

OBSERVER



STELLAR SPECTACLES

Discovered by William Herschel on January 18, 1784, the Christmas Tree Star Cluster (NGC 2264), is a huge star-forming region more than 2,600 light years from Earth in the winter constellation Monoceros. Herschel discovered the associated nebulosity the next year. Two distinctive nebulae—the Cone and Fox Fur—are within the nebular cloud of ionized hydrogen, which is being blown away by the giant 5th magnitude star S Monocerotis that forms the base of the Christmas tree. The blue reflection nebula surrounding S Mon, the tiny Snowflake Cluster above the cone and a rare yellow nebula in the center of the tree are only visible in photographic images or very large scopes. Taken Dec. 6, 2010 at the EGK Dark Site, Darrell used a modified Canon 450D through an AT8IN f/4.8-inch imaging Newtonian.

Image © Darrell Dodge

Calendar

2.....	New moon
11.....	First quarter moon
18.....	Full moon
24.....	Last quarter moon

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FEBRUARY SKIES *by Dennis Cochran*

"HUGE GAMMA RAY BLOB IN SPACE!" A member of the Cosmology Discussion Group at Boulder Library sent this NASA info out to the members. The blob is actually two blobs above and below the poles of our galaxy that emit x-rays. They were discovered by the Fermi Spacecraft's Large-Area Telescope. A previously-unknown aspect of the Milky Way, this structure stretches across the sky from Virgo to the southern constellation, Grus. Each blob is a sort of bubble with well-defined edges. Its nature and origin are not understood, but one immediately suspects that the central black hole of our galaxy may have something to do with it, or was perhaps a starburst in the past. I shouldn't have even mentioned this since it is not something we can observe, but it's nice to know about. There is always more to be discovered in the universe.

Auriga is overhead, which means ε (epsilon) Aurigae is, as well. This binary system-with-disk should be coming out of its eclipsed state, which was at its dimmest last August. ε (epsilon) Aurigae is the star southwest of the bright alpha star Capella, at the point of a sharp little triangle that adorns the west side of the Charioteer. The recovery light curve of this eclipsing system may be smooth or may be fluctuating, depending on the character of the disk that surrounds the giant F-type star and embeds the smaller B-type star, and also on whether the giant star pulsates, as these stars often do. Somebody gets to untangle all of this by recording and studying the spectrum of Epsilon, but it may be possible for amateurs to plot its information-laden light curve by observing the star every night and estimating its brightness (apparent luminosity) in comparison to other stars.

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PRESIDENT'S CORNER

by Ron Pearson

For members of the DAS, February is the most important month in our calendar as an organization of people that come together regularly to enjoy astronomy and related activities. You could look through a telescope all by yourself, but hey, you decided to seek out and share your endeavor with about 299 other people in the immediate area. As an organization dedicated to sharing astronomy, it is when you, the members, decide how we are going to best achieve our goal. Members have input all year round and opportunities to participate in many activities, either as individuals that just use the dark site, or as full participants that contribute their time and talents to all of us.



February is when we have our "Annual Meeting" which includes a short business report on the financial status of our organization. We also hold elections for officers and Executive Board members. You get to decide who will best serve and work toward the goals of the DAS organization, both through the nomination process and the election. It might even be you. As someone who has served as an officer or board member on and off for 20 some years, and as President for one year, the one thing, yes, that "One Thing," that does more to move DAS toward being an ever better "club" is good communication. With several disparate aspects of DAS functions spread over a large geographic area and activities constantly changing through the year, coordination requires far

more communication with other officers, committee folks, members and the public.

We have far more opportunities and technology for communication now than ever before—the major pipeline, now, being the internet. Therefore if you decide to serve DAS with your time and talents on the E-Board or in other activities such as committees, the most important requirement of doing the job well is communication with others that share responsibility. If you are one of those that like to get things done and not just think about them or gripe about problems, the most effective way to get support and help from others is to work at getting your ideas across through communication.

The key to being an active member who is informed of the latest things in the sky, finding out if folks are going to the dark sky site or just what is happening the next meeting, is joining the DAS Yahoo group. It might mean getting your *Observer* via the internet instead of a week or two late by paper.



