The Denver
OBSERVER
FEBRUARY 2014

GALAXIES GALORE!

A BEVY OF BEAUTY

Virgo Cluster galaxies in the constellations Virgo and southern Coma Berenices are quite numerous. The arc of bright galaxies on the west side of this image comprise Markarian's Chain, considered the heart of the Virgo Cluster. Over 100 galaxies are visible on the full resolution image. Thirty five of the galaxies in this image are labeled on the back page, and many unlabeled galaxies can be seen. Many of the brighter galaxies can be seen in small amateur telescopes.

Technical. Canon 1D Mark IV 16-megapixel digital camera, 300 mm f/2.8 L IS lens at f/2.8. Six 2-minute exposures were combined for this image. Full image, no crop. Tracking by an Astrotrac. The field of view is 5.32 by 3.55 degrees. Stars to about magnitude 19 were recorded. No flats, no darks.

Image © Roger Clark, www.clarkvision.com

Calendar

6..... First quarter moon
14..... Full moon
21.... Saturn 0.3° N of moon, occultation
22..... Last quarter moon
25.....Venus 0.4° S of moon, occultation
Mar. 1..... New moon

Inside the *Observer*

FEBRUARY SKIES

by Dennis Cochran

It's big, it's HUGE, it's overwhelmingly largish! **Jupiter** stares down from the mid-south at us earthlings like a circling UFO. The Orion Nebula **(M42)**, is below-right of Jupe, and below-left of Orion is Sirius, the night sky's brightest star. He's in Canis Major, sniffing at less-bright Lepus the Hare to his west. Lepus is underneath Orion, hoping that he won't be noticed. Monoceros the unicorn is east of Orion. Taurus the Bull is upper-right from the Hunter, with its big red star, Aldeberan, that makes one point of the bull's horns. This is an evening of superlatives and favorites. Everybody learns to find the naked-eye-fuzzy nebula arrayed in the scabbard that hangs from the belt of Orion as a first lesson in the deep-sky discipline. Actually everyone learns the moon first, of course, then one or two bright planets. Orion, however, is usually first among all the rest—the Messier, NGC and IC objects. Also, in this region west of the Winter Milky Way (WMW) imagers can find nebulosity aplenty to shoot at. You know who you are.

Auriga the charioteer is at the evening zenith, a six-sided near-rectangle constellation with bright Capella in its northeast corner. A line straight across his knees is where we find the three star clusters **M36, 37 and 38**. M37 is just outside (east) of Auriga's figure at $05^h\ 50^m\ +32.5^\circ$, while the other two are to the northwest inside the figure. Just below-right of M36 ($05^h\ 35^m\ +34^\circ$) and M38 ($05^h\ 29^m\ +35^\circ$) are three IC nebulae: **IC 477, IC 405 and IC 410**. IC 405, at $05^h\ 30^m\ +34.5^\circ$, is called the Flaming Star. Check it out to see if you think it deserves that appellation, then turn to **IC 410** just southeast of it. Buried in its nebulosity is a star cluster. Then, just under M38 is larger, fainter **IC 477**.

Continued on Page 3

PRESIDENT'S MESSAGE

by Ron Hranac

Article II, Section 2.0 of Denver Astronomical Society's bylaws says, *"The Annual Meeting and election of the Executive Board and Officers shall be conducted at the General Meeting in February or at another date, as the Executive Board may direct. The Officers and Board members will be installed at the Annual Banquet in March."*

This year's annual meeting is scheduled to be held on Friday, February 14th at DU's Olin Hall, with things getting underway at 7:30 P.M. MST. An important side note about parking: Construction of a new building is underway on what was until recently the parking lot on the east side of Olin Hall. Parking passes will no longer be available during our meetings, but DAS members can use available free parking on nearby streets on a first come, first served basis. Metered parking is available along the short roadway on the north side of Iliff across from the existing Olin Hall parking lot for $1.50/hour. Parking can be paid for in the kiosk at the north end of the short street—use cash, credit, or bitcoins. The kiosk will provide a receipt that can be placed on your vehicle's dashboard. There are handicapped spaces along the south end of Olin Hall for those who need that accommodation.

