The High Desert Observer

The Bulletin of the Astronomical Society of Las Cruces

August, 2006

President's Note

During July meeting of our ASLC, I introduced the possibility for our members to get some limited time on the 3.5 meter (yes, 140 in) Apache Point telescope. It is not a done deal, but a possibility. For those who missed our last meeting, here is what the Adler planetarium (in Chicago) is doing. They get about an hour of Apache Point scope time for free, once or twice a month, during the evening or morning twilight, for a worthwhile project. Their project is to look at really dim earth orbit crossing asteroids, something our guys like Bert are following, but dimmer than we could photograph. Supposedly, even during twilight, they can get about 23rd magnitude object images in about 5 minute exposures. It would be wonderful if we could come up with a project or two, and get some time on the big scope and then get the results published in *Sky and Telescope*. How about giving this possibility some thought! During twilight and even late afternoon, looking away from the sun, infrared images can be made with very little interference from the old Sol, so that is one area we could explore. This possibility came up during discussions with Dr. Kurt Anderson, who thought that if Adler can do it, perhaps we and schools, or museums, in our area could also get a chance to get a peek through a 3.5 meter. Obviously, this scope has no eye piece, so anything we could do would be by remote access, under their control, and using available instruments already attached to the scope. So lets scratch our gray matter containers, and see what may come forth. This could be a good way to begin some cooperative ventures with NMSU, using their instruments while they are not fully occupied. Vince D.

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August Meeting Program: Home-Built Observatories

Joseph Mancilla

The idea of having your own personal observatory has always been appealing, but perhaps you're not sure about how to go about building one. This month three of our members, Bill Stein, Jerry Gaber, and George Hatfield will take us through the process and trials that they encountered when they built their own observatories. Those of us who are do-it-yourself astronomers will not want to miss this. The meeting this month will be held on August 25 (DABCC, room 77, 7:30pm). Please see the ASLC website for directions to the meeting site (http://www.aslc-nm.org/).

As Far as the Eye Can See

Joseph Mancilla

As many of you already know, I carry the torch for the art of visual observing. Our eyes are our most important tool! We must not take them for granted. Even with the revolutionary changes and growth with CCD cameras, computer software, and robotic controls, the modern astrophotographer depends on his eyes to align, adjust and coordinate these components. As a visual observer, "we must learn how to see." This advice has been handed down to us beginning with William Herschel all the way down to Clyde Tombaugh. Amateur astronomers are like the sailors of old who relied on good charts for their navigation. We use a modern star atlas to hunt down our objects. To learn our way around the sky is our challenge. Finding our object is the first step. Seeing all that we can see is the next step. Sometimes this requires taking our scope and our eyes to the edge of their limits. I must interject and comment about last month's observing session at Upham. There were only four of us. Myself plus three of our club's prominent astrophotographers. Steve Barkes, Dave Dockery, and Rich Richins. The interesting part is that none of them brought imaging equipment. Now the skies were not that good especially for imaging, but we did get a couple hours of visual observing before the clouds finally took over. It was kind of nice. Everyone would consult a chart before hunting down an object, or just with pure dead reckoning and memory looking at the sky, pointing the scope with a Telrad, looking through the eyepiece and voila! There it is. As Steve B. related, that's always a thrill. Once you have found your object, do you just take a peek and move on or do you really take a long hard look and scrutinize? Take a long look. Drink it in. Use averted vision. Use various magnifications. The sky conditions are sometimes very fickle and can change quickly. This is why I have a squadron of eyepieces. For deep sky objects, 10x to 25x per inch of aperture works well. For lunar and planetary work, 25x to 40x per inch of aperture and for double stars, 40x to 65x per inch of aperture. These are general guidelines. Don't be afraid to experiment. You may want to take some notes on what you see or make a sketch. By all means do so. They will be a valuable record later on. A great investment is to buy a set of "Burhnam's Celestial Handbook", volumes 1, 2, and 3. They are loaded with scientific, historical, and mythological information concerning the heavens. Educating ourselves about the various objects we observe gives us a better appreciation for those objects. It adds meaning to what we see. As an example, at our last session that I described, I was showing Steve B. a small fairly faint globular cluster in Delphinus. At mag. 10.6, NGC 7006 was only a smudge of light. This globular cluster is thought to be one of the most remote lying in intergalactic space at a distance of 150,000 light years. Not exactly in our neighborhood ! Take a look. Be patient, look deep and take care of your eyes. NGC 7006 is at R.A. 21h 01.5m, Dec. +16 11'. Happy hunting!

