

OBSERVER

JUST AROUND THE BEND



ANDROMEDA GALAXY (M31) AND COMPANIONS

Darrell made this beautiful image of our closest spiral galaxy neighbor on July 17th at the EGK Dark Site. It is a two-image mosaic, each 4x120 and 2x180. Please check with Darrell for image specifications.
Image copyright 2010 Darrell Dodge

Inside the Observer

President's Corner..... 2

Society Directory..... 2

New Astronomer's Den Chart..... 4

August Speaker, Dr. Greem..... 5

Picnic/Potluck and Open House..... 5

NASA'S Space Place..... 6

Schedule of Events..... *back page*

Calendar

2..... Last quarter moon,

9..... New moon

12..... Perseid meteor shower peak

16..... First quarter moon

24..... Full moon

AUGUST SKIES *by Dennis Cochran*

We started at Arcturus on a tour of eight objects last month. This time we'll do the same with ten globular clusters, but first we'll review the constellations of that area. In town, it might be hard to see the elongated kite shape of Boötes the Herdsman extending northeast from Arcturus. Just east of Boötes is the unmistakable cup shape of Corona Borealis, the Northern Crown. South of the Crown is the faint head of the serpent, Serpens Caput, a flat triangle. Serp-Cap wiggles south before taking a sharp turn east to run into Ophiuchus the Serpent-Bearer. As a side note, it may be hard to see the Serp-Cap stars from Chamberlin; in fact I had a hard time seeing Corona Borealis.

Serpens continues across Ophiuchus in a shallow downward curve that seems to define the bottom of that large bell-shaped constellation, but it

actually runs across it, since Ophiuchus' faint legs extend down below the curve. Serpens emerges as Serpens Cauda (tail) from the eastern side of Ophiuchus at his ν (nu) star, slanting northeast toward Altair and ending in Serp-Cauda's θ (theta) star.

Back to Arcturus.

Two non-kite stars extend in different directions from Arcturus like cosmic ray particles glancing off a molecule high in the atmosphere. If we head down to the southeast we find the ζ (zeta) star of Boötes; remember that distance and direction. If you can imagine going one and a half times that distance in the opposite direction (northwest) from Arc-

Continued on Page 3

PRESIDENT'S CORNER

I hope the summer is going well for everyone, and that you've gotten some good faint photons of starlight, galaxies and nebula from our Dark Sky Site or while camping or attending one of the big summer star parties, like Rocky Mountain Star Stare or Weekend Under the Stars.

We have recently returned from a 3-week trip to Alaska to see the wilderness, wildlife and our daughter in that great state. We were there during the summer solstice of June 21st where, from the location of Anchorage, the sun only sets for about 4-1/2 hours. A bit further north in Denali National Park, the sun sets nearly at midnight. This was a new experience for me and certainly makes Alaska like no other part of America. To see no stars, other than the sun gave me a much greater appreciation for the sunsets and dark sky we have here, even if it comes at 9:30 p.m. in the summer. The reaction of some folks we talked to in Alaska (not a scientific poll) was funny, because when you mention that after June 21st the days are getting shorter, they give you sort of depressed look! They know 6 months of gray darkness with few stars to be seen, due to weather, are coming again. But even in Anchorage, a city of only a couple hundred-thousand, they have a light-speed scale model of the solar system in the downtown district, which

stretches for miles along the coastline parks. It starts with the sun, and walking at "light speed" you find tiny Mercury one city block away. An eight-minute walk away is the not-much-larger pebble, Earth. So even where most of these objects are not easily visible in the sky, there is a free astronomical educational display set up for everyone to see and get an idea of the size of the solar system. This makes Alaska seem a bit smaller, even if it is twice the size of Texas, as they like to point out.

