The Observer Volume 2, Issue 1 Fall 2009

The Observer

Newsletter of the Brazos Valley Astronomy Club

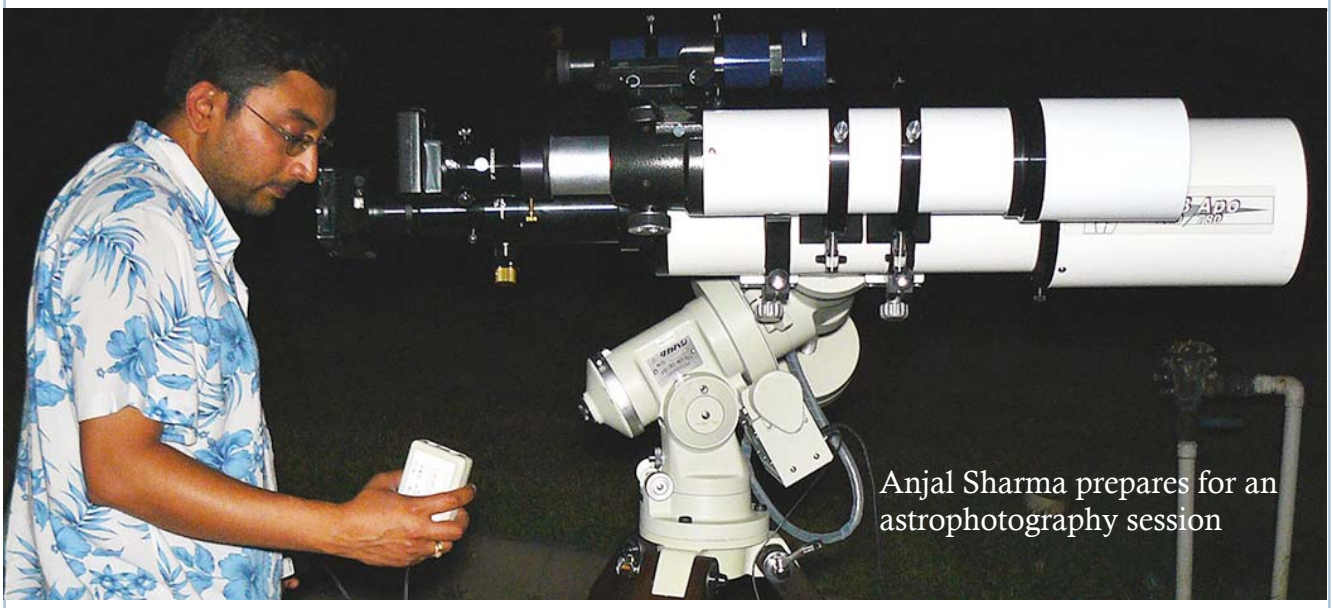
M51 Whirlpool Galaxy

Photo by Anjal Sharma

Welcome!

Let BVAC Take You To The Stars

The Brazos Valley Astronomy Club is a small band of amateur astronomers who gather for observing and astronomy fellowship. The Club, formed in 2006, is small but growing – and as we grow we get better because we have more to offer. If you are interested in the stars, astronomy, space, or similar subjects, this is a club that you will enjoy. Astronomy is a feast best shared. If you are a beginner, the club is a great way to meet people who know about astronomy and to find out about telescopes and other astro-equipment. If you are an experienced astronomer, you will meet others with similar interests. Come to a meeting or star party and try us out. Contact information is provided later in this newsletter.