Continued on Page 3

DAS SCHEDULE

FEBRUARY

- 4-5 EGK Dark Sky weekend
- 12 Open House at Chamberlin (Begins at 5:30 P.M.)
- 18 Annual meeting at D.U.'s Olin Hall (Begins at 7:30 P.M.) Election of officers.
- 25 E-Board Meeting at Chamberlin (Begins at 7:30 P.M.) *New officers and E-Board members should attend this transition meeting.*

MARCH

- 4-5 EGK Dark Sky weekend (Messier Marathon weekend!)
- 12 Open House at Chamberlin (Begins at 6:00 P.M.)
- 19 DAS Spring Banquet and Inauguration of Officers (Takes the place of the General Membership meeting (Begins at 6:00 P.M.).
- 25 E-Board Meeting at Chamberlin (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.*

Society Directory

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 Joe Gafford David Shouldice
 Frank Mancini Steve Solon
 Keith Pool Dan Wray
 Ron Mickle, Past President
 President Emeritus, Larry Brooks

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 Ron Pearson (Chair)
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 Darrell Dodge, Interim Chair
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 Naomi Pequette (Chair)
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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

FEBRUARY SKIES (CONTINUED FROM PAGE 1)

son to nearby stars. AAVSO probably has a chart of the region with star magnitudes on it. Our own Dr. Bob Stencel has written about this object.

South of Auriga, Orion is now very well placed for evening observation. The M42 & 43 complex in Orion's sword is the main attraction, enclosing the four-star "Trapezium" at its core, an intense, beautiful stellar neighborhood that always intrigues the visual and imaging viewer. Up at the belt of Orion, the hard-to-see "Horsehead" dangles down from the left-hand star, Alnitak. This small cloud formation in space is the other "horse" in the sky, after Pegasus.

Reflection nebula M78 is distanced about one belt-width upper left from the belt, next to (part of?) Barnard's Loop, a largely-invisible photographic object, almost as big as Orion itself. From there keep on going upper-left from the belt until you're in the region left of Betelgeuse but down a bit, on an extension of the line from λ (lamda) Orionis to B'juice; λ (lamda) is the star above the hourglass shape of the Hunter. Down this line, 1.5 times the λ (lamda)-B'juice distance, you'll find the one-degree-wide Rosette nebula (NGC 2237) surrounding easier-to-see star cluster NGC 2244, the object to look for before you try to resolve the Rosette.

Cancer is the dim constellation between Leo and Gemini. M44, the Beehive Cluster is just above-right of the delta star in the center of that three-armed constellation. δ (delta) Cancri is right on the ecliptic, but of course you can't see the ecliptic. (You can trace it westward, however, from Cancer past the bottom star of the right-hand twin in Gemini, then on to a point below the Pleiades.) You can follow the southeastern arm (leg, actually) of Cancer down towards α (alpha) Cancri to find, just to its west, cluster M67. South of that is the little five-sided head of Hydra the Water Snake. Now, if you

can see the Hydra head and also the bottom of Canis Major below Sirius, the brightest star in our night sky (down-left from Orion), then you can search 1/3 of the way over from Hydra to Canis Major for lonely star cluster M48. Another third of the way gets you to the cluster pair M46 & 47. Directly below this pair is the even lonelier cluster, M93, to the left of the Big Dog's hind legs. However you'll be lucky to see this low to the horizon. At the M46-47 level, sweep west to a point under Sirius to find cluster M41. Now, from Sirius you can go upper-left towards Procyon in Canis Minor. At 40 percent of that distance you'll find the M50 cluster. Back at Sirius again, the constellation west of it is Lepus the Hare, right under Orion. And under Lepus, in the line of its alpha star to its beta, is globular cluster M79. At last a glob, after all those open clusters!

Planets: Jupiter is still observable after sundown. Uranus is loyal to Jupiter, just west of him on the ecliptic. Saturn rises right in the middle of Virgo, in the 11-12 P.M. slot, and earlier as the month progresses. Mars is behind the Sun with Neptune, more



GLITTERING DIAMONDS . . . WITH A HIDDEN SURPRISE

Although they're technically in the southern constellation Puppis, Messier 46 (upper left) and 47 vault high enough for northern folk to appreciate them. M46 comes with an added bonus, planetary nebula NGC 2438, the small hazy sphere in its upper quadrant. The farther of the two, M46 resides 5,400 light years away, while 47, with its ~50 stars, sparkles from 1,700 light years distance. Details: image from a scanned negative—Minolta 135mm lens piggybacked on a CG-11, one-hour exposure on Kodak Royal Gold film 400, Kiowa Observatory, 1998.

Image © Steve Solon

than likely plotting to take over the solar system from Jupiter.

