

OBSERVER

Newsletter of the Denver Astronomical Society
One Mile Nearer the Stars

Wispy Winter Wonderland

The double star 52 Cygni illuminates wisps of an ancient supernova remnant—part of the Veil Nebula in Cygnus. Steve used an 80mm StellarVue refractor on a Paramount ME mount. Exposures were 30x3-minutes in h-alpha for a total of 90 minutes.

Image copyright, 2006 Steve Solon

H A P P Y N E W Y E A R !

J A N U A R Y S K I E S

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Welcome to 2007! Sunset of the New Year is ushered in by Venus. The evening star shines with a brilliance of an apparent magnitude (M_v) -3.9. By month's end, Venus will be visible for almost two hours after sunset. The disk of Venus, as

seen through a telescope will be greater than 90% lit. Remember, Mercury and Venus both go through phases similar to that of the Moon.

On January 1, Saturn will rise around 8 P.M. in the East, and transit around 3 a.m. the next

JANUARY PREDOMINANT CELESTIAL OBJECTS

Description	RA	DEC	Description	RA	DEC
M31, Andromeda galaxy	0h 42.7m	41° 16'	ε Persei, double star	02h 50.6m	55° 53'
M33, Triangulum galaxy	01h 33.9m	30° 39'	Pleiades	03h 47.5m	24° 06'
Mira, Variable star	02h 19.7m	-2° 57'	R Leporis, Crimson Star	04h 59.6m	-14° 47'
Perseus double cluster	02h 21.5m	57° 08'	M42, Orion nebula	05h 35.4m	-5° 22'
ι Cassiopeiae, triple star	02h 29.0m	67° 24'	M35 cluster	06h 08.9m	24° 21'
M77, Spiral galaxy	02h 43.0m	0° 01'	Castor, double star	07h 34.6m	31° 54'

3 Full moon (AKA "Old Moon")
11 Last quarter moon
18 New moon
25 First quarter moon

morning. However, by January 31, it will start rising around 6 p.m. and transit around 1 a.m. Saturn is easily identifiable at 0.3 M_v and will lie about 6° from dimmer Regulus. January marks

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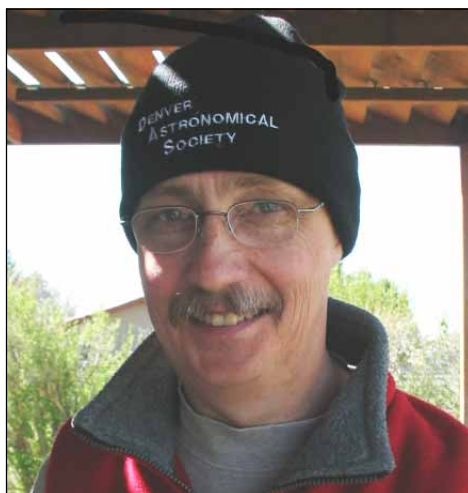
President's Corner

Holiday seasons give us a time to reflect on where we've been, where we are and where we're going. The past year has seen lots of improvements with DAS, its relationship with DU and our ability to resume and increase activities with other astronomy societies along the front range, and with the community at large. Special thanks go out to all of you. It is each individual contribution that has added up to some fun and educational opportunities, with basics like all our public outreach events, especially the Transit of Mercury last month. By my informal count DAS people were involved with well over 2000 people at several sites around town. Other clubs had good success with the event as well.

The lack of something exciting in the sky hampers drawing new people into amateur astronomy. This fall season is a good example, as all the pretty planets are in the early morning sky! The transit of Mercury was a good chance to perk things up some in November. This winter, however, things are improving as Saturn and Jupiter make their way into the later evening sky, and Orion is attending the public



events earlier and earlier. The M42 nebula is spectacular in the Clark telescope and always pleases our visitors. We are seeing a boost in the content of scout programs, and have been invited to give several talks this fall.



Wayne Green, President of the Denver Astronomical Society.

This Christmas season, several people with our science program are working with Dr. Mark Bottorff to make some basic photometric observations of Seyfert galaxies, using a basic CCD camera and the Clark telescope. The main goal of this program is to publish citations of science from the Clark in referred journals. The bonus of this work is that we get to learn more about the equipment and science possibilities and capabilities of the Clark—improving our work for the future.