Here in the lower 48 we have our own 24 hours of light, imposed upon us, by us, with our light pollution. Recently on our listserv there have been questions and discussion about how to view deep-sky objects even with the city lights. Many of us can't get out to the dark sky site, or out camping in the mountains under rare dark starry skies. Jack Eastman, old time DAS observer from before electric lights or at least since PCs were invented, commented that (just?) 40 years ago he used to be able to see the Milky Way from his house in Sheridan. Fortunately, there are people working to reverse the trend



DAS PRESIDENT, RON PEARSON

Ron touches the sun (ouch!) in the center of the "Planet Walk," a scale model of the solar system that is spread out over several miles in Anchorage, Alaska.



of "outrageous light pollution", as Dr. Stencel calls it. The International Dark Sky Association (IDA) is foremost in the battle with various industries for better lighting designs. The DAS is a member of IDA and, of course, Dr. Bob and Aaron Reid are the main advocates for better local lighting in Denver. But we can all do our part by shielding our outside deck or house lights, turning them off or not using them when not needed, and advocating for better lighting with

Society Directory

- President:**
 Ron Pearson (303) 670-1299
president@denverastro.org
- Vice President:**
 Norm Rosling (303) 718-7273
nrp@denverastro.org
- Secretary:**
 Bonnie Kais (720) 344-4263
- Treasurer:**
 Brad Gilman (720) 488-1028

Executive Board Members

- | | |
|----------------------------------|-----------------|
| Jack Eastman | Tim Pimentel |
| Joe Gafford | David Shouldice |
| Frank Mancini | Steve Solon |
| Keith Pool | Dan Wray |
| Ron Mickle, Past President | |
| President Emeritus, Larry Brooks | |

Committees

- Van Nattan-Hansen Scholarship Fund:**
 Ron Pearson (Chair)
 P.O. Box 150743
 Lakewood, Colorado 80215-0743
- EGK Dark Site Committee:**
 Darrell Dodge, Interim Chair
 Email: *darksite@denverastro.org*
- IDA Representative:**
 Dr. Robert Stencel
 Email: *coloida@hotmail.com*
- Student Astronomy Chair:**
 Naomi Pequette (Chair)
- Finance Committee**
 Frank Mancini (303) 663-5263

Volunteers or Appointed Representatives

- ALCor:**
 Darrell Dodge (303) 932-1309
- Newsletter:**
 Editor: Patti Kurtz (720) 217-5707
 Email: *p_kurtz@comcast.net*
 Proofing, writing and patience: Steve Solon
 The *Observer* is available in color PDF format from the DAS website.
- Website:**
 Darrell Dodge
 Email: *dmdodge@aol.com*
 Chad Warwick, IT Specialist
- Librarian:**
 Phil Klos
 DAS Information Line: (303) 871-5172
- DAS Correspondence:**
 Denver Astronomical Society
 Chamberlin Observatory c/o Ron Pearson
 2930 East Warren Avenue
 Denver, Colorado 80210

The Executive Board conducts the business of the DAS at 7:30 p.m. at Chamberlin Observatory. Please see the Schedule of Events for meeting dates. All members are welcome.

www.denverastro.org

AUGUST SKIES (CONTINUED FROM PAGE 1)

urus, you'll find the bright globular cluster M3, over toward the corner star of Coma Berenices. Back at Arcturus, if we go down to ζ (zeta) Boötes, then keep going in that direction almost twice that distance farther, we'll run into M5, the largest of the globulars we will visit. M5 may be bigger even than M13, which we found last month; it extends almost over into Serpens Caput. Not far southeast of M5 is μ (mu) Serp-Cap, the star at the point where Serp-Cap turns from south to east before running into Ophiuchus.

If we follow Serp-Cap east to the δ (delta) star of Ophiuchus, we can continue on to drift east into his bell-shaped expanse to run into a pair of globulars, M10 and 12, themselves almost as big as M5. After comparing these two—M12 is the larger—wander south bearing a bit west to pass ζ (zeta) Ophiuchus, one of the stars marking the coiling of the snake around the big guy, and come to M107, a smaller glob. From ζ (zeta) Oph, one of the legs continues south to come to a halt just above bright red Antares, the Heart of the Scorpion, the Rival of Mars (Anti-Ares.) Just west of this ruddy giant is the globular cluster M4. I know from painful experience that M4 is hard to find from Chamberlin, being washed out by the city light pollution. Antares is the α (alpha) star of Scorpius, while just up the body of the beast is the σ (sigma) star. Between these two stars, closer to Antares even than M4, is the faint glob NGC6144, which calls out for aperture, high power and dark skies.