You're encouraged to attend the annual meeting and participate in the elections. Keep in mind that elected officers and board members are your voice in the direction of DAS, so let your voice be heard. Nominations began at the general meeting in January and will continue through February's meeting. If you'd like to nominate someone for a position on the E-Board, send an e-mail to *nominations@denverastro.org* or let Tim Pimentel or Ivan Geisler know in person.

DAS President Ron Hranac during Solar Day at the Denver Museum of Nature & Science.
Image courtesy of Jeff Tropeano

It's hard to believe that yours truly was elected DAS President a year ago—I'm still trying to figure out where the time went. Before too much more time slips by, this might be a good opportunity to share a few comments about the state of the Society.

DAS is in good shape financially, and the E-Board just approved a budget for 2014. Our membership count has been in the vicinity of 400 at the end of each of the last two years, and we hope to see that number continue to grow.

Indeed, in an effort to reach a younger demographic, DAS has been establishing a social media presence to

Continued on Page 5

DAS SCHEDULE

FEBRUARY

31-2 EGK Dark Sky weekend
8 Open House (Begins at 6:00 P.M.)
14 DAS Annual Meeting at Olin Hall (Begins at 7:30 P.M.) Speaker: Dr. Josh Walawender, Election of Officers, Valentine's Day
17 Presidents Day
21 E-Board Meeting at Chamberlin (Begins at 7:30 P.M.)
28-2 EGK Dark Sky weekend

MARCH

28-2 EGK Dark Sky weekend
8 Open House (Begins at 6:30 P.M.) International Sidewalk Astronomers Night
15 DAS Annual Banquet at Embassy Suites (Begins at 5:30 P.M.) Installation of Officers (See Page 6).
17 St. Patrick's Day
21 E-Board Meeting at Chamberlin (Begins at 7:30 P.M.)
28-30 EGK Dark Sky weekend

Open House costs: If the skies are clear, $2 per person ($5/family), and $1 per person in the event of inclement weather.
Public nights are held at Chamberlin Observatory every Tuesday and Thursday evenings beginning at the following times:
March 10 - September 30 at 8:30 P.M.
October 1 - March 9 at 7:30 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

President:
Ron Hranac 303-790-0893
president@denverastro.org
Vice President:
Lisa Judd (626) 487-8515
vp@denverastro.org
Secretary:
Dena McClung 303-564-8630
secretary@denverastro.org
Treasurer:
Brad Gilman (720) 488-1028

Executive Board Members

John Barela — Digby Kirby
Jack Eastman — Scott Leach
Joe Gafford — Ed Scholes
Chuck Habenicht — Dan Wray

Past President, Ron Pearson
President Emeritus, Larry Brooks

Committees

Van Nattan-Hansen Scholarship Fund:
Tim Pimental (Chair)
PO Box 100621
Denver, CO. 80250-0621
EGK Dark Site Committee:
Darrell Dodge, Interim Chair
Email: darksite@denverastro.org
IDA Representative:
Dr. Robert Stencel
Email: *coloida@hotmail.com*

Volunteers or Appointed Representatives

ALCor:
Darrell Dodge (303) 932-1309
Newsletter:
Editor: Patti Kurtz (720) 217-5707
Email: *p_kurtz@comcast.net*
Proofreaders: Darrell Dodge, Ron Hranac, Lisa Judd, Zack Kurtz
The *Observer* is available in color PDF format from the DAS website.
Website:
Darrell Dodge
Email: *webmaster@denverastro.org*
IT Coordinator:
Scott Leach

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

FEBRUARY SKIES

Do you want to see **M1,** the blurry patch that started it all? This is the Crab Nebula, an exploded star whose shredded insides show amazing detail in recent Hubble pictures. Astronomers have even been able to measure changes in some of these details over the years that the Crab has been photographed. In Taurus, the Crab Nebula is just northwest of ζ (zeta) Tau, the star way out east of the southern horn of the bull, the horn that includes Aldeberan, at 05^h 34.5^m +22°. A nearby mystery challenge for imagers is to discover what **S167** in Auriga is like. It's a supernova remnant (?) southeast of β (beta) Aur at about 05^h 45^m +27°. It was not discussed in my *Peterson Field Guide to the Stars and Planets*, but appears intriguing on their Chart #11.