Anjal Sharma prepares for an astrophotography session

An Interview with President Sharma

OBS: *Congratulations on your election as BVAC president. Tell us a little bit about yourself. Where did you grow up? Where did you go to school? Tell us about your family? Your job?*

AS: Thank you Will. I am honored to serve the club in this capacity. I was born in Bombay, India and grew up in that bustling metropolis. I was educated at St. Lawrence high school and graduated with a Bachelor's degree in Science from the University of Bombay and followed that up with a Master's degree in Chemistry from the Indian Institute of Technology. I then traveled to the USA to attend graduate school at the University of Kansas (Rock Chalk, Jayhawk!), where I graduated with a doctoral degree in chemistry. This was followed by a short postdoctoral stint at the University of Pittsburgh and then I and my wife, Bhumi, moved to College Station in 2003, where I took a postion at Lynntech. My daughter, Harshali was born in shortly afterwards. My research is in the fields of photonic bandgap materials for useful applications including chemical and biological sensing and optical switching. I also have a strong interest in the field of electrochemical generation of reactive species for medical applications related to disinfection and sterilization. My wife is an employee at St. Joseph in Bryan and my daughter goes to Kindergarten at Southwood Valley Elementary. We now live in Pleasant Forest right within the light dome of College Station.

OBS: *When did you get interested in astronomy? Was there a seminal event? What was your first scope?*

AS: I became interested in Astronomy when I turned 6. My grandpa took me to the American Consular Library in downtown Bombay where I remember just gawking at the 6-foot scale model of the Saturn V moon rocket. This is likely the one event that defined my lifelong love for astronomy. My grandpa encouraged this obvious interest by having me read books on the space race and taking me on periodic trips to the Nehru Planetarium to see the shows and look through the rooftop observatory telescopes. My first view of the Moon through a 12-inch Newtonian from the planetarium was breathtaking and I remember thinking that the people who had walked on this rocky cratered

Continued on next page.

Sharma Interview *Continued from p. 2.*

surface were privileged. Although I didn't grow up to be an astronaut, I am most decidedly an astro-nut!! I couldn't afford any scopes growing up or even as a poor graduate student in Kansas, so it wasn't until I was in College Station, that I purchased my first scope - a Celestron Nexstar 8i computerized 8-inch SCT.

OBS: *As president, what do you see ahead for the club? Do you have a particular goal or philosophy?*

AS: I think that the club has grown significantly under the last administration and looking ahead, I would like to see it grow even more, with new members being added to the ranks. One of the most important challenges that all current officers and club members should address in the coming months is to begin recruiting for the club in earnest. I believe that we should take every opportunity to advertise the club as a positive influence on the community. We should conduct more outreach sessions including holding star parties open to the public and posting flyers in local schools and college campus buildings. I would like to see membership double within the course of year or year and a half. Although it is a challenge, I believe that with proper planning and follow- through efforts we would be able to meet this goal. The members that we would ideally like to recruit are like-minded people who have a curiosity about stargazing and a desire to continue their astronomical journey. A second goal that I would like to address is to begin increasing the club coffers. In the past we have been reluctant to do this, beyond collecting membership dues, but I think that we should begin collecting door fees or sell tickets for some outreach events. We should use the proceeds to maintain some inexpensive telescopes and mounts to loan out to club members, and utilize at star parties. I will coordinate this aspect with the treasurer and club secretary. My philosophy is that there is room for different philosophies and approaches in the club. Therefore, I encourage every club member to exercise their democratic rights and actively advise the officers in conducting club affairs. Every club member should become more involved in the club and help us meet the goals of becoming a premier community organization.

Photo by Anjal Sharma

BVAC Elects New Officers for 2009

At the September meeting, BVAC members elected a slate of new officers who will serve for the 2009-2010 fiscal year. Congratulations and good luck to all of our new officers.

President: Anjal Sharma

Vice-President: Mark Spearman

Treasurer: Don Bray

Secretary: Tim Cowden

Newsletter Editor: Will Sager

A Primer on Planetary Imaging With A Webcam

By Derek Kuhl

Everyone who has ever looked through the telescope at the wonders of the sky has wished at one time or another to be able to capture that image to savor later or share with others. Living in an urban environment like most of us do, common targets for the backyard telescope are the Moon and planets. In the past, with photographic film, imaging the planets was a wizard's art which never was able to match the view through the eyepiece. Now with some simple photographic and computer processing tools, the images produced with even simple equipment surpasses easily what can be seen with the naked eye. In this article, I would like to cover the basic steps and equipment needed to make planetary images.