On the other side of the zenith southwest of Polaris is the Winter Triangle (one that I just made up) of the Double Cluster on the southeast side of Cassiopeia's 'W' shape, then the M52 cluster on her northwest side, and M31 the Andromeda Galaxy making a nice even triangle with those two on Cass's southwest side.

PRESIDENT'S CORNER (CONTINUED FROM PAGE 2)

If you decide to serve as an officer or on the E-Board, the path to the most information and exchange of information between board meetings is joining in the DAS E-Board Yahoo group. We have regular communication about what's going on, current problems that crop up that need immediate solving or opportunities that may present themselves with a short fuse that require discussion and decisions quickly. Individual e-mail addresses or voice-mails are too ephemeral for "real-time" information sharing. If you are not part of these pipelines of communication in the DAS, you will

likely miss out on something, leading to frustration or isolation. As the current president, I, and presidents of the past few years, rely on these pipelines not just to get the latest on a supernova in some galaxy, but discuss the whole universe of DAS activities so when members come to Board meetings, they are informed and prepared to vote on actions or seize opportunities if needed. I realize it's not for everyone, but I hope it appeals to enough of you to keep making the Denver Astronomical Society one of the most vibrant and fun astronomical societies in the United States.

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.

D-FILES

MY SIMPLE ALUMINUM DOBSONIAN TELESCOPE (OR WHAT TO DO WHEN AN AMATEUR ASTRONOMER RETIRES)

Article and photos by David Shouldice



Scope ready for viewing.

scope needed to be portable, quick to set up, cheap and, oh yes, I wanted it to track the stars. Sadly I have no machine shop at my disposal but, and there is a big but (no pun intended), I had more time than money.

With all those requirements, I first concluded that I needed to have a scope that could survive being left out in the weather. That solves the problem of the half hour cool down time and gets it out of the family room when my wife is tired of looking at it. That excluded wood, and left aluminum. Next, I had to figure out how to make the optical path collapsible and strong. The common triangular truss tube structures used on Dobsonian telescopes are very light and strong but do not collapse and require assembly and disassembly.

I chose an aluminum surveyor's tripod from Home Depot for the optical tube. The tripod legs conveniently extended close enough to my 60-inch focal length.

I should explain at this point that I had a starting place for the design. In its previous incarnation, I had the lovely 12.5-inch mirror in a 14-inch fiberglass tube on a Losmandy G11 German equatorial (read "really heavy") mount. It was a monster. The optical tube had exceeded the 60-lb. weight rating of the mount (the G11 itself weighed 75 lbs.) and it would stop running when it got too cold. So I started with a great mirror, mirror cell, secondary and spider.

What I created is a lightweight, 50 lb., very portable, collapsible (fits in the back of my car), easy-to-collimate 12.5-inch mirror telescope that can be left out in the weather. Its length can be easily adjusted for my bino-viewer or my webcam, but it is mostly a fast-to-transport (with my added clip-on wheels), easy to set up, reasonable aperture, cheap aluminum telescope. It has no wood to worry about warping in the heat or cracking or delaminating. Needless to say, it's durable.

I also added an aluminum equatorial tracking table to allow me to do high power planetary work or photography. The tracking table also has the ability to allow the public to view a high power object without my constant did-

The problem with astronomy and aging is that the desire for more and better views collides with my ability to manhandle a telescope. I wanted a bigger scope, and when the sky is gorgeous and the seeing is good, I just wanted to sit and watch the moon and planets and tour the dark skies for nebulae and galaxies—I didn't want to haul 100 lbs. over to a field or bench press it into my car. I didn't want to take 20 minutes setting it up or wait a half hour for it to cool down and I didn't want to buy a van to haul it in. To simplify my dilemma, the tele-

dling to track a planet, but that is another story.

If you are interested in amateur telescope-making (ATM), here is how I did it:

I started, as many of you would, at Home Depot. They had a surveyor's tripod that was just the right length for my mirror's focal length and my desired collapsible trusses.

The legs conveniently attached to the bottom of the three mirror cell's mounting screws.

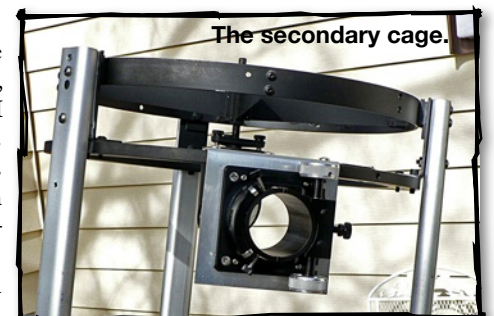
The secondary cage was somewhat straight forward. I bolted a 14-inch aluminum "Lazy Susan" and a strip of rolled aluminum with right angle brackets to attach the top of the tripod legs. This allowed me to attach the spider to the rolled ring, and make a simple right angle bracket for the focuser. This ended up making a surprisingly rigid secondary cage.