Before we go farther south, let's jump west from ι (iota) Aur (lower-right corner star) and a bit upwards to **NGC 1499**, better known as the California Nebula. This is just above ξ (xi) Per at 04^h 00^m +37°. Can you see it? Can you image it?

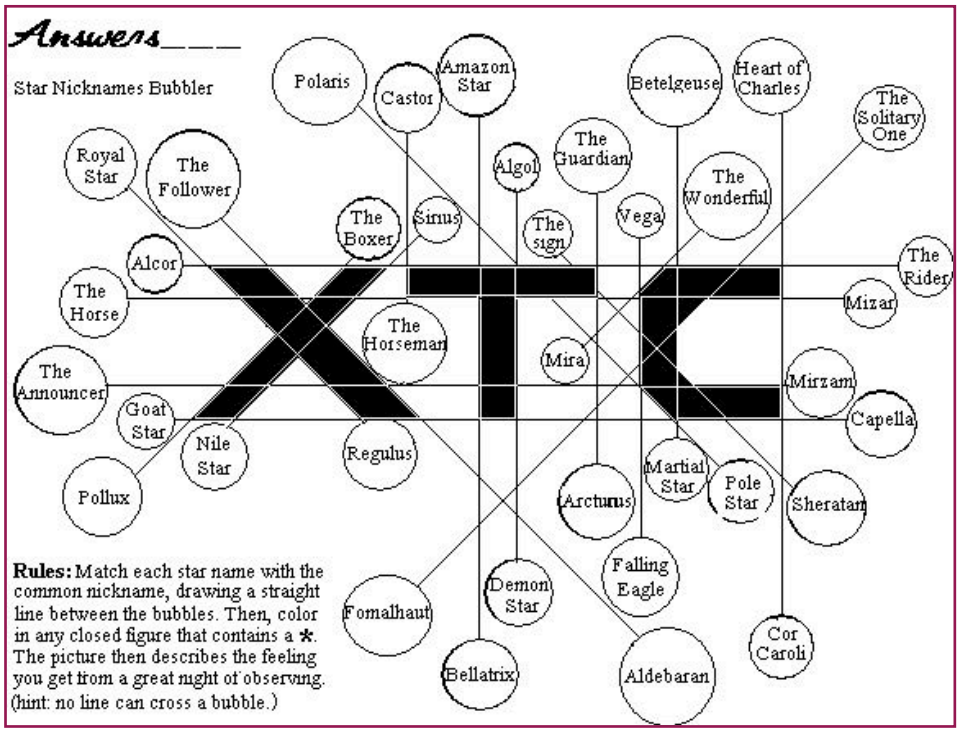
Now, back in Taurus, northeast of Aldeberan at 04^h 47^m +19° is **NGC 1647**, a moon-sized (1/2 degree wide) star cluster of 50 members. Of course, the Pleiades (**M45**) , a nearby open cluster that makes a pretty naked-eye asterism often mistaken for the Little Dipper, is a very nice binocular object. The six brightest stars in this group are also called the Seven (!) Sisters, as well as Subaru. But what happened to the seventh sister?

One could surf the WMW from Auriga's bouncing chariot northwest to Queen Casioppeias's divan right through the **Double Cluster** and look at all that good stuff around her resting place, now close to overhead. But, this means crossing the zenith—yikes! I mentioned this diversion because I'm saving the riches of Orion and Canis Major for next month. It might be fun to surf the whole WMW, our galaxy's outer reaches as seen from inside, all the way from Monoceros in the southeast over to Cygnus setting in the northwest, a route that nature has made for us, but one that we seldom take.