Elections are looming on the DAS horizon. The elections are in February. Nominations are

Continued on page 7

DAS Schedule

JANUARY

- 5 General Membership Meeting at D.U.'s Olin Hall (*Begins at 7:30 P.M.*)
- 12 E-Board meeting at Chamberlin Observatory (*Begins at 7:30 P.M.—Note: new time*)
- 20-21 EGK Dark Site Weekend
- 27 Open House at Chamberlin Observatory (*Begins at 5:00 P.M.*)

FEBRUARY

- 2 General Membership Meeting at D.U.'s Olin Hall (*Begins at 7:30 P.M.*)
- 9 E-Board meeting at Chamberlin Observatory (*Begins at 7:30 P.M.—Note: new time*)
- 17-18 EGK Dark Site Weekend
- 24 Open House at Chamberlin Observatory (*Begins at 5:00 P.M.*)

Public nights are held every Tuesday and Thursday evenings beginning at the following times: October 1 - March 31 at 7:00 P.M. April 1 - September 30 at 8:30 P.M. at Chamberlin Observatory. Costs to non-members are: \$3.00 adults, \$2.00 children. Please call (303) 871-5172 for reservations.

Society Directory

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Ron Mickle	Dan Wray

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Darrell Dodge

Annual Picnic:

Keith Pool

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Observer editor, Patti Kurtz (720) 217-5707

The Observer is available in color PDF format from the DAS website.

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Darrell Dodge and Patti Kurtz

DAS Information Line:

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DAS Correspondence:

Denver Astronomical Society

Chamberlin Observatory C/O Wayne Green

2930 East Warren Avenue

Denver, Colorado 80210

The Executive Board conducts the business of the DAS at 8 P.M. at Chamberlin Observatory. Please see the Schedule of Events for meeting dates. All members are welcome.

the das . org

Prodigal Son Returns to DAS for January 5th Presentation on Active Galaxies

by Darrell Dodge

January's general meeting presentation will be "Active Galaxies: The most powerful engines in the universe!" by Dr. Mark Bottorff, Southwestern University, Georgetown Texas. As usual, the meeting will begin at 7:30 pm in Room 105 of Otis Hall. There will be a reception at Chamberlin Observatory following.

Active galaxies, also called Seyfert galaxies (like M77), quasars or blazars, are spiral or irregular galaxies containing an extremely bright nucleus, most likely caused by the gustatory activities of a supermassive black hole, that can sometimes outshine the surrounding galaxy. The light from the central nucleus varies in less than a year, which implies that the emitting region must be less than one light year across. While Seyfert galaxies are found near our Milky Way, most quasars are very distant (more than 3 billion and up to 12 billion light years), implying that they are earlier forms of active galaxies.

As many people who've hung out with Mark at star parties (and at the EGK Dark Site) may know, Mark was a DAS member in the 1970's when he was a teenager and used to operate the 20-inch Clark Saegmuller refractor for public nights. He was also an S&S Optika employee, and earned an MS in applied mathematics from the University of Colorado at Denver in 1986. His mother still lives in the Denver area, so he has a lot of Colorado connections.

Mark began studying quasars while earning his Ph.D. and working as a research assistant at the University of Kentucky. After finishing his doctorate in 1999, he stayed for three years as a post-doctoral researcher and wrote papers based on quasar information gathered by the Hubble Space Telescope. Prior to attending the University of Kentucky, he taught for three years at Dickinson College in Carlisle, Penn.

Mark is now an assistant professor of physics at Southwestern. His main area of research is



Dr. Mark Bottorff

Image courtesy Southwestern University,
Georgetown, TX

Seyfert galaxies and quasars and associated work on plasmas and photoionized environments, but he has also published research on studies of planetary atmospheres, particularly Venus's cloud cover.

The SU Web site notes that Mark has been an avid astronomer since his parents first bought him a telescope at age 15. "I remember seeing a star one night and viewing it through my telescope only to find out it was Jupiter," he says. "I was as excited as Galileo must have been. I went to the library the next day to read a book on astronomy, and I've been hooked ever since."