The equipment used for planetary imaging ranges from the basic to the elaborate and esoteric. To obtain good planetary images, one needs a system that has a long focal ratio to make the resulting image sufficiently large so that details can be recorded and sufficiently bright so that images can be captured rapidly enough overcome the distortions of the atmosphere. Typical focal lengths range from as short as 4,000 mm to as long as 15,000 mm. Images from such long focal lengths frequently become quite dim if the starting aperture is not sufficiently large. It is difficult to produce quality planetary images using telescopes whose effective aperture is less than 8 inches. Larger is, of course, better and the best planetary images come from telescopes in the 11-16" range. Barlows and their cousins are frequently used to produce the focal lengths necessary. A telescope of this focal length needs to be on a driven mount of sufficient quality to keep the planet centered in such a narrow field of view.

This a very simple rig for imaging the full moon. It is a modified 60-mm Celestron finder onto which a Phillips SPC900NC webcam has been attached. The rig cost less than $100 from new parts. It makes very nice widefield images of bright objects like the Moon or Jupiter and its moons.

Maximum performance of the optical part of the setup is mandatory. Very important aspects of this maintenance (*continued*)

Join the Club and Support Astronomy in the Brazos Valley

Your club dues give you benefits: you receive club discounts for Astronomy and Sky and Telescope magazines; you also become a member in the Astronomical League (a national organization of amateur astronomers), and you gain access to members-only star parties and can borrow club equipment. Your dues also support the club and its activities.

BVAC dues (per year):

Regular Member: $25
Student Member: $10
Senior Member: $15
Family Membership: $35
Sustaining memberships:
Silver: $50
Gold: $75
Platinum: $125

include precise collimation of the optical train and proper thermal equilibration of the entire telescope. Small errors in collimation can greatly reduce the image quality even from an otherwise excellent telescope. Collimation needs to be checked often, at least every viewing session or when moving the telescope. The best way to check collimation is with the entire imaging train in place using the live image from the camera to produce the star image. This article from Sky and Telescope Magazine is an excellent reference: (www.skyandtelescope.com/howto/diy/3306876.html) as is Legault's excellent article (www.astrosurf.com/legault/collim.html).

Thermal equilibration to reduce tube currents is also critical to producing quality images. The larger the optics, the longer thermal equilibration will take. Also closed tubes, like the Schmidt Cassegrains, which are very popular for planetary imaging, also take longer to cool down. Placing the telescope outside for several hours before imaging is planned and/or fans mounted on the telescope are both popular methods for cooling the telescope to the ambient temperature.

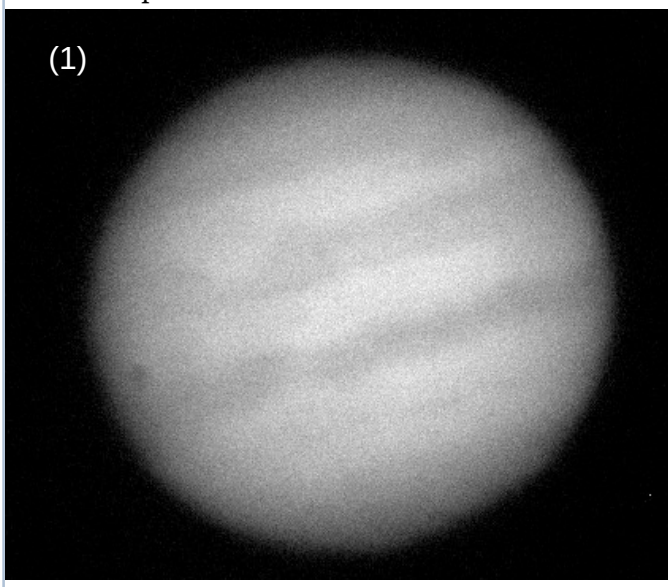
Modern planetary imaging requires a camera that is able to capture many frames in a short period of time. The size of the sensor is not so very important since even in the longest focal length telescopes, the image is not very large. Webcams were found to fit this task admirably and are used for the majority of high-resolution planetary imaging. The Phillips TouCam was the first webcam to find wide utilization as a planetary imager. A subsequent version, the SPC900NC and then later, dedicated webcam-derived astrocameras dominate the planetary imaging scene. The dedicated astrocameras offer improved circuitry and sensors to allow greater bit depth of images and faster data transfer to allow faster capture rates. Another innovation afforded by the dedicated cameras is monochrome imaging. With mono-chrome imaging, all of the pixels on the chip are utilized simultaneously while with a color chip only about 1/3 of all of the pixels are used for each color. The monochrome cameras yield a more detailed image for a given chip size. However, to capture a color image with a monochrome camera one needs to use color filters and acquire 3 images, one in each color, to be later combined with the computer. Widely used dedicated astrocameras are the DMK series cameras from Imaging Source and the Skynyx cameras from Lumenera.

