The High Desert Observer

The Bulletin of the Astronomical Society of Las Cruces

April, 2007

President's Message

The ASLC held its first Board of Directors Meeting of the year last month. A number of items were discussed, and I will mention a few here. The Astronomical League has an award for the best society newsletter, the Mabel Sterns Award. This award was named after the first editor of the Astronomical League's newsletter, now called the *Reflector*, which you should be receiving every quarter as part of the ASLC's membership in the Astronomical League. If you are not getting the *Reflector*, please contact the Treasurer. We have submitted George Hatfield's name and the *High Desert Observer* for this award. We will know in a few months who wins the award.

Janet and Bert Stevens

We also discussed Astronomy Day, and deferred it to the membership. At the March meeting, no one stepped forward to run Astronomy Day here in Las Cruces. However, the president of the El Paso Astronomy Club was present and invited us down to participate in their Astronomy Day festivities. I urge all our members to go down and help them out. For more details, see the March meeting minutes on page 7 of the HDO.

Also on April 21, The ASLC will hold a "Star Tour" at the Chihuahuan Desert Nature Park, starting at 8:00pm. The park is off Jornada Road, 6.4 miles north of U.S. 70 near Onate High School. This event is being publicized (see http://www.zianet.com/cdnp2/index.html), so we can use some additional telescope operators out there.

We are also considering the purchase of a Coronado Personal Solar Telescope for the Society since Richard Jones will be leaving the area and taking his PST. We will miss Richard and his solar scope was frequently brought to our public events. To replace that loss, we are considering a 60-mm PST. Since the Meade people will be at TSP, we have asked those attending TSP to try some of the available PSTs and report back. We will probably have another Board meeting in early June with a final decision to be made at the June membership meeting.

I would also like to ask anyone who has any ASLC equipment or assets to make a list of them and send that list to the Treasurer, so she can catalog all our assets as directed by our Bylaws. Please do this as soon as possible so we can get a complete list. Speaking of the Bylaws, we will be making some minor changes to the dates that the Bylaws require certain things be done, so that they match what we are currently doing. This will not be a major rewrite of the Bylaws.

Also at the March general meeting, our own Fred Pilcher spoke to us about asteroid light curves and how they are used to measure asteroid rotation. It was a fascinating talk, with asteroid models (rocks) that Fred picked up around his house. Some of them actually looked like the asteroids that spacecraft have photographed. We hope to see you all at this month's meeting! Clear Skies! Bert

Next Meeting

The next meeting will be held on April 27 (fourth Friday of the month), 2007 at the usual place and time (DABCC, room 77, 7:30pm).

The "Astro Tidbits" Group (contact: Nils Allen) will meet this month at 7pm. The Imagers Group (Contact: Rich Richins) will meet again next month. Anyone is welcome to attend these special interest groups.

Other events planned for April include: Dark Sky Observing at the Upham dark sky site, Saturday, April 14, dusk

ASLC MoonGaze, International Delights Cafe, Saturday, April 28, dusk

ASLC sponsored "Star Tour" at the Chihuahuan Desert Nature Park, Saturday, April 21, 8:00pm.

Spring Southern New Mexico Star Party, April 17-21, at the City of Rocks State Park

Please see the ASLC website for further information (http://www.aslc-nm.org)

This Month's Observer

Asteroid Rotation

By Fred Pilcher

In a previous article in the HDO I explained the equipment and procedures to observe asteroid lightcurves and from these deduce rotational properties. In this article I will describe the rotational properties themselves.

Except for the largest asteroid 1 Ceres the masses of asteroids are too small to pull them into a nearly spherical shape. As they rotate larger and smaller cross sectional areas are alternately presented toward the Earth and they become respectively brighter and fainter. The graph of brightness or magnitude versus time is called the lightcurve. The time interval between repetitions on the lightcurve is the rotation period. The difference in magnitude between lightcurve maximum and minimum is the amplitude. We also need to define two angles. The phase angle (figure 1) is angular distance between Sun and observer, as seen from the asteroid. The aspect (figure 2) is the angle between rotation axis and line of sight.

The amplitude is greater for asteroids with more elongated shapes. But it is also greater for larger aspect angle, being greatest for equatorial viewing and zero if the pole pointed directly toward the Earth. The amplitude also tends to become larger as the phase angle increases, due to the effects of shadowing by surface irregularities.