Mark has continued the public outreach and education work he started with the DAS at Southwestern, where he shares his passion for viewing and understanding the universe with both his students and the community through monthly public viewing nights at the Fountainwood Observatory. Much like the DAS supports the University of Denver's Chamberlin Observatory, the Williamson County Astronomy Club provides volunteer support for Fountainwood. The primary research telescope there is a 16-inch F/8 SCT.

Like many astronomers (think of Chandrasekhar's papers on Monet) Mark has an interest in the arts. He has "dabbled in acrylic painting," won prizes for his photography and danced ballet for 10 years with the Lexington (Kentucky) Ballet Company.

Speaking of Galaxies

During the 2005 Okie-Tex star party, Joe Gafford imaged this spectacular galaxy cluster on the Pegasus-Pisces border (NGC 7626). He used an 18-inch f/4.5 JMI telescope with an SBIG ST-2000XM CCD camera. LRGB exposures were 10-, 10-, 7-, and 10-minutes respectively. This image showcased in the January 2006 *Observer*.



Image copyright 2006 Joe Gafford

updates

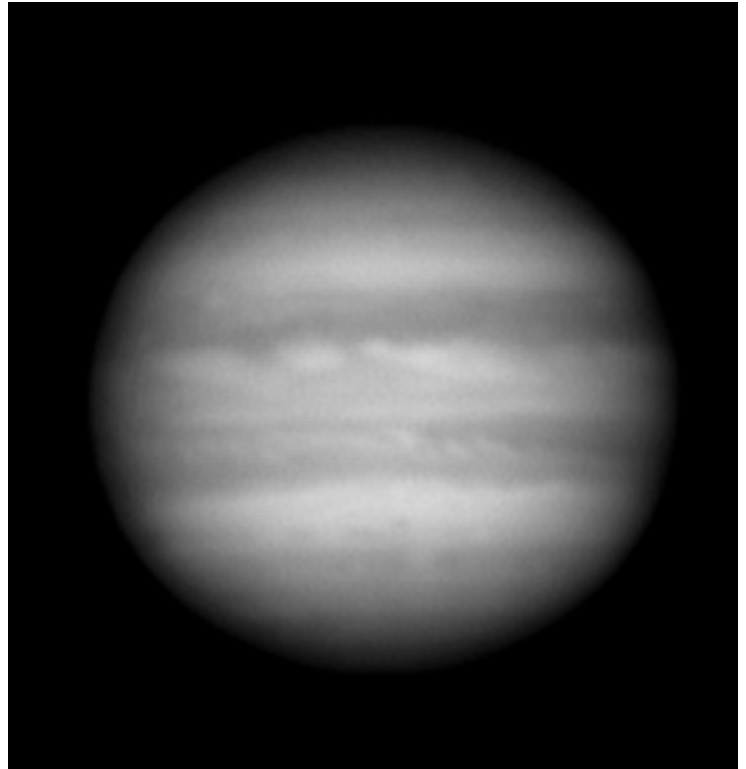
The Year in Review



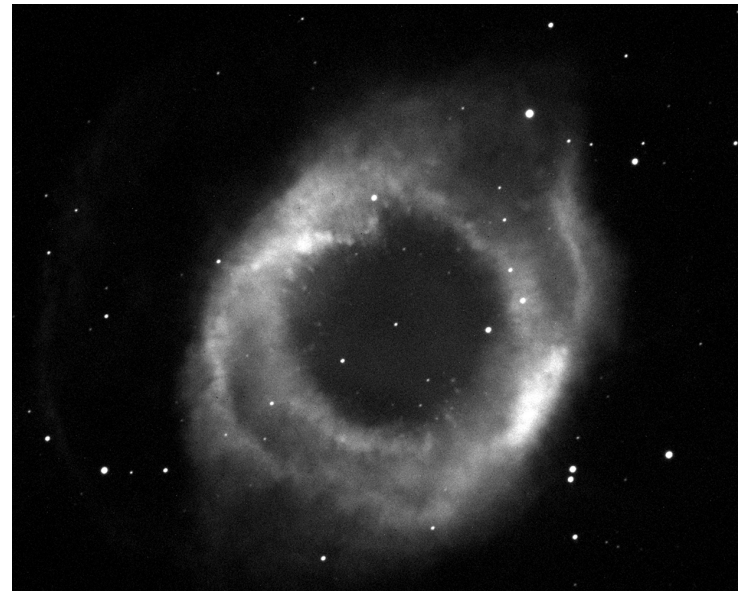
M13 (NGC 6205) in Hercules
Image copyright 2006 Craig Anderson

DAS members observed numerous astronomical sights throughout last year, both abroad and close to home. From last year's total solar eclipse to November's transit of Mercury, shutterbugs recorded our universe in spectacular imagery. DAS photographers outdid themselves with glorious images of the celestial bouquet above. This month's issue of the *Observer* is sprinkled throughout with some of last year's best work.