Careful focusing is mandatory and more difficult at these long focal lengths. The standard focusers of many telescopes are frequently inadequate for the demands of planetary imaging and supplemental Crayford focusers are frequently used to improve fine focus capability. In addition, focus aids such as the Batinov mask are often used to achieve critical focus.

This is a rig at the opposite extreme of complexity. The main scope is a CPC1100 mounted alt-az. The imaging train consists of a Televue 4x Powermate, and ATIK USB filterwheel with Astronomik RGB filters and a Lumenera Skynyx 2-0M camera. Final f ratio on the scope is f/40, which translates to a focal length of 11,200 mm. On the laptop, I am running Lucam Recorder which allows automated imaging runs controlling the filter wheel and exposure. This allows very rapid image capture of rapidly spinning planets like Jupiter.

Actual image capture requires the camera to be connected to a computer for storage of the generated image. The images are captured as a video image for easy handling of the hundreds of frames produced. The raw (*continued*)

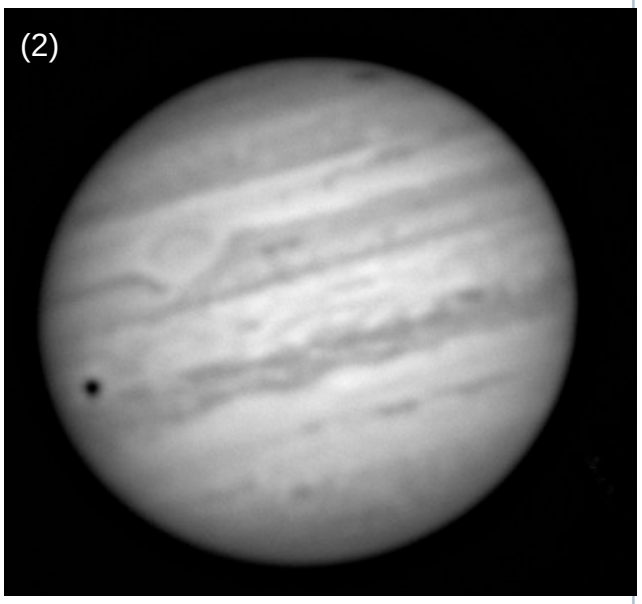
frames captured this way are frequently unimpressive. Here is a single frame (1) from decent raw data of Jupiter.