A hypothetical asteroid in the shape of a triaxial ellipsoid will have a perfectly regular lightcurve with two maxima and minima per rotation, amplitude varying with phase angle and aspect, but nonvarying period. Lightcurves obtained at a single opposition can determine the rotation period. To determine pole position lightcurves obtained at multiple apparitions at widely different parts of the sky and therefore exhibiting smaller amplitudes at smaller aspects are required. However there is a twofold ambiguity in pole positions determined in this manner, at the same aspect angle but on opposite meridians in the sky. Except in unusually favorable circumstances, or if disk resolved imagery can be achieved by spacecraft or for the largest asteroids by the HST or ground based adaptive optics, this ambiguity cannot be resolved. The combination of rotation period and orientation in space of the north (direction of advance of a right handed screw) pole is called the spin vector.

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Asteroid Rotation, continued from page 2

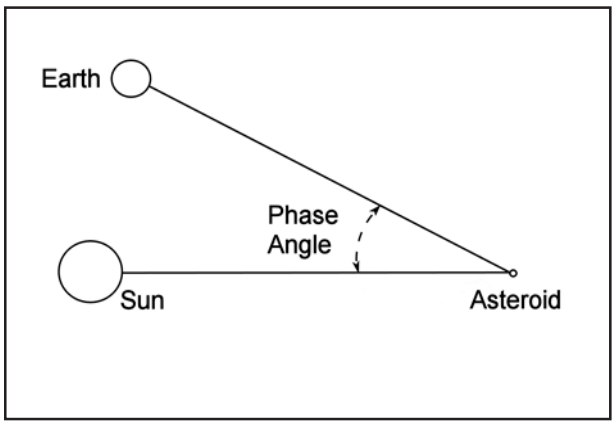

Figure 1: The phase angle is that observed at the asteroid between the lines of sight of the Earth and Sun.

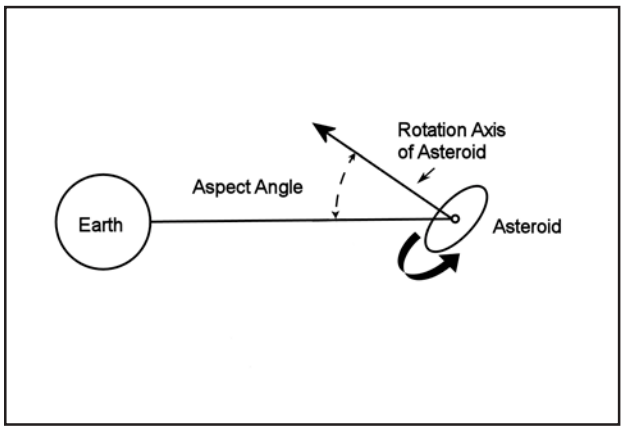

Figure 2: The aspect angle is the angle between the line of sight to Earth and the rotational axis of the asteroid.

Real asteroids are not triaxial ellipsoids and have irregularities in their lightcurves. If the shape and spin vector were known, the lightcurve could be modeled with great accuracy at all aspects and phase angles. In real life we have to do it the other way around, only the phase angle being known a priori. Only in the past few years has Mikko Kaasalainen, University of Helsinki, and colleagues, developed a robust lightcurve inversion model which yields both the shape and spin vector (see Figures 3 and 4 for an example). It is computationally intensive. A grid of up to a thousand points on all sides of the asteroid is laid down. Between these points are flat facets, for which area, orientation to Sun, Earth, possible shadowing, and therefore light reflected to the Earth, are determinable. The sum of the light reflected to Earth by all facets is obtained. The radius of each point representing the corner of two or more facets is varied separately in small steps, as is a presumed spin vector. For each assumption the modeled lightcurve is compared with all available observed lightcurves. After a very large number of iterations a close match is found. The longitude and latitude of the pole are usually established within a few degrees and the sidereal rotation period in hours to 5 to 7 decimal places, larger for a longer interval of observation. In some cases the ambiguity in pole position can be resolved. For those cases in which it cannot, the shape model is mirror imaged for the two pole positions. Shape models generally include only convexities. Real asteroids have craters, and large flat regions in the shape model can be suspect (but not proved) to have large craters. In the cases where we are unlucky enough that the asteroid equator is nearly in the plane of its orbit and only a small range of aspects can be observed from Earth, the period and pole position can still be reliably determined but the shape model is poorly constrained in latitude.