We mentioned dominant Jupiter, but what about other planets? If you're a **Mars** fan the Red Planet rises around midnight, it's still a morning object. **Saturn** is even more so. The two medium-sized gas giants **Uranus and Neptune** are evening objects—the former is in Pisces and the latter farther west. Have fun observing all these wonderful sights with the chittering scorpions crawling up your legs and—but you know about all that. Frozen snakes so cold you could use them as hiking sticks; this is called "adventure travel." However, the marvelous winter skies are worth it all. ★

JUPITER AND MOONS

Sorin imaged this on February 1, 2013. From left: Io, Callisto, Jupiter, Europa, and Ganymede. To learn how this image was made, visit: *http://soggyastronomer.com/* and see the article "How To Photograph The Gas Giants: Jupiter and Saturn." *Image © Sorin*



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's 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-exampt 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.

More information about DAS activities and membership benefits is available on the DAS website at *www.denverastro.org.*★

NASA'S Space Place

SURPRISING YOUNG STARS IN THE OLDEST PLACES IN THE UNIVERSE

by Dr. Ethan Siegel

A Space Place Partners' article

Littered among the stars in our night sky are the famed deep-sky objects. These range from extended spiral and elliptical galaxies millions or even billions of light years away to the star clusters, nebulae, and stellar remnants strewn throughout our own galaxy. But there's an intermediate class of objects, too: the globular star clusters, self-contained clusters of stars found in spherically-distributed halos around each galaxy.

Back before there were any stars or galaxies in the universe, it was an expanding, cooling sea of matter and radiation containing regions where the matter was slightly more dense in some places than others. While gravity worked to pull more and more matter into these places, the pressure from radiation pushed back, preventing the gravitational collapse of gas clouds below a certain mass. In the young universe, this meant no clouds smaller than around a few hundred thousand times the mass of our Sun could collapse. This coincides with a globular cluster's typical mass, and their stars are some of the oldest in the universe!

GLOBULAR CLUSTER NGC 6397

Image credit: ESA & Francesco Ferraro (Bologna Astronomical Observatory) / NASA, Hubble Space Telescope, WFPC2.

These compact, spherical collections of stars are all less than 100 light-years in radius, but typically have around 100,000 stars inside them, making them nearly 100 times denser than our neighborhood of the Milky Way! The vast majority of globular clusters have extremely few heavy elements (heavier than helium), as little as 1% of what we find in our Sun. There's a good reason for this: our Sun is only 4.5 billion years old and has seen many generations of stars live-and-die, while globular clusters (and the stars inside of them) are often over 13 billion years old, or more than 90% the age of the universe! When you look inside one of these cosmic collections, you're looking at some of the oldest stellar swarms in the known universe.

Yet when you look at a high-resolution image of these relics from the early universe, you'll find a sprinkling of hot, massive, apparently young blue stars! Is there a stellar fountain of youth inside? Kind of! These massive stellar swarms are so dense – especially towards the center – that mergers, mass siphoning and collisions between stars are quite common. When two long-lived, low-mass stars interact in these ways, they produce a hotter, bluer star that will be much shorter lived, known as a blue straggler star. First discovered by Allan Sandage in 1953, these young-looking stars arise thanks to stellar cannibalism. So enjoy the brightest and bluest stars in these globular clusters, found right alongside the oldest known stars in the universe!