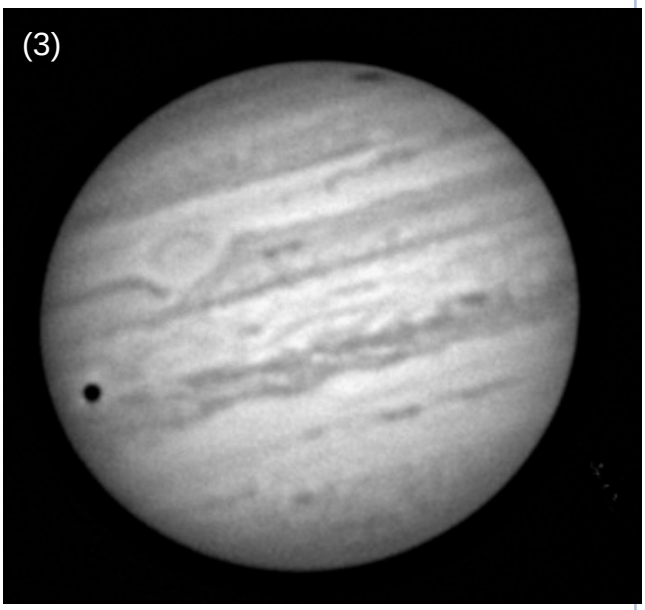


Not very impressive is it. It is only after processing of the images on the computer that the true beauty of the image is revealed. This computer processing can become quite complicated in order to extract the last bit of image quality from the data. The program *Registax* is very frequently utilized early in the processing algorithm to manage the raw.*avi* files generated by the camera.

The first step in processing is to adjust each frame so that the image is located in the exact same place in the frame. This is the *Registax align* function. This is done by identifying a distinctive feature in the image and then allowing the computer to place that feature at the same place in each frame. Next the *optimize* function can be used to improve and homogenize the density of the image. Once that is done, the *stack* function can be used to convert the video image to a single still frame. The image in that still frame can then be improved by using the *wavelets* function. *Wavelets* allows the selective sharpening of elements of differing size in the image. This can dramatically improve the appearance of the image. After these processing steps, the Jupiter image looks like the following photo (2).

Deconvolution is another processing technique that is frequently employed at this point. This function is not contained in *Registax* so other software must be employed. *Astra Image* and *Maxim DL* are two programs that contain the deconvolution function. Properly used deconvolution on the above image yields the



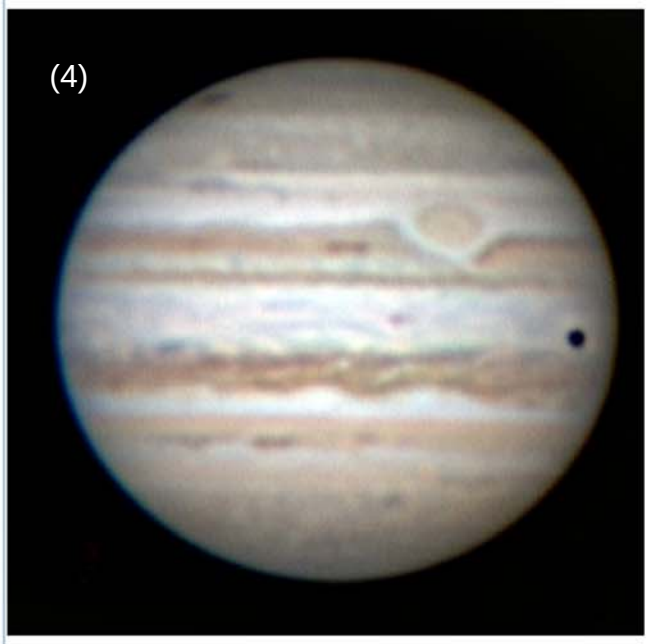


following processed image (3).

At this point, if you are shooting monochrome images, the three different colors can be combined (4). *Photoshop* can be used for final adjustment of levels and for labeling the image.

The main problem with generating a beautiful planetary image or two is that you are never satisfied with the result. (continued)

What starts as a hobby can rapidly turn into an obsession. However, if you are interested in planetary imaging, now is an excellent time to try it. In the next couple years, the apparent altitude of the planets will be higher and higher in the sky. This will create excellent conditions for capturing high-resolution images of the other members of our solar system. With our relatively southern latitude, we in Texas will be ideally positioned for planetary imaging. I wish you luck and I encourage you to give it a try!