M16, The Eagle Nebula, from the 2006 Rocky Mountain Star Stare
Image copyright 2006 Philip Good



Jupiter through the Clark 20-inch Refractor
Image copyright 2006 Bryan Wilburn



The Helix Nebula (NGC 7293) in Aquarius
Image copyright 2006 Craig Anderson





Image copyright 2006 Bryan White



Image copyright 2006 Craig Anderson



Photo copyright 2006 Joe Gafford

Clockwise from upper left: Aurora borealis from Yellowknife, Canada; the Trifid Nebula, M20 (NGC6514), in Sagittarius; totality from Sollum, Egypt; the Pelican Nebula (IC 5067-70) in Cygnus; and IC1613, an irregular galaxy in Cetus.

Image copyright 2006 Pauline Ide



Photo copyright 2006 Joe Gafford



Space Weather for Air Travelers

by Dr. Tony Phillips

At a time when much of the airline industry is struggling, one type of air travel is doing remarkably well: polar flights. In 1999, United Airlines made just twelve trips over the Arctic. By 2005, the number of flights had grown to 1,402. Other airlines report similar growth.

The reason for the increase is commerce. Business is booming along Asia's Pacific Rim, and business travel is booming with it. On our spherical Earth, the shortest distance from Chicago to Beijing or New York to Tokyo is over the North Pole. Suddenly, business travelers are spending a lot of time in the Arctic.

With these new routes, however, comes a new concern: space weather.

"Solar storms have a big effect on polar regions of our planet," explains Steve Hill of NOAA's Space Weather Prediction Center in Boulder, Colorado. Everyone knows about the Northern Lights, but there's more to it than that: "When airplanes fly over the poles during solar storms, they can experience radio blackouts, navigation errors and computer reboots—all caused by space radiation."

In 2005, United Airlines reported dozens of flights diverted from polar routes by nasty space weather. Delays ranged from 8 minutes to nearly 4 hours, and each unplanned detour burned expensive fuel. Money isn't the only concern: Pilots and flight attendants who fly too often over the poles could absorb more radiation than is healthy. "This is an area of active research—figuring out how much exposure is safe for flight crews," says Hill. "Clearly, less is better."

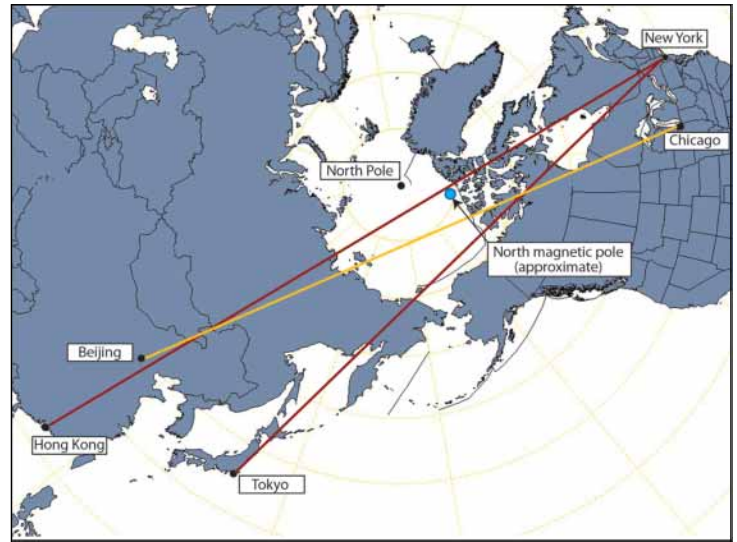
To help airlines avoid bad space weather, NOAA has begun equip-

ping its GOES weather satellites with improved instruments to monitor the Sun. Recent additions to the fleet, GOES 12 and 13, carry X-ray telescopes that take spectacular pictures of sunspots, solar flares, and coronal holes spewing streams of solar wind in our direction. Other GOES sensors detect solar protons swarming around our planet, raising alarms when radiation levels become dangerous.

