

# OBSERVER

## Summertime Melodies



**DUELING GALAXIES**

NGC 6027, Seifert's Sextet taken at the RMSS star party near Gardner, CO. This is an interacting galaxy cluster with the tidal lanes visible, each galaxy a different color. Joe used an SBIG ST-2000XM CCD camera on his 18-inch f/4.5 Newtonian telescope. He shot 20 minutes each of LRGB in five-minute increments.

*Image copyright 2009 Joe Gafford*

Inside the Observer	
<i>President's Corner</i> .....	2
<i>Society Directory</i> .....	2
<i>Speaker Review</i> .....	3
<i>Chief Observer, Jack Eastman</i> .....	4-6
<i>Van Nattan-Hansen Awards</i> .....	4
<i>Astro-imaging Contest</i> .....	6
<i>NASA's Space Place</i> .....	7
<i>Earthworks Expo</i> .....	back page
<i>Schedule of Events</i> .....	back page

Calendar	
5.....	Full moon
12.....	Perseid meteor shower peak
13.....	Last quarter moon
20.....	New moon
27.....	First quarter moon

## AUGUST SKIES *by Dennis Cochran*

Saturn may be spotted far in the west at sundown in early August, and then it disappears. Jupiter is our big player this month, up all night. He is huge this time around, 49 seconds of arc wide, glaring over the south from Chamberlin like an airliner landing on Colorado Boulevard. Constellation-wise he is in the eastern corner of Capricorn.

Hercules, the mythical strongman, should be just past overhead and may be hard to find from Chamberlin, with no really bright stars. The big globular cluster M13 is found along the western edge of the keystone asterism at Herc's center. Not having much experience with keystones, I call it the Chinese take-out box. Hercules harbors another M-object glob: go above the middle of the top edge of the take-out box a distance equal to the box's depth to find M92. And there are fainter objects back around M13: NGC

6207, a spiral galaxy, lies just above M13 on the western edge of the take-out box, maybe even in the same field of view. If you continue upward off the west side of the box, at least one box-length north, there is the faint glob, NGC 6229. Good luck in finding that from the city. Can you Dark-Site folks image it for us?

We mentioned the Wild Duck Cluster, M11, last month, as reachable via some obscure object. It's easier to find off the talons of Aquila the Eagle, the constellation that contains Altair, the southernmost of the Summer Triangle stars; the other two are Vega and Deneb. Head south from Altair down to Aquila's Lambda star and keep going past a nearby dimmer star; the same

*Continued on Page 3*

# PRESIDENT'S CORNER

The August issue of the *Observer* opens by welcoming our newest members, listed at the end of this article. We are pleased to have you join us!

Every year since 1973, the Denver Astronomical Society has taken the opportunity to reward our youth for their academic achievement. We harken back to the early 20th century, when Albert Einstein was put on tour around the U.S. and treated as a rock star. During the July General Meeting, the DAS recognized two "stars", recipients of the Van Nattan-Hansen Scholarship. Both Paige Remington and David Bicknase were chosen by the VN-H scholarship committee based on their high grades in math and the physical sciences, leadership skills and strong letters of recommendation. Paige and David typify past recipients of the scholarship. These winners are the leaders of tomorrow and the DAS is proud to continue its support of mentoring and encouraging youth in their studies of math and the sciences.

In the June issue of the *Observer*, I referenced the use of technical and scientific terms that may not be understood by all readers and the need to challenge ourselves to gain a better understanding of the science we love. This was demonstrated at the July meeting of the general membership during Dr. Mark Bottorff's presentation of the Interstellar Medium (ISM). Dr Bottorff, who is also a past recipient of the DAS VN-H scholarship, gave an excellent presentation explaining the density of the ISM as  $n \approx 2.5 \times 10^{19}$  molecules /  $cm^3$ , describing it as a billion times more empty than the best terrestrial commercial vacuum pumps. He went on to explain how hot intercloud gas is millions of degrees in temperature, but with an energy density so low you would freeze in its environment. Dr Bottorff was able to bring a very technical subject to a scientifically minded group of individuals and explain it without compromising the details. The DAS has others who are gifted in this respect, such as Jack Eastman and Dr. Bob Stencel, to name two.