Mars is Coming!

Mars never really left our skies, but much of the time it is across the solar system from Earth and it appears small in all but the largest telescopes. Every 2.1 years, the Earth catches up with Mars on the same side of both planets' orbit and Mars appears much larger. Mars has its greatest angular size at *opposition*, when the Earth is almost on a line between Mars and the Sun. Sometimes Mars is closer and appears up to 24" (arc seconds) in diameter (75% as large as Jupiter), as was the case for the highly-publicized opposition in 2003. Our next opposition, in late January 2010, is not as favorable and this time Mars will only reach 14" in angular size. Nevertheless, it will be our best chance to see the red planet until the following opposition of 2012.

Meteor! Meteor!

Meteor Observing is Fun - and Surprising!

By Will Sager

If you like action and surprises, meteor watching is a great hobby. What's more, it is an inexpensive form of astronomy that requires little in the way of equipment. Armed with a chair and a little knowledge, you can have a memorable astronomy experience. And to paraphrase *Forrest Gump*, meteor showers are like a box of chocolates because you never know what you will get.

To understand meteors, first it helps to know what we are looking at. Meteors are bright streaks in the sky caused by ionization as a small bit of extraterrestrial matter collides with molecules in the upper atmosphere. Meteor *showers* are related meteors that radiate from a spot in the sky, usually at a particular time of year. The shower occurs because the Earth encounters a stream of debris, usually from a comet, that has been left in a particular orbit. When the Earth's orbit crosses the debris stream orbit, many bits of the debris hit the atmosphere to make meteors. The shower meteors can appear anywhere in the sky, but the streaks point back to a *radiant*, which is the spot in the sky toward the debris stream. The meteors appear to radiate from that spot for the same reason that snowflakes appear to radiate from a vanishing point when you are driving into them in a snowstorm.

Meteors from a particular shower - usually named after the constellation that the radiant appears to be in (for example, the Geminids) - peak on the date that the Earth goes through the heart of the debris stream. Many of these streams are wide, so you may see shower meteors days or even weeks before and after the shower maximum, but at reduced levels. The maximum number of meteors are seen on any given shower night when the radiant is highest overhead. This is because you see all sides of the radiant and because you can (*continued*)

see fainter meteors at the zenith, where there is less atmosphere for the light to go through to reach your eye. For most meteor showers, this is in the hours just prior to dawn because the Earth is turned so that you are on the leading side of the planet as it moves through space. An analogy is that more bugs splat on the windshield of your car than on the back window. Some showers, such as the Geminids, have earlier peaks because the radiant reaches zenith earlier in the night.

For meteor observing sessions, I need only a few pieces of equipment. Foremost is a comfortable, reclining chair that allows me to lie back and view near the zenith. I use a hand-held digital recorder to log observations and a Radio Shack talking clock to give me time without looking away from the sky. My observing kit includes a few more convenience items: a small table for the clock and a radio for company, a red flashlight to find things in the dark without messing up my night vision, and a sleeping bag and warm clothes for cold nights. The recorder and talking clock allow me to keep my eyes on the sky without interruption. Since you never know when or where a meteor will appear, you don't want to look down. When I see a meteor, I whack the clock, which announces the time, and I speak my data into the recorder – all the while keeping my eyes peeled.

Because you don't know where or when a meteor will appear, your style of observing has to be different from other forms of astronomy. You need to keep your attention focused not on the center of your vision, but on the sides. I usually let my eyes wander between the stars in front of me, trying not to focus on particular stars or asterisms because focusing lessens your attention to peripheral vision. The chair is also important in this strategy because a reclining chair allows your center of view to be high in the sky, so your peripheral vision is not blocked by trees and other ground objects.