Lightcurve irregularities could be caused by bright or dark albedo spots, and for the largest asteroids 1 Ceres and 4 Vesta these are important. Nearly all other asteroids can be modeled with uniform albedos and by shape factors alone. Any albedo spots on these asteroids are too small to appreciably affect the shape model. Many years ago Fred Whipple stated that "Asteroids paint themselves gray," as dust from impacts is spread uniformly over the surface. Available evidence is consistent with this effect being almost universal.

This procedure has been tested for the small number of asteroids which have been spacecraft imaged or have had shapes constructed by radar observation. Shapes derived from the lightcurve inversion technique are in good accord with these directly observed shapes. Kaasalainen concludes that shapes constructed by lightcurve inversion are intermediate in resolution between HST or ground based adaptive optics and spacecraft encounters.

A typical shape model derived by Kaasalainen, that for asteroid 3 Juno, is shown in Figure 3 along with four

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Asteroid Rotation, continued from page 3

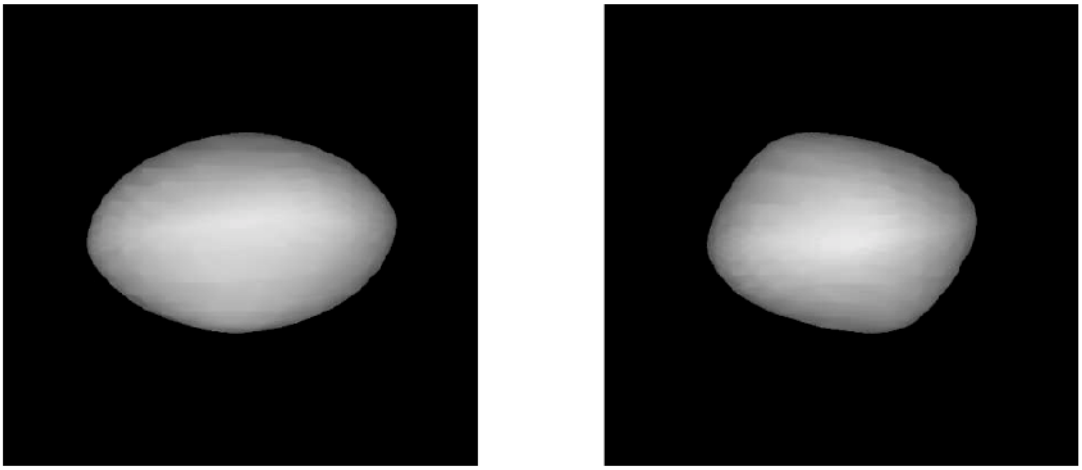

Figure 3: The shape model of 3 Juno, shown at equatorial viewing/illumination geometry, with rotational phases 90 degrees apart. Taken from M. Kaasalainen et al., Icarus 159, 369 (2002), http://www.rni.helsinki.fi/~mjk/IcarPIII.pdf.