Locally, the EarthWorks Expo is scheduled for August 22-23, 2009 at the Denver Merchandise Mart. Check out the webstie at <http://www.earthworks2009.com/attend.html>.



## DAS PRESIDENT

Ron Mickle at the Meyer-Womble Observatory atop Mt. Evans.

Photo by Joanie Mickle

The exhibitor list contains dozens of vendors promoting energy-efficiency. So why mention the Expo here? We are keenly aware of the light pollution we cope with whenever we point our telescopes to the sky. The Colorado chapter of the International Dark Sky Association (IDA) will have a booth (#254) and table set up at the Expo. We need volunteers, working two-hour shifts, to help staff the booth for the weekend. This is a worthy cause that serves all of us, so if you have time, please consider signing up for a shift. Aaron Reid is the point-of-contact and can be reached at 720-219-1535.

I would like to remind everyone that Epsilon Aurigae starts its eclipse this month and observations are needed. For more information, see the July issue of the *Observer* or go to the "Epsilon Aurigae Eclipse Campaign" website maintained by Dr Stencel—<http://mysite.du.edu/~rstencel/epsaur.htm>.—Ronald E. Mickle, President

## WELCOME TO NEW DAS MEMBERS!

- |                     |                     |
|---------------------|---------------------|
| Ken Ballard         | Edward Neil Kessel- |
| Trevor Ballard      | man                 |
| (Student)           | Angela Richman      |
| Craig Betzina       | Steven Ridley       |
| Jonathan W. De Jong | Linda Scholes       |

## Society Directory

- President:**  
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- Vice President:**  
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- Secretary:**  
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- Treasurer:**  
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## Executive Board Members

- |                                  |                 |
|----------------------------------|-----------------|
| Jack Eastman                     | David Shouldice |
| Joe Gafford                      | Tim Pimentel    |
| Ginny Kramer                     | Steve Solon     |
| Frank Mancini                    | Dan Wray        |
| Wayne Green, Past President      |                 |
| President Emeritus, Larry Brooks |                 |

## Committees

- Van Nattan-Hansen Scholarship Fund:**  
Ron Pearson (Chair)  
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- EGK Dark Site Committee:**  
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- IDA Representative:**  
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- Public Outreach Committee:**  
Ron Mickle (Chair)
- Student Astronomy Chair:**  
Naomi Pequette (Chair)
- Finance Committee:**  
Frank Mancini (303) 663-5263

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The *Observer* is available in color PDF format from the DAS website.
- Website:**  
Darrell Dodge  
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- Librarian:**  
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Chamberlin Observatory c/o Ron Mickle  
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](http://www.denverastro.org)

# IN CASE YOU MISSED IT . . .

by F. Jack Eastman

The speaker at the June General Meeting at Olin Hall was Laura Ellen Dafeo, talking on the Huygens Probe, part of the Cassini mission to Saturn that landed on Saturn's big moon, Titan. She discussed the science returned, atmospheric composition and structure, surface detail and composition, as well as the behind-the-scenes glitches and all with the mission. She covered, in particular, the Descent Imager/Spectral Radiometer (DISR), the prime instrument on Huygens, on which she was Senior Staff Engineer, working directly with the University of Arizona's Lunar and Planetary Lab, the sponsor of the DISR instrument. She was also responsible for the design of the Surface Science Lamp, basically a landing light used to illuminate the surface in the final few meters of descent.

The meeting was sort of a class reunion, as several of us who worked on the DISR were in attendance, including Dr. Marty Tomasko, the Principal Investigator on the DISR instrument. Our own John Fleming was the Program Manager at Lockheed Martin, seeing to it the job got done, a job, no doubt, like herding a bunch of cats. Googling "esa disr" will get to the Cassini-Huygens webpage with much, much more detail about this mission, science objectives and the DISR instrument details.

A wonderful talk from a very talented guest.

## AUGUST SKIES (CONTINUED FROM PAGE 1)

short distance farther is Mr. Aquila is an ill-defined constellation. The Peterson Guide (Menzel and Pasachoff) shows a different shape than the *Sky & Telescope* map. On the latter, the Lambda star is easier to spot, at the point of a south-flying arrow shape. Mr. is actually over into Scutum's territory.