I record my observations because I like to "keep score" of what I have seen. Furthermore, these data are valuable for keeping track of meteor showers and their changes, so I submit them to the American Meteor Society (see below). Observations include the following descriptors: time, magnitude, duration, length, end-point height, distance from center of vision, and quality of sighting. In addition, I note whether the given meteor was a shower member or a *sporadic* (non-shower meteor) and whether it left a train and if so, for how long.

Meteor showers can be either strong, with tens of meteors per hour, or desultory, with only a few seen even in a night, even at the maximum. The two most reliable are the Perseids, which peak on August 11-12 and the Geminids, which are maximum on December 13-14. Either will produce about 60 meteors per hour on the night of maximum under good conditions. Some good secondary showers are the January Quadrantids (a brief shower on a cold night), the October Orionids, and the November Leonids.

The author, ready for another night of meteor observing, demonstrates the simple equipment needed for making meteor observations.

The Leonids are a famous shower that you may have heard about. At most times, the shower is not a strong one, and you might see about 15-20 of these meteors in a good hour. But about every 33 years, the Earth encounters the heart of the debris stream from the parent comet (Halley's Comet) and the shower explodes in a meteor "storm" (*continued*)

with many hundreds of meteors visible per hour in the right locations. Unfortunately, the last Leonid storms occurred from 1999-2001, so you have a long while to wait for the next one. Nevertheless, even on slow nights, the Leonids are known for hurling a fireball or two across the sky to give you a sight that will make you jump out of your chair. And that, in a nutshell, is why meteor observing is a blast.

For readers interested in more information about meteor showers and meteor observing, a good place to gather information is the American Meteor Society web page (www.amsmeteors.org). You can also check out the web site for the International Meteor Organization (www.imo.net).

Annual Plague of Christmas Telescopes Arrives

Hints for Buying a First Telescope

By Will Sager

It happens every year about this time. The Christmas shopping season brings advertisements touting bargain telescopes – too good a deal to pass up, right? You know the ones. For $19.95 they can give you 200X, 300X, and 400X and the box shows you the fantastic spiral galaxies that you can see – with millions of stars – almost as if you were in a spaceship. How can you resist?

It's a scam, folks, and if you have been around astronomy for any length of time, you will have met the people who fell for this scam and became disenchanted with astronomy. Unfortunately, it is not illegal to sell bad telescopes, so the best we can do is to let people know why they are a bad idea and give alternatives.

The usual "dime-store" telescope has two main flaws that make it difficult to use. The mount is often flimsy, so even if the optics work OK, the user has great difficulty centering and focusing on objects. The other main flaw is that the optics are often poor and over-rated. The box may say that you can achieve 300X (magnification), but if the aperture is only 50 mm, the highest useful magnification is only 100X. A rule of thumb is that the maximum useful magnification for good optics is 50X times the aperture in inches. Above that, the optics reaches "Dawes Limit", which is determined by the physics of optics, and greater magnification does not equal greater resolution.

Friends don't let friends use bad telescopes. This "dime-store" special has a flimsy mount, poor finder, a poor eyepiece, and a small aperture. It probably will not deliver a positive performance.

So if the cheap telescope is not a good entry into astronomy, what is? There is no one good answer and there are many optical options out there. A good start is another rule of thumb that applies here: you get what you pay for. It is better to spend a little more money and get a well-designed telescope than it is to get one that is poorly designed that will turn you off to astronomy.

A good choice for beginners may not be an obvious one. Don't get a telescope; get binoculars instead. With binoculars, you can afford a decent pair for under $100 and they can be used on almost everything, they are easily transported, and you can use them to watch birds or a football game. The thing to remember about binoculars is that you want to get large aperture lenses, typically 50 mm, (*continued*)

instead of the tiny lenses on pocket binoculars. Further, you don't want high power because you can't hold them steady without a special mount. You shouldn't consider more than 10X for hand-held binoculars and 7-8X would be better. That said, there are many reasonably-priced 7x50 to 10x50 models available.