Learn about a recent globular cluster discovery here: *http://www.nasa.gov/press/2013/september/hubble-uncovers-largest-known-group-of-star-clusters-clues-to-dark-matter.*

Kids can learn more about how stars work by listening to The Space Place's own Dr. Marc: *http://spaceplace.nasa.gov/podcasts/en/#stars.* ★

FEBRUARY SPEAKER: DR. JOSH WALAWENDER

Talk: Project PANOPTES

Dr. Josh Walawender is an astronomer at the 8-meter Subaru Telescope on Mauna Kea on the Big Island of Hawaii. He earned his bachelors degree at the University of California at Berkeley and his PhD at the University of Colorado at Boulder. Josh's research interests lie in the area of star formation and he has worked extensively on building and operating "small" (0.1 to 1 meter) robotic telescopes. Josh has been an avid amateur astronomer since childhood and still enjoys observing sessions under the Big Island's pristine skies.

According to Josh, "The goal of Project PANOPTES (Panoptic Astronomical Networked OPtical observatory for Transiting Exoplanets Survey) is to build low cost, reliable, robotic telescopes which can be used to detect transiting extra-solar planets. Panoptes is a "citizen science" project in which we hope to involve amateur astronomers, school groups, and others from the community in all aspects of the science: instrument design, instrument construction, data collection, and data analysis.

The hardware and software will be open source. We are depending on members of the community to assemble and deploy their own Panoptes units in order to build up a global network of telescopes. The hardware is designed to be standardized, using as many commercial off the shelf components as possible so that a Panoptes "unit" can be reproduced quickly and easily." In this talk, Dr. Walawender will describe the current state of Panoptes and how amateur astronomers can get involved. ★

MEET YOUR FELLOW ASTRONOMER

by Dena McClung

The subject of this month's member profile is Sorin, who joined DAS last September and treated us to a presentation at DAS's November Show-And-Tell meeting. Until moving to Colorado last July to take a new career opportunity, Sorin had lived his entire life in Seattle. He's had a life-long passion for science, and took a turn toward serious astronomy three years ago during a trip to the top of Mauna Kea. He watched from outside the cluster of observatories as the sun set and the domes opened at dusk, before his tour group moved a few thousand feet down the mountain to look through some scopes with virtually no interference from light pollution. A year later, he took a trip to Puerto Rico, driving through winding jungle roads to visit the Arecibo Radio Observatory.

In 2012, Sorin did some serious research before purchasing his first telescope fourteen months ago and diving right into astrophotography. Due to the fact that Seattle is sandwiched between the Puget Sound and Lake Washington, thereby restricting light sources to a certain area, he finds that light pollution there was actually less of a problem than it is in Denver. Despite his home's location (with a great view of the Space Needle), Sorin began shooting the sky in his own yard, using his Celestron C6 Schmidt-Cassegrain on an equatorial mount with a Canon t3i DLSR camera. He captured images of the Orion Nebula and Jupiter, among other targets, and used Nebulosity software to process his images, enjoying what he describes as a steep but rewarding learning curve.

Sorin refused to be dissuaded by the advice he found on the Cloudy Nights astrophotography forums, and started his own blog in January 2013 (www.soggyastronomer.com) to show people that they don't need months of training and practice to begin producing beautiful images. He was a board trustee with the Seattle Astronomical Society and started an astrophotography interest group within the club, which met monthly.