Scutum, a squashed diamond shape between Aquila and the gaseous nebulae in Sagittarius that we'll talk about next month, is a Hevelian constellation called The Shield, which belonged to John Sobieski, King of Poland, who saved Vienna from the Turks in 1683. Think about it: if the King of Poland hadn't taken his army down to Vienna, we of European heritage might today be Moslems, speaking Turkish, because the Ottoman Empire was on a roll and had already conquered the area south of Vienna. Sobieski deserves a constellation.

On the north side of the zenith is the head of Draco the Dragon, an asterism called The Lozenge. Most of Draco lies between Vega and the Little Dipper, with the Lozenge's four stars, Beta, Lambda, Nu and Xi being slightly closer to Vega. Xi is the star in this circle closest to Polaris. Slightly less than 1/3 of the way to Polaris you'll find NGC 6543, one of the brightest planetary nebulae in the sky. It was the first planetary to be observed spectroscopically, which revealed it was a gaseous object rather than a collection of stars — another good target for deep-sky explorers and imagers.

The Perseids arrive on the nights of the 11th & 12th. This meteor shower will occur for sure, being called "reliable" by *S&T*. There's also a comet, but I've misplaced my astro mags. I

think it's called Knopf or something like that, and it's east of Jupiter in the body of Aquarius. Somebody will probably image it.

Our General Meeting is on Friday the 7th, but the Open house will have to wait three weeks until Saturday the 29th. Last month I failed to mention that the July Open House on the 25th was also the day of our annual picnic. Augh! Ten lashes with a lens brush.



### AND THE WINNER OF TONIGHT'S FIGHT IS . . .

Coma Berenices harbors a beauty of a galaxy, despite its black eye. M64, or NGC 4826, contains a dark lane of absorbing dust, hence its common recognition as the "Black Eye" or "Sleeping Beauty" galaxy. Recent findings indicate the outer gas regions are rotating opposite their inner counterparts, this due to the possible ingestion of a satellite galaxy in eons past. At a distance of 17 million light-years, M64 stands as one of the most recognizable galaxies of summer. This LRGB image, 2,1,1 and 1 hours, respectively, was taken with an SBIG ST-8e CCD camera on a 12.5-inch reflector riding on a Paramount ME.

Image copyright Steve Solon

# SEEING IS . . . SEEING

by F. Jack Eastman



**JACK EASTMAN,  
DAS CHIEF OBSERVER**

*Photo by Joe Gafford*

So you've just purchased that long sought after telescope after months of deliberation. A clear night seems possible and the usual fare on TV is awful, so it's outside to see the stars.

First target, Saturn. You were told the rings and a few moons would be quite a sight even though your new scope is small compared to the ones the pros use. You find Saturn okay, but it looks fuzzy. Yes, the rings are there, but not as sharp and clear as you were expecting, recalling a view some time ago with a friend's telescope of similar size. You purchased your instrument through a very reputable dealer, so everything should be up to standard, optical quality, alignment and such, so what's wrong?

Seeing. You are, no doubt, experiencing "bad seeing".

There are various terms to describe the state of the atmosphere that we must look

through to see our favorite celestial objects. One of these, "seeing," is used to describe the turbulence in the atmosphere that blurs the view, reducing the telescope's resolution. This turbulence is caused by air of different temperatures in motion in front of your telescope. It may be from winds at high altitudes, local "heat waves" from a warm street or even from temperature differences within the telescope. If the blobs of air are larger than the telescope's aperture, they will cause the image to wander about, but the image will still be reasonably sharp. One can see good detail on a planet, for example, but the image movement will compromise photography needing longer exposures, one of the reasons early astronomers could see, by eye, far more detail on the Moon and planets than could be photographed. If the bad air cells are smaller than the telescope, then there will be multiple moving images,

## TWO OUSTANDING STUDENTS AWARDED VAN NATTAN-HANSEN SCHOLARSHIPS FOR 2009

by Darrell Dodge, DAS ALCor

Paige Remington and David Bicknase, two talented students entering Colorado colleges this Fall, were each awarded \$1000 DAS Van Nattan-Hansen Scholarships for the 2009-2010 school year.