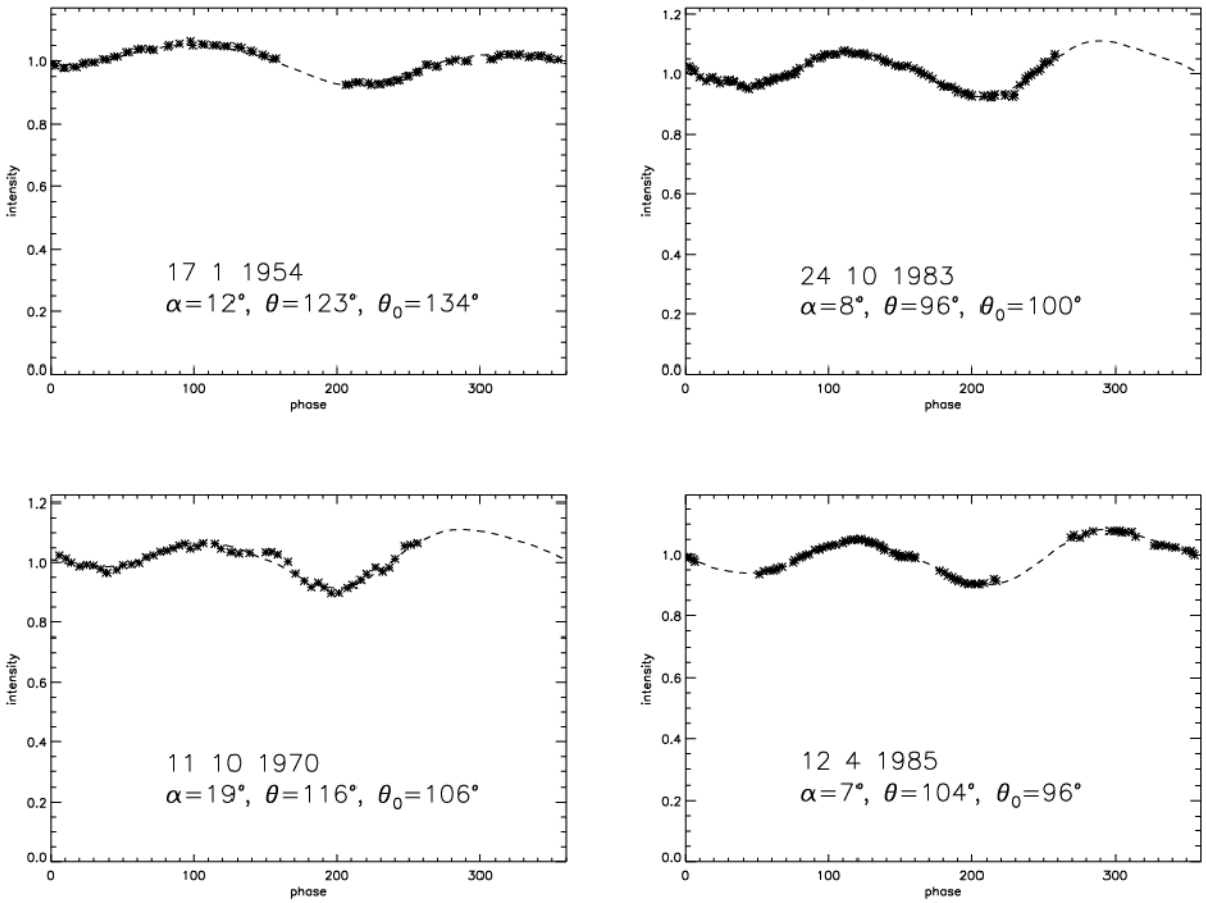

Figure 4: Four lightcurves (asterisks) and the corresponding fits (dashed lines) for 3 Juno. Taken from M. Kaasalainen et al., Icarus 159, 369 (2002), http://www.rni.helsinki.fi/~mjk/IcarPIII.pdf. See the article for more information on these curves.

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Asteroid Rotation, continued from page 4

lightcurves at a variety of phase and aspect angles used to derive the shape (Figure 4). Even for this large ~250 km asteroid the shape is markedly nonspherical and not even a triaxial ellipsoid. It is difficult to relate bumps on the lightcurves to specific bumps on the shape model. This requires a complicated three dimensional mathematical analysis and is best left to the experts. The shape model is believed correct to 10%. This means that irregularities smaller than 10% of the overall size have been smoothed out and are not shown in the model. Real asteroids are far more irregular on this small scale than can be derived by lightcurve inversion alone.

By early 2007 nearly 2000 different asteroids have published amplitudes and rotation periods of widely varying accuracy and reliability, and fewer than 100 have accurate spin vectors and shape models. The number in both categories is increasing rapidly because of the large number of lightcurve observers, mostly amateurs. Some periods are based on only one or two nights of observation, and likely to be in gross error. In other cases the period may be very long, or nearly commensurate with the Earth's rotation period, or have a very small amplitude, or a combination of these. In these case large sections of the lightcurve may be unavailable during the daylight hours at any single observatory. Different periods, known as aliases, may fit the available data comparably well. Cooperative ventures at widely varying longitudes can fill the gaps from any one observatory, and these are just beginning to be utilized. Even if the period can be found unambiguously, the amplitude from only one opposition provides no information at all on the pole orientation. The amplitude at an unobserved equatorial orientation may be larger by an unknown amount.