Southern New Mexico Star Party, October 17-22

Rich Richins

Join astronomers from throughout the Southwest under the pristine dark skies of Southern New Mexico at the Southern New Mexico Star Party. The event takes place over five evenings, October 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. October 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.

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Southern New Mexico Star Party, continued from page 2

This year, participants will have the opportunity to share their love of the night sky with the public during two evening sessions (Wednesday and Saturday from 7 to 9 pm) using their personal scopes and the park's own observatory-housed 14" SCT. And if that's not enough, the second annual X-Prize Cup Exposition is being conducted October 20-21 only 75 miles from our observing field. You can easily take in the Expo during the day and view the stars that evening. So download a registration form today (http://www.aslc-nm.org/SNMSP_Registration.pdf) 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. For more information see http://www.aslc-nm.org/SNMSP_Home.htm.

Celebrating 40 Years of Intent Listening

By Diane K. Fisher

In nature, adjacent animals on the food chain tend to evolve together. As coyotes get sneakier, rabbits get bigger ears. Hearing impaired rabbits die young. Clumsy coyotes starve. So each species pushes the other to "improve."

The technologies pushing robotic space exploration have been like that. Improvements in the supporting communications and data processing infrastructure on the ground (the "ears" of the scientists) have allowed spacecraft to go farther, be smaller and smarter, and send increasingly faint signals back to Earth—and with a fire hose instead of a squirt gun.

Since 1960, improvements in NASA's Deep Space Network (DSN) of radio wave antennas have made possible the improvements and advances in the robotic spacecraft they support.

"In 1964, when Mariner IV flew past Mars and took a few photographs, the limitation of the communication link meant that it took eight hours to return to Earth a single photograph from the Red Planet. By 1989, when Voyager observed Neptune, the DSN capability had increased so much that almost real-time video could be received from the much more distant planet, Neptune," writes William H. Pickering, Director of JPL from 1954 to 1976, in his foreword to the book, *Uplink-Downlink: A History of the Deep Space Network, 1957-1997*, by Douglas J. Mudgway.

Mudgway, an engineer from Australia, was involved in the planning and construction of the first 64-m DSN antenna, which began operating in the Mojave Desert in Goldstone, California, in 1966. This antenna, dubbed "Mars," was so successful from the start, that identical 64-m antennas were constructed at the other two DSN complexes in Canberra, Australia, and Madrid, Spain.

As Mudgway noted in remarks made during the recent observance of the Mars antenna's 40 years of service, "In no time at all, the flight projects were competing with radio astronomy, radio science, radar astronomy, SETI [Search for Extra-terrestrial Intelligence], geodynamics, and VLBI [Very Long Baseline Interferometry] for time on the antenna.... It was like a scientific gold rush."