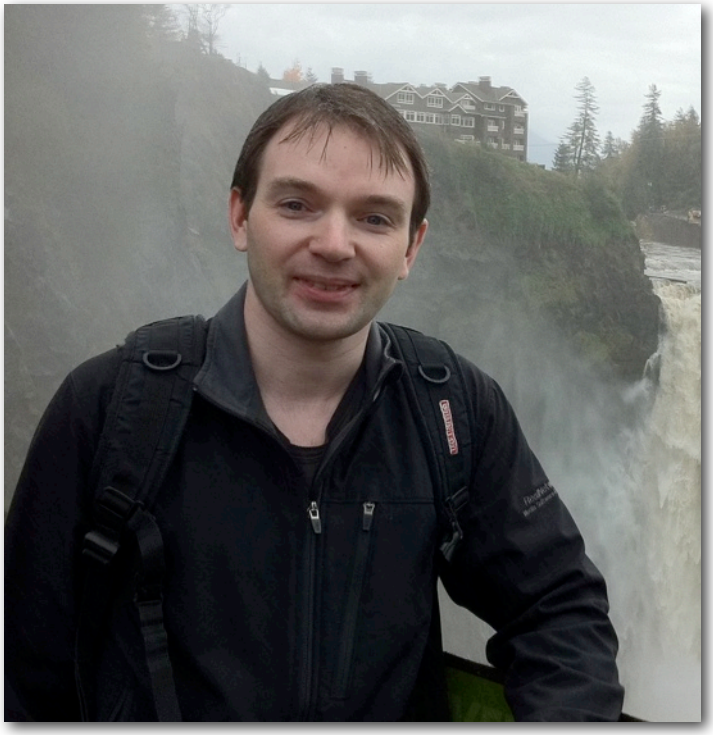
After the coma and field curvature of his SCT became more pronounced to him in his images, Sorin switched to an Astro-Tech 6-inch f/9 Ritchey-Chrétien Astrograph and uses an auto-guider. He photographed Comets Lovejoy and LINEAR, using Sky Safari to aid in finding them. Among his goals are attaining the Astronomical League's comet observing award, and photographing all of the Messier objects.

Sorin looks forward to hearing a variety of speakers at DAS member meetings to learn about other aspects of astronomy, as well as socializing with other members and learning from them. He plans to utilize the DAS's dark sky site more regularly now that it has reopened following the rattlesnake episode and the September deluges (for which he is sorry, if the Seattle weather followed him to Colorado).

Sorin's other interests include hiking, snowboarding, science fiction, physics and astrophysics. He has a liberal arts degree in philosophy with a minor in creative writing, and plans to attend Denver's Star Fest sci-fi convention in May, perhaps in his Dr. Who costume.

In addition to *soggyastronomer.com*, Sorin is on Twitter *@SoggyAstro*, on Facebook as SoggyAstronomer, and posts his astrophotos on Flickr at *~www.flickr.com/photos/soggyastro/*.

Sorin is a Director of Product Management with Pearson. ★



SORIN

Image courtesy: Sorin

PRESIDENT'S MESSAGE

(CONTINUED FROM PAGE 2)

get the word out about what we do. We now have a Facebook page, are on Twitter, and a social media committee is looking at other options such as YouTube, Yelp, and Google Hangout.

Astronomy-related outreach is without a doubt one of the most important things we do. The combination of our monthly open houses and twice-weekly public nights at DU's historic Chamberlin Observatory, solar observing during Colorado Astronomy Day at the Denver Museum of Nature & Science, and various observing events at schools and other venues brings astronomy to thousands of people each year. A big tip o' the hat to our many volunteers who make this happen.

The Van Nattan-Hansen Scholarship program "provides support for worthy graduating high school students or undergraduate college students majoring in astronomy and the physical sciences." The scholarship program is generously funded by our members and others—thank you very much for that. If you know of a deserving student who may qualify for a VNH scholarship, encourage him or her to apply. More information is available at *http://www.denverastro.org/vannattan.html.*

I couldn't help but think of Jim Stafford's 1974 song "Spiders & Snakes" when rattlesnakes were spotted at the Edmund G. Kline dark sky site last year. We hired a snake eradication specialist to clear the place of the critters. Even so, you should still keep an eye open when visiting or using the facility. The lease on the dark sky site is up in three years, so a major goal of the E-Board during 2014 is to get the ball rolling on renewing that lease, as well as looking at the possibility of a lease-to-purchase option or similar arrangement.

A new Wi-Fi access point was installed in Chamberlin to replace one that had seen better days, and we also obtained a Wi-Fi repeater to extend the range of wireless Internet access to portions of the park lawn on the south side of the building during open houses. Storage in the observatory's ready-room was upgraded with new cabinets.

And the list goes on.