The scholarship fund was established by the Denver Astronomical Society in 1973 to honor the memories of beloved DAS members William R. Van Nattan (1921-1971) and Charles Hansen. In the 36 years since, the scholarship has assisted 27 students of astronomy and physical sciences or mathematics, providing over \$30,000 to help fund their educations. The April 2008 issue of *The Denver Observer* traces the careers of some of the more notable recipients.

The year's awardees more than live up to this rich tradition.

Paige Remington will be entering the University of Colorado-Boulder with an impeccable academic record at Evergreen Senior High School. Paige traces her interest in astronomy to the first time she viewed the Leonid meteor shower with her father when she was nine. She uses a Celestron Nexstar 6 SE to observe planets and deep sky objects. She's recently been watching a series of

DVD lectures on dark matter, a topic which is "one of the most fascinating subjects [she has] encountered so far."

Ms. Remington combines her love for astronomy with high mathematics skills, an excellent work ethic, and well-rounded extracurricular



**PAIGE REMINGTON ACCEPTS HER  
AWARD FROM DAS PRESIDENT,  
RON MICKLE**

*Photo by Rich Remington*

*Continued on Page 6*

and if the effect is severe, the image will just be a blur.

This is why larger telescopes often don't live up to their theoretical resolution; their aperture is larger than the seeing cells. If the problem is in or near your telescope, being sure you aren't looking over a warm parking lot and allowing your telescope to thermally equalize with the surrounding air will help a great deal. Bad seeing, originating far from the telescope (winds in the jet stream for example), may be cause to cap up the scope, go inside and drink beer.

In an interesting experiment, I focused as best I could on a big fuzzy star nearly overhead. As I carefully moved the focuser I noticed the "heat waves" came into sharp focus, looking not unlike water flowing in a shallow stream. Noting how far I moved the eyepiece (measured with a dial indicator), I could calculate the distance to the troublesome layer, finding it was at about 24,000 feet, the approximate altitude of the jet stream. Guilty party identified!

Then, there is also transparency. This is the measure of how clear the air is and is crucial to the visibility of faint objects, such as nebulae or galaxies. There are really two flavors of this effect, the first being (as the name implies) the clarity of the air, freedom from haze, fog and cloud. It may be the air is very clear, but faint objects are still elusive. If there is background light (our ever-growing nemesis, light pollution) the visibility of faint objects will also be compromised, so one needs both a dark sky and a clear one. Often the beginner, when referring to "seeing" while talking about the clearness of the sky, actually means transparency.

It turns out that seeing can affect the visibility of faint stars, as well. If the otherwise tiny point star image is spread out over a large area, it may be lost to view. This is why seeing, as well as transparency, is of importance to the variable star observer who is trying to see faint stars.

To get an idea how sensitive air temperature can be, and why we get "bad seeing" from "thin air" let's look at this sensitivity. We can think of the light from a star coming into the telescope as a series of waves, light waves, which are perfectly flat. It is the job of the telescope optics to make these waves converge to a focus by converting these plane waves into spherical wavefronts, exiting the rear of the telescope's objective, which converge to a point at the telescope's focus. We like to think of excellent optics as not having



#### LIGHTNING VS. ASTRONOMY

Frankly, with the weather we've had lately, it's remarkable that any observer has been able to see anything. Colorado's summer has been its wettest and wildest in many years. Special thanks to Longmont's Gary Garzone for shooting the weather when he can't find any stars!

*Photo by Gary Garzone*

deviations from the perfect spherical wavefront of more than  $1/10$ th wave, about 2 millionths of an inch. More on the subject of wavefront error and its effect on telescope performance in a future discussion.

My old workhorse, the 32-cm Newtonian, has a tube length of about 2.5 meters. A one-degree Celsius temperature difference along that length leads to a 4-wave error—40X our  $1/10$ th wave tolerance! If this is a nice even gradient across the aperture, no harm is done; it will cause a tiny error in the apparent direction the telescope is pointing. But blobs of air, or an air current inside the tube, will cause a significant problem. More on the subject of seeing and transparency can be found in *Norton's 2000 Star Atlas and Reference Handbook*, 18th ed., Chapter III, page 62. This is an excellent reference, with a wealth of information on observing, as well as data regarding planets, stars and galaxies, all in concise packets.