If you really have your heart set on a telescope, then look for inexpensive telescopes made by reputable companies. If you look at Sky & Telescope or Astronomy Magazine and you don't see the manufacturer of a certain telescope mentioned anywhere, then you are probably looking at a scope that is not widely accepted. Most of the scope sellers who hope to keep favor with astronomy enthusiasts won't sell too many real stinkers for fear of damaging their reputation. A good inexpensive telescope is a 6 to 8-inch Dobsonian reflector. A Dob is just a simple reflecting telescope on a simple alt-az mount. Orion Telescopes, for example, sells a 6-inch Dob for $280 and an 8-incher for $330. Both will give decent light-gathering ability and reasonable magnification. The same company has some smaller, table-top reflector scopes, but they have smaller mirrors and focal lengths which means that they will not gather as much light nor give much magnification.

6-inch Dobsonian reflector telescope

Suppose your would like to spend more, say between $1000 and $1500. That will get you a very nice scope. In this range, a good bet is an 8-inch Schmidt-Cassegrain telescope on a computerized mount. The SCT combines decent light gathering with a long focal length, which translates into higher magnification, in a reasonably small package because the light path is folded. This means a more easily portable scope. And the computerized "goto" mount is the most important development in amateur astronomy in the last generation. Today's computerized SCT will set it self up with the flip of a switch and its database will point the scope at any of thousands of objects without help. Of course, this allows inexperienced observers to find celestial objects that once took many hours of expertise.

Popular, computerized 8-inch SCT scope

Suppose money isn't a problem. Should you get the biggest telescope that you can get your hands on? Of course, a big light-bucket is the dream of many amateur astronomers. There are, however, two big problems with such a scope. First of all, your giant will collect photons wherever they come from, including all of that light pollution scattered from the atmosphere overhead. So you will need to take your Titan to a dark sky site for best results. Moreover, your Godzilla-scope will be heavy and it will take time and effort to move it around. Soon you may find yourself reluctant to take the effort to get the beast out of the garage. The best telescope is the one you will use, so portability and easy of use should be high on your priority list.

There is no perfect scope and half the fun of astronomy is trying different kinds. So try many kinds at star parties and tell your spouse or significant other that it is OK to own more than one!

Members' Photo Gallery

Top left: The Crab Nebula (M1) by Kelsey Golden, using an Orion 80ED scope and Meade DSI III Pro camera; 3 January 2009

Bottom left: The Moon by John Croom; 9 November 2008

Right: The crescent Moon and Jupiter between trees at sunset, by Will Sager using a Nikon D80, 2 second exposure at ISO 800; 29 August 2009

Left: The Pleiades (M45) by Anjal Sharma using a Takahashi Sky90 scope and IR modified Canon digital Rebel camera; Image is a stack of 8 images of 2-6 minute duration; 13 December 2006

Brazos Valley Astronomy Club

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Newsletter Editor: Will Sager
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The BVAC usally meets once per month on the evening of the third Friday of the month. Many recent meetings have been at the Texas A&M Observatory.

Recent meetings:

July 17, 2009: Speaker Ms. Keri Bean, Texas A&M University, "Mars Phoenix Lander"

August 21, 2009: Speaker Dr. Kim-Vy Tran, Texas A&M University, "The Great Observatories: Windows on the Universe"

September 18, 2009: Speaker Ms. Keely Finklestein, Texas A&M University, "Star Formation in HII Region Environments"

October 16, 2009: Speaker, Dr. Karl Aufderheide, Texas A&M Univesity, "Astobiology: A Brief Overview"

November 20, 2009: Speaker, Dr. Will Sager, Texas A&M University, "Lifestyle of an Oceanic Supervolcano"

December 2009 – No meeting

Recent Star Parties:

April 3, 2009: Bioblitz public star party (with BRASS)

August 15, 2009: Members-only star party at Regina Caelorum Observatory in Wheelock

September 25, 2009: Texas A&M Observatory Open House

November 7, 2009: Austin's Colony public star party (with BRASS)