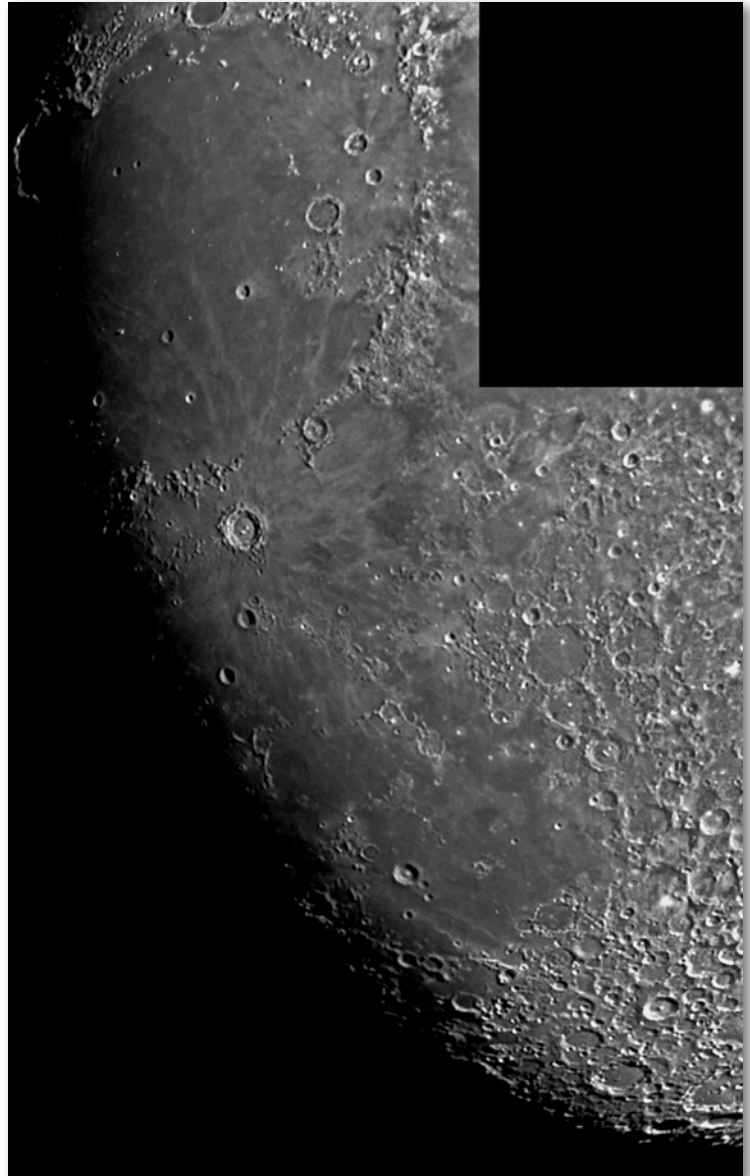
If we swing east of Antares a ways we come to the often-ignored globular M19, compact and slightly oval. Now drop straight down like a spider to find its neighbor, M62. Just east of us now hangs the other faint leg of Ophiuchus. Beyond it to the east is fabulous Sagittarius and its famous 'teapot' central asterism. Here, we are truly in the thick of the Milky Way because this region contains the center of the galaxy, discovered by radio astronomers. For now let's ignore all the gaseous nebulae and star clusters that abound in the region—see last month's September Skies for these—we're doing globs, so let's find M22, east of the top star of the teapot's lid. M22 is the third-largest globular in our sky and the "most easily resolved" according to *Peterson's Field Guide: Stars and Planets*. At 9600 light-years, it is relatively nearby.

Saturn is setting earlier all the time, but Jupiter rises at the same time (10:30 P.M., later

in the month, 8:30 P.M.) so take heart. The after-sunset planets include Saturn, Mars and Venus. Mercury is too low to make it. Later, when Jupiter comes up in the southeast in Pisces, he is accompanied by Uranus, the green planet, located three, later closing to two degrees west. Blue Neptune rises at sunset farther west on the ecliptic, just off the eastern tip of Capricorn. Look sharp, though—it's only 2.3 arc-seconds wide.

"Bad Things," etc.—too much other stuff this month. Wait for it.