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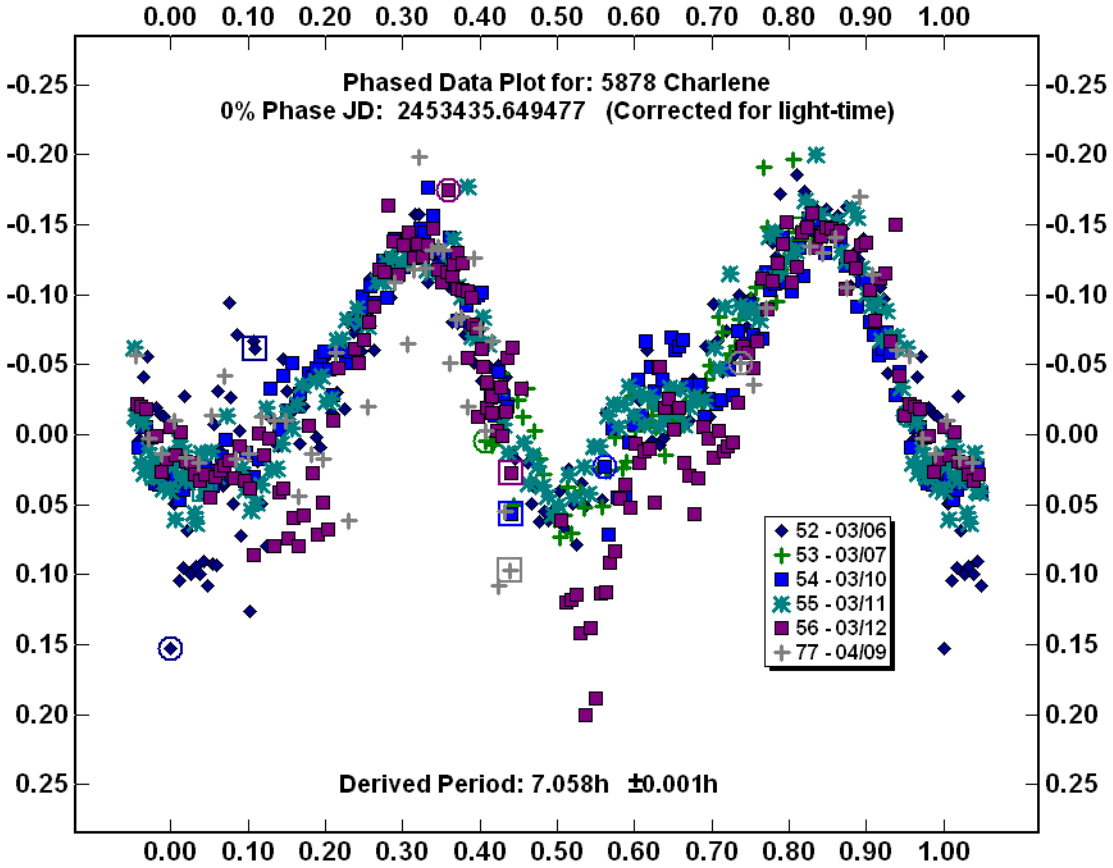
Asteroid CCD Photometry and Lightcurve Analysis

Frederick Pilcher

Solid bodies smaller than several hundred kilometers have insufficient gravity to be pulled into a spherical shape, and this characterizes almost all asteroids. An elongated rotating asteroid will brighten as the broad side and fade as the narrow side are alternately turned toward the Earth. A plot of magnitude versus time is called a lightcurve, and the rotation period is typically determined by the time interval for two maxima and minima. Most asteroids have rotation periods 4 to 20 hours, although longer periods up to many days are occasionally found. A sample lightcurve of asteroid 5878 Charlene, obtained by this author and Bob Koff in



March, 2005, is shown in the figure. Irregularities in the lightcurve, as seen for 5878 Charlene, are caused by irregularities in the shape. Mikko Kaasalainen in Finland has at last solved the difficult problem of finding the shape from lightcurves, but this requires observations of a single object at several oppositions on all sides of the sky. With several thousand asteroids becoming brighter than magnitude 15 or 16, the limit for accurate CCD photometry in smaller telescopes, interested amateurs can do useful work for many years to come. Good quality lightcurves for brighter objects made by 8 inch telescopes have been published, but most amateur lightcurve observers use 10- to 16-inch telescopes. Usually a single object is tracked all night to obtain as much as possible of the lightcurve on a single run. Polar alignment to one or two arcminutes on an equatorial mount and periodic drive error correction to two or three arcseconds are requisite to all night tracking. Successive exposures, generally 1 to 4 minutes depending upon target brightness, are obtained with a CCD camera throughout this interval. Most lightcurve work is done in a single filter or unfiltered. SBIG, Apogee, and Finger Lakes all manufacture CCDs fully capable of 0.02 magnitude photometric accuracy at magnitude 14 in a 14-inch reflector, and there is no strong preference among these brands. Focus correction with telescope thermal contraction is necessary for fully automated operation, and this can be achieved with

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either a Robo-Focus or Optec focuser. In addition to the long series of target images, dark frames at the same CCD operating temperature and flat field frames with compensating darks at the flat field exposure time are also necessary to achieve photometric accuracy. Several methods of obtaining flat field frames (a field with uniform light level) have been devised. The simplest conceptually is to direct the telescope toward a white sheet illuminated by light reflected off the dome interior from a luminary pointing away from the sheet.