"Our next-generation satellite will be even better," says Hill. Slated for launch in 2014, GOES-R will be able to photograph the Sun through several different X-ray and ultra-violet filters. Each filter reveals a somewhat different layer of the Sun's explosive atmosphere—a boon to forecasters. Also, advanced sensors will alert ground controllers to a variety of dangerous particles near Earth, including solar protons, heavy ions and galactic cosmic rays. "GOES-R should substantially improve our space weather forecasts," says Hill. That means friendlier skies on your future trips to Tokyo.

For the latest space weather report, visit the website of the Space Weather Prediction Center at <http://www.sec.noaa.gov/>. For more about the GOES-R series spacecraft, see http://goespoes.gsfc.nasa.gov/goes/spacecraft/r_spacecraft.html. For help in explaining geostationary orbits to kids—or anyone else—visit The Space Place at http://spaceplace.nasa.gov/en/kids/goes/goes_poes_orbits.shtml.

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



The shortest airline routes from the Eastern U.S. to popular destinations in Asia go very near the magnetic North Pole, where space weather is of greatest concern.

Photo courtesy: NASA

From the Editor:

Apologies for the lateness of this month's newsletter and lack of proofreading—excuses include holidays, empty-nest syndrome, college graduation and (finally) the launch of our new travel company, Phoenix Travel, LLC (www.phoenix-travel.net)! Speaking of that, we're in the process of considering tour leaders for the 2008, 2009 and 2010 total solar eclipses. If you're interested, please let me know: We're looking for fairly well-traveled people with graceful dispositions and those who adapt well to sometimes adverse conditions.

As for this issue, I thought a "Year in Review" was appropriate because DAS photographers truly deserve acknowledgement for their hard work and beautiful accomplishments.

Please note that my e-mail address has changed—please use p_kurtz@comcast.net from now on. If you've sent anything in the last month to another address, please re-send.

I have a request to those contributing articles: feel free to submit text as Word or straight text documents. If you have accompanying images, please submit them separately as jpegs or tif files. Thanks so much! — Patti Kurtz

nasa's space place

January Skies

Continued from page 1

the month Saturn starts its retrograde motion (westward motion against the stars), moving away from Regulus until mid-April.

The spiral galaxy M77 is a fascinating galaxy, especially if the observer understands what he is observing. Start by finding M77 (see coordinates below). It is easily located in the sky by looking 1° from Delta Ceti. Note that the nucleus of the M77 is fairly bright as galaxies go. When viewing, keep in mind that M77 is a Hubble class of galaxy known as spiral. The other three classes are barred spirals, ellipticals and irregulars. We can fine tune the classification of M77 as a Sb type, meaning spiral, moderately wound and a moderate bulge. Even more interesting is that M77 was furthered categorized in the 1940s by astronomer Carl Seyfert as an active galaxy. The nucleus of Seyfert galaxies are exceptionally bright, possibly fueled by super massive black holes. The core of M77 contains a central object of approximately 10 million solar masses. Of all the galaxies with an active galactic nucleus, or AGN, M77 is the only Messier object that is classified as a Seyfert. There is a great deal of information available on the internet and in publications to readers who wish to know more about Seyferts.

Also located in the constellation Cetus is the red giant star Mira (Omicron Ceti). Mira is the prototype class of variable stars named Mira Stars. Every 332 days, Mira brightens to a maximum M_v between 3 and 4, but has reached 2nd M_v . Mira, the Wonder Star as it was named centuries ago, lies about 6° from M77 (see coordinates below). There are some interesting facts to remember when observing Mira. As a red giant it no longer burns hydrogen in their core, but instead burns hydrogen in the outer shell surrounding a helium core. It is also



M33

One of this month's "Predominant Celestial Objects," the beautiful Pinwheel Galaxy, M33 in Triangulum, shines at magnitude 5.7 and performs its spiral whirls not far from the Milky Way's serene sister galaxy, M31. Also known as NGC 598, the Pinwheel contains untold numbers of star-forming regions and sends us its glow from 2.3 million light-years away. Steve used an SBIG ST-8e CCD camera on a StellarVue80mm refractor for a total LRGB time of 140 minutes.

