be a progression of rings and dark spaces, evenly spaced in a refractor, somewhat differently in a reflector. However, they should have the following characteristics. The rings should progress in size evenly, with the outer one being larger and brighter. The rings may show spikes due to the legs of the spider. The rings should be perfectly round and the light distribution even. There should be no lumps, bumps or hollows. If one or more of the rings are brighter or dimmer, there are zones. If the outer ring (in a refractor, inside focus on a reflector) is wooly and the rings of low contrast there is turned edge. If the rings progressively darken or brighten more than they should there is spherical aberration. Usually a scope will show some level of error, even if the in focus image is good. The star test is subtle, but very sensitive.

Now rack the focuser an equal distance inside focus. The rings should look pretty much the same. If they look softer on one side than the other there are surface errors.

Now move the focuser until only three or four rings show. This is much more critical of the image. Once again, the rings should be round etc. No lumps or out of round. Again, the rings should look the same on both sides at equal distances from focus.

Now very slowly rack through focus. The image should remain round and about equally illuminated. There should be no softness around the edge. Go through focus and see if the center of the image gets smaller and smaller but starts to show a slightly larger halo. If this is the case, there is a slight error. The image should shrink to a small round dot with no spikes.

Good luck with this. The slightest atmospheric problem will be more readily visible on the outside of focus. If one is interested, the height of the air causing turbulence can be roughly found by racking out of focus until the rippling waves are about sharply focused, measuring the amount of eyepiece travel, and using the object/image formula.

To be really critical, use a very high power, about 50 to the inch or more. In a really fine instrument the images will still be nice and round. I recently tested a home made 6" f/9.5 reflector and found the star test to show no errors at very high power. The planetary views thought this scope far surpassed my 4.5" refractor. So don't let the old reflector versus refractor saws fool you.

There is much more to this, but I've run out of time.

Some last notes...A Schmidt-Cass scope, as marketed by most major vendors, has a 30 percent secondary and cannot possibly give the highest contrast planetary image. It should, however, be up to a fair standard. Do not condemn these general-purpose scopes when comparing them to high quality scope designed for maximum contrast.

Any reflector with an obstructing secondary larger than about 25 percent is already teetering on the edge of + wave optics. Any of our "wobbly stack" errors will push it over that edge.

Always check the collimation carefully. It matters little for deep sky, but is critical for planetary viewing and imaging the faintest possible star speck.

Try different eyepieces. If using a star diagonal in a refractor, try a different one. They are notorious for degrading the image.

Short f scopes are very tough on eyepieces. Since eyepieces are designed for a shallow light cone, they perform much worse on short f scopes.

Multi element wide field eyepieces are wonderful for just that, but cannot give the best planetary performance.

Experience is the major factor separating the casual observer from the person who sees so much. Only time at the scope can improve your perception.

Enjoy your holidays!

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- BMAA member Bernie Kosher provides the monthly 'Tips' column. He can be reached at [bkhere@optonline.net](mailto:bkhere@optonline.net). [-ed]

## Hurricane Team Work

- by *Dr Tony Phillips*

On a gray breezy day last September thousands of people got in their cars and reluctantly left home. US East Coast highways were thick with traffic. Schools closed. Businesses shut down.

Perfect!

When powerful Hurricane Isabel arrived some 38 hours later nearly everyone in the storm's path had fled to safety.

Days later Vice Admiral Lautenbacher, in a briefing to President Bush, praised the National Atmospheric and Oceanic Administration (NOAA): "Without NOAA's excellent track forecasts, hurricane Isabel's toll on lives and property would have been even more devastating. This is NOAA's first year of providing 5-day forecasts-and the 5-day forecast for Isabel was as good as our 2-day forecasts have been over the last decade."

Many people in NOAA played a role. A team of pilots, for instance, flew Gulfstream-IV High Altitude Surveillance jets right up to the approaching hurricane, logging 25,000 miles in the days before landfall. Their jets deployed devices called dropsondes-little weather stations that fall toward the sea, measuring pressure, humidity, temperature and wind velocity as they plummet. The data were radioed back to the aircraft and transmitted to forecasters on shore.

While two Gulfstream-IV crews flew night and day around the storm, a NOAA satellite named GOES-EAST monitored Isabel from above. (GOES is short for Geostationary Operational Environmental Satellite.)