The problem now was constructing and rigidly attaching an altitude bearing to the bottom. These bearings rotate at the center of gravity of the tube and allow the scope to pivot from horizontal to vertical. If I figured it right, my balance point was 16-inch from the bottom of the mirror. If I made the bearing's radius small, I needed a rigid 16-inch high base to support it. If I made a big 16-inch radius bearing, the base is small and easy to make rigid, but the bearing gets much larger. I went with a larger radius. I made it from a piece of square 1-inch aluminum tubing rolled to a 12-inch radius. (Both this and the rolled ring were made by a sheet metal company in town). The trick was attaching it to the three legs. I took another piece of 1/2-inch aluminum strip. I attached it from the bottom of the surveyor's tripod legs (and mirror cell) using a U-shape giving two parallel sides, which would give a place to connect the attachment plate for my altitude bearings. Adding some aluminum cross braces for stiffness, and attaching the top of the altitude bearings to the side tubes was all it took to make a lightweight but rigid assembly.

Next, I needed a rocker box assembly for all this to sit on. Following guidance from Dave Kriege's book, *The Dobsonian Telescope*, I made four angled supports for the altitude bearings (Teflon-covered) that sat on a square base made of 1-inch square tubing. I braced the corners with



Telescope collapsed for transport.



The secondary cage.



The base and mirror box.

sheet metal plates and used rivets to attach the plates to the tubing. For added structure, I attached a “Lazy Susan” ring below the square base and covered it with Formica to give a smooth rigid surface for the azimuth bearing.

The rocker box assembly rotates about the ground board and is supported by three Teflon pads above the feet. It, like the altitude bearings, are covered by Kriege’s recommended Wilsonart “Ebony star” laminate material. The two pieces are bolted together to allow it to rotate about the center.

In the past I would have

made all the base parts from $\frac{3}{4}$ inch laminated plywood, but now I used $\frac{1}{2}$ inch square aluminum tubing corner braces and rivets.

Now, that description was only several paragraphs long but it took me more than a year of staring at the half completed design and searching the web to see how others solved the same challenges.

For the finessing and completion, I added a shroud made of Ripstop nylon that sits on the inside of the tripod tube that is held erect in a column by three rings. I stole these from a collapsible clothes hamper (Don’t tell my wife). I Velcro’d it to the secondary cage, and to the mirror cell. Also, there is a separate Ripstop nylon secondary cover to block stray light from getting to the back of the focuser.

Finally I added an aluminum “U” channel to the back of the rocker box with clips to hold in the axle with wheels for easy lugging. I also added some keepers to hold the mirror box and optical tube together when transporting.

I have been finessing some of the design to make it stiff enough to handle a wind, and have been readjusting the balance point now that all the parts are in place. The scope is quite nice and portable and very easy to transport. It is just what this aging astronomer had desired.

Sometime later I will tell you how I made the aluminum equatorial table that it sits on.

I get many compliments from the people and families that get to look through my scope at public star parties. When people ask me the brand name of the scope I tell them in astronomy, unlike most hobbies, you can build your own equipment from scratch.

I had it out on my driveway for Halloween to show off the stars to the neighborhood kids and their parents. It is such a pleasure to use since it is so easy and fast to set up for viewing. When done and I am tired, I collapse the scope, cover it, clip on the wheel bar, bring it in and then collapse myself.



The telescope uncovered.

HELP WANTED—DAS

by Ron Pearson

With the DAS elections coming up at the February meeting, I want to make a request of you, the membership, to offer us your time and talents, not just by running for an Officer or Executive Board position, but as a non-elected volunteer. While the E-Board members give of their time, there are several non-elected volunteer roles where many tasks are performed by the few that keep the DAS running day to day. One could say it’s not fair that only a couple dedicated individuals give so much of their time, but it also puts the DAS in a precarious position; if one key person can’t carry out that function anymore, the things many take for granted will not happen, which will make many members unhappy. As you’ll see from my summary, some individuals carry out multiple tasks and could use a break. Here are some of the important, non-elected functions or roles that are often taken for granted, but require a willing, knowledgeable person to carry out:

Membership: Taking in and accounting for memberships; folks joining and leaving, annual roster and data base; currently handled by Darrell Dodge and Brad Gilman, DAS Treasurer.