The E-Board will be working on several goals during 2014, some of which are a follow-up to the SWOT (strengths, weaknesses, opportunities, and threats) analysis we did early last year. We also have a couple special occasions to celebrate this year: The 150th anniversary of DU and the 120th anniversary of Chamberlin. 2014 looks to be a busy year! ★

ESA'S SLEEPING BEAUTY WAKES UP

PRESS RELEASE FROM THE EUROPEAN SPACE AGENCY

"**20 January 2014**

It was a fairy-tale ending to a tense chapter in the story of the Rosetta space mission this evening as ESA heard from its distant spacecraft for the first time in 31 months.

Rosetta is chasing down Comet 67P/Churyumov-Gerasimenko, where it will become the first space mission to rendezvous with a comet, the first to attempt a landing on a comet's surface, and the first to follow a comet as it swings around the Sun.

Since its launch in 2004, Rosetta has made three flybys of Earth and one of Mars to help it on course to its rendezvous with 67P/Churyumov-Gerasimenko, encountering asteroids Steins and Lutetia along the way.

Operating on solar energy alone, Rosetta was placed into a deep space slumber in June 2011 as it cruised out to a distance of nearly 800 million km from the warmth of the Sun, beyond the orbit of Jupiter.

Now, as Rosetta's orbit has brought it back to within "only" 673 million km from the Sun, there is enough solar energy to power the spacecraft fully again.

Rosetta calls home

Thus today, still about 9 million km from the comet, Rosetta's pre-programmed internal "alarm clock" woke up the spacecraft. After warming up its key navigation instruments, coming out of a stabilising spin, and aiming its main radio antenna at Earth, Rosetta sent a signal to let mission operators know it had survived the most distant part of its journey."

To read the remainder of this release, go to: *http://www.esa.int/Our_Activities/Space_Science/Rosetta/ESA_s_sleeping_beauty_wakes_up_from_deep_space_hibernation* ★

A BIRD IN THE HAND

The Pelican Nebula (IC 5070) is an emissions nebula that is part of the North America Nebula and is about 1,800 light-years away. Kyle used an astronomy modified Canon 600D camera on an Astro-tech AT8 telescope for three hours and 16 minutes.

Image © Kyle Williams

WELCOME NEW DAS MEMBERS!

Wolfgang Craig
Daniel Dugan
Susan Gelber
Ron Gilbert
Eric Girouard
Andy Hait
Robert Hooper
Mary Hyde-Herrmann
Andrew Knolla
Leon Miller
Cyndi Moltz Bray
John Mozer
Karlee Paiz
Mark Palmer
Joseph Pesce
Leondis J Redwine II
David Romero
Cynthia Williams
Robert Wilson

AN UNEXPECTED SURPRISE

On the evening of January 21st at the University of London Observatory, within the city limits of London, an instructor gave his students an introductory demonstration of how to use the CCD camera on one of the observatory's telescopes. They chose to image M82 because their sky was clouding over rapidly and the galaxy was in a patch of clear sky.

This 10-minute workshop led to a "global scramble to acquire confirming images and spectra," after the instructor noticed a bright star in the image and the students pulled archived photos with which to compare their image, according to *S&T*.

For more information on this unusual (to say the least) find, go to: *http://www.skyandtelescope.com/observing/highlights/Bright-Supernova-in-M82-241477661.html.*

Supernova in M82 (Supernova 2014J): Image right: Brian Kimball of Longmont imaged this with his STL11000XM CCD camera with Astrodon filters on an Astro Tech AT10RCF Ritchey Chretien astrograph. LRGB image: 27 minutes in the luminance channel and 18 minutes in each color.

The next page shows two images: the left image was taken in February 2013, while the right was taken on January 25, 2014 from Craig Betzina's observatory in Strasburg. He used a Canon 60DA DSLR camera on a Takahashi FSQ-106N refractor at f/5 on a Paramount ME.

DAS 2014 SPRING BANQUET INVITATION

DAS members and their guests are cordially invited to the Denver Astronomical Society's Annual Banquet on **Saturday, March 15th** from 5:30 to 9 P.M. at the Embassy Suites, 10250 East Costilla Avenue Centennial, CO 80112 (see map). Please note that this ***is not the same Embassy Suites where the Holiday Banquet was held***.