Image copyright 2006 Steve Solon

a member of a multiple star system. The surface temperature varies from 2,600 K at maximum luminosity down to 1,900 K. As of December 16th, Mira was 8.1 M_v .

To learn more about Mira, visit the American Association of Variable Star Observers (AAVSO) website <http://www.aavso.org/> and under Pick a Star, type "omi cet" and select Find charts. At the Charts website <http://www.aavso.org/cgi-bin/searchcharts3.pl?name=omi%20cet>, select the "A" chart, which will provide you with several comparison stars listed as 55, 64, 73, etc. Interpret these numbers as magnitudes 5.5, 6.4, 7.3, and so on. Identify Omicron Ceti (Mira) and interpolate what you believe the current magnitude is.

To get a great view of the planets, stars, and other celestial objects, visit the Denver Astronomical Society's next Open House at 5 p.m. on Sat-

urday, January 27 at the University of Denver's Historic Chamberlin Observatory. For the public, there is a \$1 upkeep fee to look through the Clark 20-inch telescope. Members of the Denver Astronomical Society have free access to the Clark 20" at Chamberlin Observatory during Open House.—Ron Mickle

President's Corner

Continued from page 2

open up till the bell sounds during the February general meeting. I would like to invite all of you that feel you would like to help DAS develop further into the future to run for office. Nominations are open, Wayne Kaaz is the Chairman of the Nomination Committee. Other positions can use some help as well, like helping to keep the library organized and pitching in with public outreach events. Talk to any board member about ways you can get involved with DAS!

I hope all had a good holiday, and I am looking forward to a great 2007 for DAS, one that has another Mars Madness!—Wayne Green



About the Denver Astronomical Society

Membership in The Denver Astronomical Society is open to anyone wishing to join. The DAS provides trained volunteers who host educational and public outreach events at the **University of Denver's Historic Chamberlin Observatory**, which the DAS helped place on the National Register of Historic Places. First light at Chamberlin in 1894 was a public night of viewing, a tradition the DAS has helped maintain since its founding in 1952.

The DAS is a long-time member in good standing of the **Astronomical League** and participates in **NASA's Project Astro** program.

The DAS' credo is to provide its members a forum for increasing and sharing their knowledge of astronomy, to promote astronomical education to the public, and to preserve **Historic Chamberlin Observatory** and its telescope in cooperation with the University of Denver.

The DAS is a 501(c)(3) tax-exempt corporation and has established three tax-deductible funds: the Van Nattan-Hansen Scholarship Fund, the Public Outreach Fund, and the Edmund G. Kline Dark Site Fund. To contribute, please see the bottom of the membership form for details.

More information about the DAS, its activities, and the special tax-deductible funds is available on the DAS web site at www.thedas.org.



**APPLICATION FOR MEMBERSHIP TO THE
DENVER ASTRONOMICAL SOCIETY**

New Renewal

Name: _____
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 E-mail Address: _____
 Occupation: _____
 Other Interests: _____
 (Students Only) School: _____ Grade: _____

Do you want to download the newsletter in PDF format from our website instead of by postal mail?
 Yes No

Do you want the above information excluded from the yearly roster?
 Yes No

Please Circle All That Apply:

Regular Membership: \$35 Students: \$12 (*Students under age 23*)
 \$ _____

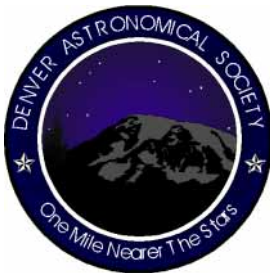
Astronomy Magazine/\$34
 Sky & Telescope Magazine/\$32.95
 \$ _____

Van Nattan Scholarship Fund \$ _____

Public Outreach Fund \$ _____

Total Amount Paid \$ _____

Please make donations to the Dark Sky Site Fund payable to the DAS EGKDS Fund and mail to Steve Solon, 9774 W. Elmhurst Place, Littleton, CO 80128-5199. Please make other amounts payable to the Denver Astronomical Society and mail along with this completed form to Brad Gilman, DAS Treasurer, 7003 S. Cherry St., Centennial, CO 80122-1179.



Denver Astronomical Society

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