Public Night Team Lead: Lead coordinator for Chamberlin Public Night teams. Coordinates and communicates with team leads for training, certifications and assignments, coordinates to fill-in when there are absences on teams; works closely with the observatory Director and staff. The current lead is Ron Mickle, who is overbooked with two teaching jobs and full-time day job.

Dark Sky Site Committee Chair: Heads up dark site committee, oversees budget of dark site, construction, operation, maintenance of facilities, site orientation of new members, any issues related to land-owner/lease, upcoming issue to resolve of continuing dark site location or new site. Darrell Dodge is current “acting” head, and has been for the past 2-3 years.

Observer Newsletter: Editor and proof-reading are managed by Patti Kurtz and Steve Solon. Distribution and newsletter pickup from the printer roles are shared by three to four individuals, including Darrell Dodge, who has been in these roles for a number of years. Coordination is closely tied to membership coordination duties to keep the mailing list current and accurate while handling

distribution of both paper and PDF version through “Constant Contact” or the DAS website.

VanNattan-Hansen Scholarship Fund: Oversees scholarship fund and selection of awardees. Chair (currently myself) and committee member positions are all way past due to be changed according to VN-H bylaws.

ALCOR: Astronomical League Correspondent. Keeps membership list in national A.L., current, promotes A.L., certifies Observing club participants, promotes meetings and information. Current ALCOR is Darrell Dodge.

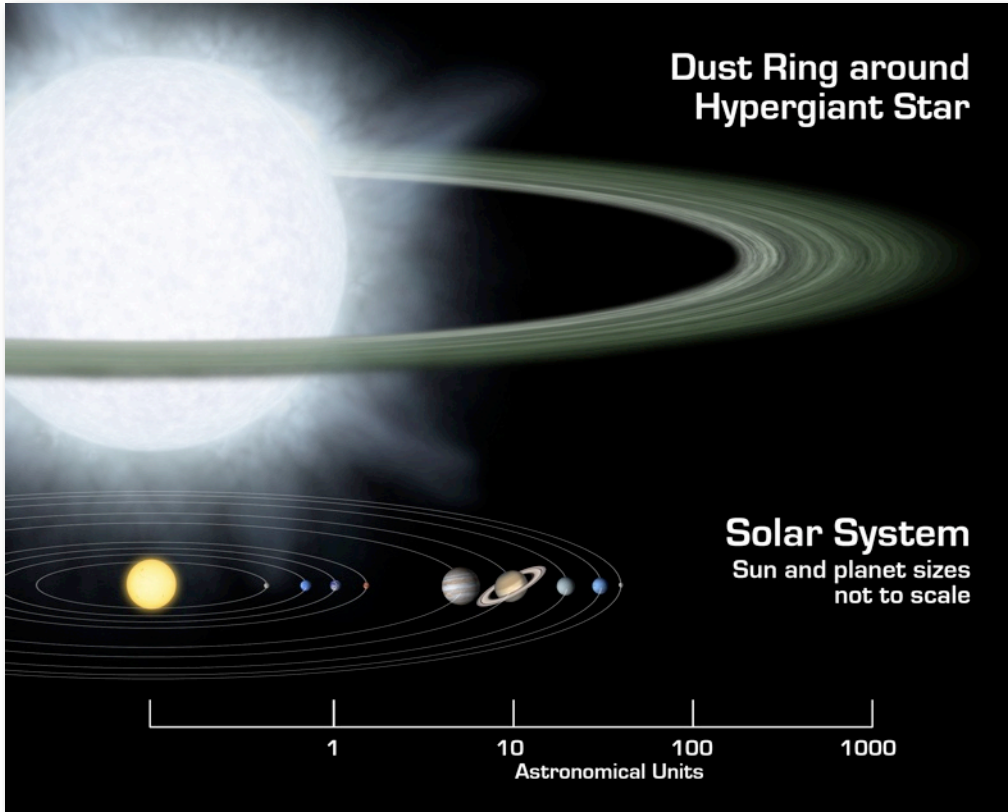
DAS Website: The website is the public face of the DAS, and therefore very important. The current Webmaster is Darrell Dodge. Close coordination and communication is needed with calendar of events and officers.