Our featured speaker this year is **Dr. Richard Alan Keen** from CU, who will be speaking on "**Earth (and Lunar) Based Observations of Volcanic Emissions to the Stratosphere."**

Dr. Keen is a meteorologist who researches climate change, weather, and severe storms at the University of Colorado, National Center for Atmospheric Research, National Oceanic and Atmospheric Administration, National Park Service, Juneau (Alaska) Ice Field Research Program, and the U.S. Army.

He has authored more than a dozen books, including *Skywatch West: The Complete Weather Guide* and *The Audubon Society Pocket Guide to Clouds and Storms.* His research papers on climate topics have appeared in the journals Science, Monthly Weather Review, Journal of Climate, Annals of Glaciology, Geophysical Monographs, Bulletin of the Global Volcanism Network, and International Comet Quarterly. He is currently an expert reviewer for the International Panel on Climate Change (IPCC) Fifth Climate Assessment Report, and records 4-foot snow storms from the weather station at Coal Creek Canyon for the National Weather Service.

An avid "chaser" of sky phenomena, Keen has seen four total solar eclipses, four annular eclipses, 24 total lunar eclipses, 230 comets, 40 tornadoes, the eyes of two hurricanes, and two erupting volcanoes, and enjoys photography for the WMO International Cloud Atlas. Keen co-discovered Nova Cygni, and is honored with asteroid 4129 Richelen, visible with his home-built 12-inch telescope.

To give the hotel an accurate head count, please **get your reservations in by March 4** through our usual reservation system. Due to space considerations, we can't accept walk-ins without a reservation. Payment directly on the DAS website through PayPal is preferred *(http://www.denverastro.org/banquet.html)*; otherwise, there is a printable version of the form to send in with your payment below. Cost per person is $25.00 and there will be a well-stocked cash bar available. If you'd like to mail in the payment, please indicate the number of people in your party on the form below. Clip the form, and mail with a check payable to the "Denver Astronomical Society" to treasurer Brad Gilman here:

Brad Gilman
DAS Treasurer
ATTN: Spring Banquet
7003 S. Cherry St
Centennial, CO 80122-1179

(cut here and keep top portion)

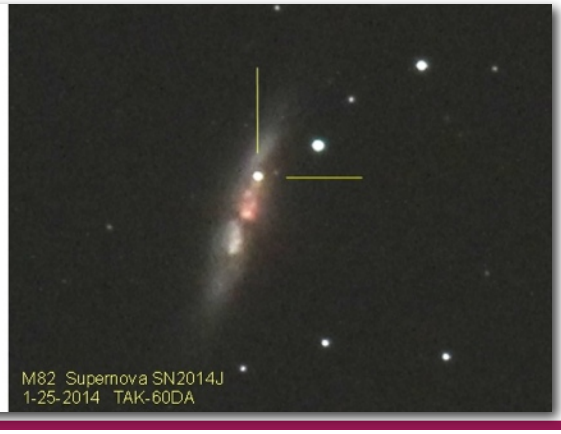
Name:_____

Phone:_____

Email:_____

Total # Meals: _____ X $25 = $ _____

Deluxe buffet includes: Chicken Pasta Primavera, Tossed Green Salad, Lemonade, Iced Tea or Punch, Rolls, Cookies and Brownies. A Vegetarian Pasta Primavera is optional.



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

CURRENT NOMINEES FOR DAS OFFICERS:

Nominations are still open until the election at the next general meeting on February 14.

President—Ron Hranac

Vice President—Lisa Judd

Secretary—Dena McClung

TREASURER—NOMINATIONS REMAIN OPEN

EBoard—John Barela, Jack Eastman, Joe Gafford, Chuck Habenicht, Digby Kirby, Ed Scholes, Sorin,

Jeff Tropeano, Dan Wray.

Ron Pearson remains in the Past President slot.