The computer software must compute the coordinates of the asteroid by numerical integration, point the telescope to this location, obtain and download successive CCD images, record for each image the UT of mid-exposure, stop the operation either when the target becomes too low in the sky or at the start of twilight, return the telescope to its park position, and turn off the telescope drive. Programs to do all of these automatically without active observer participation are available from several firms. This writer prefers MPO Connections, written especially for asteroid photometry by veteran asteroid observer Brian Warner.

After the night's run is completed, the images must be photometrically measured. Again several commercial programs are available to do this, and again this writer prefers the one written specifically for asteroid photometry by Brian Warner, MPO Canopus. A blinker for two images obtained near the start and end of the run enables identification of the moving target. For these two images the observer now clicks the cursor on the same comparison stars and then on the target in its two separate locations. From the times of these two images the software then interpolates the position of the target at the times of all exposures. Each frame is then measured in time sequence. The observer need only locate the first comparison star, and the computer will locate all other comparison stars and the target and measure the exposure or CCD well depth of all pixels within a selected measuring circle. Usually none of the comparison stars within an arbitrary field has a known magnitude, but this technique does obtain changes in the magnitude of the rotating target asteroid, a procedure known as differential photometry. This establishes the rotation period and amplitude and is sufficient for most but not all pure rotation studies. If actual magnitudes are required, CCD images of Landolt or Henden standard star fields must also be obtained on the same night, and MPO Photo Red, a part of Canopus, computes the asteroid’s real magnitude by comparison with these standard stars.

When all asteroid instrumental magnitudes and corresponding UT are obtained, a graph is constructed. A single night is rarely sufficient to establish a unique period, but a sequence of runs on separate nights can now be graphed together, and phased against all possible periods within a range selected by the observer. The sum of squares of the magnitude residuals for each trial period is computed, and the most likely rotation period becomes that for which this sum is a minimum. But ambiguous or uncertain results sometimes remain even after several all night runs on the same target. "Asteroids do not yield their secrets easily," writes Brian Warner.

September Issue of the HDO

The HDO is your newsletter and I mean that in more than one way. First, you are entitled to receive the newsletter as part of your membership in ASLC. But, second, our newsletter depends on member support. Please consider submitting an article on your favorite topic. We all have one (or more) such topic and the membership would like to hear about your astronomical interests and expertise. The HDO will be published around the 10th of each month. Articles for the September issue should be sent to me by Friday, September 8. Material should be sent as email (gmhlcnm@msn.com) text 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

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, July, 2006 Meeting

Vince Dovydaitis opened the meeting with an announcement concerning the topic of the ASLC Board Meeting held just prior to the meeting. One of our ASLC board members, John McCullough, was concerned that the dates of the National Public Observatory's Southwestern New Mexico Star Party (SNMSP) and the X-Prize Event (21 – 22 October) were in conflict. Vince suggests that the ASLC is large enough to cover both events. Vince recommended that John McCullough organize the ASLC support for the X-Prize Event. Vince appointed Joseph Mancilla as the focal point for the SNMSP.

Next, Vince introduced Mr. Chris Jones, a member of the Alamogordo Astronomy Club. Chris talked about the upcoming White Sands Star Party (WSSP) scheduled for 22-23 September 2006. The 22nd is for the astronomer viewing only. The WSSP is a three-way collaboration between the White Sands National Monument, the New Mexico Museum of Space History, and the Alamogordo Astronomy Club. The WSSP is a fund-raiser for the Astronomical Society of the Pacific's Project ASTRO. You may register for the WSSP at http://www.zianet.com/wssp/. If you volunteer for at least four (4) hours to help out at the WSSP, you pay half price for the weekend. Chris says he needs between 30-35 people to volunteer.

There was a discussion on problems with mail service and how it has impacted *Sky and Telescope* subscriptions for some ASLC members. Janet Stevens explained that one ASLC check arrived very late to S&T and she sent a second check that arrived before the first. Janet recommended that the ASLC obtain either a debit or credit card. Janet will report on options at the next ASLC meeting. Janet told the ASLC members that we can obtain the "Star Date Magazine" at a discount price since we are members of a club. Normally, the subscription fee is $24 and we can obtain it for $21. She handed out a few Start Date membership application forms.