I hope this gives you a partial picture of the importance these positions take in your enjoyment of the Denver Astronomical Society. Under each of these lead roles are, of course, the volunteers who contribute to each function. Even if you don’t step up to the plate for one of these roles, it is important that they, the individuals and the time they give to you, not be taken for granted.

NASA'S SPACE PLACE

PLANETS IN STRANGE PLACES

A Space Place Partner Article
by Trudy E. Bell



Red star, blue star, big star, small star—planets may form around virtually any type or size of star throughout the universe, not just around mid-sized middle-aged yellow stars like the Sun. That's the surprising implication of two discoveries in 2006 from the 0.85-meter-diameter Spitzer Space Telescope, which is exploring the universe from orbit at infrared (heat) wavelengths blocked by the Earth's atmosphere.

At one extreme are two blazing, blue "hypergiant" stars 180,000 light-years away in the Large Magellanic Cloud, one of the two companion galaxies to our Milky Way. The stars, called R 66 and R 126, are respectively 30 and 70 times the mass of the Sun, "about as massive as stars can get," said Joel Kastner, professor of imaging science at the Rochester Institute of Technology in New York. R 126 is so luminous that if it were placed 10 parsecs (32.6 light-years) away—a distance at which the Sun would be one of the dimmest stars visible in the sky—the hypergiant would be as bright as the full moon, "definitely a daytime object," Kastner remarked.

Such hot stars have fierce solar winds, so Kastner and his team are mystified why any dust in the neighborhood hasn't long since been blown away. But there it is: an unmistakable spectral signature that both hypergiants are surrounded by mammoth

disks of what might be planet-forming dust and even sand.

At the other extreme is a tiny brown dwarf star called Cha 110913-773444, relatively nearby (500 light-years) in the Milky Way. One of the smallest brown dwarfs known, it has less than 1 percent the mass of the Sun. It's not even massive enough to kindle thermonuclear reactions for fusing hydrogen into helium. Yet this miniature "failed star," as brown dwarfs are often called, is also surrounded by a flat disk of dust that may eventually clump into planets. (This brown dwarf discovery was made by a group led by Kevin Luhman of Pennsylvania State University)

Although actual planets have not been detected (in part because of the stars' great distances), the spectra of the hypergiants show that their dust is composed of forsterite, olivine, aromatic hydrocarbons, and other geological substances found on Earth.

These newfound disks represent "extremes of the environments in which planets might form," Kastner said. "Not what you'd expect if you think our solar system is the rule."

Hypergiants and dwarfs? The Milky Way could be crowded with worlds circling every kind of star imaginable—very strange, indeed.

HUMONGOUS! Keep up with the latest findings from the Spitzer at www.spitzer.caltech.edu. Kids and their grownup friends can enjoy beautiful images from Spitzer while playing Spitzer Concentration at The Space Place (spaceplace.nasa.gov/en/kids/spitzer/concentration).

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

DAS Spring Banquet

Saturday, March 19th, 6-9 P.M.
Columbine UU Church,
Littleton

Mexican Buffet by
Angies of Littleton
Cerveza

Cost: \$15 per person

Installation of Officers,
Presentation by:
Naomi Pequette

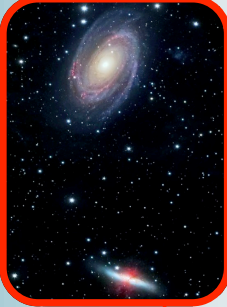
Registration form
online soon at:
www.denverastro.org/banquet2011.html

WELCOME
DAS NEW MEMBERS
Erica Calog
Jeff Calog
Gil Davis
Craig Henderson
Jon Jouett
Thomas R. Leet