Meetings: WUTS (Week-end Under The Stars) takes place in a double meadow west of Laramie, WY from Thursday the 5th thru Saturday the 7th, with the latter being the day/evening of the talks, prize drawings, etc. Friday, however, at 2pm is a tour of the infrared scope on Jelm Mtn. No catered food at WUTS: BYO food and water. They do provide outhouses. The next Saturday, the 14th, is our Open House at Chamberlin. Friday the 20th is the General Meeting at Olin Hall, and the last Friday, the 27th, is the E-



IT'S ALL IN THE DETAILS

There's nothing quite like angled sunlight to bring out the best in our satellite. Some of the highlights in this 2-image mosaic are, left to right, top to bottom: "C"-shaped Sinus Iridum opening onto Mare Imbrium, the giant ray crater, Copernicus, below that, and finally, amid the debris field near the south pole, the crater Tycho, with its prominent central peak. Details: An SBIG ST-8e CCD camera on a Celestron C-11 Schmidt-Cassegrain reflector. They made two 3/1000-second images through a Custom Scientific h-alpha filter,

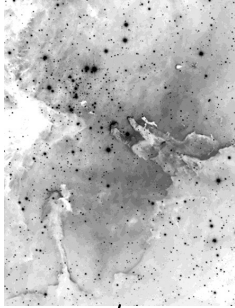
Image copyright 2010 Brad Gilman and Steve Solon

Board Meeting at Chamberlin. Lotsa 'stronomy stuff goin' on.

NEW ASTRONOMER'S DEN

August 13 & 14, 2010

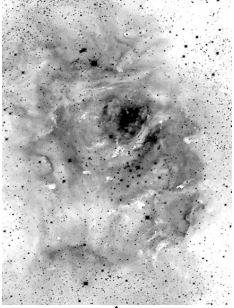
On The Way to the Center of the Milky Way Galaxy



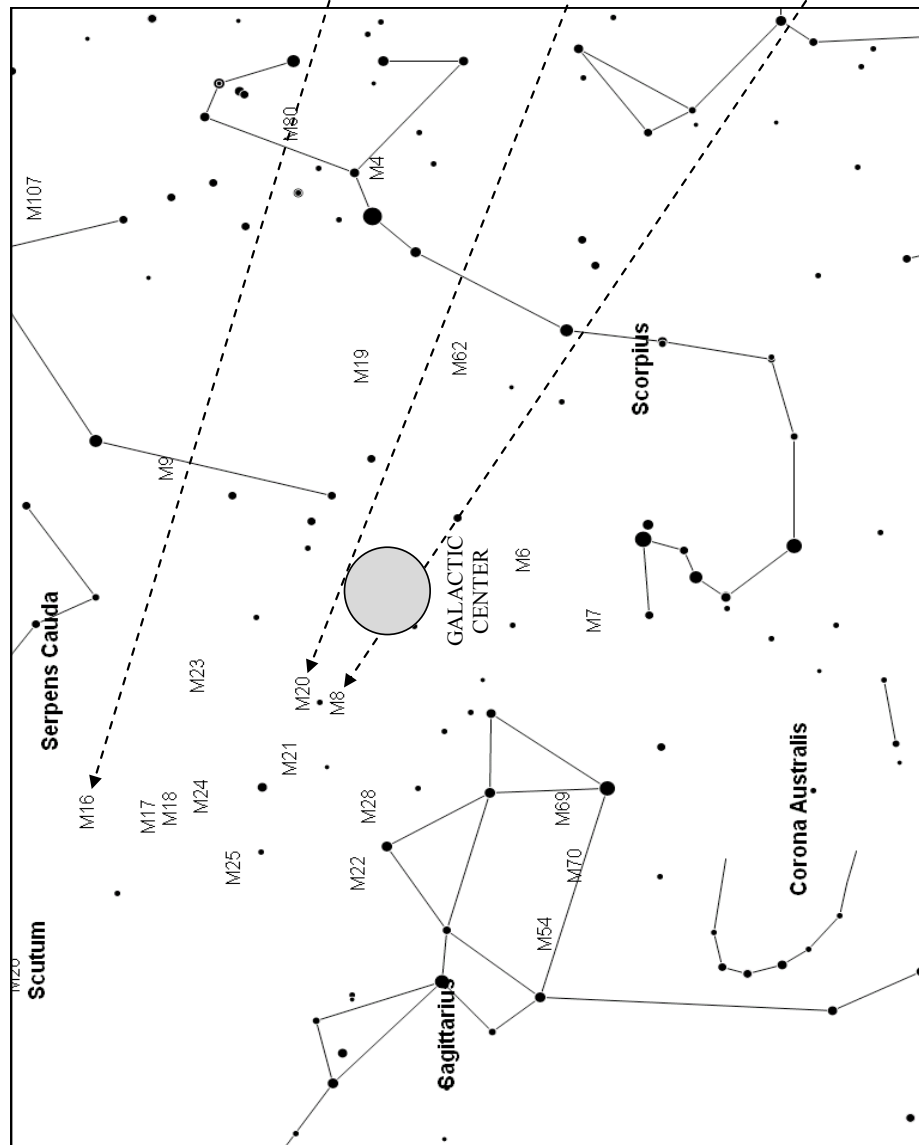
The Eagle Nebula (M16) contains cold pillars of gas and dust that are slowly being eroded away by the stellar winds of the star cluster to the upper right of center.