For asteroids larger than 50 km the distribution of rotation periods is roughly Gaussian, mostly between 4 and 20 hours, with a mean near 10 hours. The mean period is slightly longer for asteroids near 100 km size than for either larger or smaller sizes. There is a bimodal distribution of pole positions, with a slight excess of direct rotations over retrograde rotations, and a significant deficiency of orientations near the ecliptic. Amplitudes are generally under 0.6 magnitude, with a few larger values. For smaller asteroids there is an excess of short and long rotation periods, and a large percentage of larger amplitudes indicative of more elongated objects. These statistics suggest that the larger asteroids are nearly intact parent bodies perhaps fairly near their primordial rotation states, while the smaller ones are mostly collision fragments. For the most recent list of asteroid periods and amplitudes, along with some comments on ambiguous periods, go to The Collaborative Asteroid Lightcurve Link website (http://www.minorplanetobserver.com/astlc/default.htm) and click on Known Lightcurve Parameters.

The shortest rotation periods observed for all asteroids larger than 0.15 kilometer are about 2.5 hours. Asteroids are generally believed to be rubble piles with little cohesive strength. For such objects with shorter periods the centrifugal force at the equator would exceed gravity and loose pieces would spin off into space. The non-observation of shorter periods supports the rubble pile hypothesis. But the few asteroids smaller than 0.15 km, observed only at extreme Earth approaches, have much shorter periods. Petr Pravec has coined the term "monolith" for such objects. They must be solid rocks without any small objects lying on their surfaces.

A solid object rotating freely in space will relax into a rotation state about the smallest axis (or axis of largest moment of inertia). This is called principal axis rotation, and is observed for nearly all asteroids. Minor planet 4179 Toutatis, about 5 kilometers along its longest axis, tumbles with a rotation about a non-principal axis and a precession about this axis, with periods of 5 to 7 days. This behavior is suspected for a small number of other asteroids. The time interval to relax into principal axis rotation increases rapidly with smaller size, and with slower rotation period. Asteroid 4179 Toutatis satisfies both of these conditions. Its tumbling motion does not indicate that the collision which produced Toutatis as a fragment occurred recently.

Asteroid 90 Antiope, when its equator is near the line of sight to Earth, displays the same lightcurve as an

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eclipsing binary star. It is a binary, two objects of comparable size and both with rotation periods equal to their revolution period. A few other larger asteroids show similar behavior. Infrequently dips are observed in single-night asteroid lightcurves. Many of these are instrumental errors, but a few are repeatable and have led to the discovery of satellites of asteroids in transit or occultation. Other asteroid satellites have been discovered through adaptive optics imaging, or by radar observations. About 1/10 of all small asteroids observed at Earth approaches are double objects in or nearly in contact. Collision hydrocore modeling suggests that three-body interactions immediately following dispersive collisions caused two of the fragments to orbit each other. Partial disruption by tidal forces at close approaches to large planets is also suggested as the origin of some binary asteroids.

Asteroid spins can also be affected by the YORP (Yarkovsky-O'Keefe-Radzievskii-Paddack) effect. For irregular shapes the absorption of sunlight and recoil due to reradiated infrared radiation can occur in different directions. Depending upon the detailed shape and orientation of the pole this may increase or decrease the period, or change the pole position. This effect can produce considerable change in a few million years for small asteroids, but is negligible at sizes greater than 40 kilometers. YORP effect is a very complex phenomenon for which detailed studies are only beginning, and we still have much to learn about how YORP has affected the observed distribution of asteroid spin vectors.

A very recent issue of Nature, 446, 22 March 2007, pp 420-422, by five co-authors including amateur photometrist Brain Warner, reports for the first time the actual observation of YORP induced rotational spin-ups. Lightcurve analysis alone from 1980, 1982, 1998, and 2005 shows that Earth crossing asteroid (1862) Apollo, 1.4 kilometers diameter, 3.065447 hour rotation period, gains an entire rotation over 40 years. The amount of spin-up matches within limits of observational error that predicted for YORP for a body with Apollo's size, shape, and spin axis. Even smaller 114 meter asteroid (54590) 2000 PH5 has a measurable spin up observed in only four years. In a few million years, shorter than its mean lifetime against collision with a major body, Apollo's period will decrease to the critical 2.5 hours at which rotational disruption may occur.