NEW ASTRONOMER'S DEN

February, 2011

*Be it Dipper, Plough or Bear —
U-M Plots The Winter Sky*

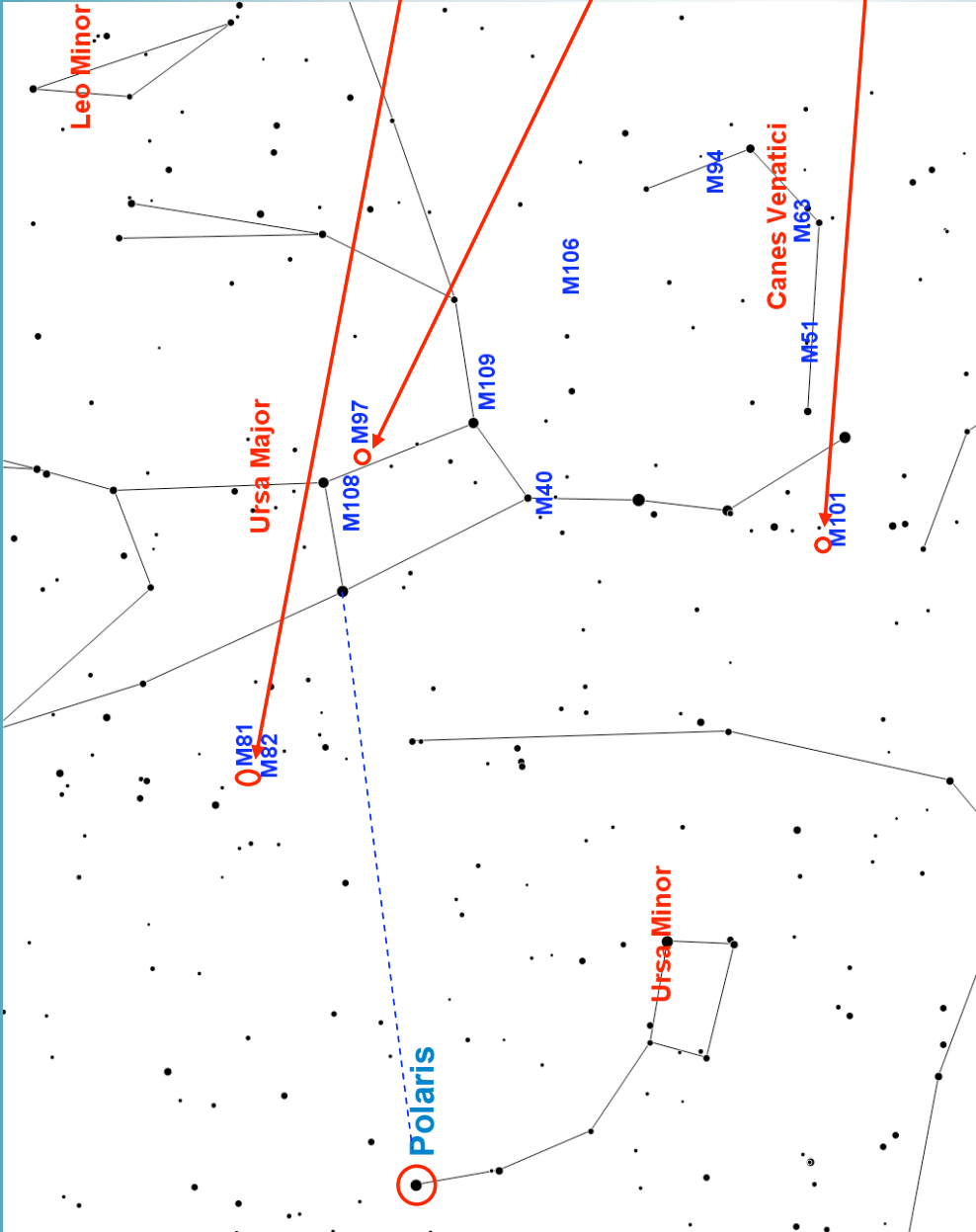
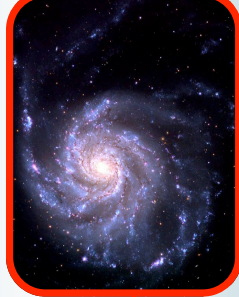


A tidal tug-of-war between M81 (right) and 82 has ripped a massive star-forming region out of 82's center. The pair is spectacular from a dark site. Keep the power low and use averted vision to do these two justice.

Planetary nebula Messier 97 displays a pair of dark lobes near its center, resembling a couple of owl's eyes, giving the hazy sphere its moniker, the Owl Nebula. As with most nebulae, darker skies provide better views.



One of Messier's final entries, the Pinwheel galaxy, M101, bears the marks of galactic interaction in its distended arms and red HII regions. 25 million light years span the distance to the tortured spiral, NGC 5457.



Northeastern sky — 9 p.m.