The Trifid Nebula (M20) is a dual gaseous entity; one half is cold gas that reflects starlight and appears blue. The other half emits energized radiation, and appears red.



The Lagoon Nebula (M8) is a violent star-forming region composed chiefly of red emission nebula and dark knots of cold gas called "Bok Globules."



Sagittarius the Archer and **Scorpius the Scorpion** inhabit the most populated part of the night sky, the area containing the very center of the Milky Way galaxy. Comet hunter Charles Messier had quite the task when he catalogued non-cometary objects in this section of the summer sky. Viewed from a dark site, far from city lights, the Sagittarius-Scorpius region appears as a bright band of hazy light all the way northeast through Cassiopeia. The haze is actually made up of millions of stars, packed into a flat disk that is home to the planet with the only (currently) known form of life in the universe.



denverastro.org



Your Extended - Vision Specialists
303-789-1089

Star chart courtesy TheSky6 astronomy software suite.
© 2010 Software Bisque

AUGUST SPEAKER IS DR. JAMES GREEN

Our August General Meeting speaker is Dr. James C. Green of the Center for Astrophysics and Space Astronomy. Dr. Green, a professor at CU, teaches Introduction to Space Astronomy and related topics concerning stars and galaxies, in addition to Astrophysical Instrumentation. His research interests include design of the Cosmic Origins Spectrograph (COS) for the 2009 re-servicing mission to Hubble. He also has involvement with the Ultraviolet Spectroscopic Explorer, including design, assembly, alignment and calibration of the FUSE spectrograph. His primary astrophysical interest is the interstellar medium, hot stars, and cosmology, while his technical interests include UV, EUV, and X-ray gratings for spectroscopic instrument design. Dr. Green will speak to us about his experiences in the last Hubble retrofit mission.—
Norm Rosling

DR. JAMES GREEN

Dr. Green (right) will speak about his experiences in the last retrofit mission for the Hubble Space Telescope.

Photo courtesy Dr. James Green



DAS PICNIC AND POTLUCK

This year's picnic and potluck was a terrific success (upper photo). Delicious food and great company was enjoyed by all who attended. The photo below shows preparations being made for the Open House that followed.

Images copyright 2010 Joe Gafford



NASA'S SPACE PLACE

BLACK HOLES NO JOKE

*A Space Place Partner Article
by Dr. Tony Phillips*

Kip Thorne: Why was the black hole hungry?

Stephen Hawking: It had a light breakfast!

Black hole humor—you gotta love it. Unless you're an astronomer, that is. Black holes are among the most mysterious and influential objects in the cosmos, yet astronomers cannot see into them, frustrating their attempts to make progress in fields ranging from extreme gravity to cosmic evolution.

How do you observe an object that eats light for breakfast?

"Black holes are creatures of gravity," says physicist Marco Cavaglia of the University of Mississippi. "So we have to use gravitational waves to explore them."

Enter LIGO—the NSF-funded Laser Interferometer Gravitational-wave Observatory. According to Einstein's Theory of General Relativity, black holes and other massive objects can emit gravitational waves—ripples in the fabric of space-time that travel through the cosmos. LIGO was founded in the 1990s with stations in Washington state and Louisiana to detect these waves as they pass by Earth.

"The principle is simple," says Cavaglia, a member of the LIGO team. "Each LIGO detector is an L-shaped ultra-high vacuum system with arms four kilometers long. We use lasers to precisely measure changes in the length of the arms, which stretch or contract when a gravitational wave passes by."

Just one problem: Gravitational waves are so weak, they change the length of each detector by just 0.001 times the width of a proton! "It is a difficult measurement," allows Cavaglia.

Seismic activity, thunderstorms, ocean waves, even a truck driving by the observatory can overwhelm the effect of a genuine

**LIGO**

The Laser Interferometer Gravitational-wave Observatory in Livingston, Louisiana. Each of the two arms is 4 kilometers long. LIGO has another such observatory in Hanford, Washington.