Helping Those New to Astronomy

Nils Allen

What is this about? It's a summary of some of the things I've learned after years of assisting and instructing folks new to astronomy. Why should you help? 'Cause we need more folks like us, for our Society and the hobby in general. Most astronomers enjoy sharing their interests and skills with others. And, darn it, it's just *good* for you! Who are you helping? Family, friends, acquaintances, strangers… if you make yourself available they will find you! They often have a cheap telescope with marginal instructions and little or no experience with astronomy.

Overall Considerations.... First, find out from the person you are working with how much time you have... that really determines your course of action. And ask about their successes and failures to date. Are they about to give up, or what? Communicate! Don't just fix things and/or tell them to do XYZ… explain what you're doing or recommending and why it's important in solving their problem(s).

Taking action.... Some basic tools like screwdrivers, wrenches/sockets, needle-nose pliers, etc. are always good to have available. Also collimation tools; decent eyepieces, optics cleaning stuff; a copy of *Nightwatch* as well as astro-mags, Orion and other astrocatalogs and flyers.

Most newbies think that all they need is some help getting their hardware working, but usually they also need assistance with operating and understanding their telescope, plus interacting with the night sky. Consider that all problems tend to fall under two different types: equipment issues and operator issues**.**

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The Astronomical Society of Las Cruces (ASLC) is dedicated to expanding members and public awareness and understanding of the wonders of the universe. ASLC holds frequent observing sessions and star parties, and provides opportunities to work on club and public educational projects. Members receive *The High Desert Observer*, our monthly newsletter, membership in the Astronomical League, including AL's quarterly *A.L. Reflector*. Club dues are $35 per year. Those opting to receive the ASLC newsletter electronically, receive a $5 membership discount. Send dues, payable to A.S.L.C. with an application form or a note to: Treasurer ASLC, PO Box 921, Las Cruces, NM 88004

ASLC members are entitled to a $10 discount on subscriptions to *Sky and Telescope* magazine. S&T subscribers MUST subscribe and renew through the Society Treasurer for the special club rate. To avoid a lapse in delivery, this must be done when S&T sends their reminder, 4 months in advance.

Minutes, March 2007 Meeting

Call to Order: Bert Stevens, ASLC President, called the meeting to order at 7:35 pm. The minutes of the Board of Directors meeting held 12 March were synopsized and accepted by voice vote.

Secretary's Report: The minutes of the February general meeting were presented as published in the High Desert Observer (HDO), the ASLC newsletter, and were unanimously accepted by those present by voice vote. There was not an additional secretary's report.

Treasurer's Report: The treasurer reported that she is required by the Club's By-Laws to maintain an inventory of the Club's assets. She requested that all Club members with known Club assets (e.g., telescopes, books, images, etc.) in their possession contact her as soon as possible and identify the item(s) and its current location. The treasurer can be contacted either via the ASLC web site or her current personal email address, jaslcnm@comcast.net. There was not an additional treasurer's report.

Committee Reports: There were no standing committee reports.

Old Business: There was no old business to discuss.

New Business: The following new business was discussed:

1. The Club's By-Laws require a minimum of four (4) Board of Directors meetings be held each year. The first board meeting for 2007 was held March 12 at Branigan Public Library. Future board meetings will be held approximately every other month at the library. One issue that was raised at the March meeting was the schedule of electing officers and their terms of office currently being executed are out of sync with that specified in the By-Laws. It was suggested that the President revise those portions of the By-Laws that are in dispute by changing the language to reflect current practice for review and acceptance by the membership at a future date.

2. Astronomy Day - Astronomy Day 2007 is officially April 21. Because no planning effort has occurred for this event this year, it was suggested that ASLC not attempt to hold an event in Las Cruces this year. After brief discussion, it was agreed to follow this course of action. Warren Marquette, President of the El Paso Astronomy Club (EPAC), was present and delivered a request for help/support, primarily in the way of telescopes and operators, for the EPAC Astronomy Day event at Keystone Botanical Gardens on April 21. The event opens to the public at 7:00 pm. Volunteers are asked to be present between 4:30 and 5:00pm to complete organization details and setup. The El Paso club will hold a drawing for a Meade ETX telescope during the evening. More details including contact information will be posted on EPAC's web site, to the ASLC yahoo.group, and published in the HDO.