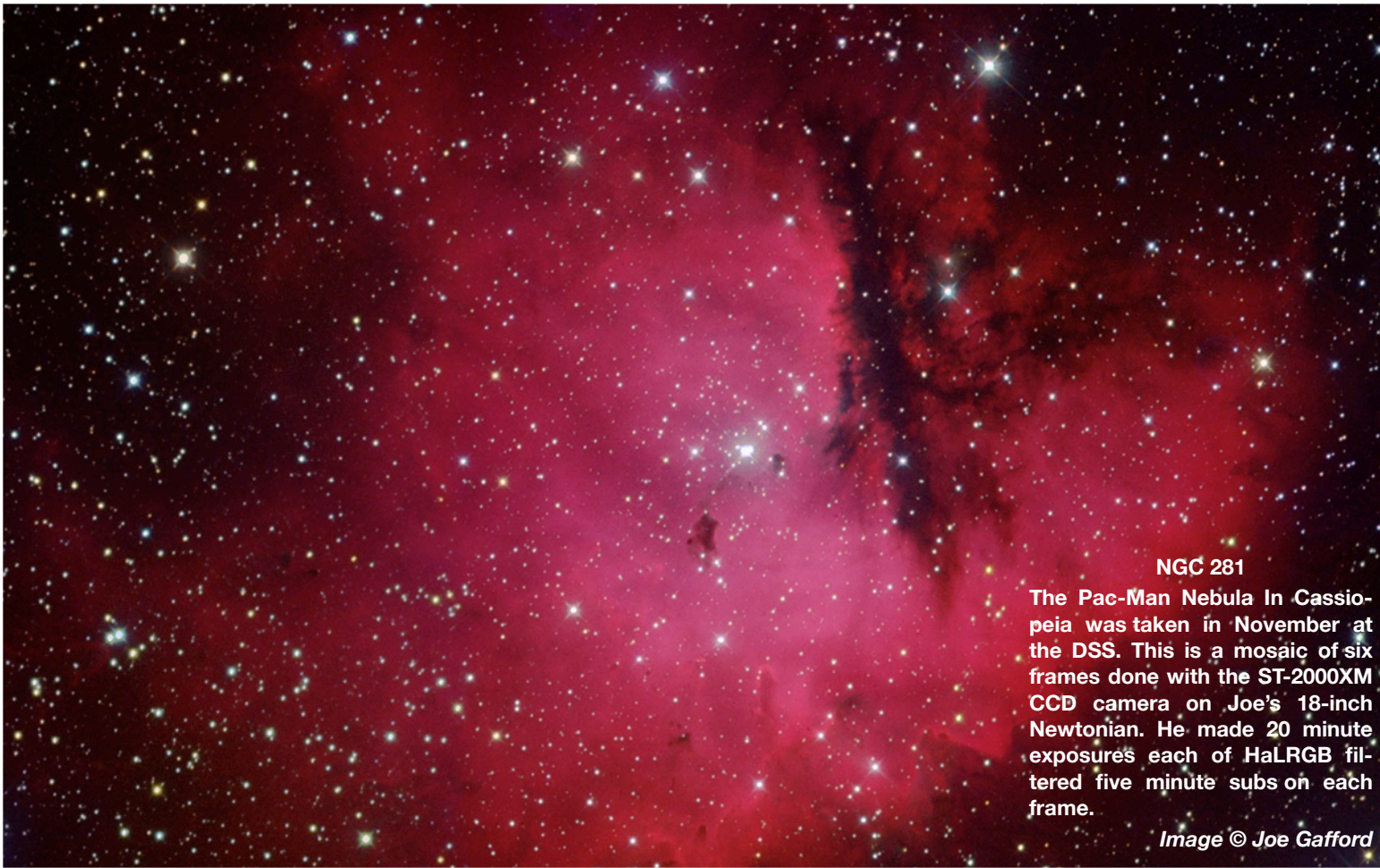
For most of us in the Denver area, the northeast represents an area of impenetrable light pollution—and so it is. Rising out of this murk in February, however, is one of the brightest “guidepost” constellations, the **Great Bear**. Playing a game of celestial “connect-the-dots” with its stars will take you just about anywhere in the winter and early spring sky, from the North Star to Arc-turus. Tucked among the hindquarters of the Bear and the Hunting Dogs is a veritable smorgasbord of bright galaxies and nebulae. Low power brings the gravitationally-tied duo of M81-82 to life, while ramping up the magnification reveals dust lanes in M51, 101, 63 and 106. And “hoo, hoo” is waiting at M97?



denverastro.org

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star chart courtesy
TheSky6 astronomy
software suite.
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NGC 281

The Pac-Man Nebula In Cassiopeia was taken in November at the DSS. This is a mosaic of six frames done with the ST-2000XM CCD camera on Joe's 18-inch Newtonian. He made 20 minute exposures each of HaLRGB filtered five minute subs on each frame.

Image © Joe Gafford



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