Photo courtesy of the National Aeronautics and Space Administration

gravitational wave. Figuring out how to isolate LIGO from so much terrestrial noise has been a major undertaking, but after years of work the LIGO team has done it. Since 2006, LIGO has been ready to detect gravitational waves coming from spinning black holes, supernovas, and colliding neutron stars anywhere within about 30 million light years of Earth.

So far the results are ... nil. Researchers working at dozens of collaborating institutions have yet to report a definite detection.

Does this mean Einstein was wrong? Cavaglia doesn't think so. "Einstein was probably right, as usual," he says. "We just need more sensitivity. Right now LIGO can only detect events in our little corner of the Universe. To succeed, LIGO needs to expand its range."

So, later this year LIGO will be shut down so researchers can begin work on

Advanced LIGO—a next generation detector 10 times more sensitive than its predecessor. "We'll be monitoring a volume of space a thousand times greater than before," says Cavaglia. "This will transform LIGO into a real observational tool."

When Advanced LIGO is completed in 2014 or so, the inner workings of black holes could finally be revealed. The punchline may yet make astronomers smile.

Find out more about LIGO at <http://www.ligo.caltech.edu/>. The Space Place has a LIGO explanation for kids (of all ages) at <http://spaceplace.nasa.gov/en/kids/ligo>, where you can "hear" a star and a black hole colliding!

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

MEOW

This is an image of NGC 6334, the Cat's Paw Nebula, just off and above the stinger in Scorpius. This is the close-up version of one that Joe took last year with a 110mm lens. Mosaic of two frames done with an SBIG ST-2000XM CCD camera on a 10-inch f/4.5 Newtonian. He made a 20-minute Ha exposure plus 10 minutes each of LRGB exposures, all five minute sub-exposures.

Photo copyright Joe Gafford



**DAS
NEW MEMBERS**

- Daniel Ace
- Mark (Morris), Cam (Cameron),
and Charity Friberg
- Cesar Guinovart
- Zachary Levin
- Ronald Iseminger (rejoin)
- J Thomas Mengel (rejoin)
- Barry Vasboe
- Darwin Weber

ABOUT THE DAS

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 the **International Dark Sky Association**. The DAS' mission 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 501 (c)(3) tax-exempt corporation and has established three tax-deductible funds: the Van Nattan-Hansen Scholarship Fund, the DAS-General Fund and the Edmund G. Kline Dark Site Fund. To contribute, please see the bottom of the membership form for details (found on the DAS website: thedas.org).

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



S&S OPTIKA HAS MOVED TO:

6579 SO. BROADWAY
LITTLETON, CO. 80121
(~1 1/2 blocks NORTH of
Arapahoe Road on the
WEST side of South
Broadway)

(303) 789-1089
www.sandsoptika.com

DAS SCHEDULE

AUGUST

- 5-8 Weekend Under the Stars (WUTS)
CANCELLED
- 6-8 EGK Dark Sky weekend
- 13 and 14 "New Astronomer's Den" on
the south lawn at Chamberlin (Be-
gins at 7:30 P.M.)
- 17 Open House at Chamberlin Obser-
vatory (Begins at 8:30 P.M.)
- 20 General Meeting at D.U.'s Olin Hall
(Begins at 7:30 P.M.)
- 27 E-Board meeting at Chamberlin

SEPTEMBER

- 10-11 EGK Dark Sky weekend
- 17 and 18 "New Astronomer's Den" on
the south lawn at Chamberlin (Be-
gins at 7:30 P.M.)
- 18 Open House at Chamberlin Obser-
vatory (Begins at 7:00 P.M.)
- 24 General Meeting at D.U.'s Olin Hall
(Begins at 7:30 P.M.)

*Public nights are held at Chamberlin Observatory every Tuesday and Thursday evenings
beginning at the following times:*

March 9 - April 14 at 8:00 p.m.

April 15 - September 1 at 8:30 p.m.

September 2 - March 8 at 7:00 p.m.

Costs to non-members are: \$3.00 adults, \$2.00 children.

Please make reservations via our website (www.denverastro.org) or call (303) 871-5172.



The Denver Astronomical Society
c/o Chamberlin Observatory
2930 E. Warren Ave.
Denver, Colorado 80210