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3. A motion to investigate the Club's purchase of a solar telescope was passed at the March board meeting. Richard Jones, currently a member of ASLC, has generously provided his PST for use at ASLC and public events and outreach efforts for the last several years. However, Richard is planning to relocate to Denver in the immediate future. Scott Roberts, Meade Instruments Sales VP, offered ASLC a 30% discount on telescopes used for public education and outreach. Janet Stevens is conducting preliminary research on an appropriate instrument, such as a Coronado PST (Personal Solar Telescope), for this purpose. This research is on a telescope only; a tripod or portable mount will also be required. Club members volunteered to assist by performing additional research at the vendor area at Texas Star Party in May.

4. Post Office box - members are currently attempting to locate the additional keys to the ASLC PO box. Janet Stevens, treasurer, has the only one. If the other keys cannot be located, the box may have to be re-keyed. If other members have a PO box key in their possession or know where the other keys may be, please contact one of the officers.

5. Rich Richins announced the spring edition of the Southern New Mexico Star Party (SNMSP) at City of Rocks State Park will be 17-22 April. Attendees setting up telescopes for the public viewing sessions will be eligible for a discount on the star party registration fee. ASLC is also a cosponsor of the event. More details will be posted on the web site.

The following announcements were made:

1. Steve Barkes announced that the second attempt for the 2007 ASLC Messier Marathon will take place on March 24 at the Upham DSO site when there will be a better chance to observe all 110 Messier objects. The March 17 attempt unfortunately was clouded out around midnight. Additional details, suggested links and observing tips for the Marathon are available via the aslc-nm.org web site and in an article in the current HDO.

2. Chuck Sterling announced that this month's MoonGaze will take place at International Delights Café on March 28 beginning at dusk.

A motion to adjourn the business portion of the meeting was offered by Joseph Mancilla, seconded by Steve Barkes, and passed by voice vote. The business meeting was adjourned at 8:00 pm.

General Announcements: Various publications, newsletters, and informational handouts are available on the Publications/Information table in the back of the room.

Observations: There were no observational reports.

Presentation: The Speaker for this month's meeting was Dr. Frederick Pilcher. Dr. Pilcher, a current member of ASLC, spoke on Asteroid Photometry that is being performed by amateur astronomers. There are a number of amateur astronomers who measure the brightness of asteroids traveling through our solar system and plot their measurements against time to create light curves of the various asteroids. Dr. Pilcher described how, in a general way and using models, these measurements are made. He also described how this information is used to find the rotation period, shape, and orientation of the rotational pole of an asteroid. While this is a powerful technique, it does not yield a size for the asteroid and Dr. Pilcher explained why this is the case. Since no slides were used, this presentation was not recorded for playback via the Internet. Other meeting presentations can be seen on the web at http://www.aics-research.com/lectures/aslcnm/.

Respectfully submitted by John McCullough, Secretary

Helping, continued from page 6

During the initial assessment, listen to the owner's appraisal of his situation as a starting point only. If the scope appears functional, do an initial hardware evaluation by trying to aim it at a target and view it. Any significant problems should quickly become evident. Here are some typical discoveries.

Equipment problems: note that hardware problems are generally easier to deal with during daylight.

#1 - It just looks wrong; odd mount tilt; scope too high; falls to one side when released.

Possible problems: assembled wrong; pieces missing, latitude wrong; tripod not level; overextended; scope unbalanced

Solutions: reassemble scope and/or replace missing pieces. Set latitude to 32 degrees; level/lower tripod for stability; balance each axis and adjust brakes. Be sure to explain what you are doing!

#2 - Can't use the finder to point scope; optics loose or misaligned; lousy image

Problem: the finder is not boresighted; or out of focus; mirrors need collimation; focuser is wobbly.

Solutions: collimate the main optics; the method depending on focuser accuracy… laser (rarely), sight-tube, A-line, bare eye; focus the finder and boresight it to the OTA. Again, explain the process.

#3 - Image oscillates; mount and focuser motions are sloppy or jerky; optically poor eyepieces.

Problems: cheap, weak parts, loose gearing; Huygens eyepieces (junk, especially small ones), dirty lenses.

Solutions: tighten things up (apply Teflon?); explain how to stiffen the tripod (weights, bracing); *tactfully* explain about "junk" telescopes; get better eyepieces (offer or suggest Plossls or SMAs); clean lenses as possible.