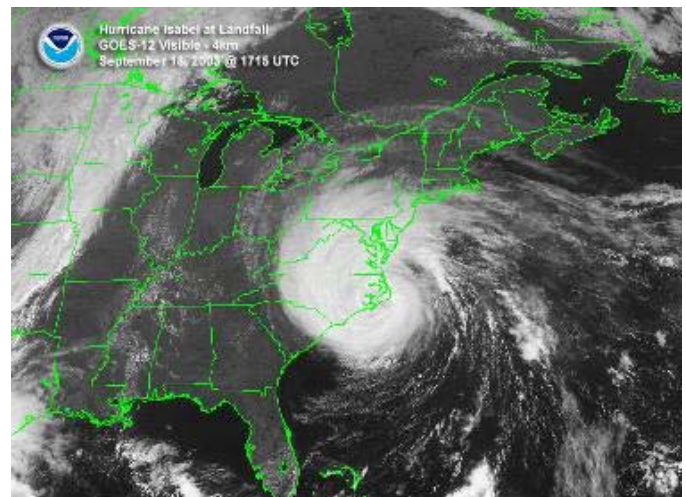
From an orbit 22,300 miles above the Atlantic Ocean, GOES-EAST had a unique view. "It could see the entire hurricane at once," says Ron Gird of NOAA. "Scientists used infrared spectrometers onboard the satellite to estimate the height of the storm clouds, their temperature and water content. GOES can also measure the temperature of the ocean surface-the source of power for hurricanes."

Constant streams of data from GOES and the Gulfstream aircraft were fed to supercomputers at NOAA's Environmental Modeling Center in Maryland where sophisticated programs, developed over the years by meteorologists and programmers, calculated the storm's most likely path.

Supercomputers. Satellites. Jet airplanes. Scientists. Programmers. Pilots. It took a big team using a lot of tools to predict where Isabel would go-accurately and with time to spare.

Says Vice Admiral Lautenbacher: "I hope everyone at NOAA shares the pride of being part of a team effort that so effectively warned the public of impending danger and enabled citizens to take action to protect themselves and their loved ones."

Well done, indeed.



GOES-East satellite image of hurricane Isabel as it makes landfall on September 18, 2003 at 1715 UTC

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To learn more about the GOES, see [www.oso.noaa.gov/goes/](http://www.oso.noaa.gov/goes/).

For kids, the SciJinks Weather Laboratory at [scijinks.nasa.gov](http://scijinks.nasa.gov) has lots of fun and fascinating facts about the wild world of weather.

*This article was provided by the Jet Propulsion Laboratory, California Institute of Technology, under a contract with the National Aeronautics and Space Administration.*

- View, continued -

Also rewarding are the prizes given out to starwatch attendees at the Holiday party. Your chances of winning increase with each starwatch you attend! This year, we will be giving away three gift certificates totaling \$175.

We usually observe national astronomy day (early May) by holding a daytime public event with posters, displays and safe solar observing.

**Star Parties** – These events are for members and guests only, and are the best way to better your observing skills. If you're considering a scope or accessory purchase, star parties are the perfect place to sample similar equipment that others may already own.

One or two star parties are scheduled each month, on Saturdays closest to the New Moon. Our local dark-sky sites are the default location, but we often plan "camping" star parties are Hickory Run State Park for darker skies, or Cherry Springs State Park for way-dark skies. Members also attend regional star parties hosted by neighboring clubs. And occasionally, a member will host a star party at his/her home. Often, star party planning comes down to the wire as weather forecasts are considered, so it's important to watch egroup traffic to avoid being left out in the cold, alone.

We have two local dark-sky sites, both off of Cafferty Rd. in Tincum Township (northern Bucks Co.) One is Van Sant airport, which is now owned by the county. The other is adjacent to Tohickon Valley County Park. Maps are available in the BMAA website member's area. The Tohickon site tends to be wet, so Van Sant has been the site of choice lately. Note that there are rules at Van Sant. We are only allowed to set up immediately off either side of the driveway. We must stay off the runway, and there's no need to get too close to the gate. For both sites, it is highly recommended that you find them during the day at least once. The roads up there can get confusing.

**Stella-Della-Valley** – SDV is BMAA's own regional star party. This is our only event that is not free, and our only star party to which everyone is invited. The weekend long event in October attracts over 100 people and includes door prizes, a swap meet, speakers, a dinner banquet and tons of observing. The SDV committee is formed early in the spring to plan for the event.