As such, it is a wonder we can see anything at all from the bottom of this ocean of constantly moving air surrounding us.

VAN NATTAN-HANSEN SCHOLARSHIPS AWARDED (CONTINUED FROM PAGE 4)



**DAVID BICKNASE, SCHOLARSHIP AWARDEE**

*Photo courtesy David Bicknase*

interests, including teaching children about astronomy, and playing softball—recently receiving the “Softball Cougar” award at Evergreen High for sportsmanship, role-modeling, and team leadership. She completed Calculus I and II as a junior in high school and Differential Equations at the University of Colorado and has already virtually completed the math requirements for an astronomy degree.

Paige is planning a double major in astronomy

and physics and is interested in research. She hopes to do volunteer work at Boulder’s Fiske Planetarium over the summer.

David Bicknase, a native of Indiana, will be attending the Colorado School of Mines this fall and plans to major in engineering physics. David is a home-schooled high school student who has proved his mettle with a 4.00 GPA in science and math courses at Ivy Tech Community College and Indiana Tech from 2007 to 2009. While auditing the General Physics I course at Indiana Tech, David’s high level of maturity and excellent critical skills impressed his professor so much that he was invited to formally register, eventually earning an A grade in the course. David chose engineering physics because he enjoys “problem solving, working with physics, and experimenting.” He hopes to “grow in my understanding of mathematics and science” at the School of Mines. Though graduating from high school in Spring 2009, he already has completed 66 hours of college credit hours in math and science. He relaxes by participating in sports and ballroom dancing.

The DAS is fortunate to have the opportunity to support such high quality students with the Van Nattan-Hansen scholarship.

**THE EARTH AND SKY PHOTO CONTEST ON DARK SKIES IMPORTANCE**

[www.darkskiesawareness.org](http://www.darkskiesawareness.org)  
 Deadline September 21, 2009

This photography contest is open to any amateur photographer of any age, anywhere in the world. The theme of this contest is "Dark Skies Importance." Photos must combine some elements of the night sky (e.g., stars, planets, the Moon or celestial events) set against the backdrop of a beautiful, historic, or notable location or landmark somewhere in the world.

Photographs must be taken during 2009, the International Year of Astronomy, and submitted by September 21, 2009. Winners will be announced on October 31, 2009. Details on this program, including the site to submit photos, can be found at [www.darkskiesawareness.org](http://www.darkskiesawareness.org).

**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 Public Outreach 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](http://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](http://www.denverastro.org).

## NASA'S SPACE PLACE

**THE COOL CHEMISTRY OF ALIEN LIFE***A Space Place Partner Article*

**A**lien life on distant worlds. What would it be like? For millennia people could only wonder, but now NASA's Spitzer Space Telescope is producing some hard data. It turns out that life around certain kinds of stars would likely be very different from life as we know it.

Using Spitzer, astronomers have discovered the organic chemical acetylene in the planet-forming discs surrounding 17 M-dwarf stars. It's the first time any chemical has been detected around one of these small, cool stars. However, scientists are more intrigued by what was not there: a chemical called hydrogen cyanide (HCN), an important building block for life as we know it.

"The fact that we do not detect hydrogen cyanide around cool stars suggests that that prebiotic chemistry may unfold differently on planets orbiting cool stars," says Ilaria Pascucci, lead scientist for the Spitzer observations and an astrophysicist at Johns Hopkins University in Baltimore, Maryland.

That's because HCN is the basic component for making adenine, one of the four information-carrying chemicals in DNA. All known life on Earth is based on DNA, but without adenine available, life in a dwarf-star solar system would have to make do without it. "You cannot make adenine in another way," Pascucci explains. "You need hydrogen cyanide."