Operator Problems: Is the user willing to rethink his/her conclusions, and learn new ideas and practice new skills?

#1 - Expects to see big bright clear images of cosmically impressive objects - without lots of effort.

Problems: confused about the trade-off of magnification, FOV, image brightness and clarity. The person may have unrealistic expectations of small scope image quality, object impressiveness and effort necessary to acquire and view them.

Solutions: a quick course on said trade-offs; benefits of low power; recommend practice; explain the concept of a *starter* scope; how to grasp object significance (recommend books, ASLC classes, practice).

#2 - Discovers that finding and tracking objects is hard or impossible; can't see detail; uses white lights

Problems: overuses hi-power; EQ mount not N aligned; poor eye positioning/stability; poor night vision.

Solutions: discuss/demo how to find objects using low power and work up; also how to find celestial north and align to it; demo proper eye/body/scope positioning; explain dark-adaptation; recommend a lot of practice (especially on the moon)!

#3 - Confused about when and where to locate objects; expects the cheap software-driven scope to do it all.

Problems: lack of sky knowledge; resources and tools for finding objects; dependent on a computer, but not a "software person"

Solutions: more binocular and/or software practice; suggest/show *Nightwatch*, astro-mags, ASLC classes and star parties.

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Helping, continued from page 9

#4 – Exhibits undue frustration with rate of progress; reluctant to jump-in and try; uncomfortable outside for long

Problem: *short* on useful astronomer traits (patient, persevering, self-motivated, tolerant of nighttime conditions)

Solutions: suggest ways to develop these traits: short rewarding sessions; be better prepared physically; observe with a companion; set reachable goals; hang around us on a regular basis!

Now, in reality all these issues constitute a super-set of possible problems - few newbies will have all of them. In the time you have, only so much can be fixed. Regardless, my overall goal is to always the same... help them toward a *positive* experience with their scope *and* our hobby. You never know – one of your "students" might become club president in a few years!

Bob Long's Image of Asteroid 2006 VV2 Makes the Big Time!

ASLC member Robert Long imaged asteroid 2006 VV2 near his home in Vado, NM as it raced past M81 and M82 on March 28. Bob took the image with his Orion ED80 and SBIG ST8-XE camera. The image below is a composite of 71 frames shot between 8:15 and 9:32pm. At the time, the asteroid was moving about 0.5 arcsec per second. Each frame was a 60 second exposure with a 5 second delay between images. The change in brightness shown by the asteroid in the composite image is real and due to its rotation (period of about 2.5 hours). Bob also created an animation which was featured on Spaceweather.com, MSNBC.com and was also the April 5 Astronomy Picture of the Day. The animation is posted on the ASLC website. An amazing video. Outstanding images Bob!

May Issue HDO

Articles for the May issue should be to me by Saturday, May 5. This deadline is a bit earlier than normal since the Texas Star Party starts the following weekend. Material should be sent as email (gmhlcnm@msn.com)

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or as an attached Microsoft Word document. If you have any questions about submitting something to the HDO, please don't hesitate to contact me (532-5648 or via email). Thanks in advance! George Hatfield, Editor, ASLC Newsletter

Join astronomers from throughout the Southwest under the pristine dark skies of Southern New Mexico at the Spring rendition of the Southern New Mexico Star Party. The event takes place over five evenings, April 17-22, at New Mexico's City of Rocks State Park - home to thousands of strange monolithic rock formations found in only six other locations in the world.

At an elevation of over 5200 feet (1600 meters) and located scores of miles from any population centers, the park offers some of the finest dark sky viewing conditions to be found. April is an ideal month to visit City of Rocks with daytime temperatures typically in the 70s and pleasantly cool clear evenings. In addition to pristine skies, there are hiking trails, picnic areas, camping sites, RV hookups, nearby hot springs, and over a thousand acres of monolithic rocks to climb and explore. Download a registration form today (http://www.aslc-nm.org/SNMSP_Home.htm) and join us. The event is jointly sponsored by the National Public Observatory, the El Paso Astronomy Club and the Astronomical Society of Las Cruces.

ASTRONOMICAL SOCIETY of Las Cruces
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ASLC - Sharing the Universe
With Our Community
for Over 50 Years