**Website** – We are fortunate to have an awesome webmaster, Jim Moyer. Our website, [www.bma2.org](http://www.bma2.org), is full of useful information both for members and non-members, including schedules of BMAA and other regional events, the Clear Sky Clock and other realtime stuff, archived issues of the Constellation and the Weekly Update, maps to starwatches and other locations of interest, and more. Some areas of the website are restricted to members only. To access these areas, you will need the username and password, which is occasionally distributed by email. If you need the password, contact the club's treasurer at [treas@bma2.org](mailto:treas@bma2.org).

BMAA members are encouraged to join the BMAA yahoo group. This group facilitates communications between members by forwarding emails to all members. This is the best way to keep in touch with the activities of the group. A link to join the egroup can be found on the BMAA website. Although it is recommended for egroup members to have a yahoo ID, it is possible to join the egroup without one. Our egroup is small and generally only generates only a couple messages each day. On occasion, a discussion may result in up to 10 or 15 messages in one day, which some find objectionable. For this reason, it is possible to select the "daily digest" setting, which groups all of each day's messages into one. This reduces the "realtime" effectiveness of the egroup, but still provides some level of communication. There's also an option to not receive any emails, but then you have to check the messages on the web to stay "in the loop". Contact our webmaster at [info@bma2.org](mailto:info@bma2.org) for more information.

**Constellation** – You're reading it! This is BMAA's monthly publication. Constellation editor, Scott Petersen, does a great job putting it together. You'll find interesting and informational articles, many authored by BMAA member and astronomer extraordinaire Bernie Kosher, as well as meeting minutes and a monthly column provided by NASA. All members are encouraged to submit articles of interest to Scott: [constellation@bma2.org](mailto:constellation@bma2.org).

At each member's option, the Constellation can be received by mail or online. The online version is in pdf format and can be readily printed. To save on printing and mailing costs, we ask that all members elect electronic receipt if at all possible. This leaves more cash in the bank to buy cool stuff, like the solar viewer and 14" telescope we bought this year.

**Observatory** – BMAA has had plans to build an observatory for several years. The biggest hurdle, which has yet to be cleared, is to find a suitable location. We have been working with the Bucks County Parks department on this matter. There are currently some promising locations on the table, including Van Sant airport, but many details have to be worked out.

BMAA purchased a 14" Newtonian this year. This was done in an effort to give the observatory project some momentum. In the mean time, a base has been constructed for the scope to permit stand-alone operation. The scope was unveiled at SDV in October and proved to be quite an attraction.

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Initial funding for the observatory was provided by Rohm & Haas, thanks to efforts by member Harvey Scribner. Other donations can and have been made to the observatory account since. A significant portion of proceeds from this year's successful SDV were put into the observatory account, which was also used to purchase the 14" scope.

**Magazine subscriptions** – Members of BMAA are entitled to savings on subscriptions to both Astronomy and Sky & Telescope magazines. You save \$10 on each, which, if you get both, almost pays for your membership. To take advantage of this benefit, you must subscribe or renew through the club. More information is available in the member's area of the website.

I have personally found these two magazines a great source of information. I look forward to reading both of them every month, even after 4 years. Someone usually brings at least one of these magazines to the general meeting, in case you're curious as to their contents.

**Sweatshirts** – Members can purchase monogrammed, hooded sweatshirts with the BMAA logo on the back and their name on the front. The current price is \$40.

**Member Images CD** – For the last two years, member Gene Nolan has compiled images taken by members into a CD, which we sell for \$10. Some of these images are pretty incredible and make for good computer desktops. Members are encouraged to submit any and all images they capture.

**Dues** – Alas, the club has operational expenses. Membership dues are due at the November general meeting. We ask that renewing member make an effort to be prompt with their renewal. The biggest reason is that maintenance of our database gets to be time consuming when members are removed just to added back later. Please help us out! Visit our website for the renewal form and instructions.

Please note that (subject to membership approval at the December meeting), dues will be going up by \$1 effective January 1, 2004. This increase reflects a \$1.50 per member increase in the dues we pay to the Astronomical League. This organization works hard on the behalf of all amateur astronomers and represents a well spent \$5 per member. Details of their activities can be found in their quarterly publication, the Reflector, as well as on their website, [www.astroleague.org](http://www.astroleague.org). If you do not receive the Reflector within a few months of joining BMAA, please contact any of the officers to rectify the situation.

Clear Skies...Antoine Pharamond, President BMAA

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