**DO ALIEN PLANETS AROUND OTHER STARS HAVE THE RIGHT INGREDIENTS FOR A PRE-BIOTIC SOUP?***Artwork courtesy NASA/JPL*

M-dwarf and brown dwarf stars emit far less ultraviolet light than larger, hotter stars such as our sun. Pascucci thinks this difference could explain the lack of HCN around dwarf stars. For HCN to form, molecules of nitrogen must first be split into individual nitrogen atoms. But the triple bond holding molecular nitrogen together is very strong. High-energy ultraviolet photons can break this bond, but the lower-energy photons from M-dwarf stars cannot.

"Other nitrogen-bearing molecules are going to be affected by this same chemistry," Pascucci says, possibly including the precursors to amino acids and thus proteins.

To search for HCN, Pascucci's team looked at data from Spitzer, which observes the universe at infrared wavelengths. Planet-forming discs around M-dwarf stars have very

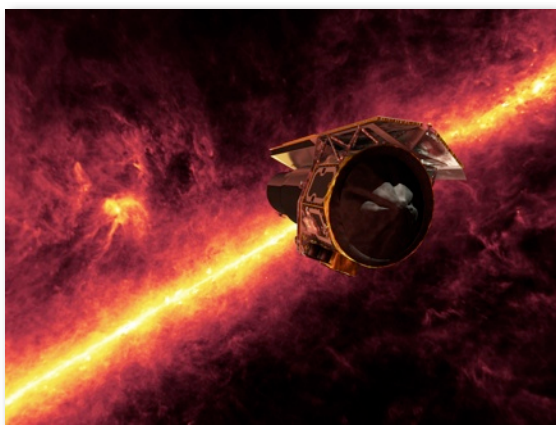
faint infrared emissions, but Spitzer is sensitive enough to detect them.

HCN's distinctive 14-micron emission band was absent in the infrared spectra of the M-dwarf stars, but Spitzer did detect HCN in the spectra of 44 hotter, sun-like stars.

Infrared astronomy will be a powerful tool for studying other prebiotic chemicals in planet-forming discs, says Pascucci, and the Spitzer Space Telescope is at the forefront of the field. Spitzer can't yet draw us a picture of alien life forms, but it's beginning to tell us what they could—and could not—be made of. "That's pretty wonderful, too," says Pascucci.

For news of other discoveries based on Spitzer data, visit [www.spitzer.caltech.edu](http://www.spitzer.caltech.edu). Kids can learn Spitzer astronomy words and concepts by playing the Spitzer "Sign Here!" game at [spaceplace.nasa.gov/en/kids/spitzer/signs](http://spaceplace.nasa.gov/en/kids/spitzer/signs).

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

**INFRARED VIEW OF SPITZER LOOKING TOWARDS RHO OPHIUCHI AT 100 MICRONS**

The band of light is the glowing dust emission from the Milky Way galaxy seen at 100 microns (as seen by the IRAS/COBE missions).

*Credit: NASA/JPL-Caltech*

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**DAS SCHEDULE**

**AUGUST**

- 7 General Meeting at D.U.'s Olin Hall (Begins at 7:30 P.M.)
- 14 E-Board meeting at Chamberlin Observatory (Begins at 7:30 P.M.)
- 20-22 Weekend Under the Stars (WUTS)
- 22-23 EGK Dark Sky weekend
- 29 DAS Open House (Begins at 8:30 P.M.)

**SEPTEMBER**

- No General Meeting this month
- 11 E-Board meeting at Chamberlin Observatory (Begins at 7:30 P.M.)
- 13-20 Okie-Tex Starparty
- 18-19 EGK Dark Sky weekend
- 26 DAS Open House (Begins at 7:00 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](http://www.denverastro.org)) or call (303) 871-5172.*



The Denver Astronomical Society  
c/o Chamberlin Observatory  
2930 E. Warren Ave.  
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**DAS/IDA TABLE AT EARTHWORKS EXPO**

<http://www.earthworks2009.com/attend.html>

August 22-23

The DAS is co-sponsoring a Light Pollution awareness table at the upcoming EarthWorks Expo, Aug. 22-23 at Denver Merchandise Mart - <http://www.earthworks2009.com/attend.html>—members are encouraged to attend and sign up for shifts staffing the table. Contact Aaron Reid, 720-219-1535.