Vince Dovydaitis and Steve Barkes showed some new books they recently purchased. Vince's book, entitled the "Mauna Kea Book," discussed the history, flora, and fauna of Mauna Kea and a third of it was devoted to the observatories on the summit. Steve purchased a new miniature "Star Atlas" and Walter Houston's "Deep Sky Wonders."

Vince mentioned that he saw a briefing from Adler Planetarium about Public Remote Observing. This triggered Vince into thinking about using the Apache Point Observatory's (APO) three and half meter telescope for ASLC projects during twilight or full moon hours. Vince challenged the ASLC members to come up with an infrared project since observations can more easily be carried out in bright sky conditions in the infrared. Of course the APO Telescope Consortium would have to approve any plan.

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Janet Stevens gave a treasurer's report. As of this meeting, the ASLC had $2597.39 in checking, $3530.23 in savings and $17,162.35 in a Certificate of Deposit.

For the evening program, our ASLC member, Bert Stevens, gave a fascinating talk on "SUPERNOVA!". Bert stated that, supposedly, in a galaxy such as ours, there should be a supernova occurrence every thirty (30) years. Bert gave an overview of stellar nuclear reactions and explained how Type II/I supernovas form.

For the August meeting, Vince convinced Bill Stein and Jerry Gaber to talk about their observatory construction. Bill Stein, ASLC Secretary

Renaissance Craftfaire Exhibit…. Calling All Wizards, Wenches, Knights and Knaves

John McCullough

If you weren't at the July monthly meeting, you missed the announcement that ASLC will again reserve space in the Children's Realm at the Doña Ana Arts Council 2006 Renaissance Craftfaire. The dates and times for this year's Faire are November 4 and 5 from 10:00 am to 5:00 pm Saturday and 9:00 am to 4:00 pm Sunday. Booth/exhibit space setup will be from 1:00 pm to 5:00 pm on November 3 and tear down after 4:00 pm on November 5.

This is a great opportunity to interface with the public and promote ProjectAstro specifically, and astronomy and science in general in our public schools. Our displays and demonstrations have evolved over the last several years and now is the time to plan our participation. Previously, we've displayed examples of our member astrophotographers' work and have had drawings for one or more images over the course of the weekend. Nils Allen has demonstrated building a 4" Dobsonian mount telescope and had a drawing for participation in one of the Telescope Making Workshops free of charge. When the weather and sun have cooperated, we've had several solar scopes and scopes with solar filters available. Also, we have done planetary observation during the day, viewing Jupiter, Saturn, Venus, and the moon last year. This has been a big hit with the public in the past.

It's time to "dress up" in Renaissance costume and interface with the public, so let us know if you can participate. If you can help with setup, tear down or manning the booth during any part of the weekend, let Rich Richins or me know. You can contact me via email at mcculloj@zianet.com.

White Sands Star Party, September 22-24

Camp out and observe Southern New Mexico's dark skies in a truly unique location - the gypsum white sands of White Sands National Monument. The White Sands Star Party (September 22-24) benefits those teaching the science of astronomy. This event will support Project ASTRO-New Mexico, a cooperative project of the Space Center, the Astronomical Society of the Pacific, and the National Science Foundation. For additional information, please see the WSSP website: <http://www.zianet.com/wssp/>

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In 1986 an ambitious upgrade program was begun to improve the antenna's performance even further. Engineering studies had shown that if the antenna's diameter were increased to 70 m and other improvements were made, the antenna's performance could be improved by a factor of 1.6. Thus it was that all three 64-m DSN antennas around the world became 70-m antennas. Improvements have continued throughout the years.

"This antenna has played a key role in almost every United States planetary mission since 1966 and quite a few international space missions as well. Together with its twins in Spain and Australia, it has been a key element in asserting America's preeminence in the scientific exploration of the solar system," remarks Mudgway.

Find out more about the DSN and the history of the Mars antenna at http://deepspace.jpl.nasa.gov/dsn/features/40years.html. Kids (and grown-ups) can learn how pictures are sent through space at http://spaceplace.nasa.gov/en/kids/phonedrmarc/2003_august.shtml .

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