

OBSERVER

READY FOR THE ISON NAILBITER?

THE PLEIADES (MESSIER 45)

A hazy glow well-up in the Eastern sky in November, the Pleiades, or Seven Sisters, is the most remarkable naked-eye star cluster. The nebulosity that appears to be part of the cluster is actually a foreground dust cloud that reflects the intense radiation of the cluster's massive B-Type stars. At an approximate age of 100 million years, the Pleiades is relatively young, and is approximately 420 light-years from Earth in the constellation Taurus. Although the nebulosity around its brightest star Merope can often be viewed in small telescopes, the full beauty of the cloud is only visible in photographs. This image was captured on a remarkably transparent night at the EG Kline Dark Site in October 2010, with a Canon 450D DSLR through an 8-inch f/4 Newtonian telescope (16 180-sec subframes.)

Image © Darrell Dodge

Calendar

3.....	New moon
9.....	First quarter moon
17.....	Full moon
25.....	Last quarter moon
28.....	ISON perihelion

Inside the Observer

President's Message..... 2

Society Directory..... 2

Schedule of Events..... 2

About the DAS..... 3

ISON Updates..... 4

Beginners Bits..... 5

Holiday Party..... 5

Member Profile..... 6

Astronomy at the Museum..... 7

New Members..... 7

Okie-Tex Attendees..... *Back Page*

NOVEMBER SKIES

by Dennis Cochran

Comet ISON (C/2012 S1) is down in Virgo now. Look on page 4 for more information. It will pass Spica as it heads east by southeast, coming to that star around the mornings of the 17th-18th of this month. Comet Enke will be in the morning sky, also in Virgo.

Planets: A bunch of planets are stationary: big deal, since they don't move that fast anyway except for Mercury, but *Astronomy Magazine* (October 2013 issue) lists these stationary points in their "Calendar of Events" (page 39). Neptune makes a very small blue dot in Aquarius, while nearer Uranus is on the ecliptic just below the westward fish of Pisces, straight up from ν (nu) Cetus. More importantly, both Mercury and Saturn will be in the area of Comet ISON in the 20s of this month. A **photo opportunity** will present itself on the 26th (albeit the crack of dawn) when

the three form a nice conjunction! Mars will be rising at two-ish in the morning. The moon and Venus greet each other on the 6th after sunset, to the right of the Teapot in Sagittarius.

Meteors: The full moon spoils the Leonids on the 17th. The Northern Taurids come earlier, on the 12th, but no swarm this year. Then, on the 21st, we'll see the Alpha Monocerotids. They had an outburst in 1995, and may have one again in 2043: hold your breath!

Cassiopeia: The old W points to a rich star cluster called M52, up off the right-hand side of the W about the same distance as Alpha to Beta farther in that direction. Close to it just to the southwest is NGC 7635, the Bubble Nebula, a planetary with a bright star in its thicker northern edge. If you look southwest from Beta you'll find a cluster of a thou-

Continued on Page 3

PRESIDENT'S MESSAGE

by Ron Hranac

During the 2008 Consumer Electronics Show, Panasonic exhibited the Life Screen, a concept 150-inch high definition plasma display panel with an estimated value of around \$150,000. Assuming you could actually buy one and get it through the front door, how would you ensure the longevity of a 150-inch HDTV? Certainly transient voltage surge suppression (TVSS) would be near the top of the list, perhaps also an uninterruptible power supply (UPS). After all, it would be unpleasant if an electrical surge zapped that new über TV.

These days the typical household has a lot of expensive gadgets connected to commercial power. The same is often true when we have astronomy gear set up in the yard or driveway, a home observatory, or even at the DAS dark sky site. What, if anything, should we be thinking about when it comes to TVSS and other ways to deal with commercial power gremlins? A first step is understanding power quality. I found some useful definitions in Cable Television Laboratories' 1992 document *Outage Reduction*:

Outages (Interruptions)—An outage is a complete loss of voltage usually lasting from as short as 30 cycles up to several hours (or in some cases even days). Outages are usually caused by the fault induced operation of circuit breakers or fuses.

Impulses (Lightning or Switching Surges)—A surge is a transient voltage or current which can have extremely short duration and high magnitude. Typically, surges are caused by switching operations or lightning. Surges can be generated by [power company] customers due to the switching of their own loads



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

Image courtesy of Jeff Tropeano

or may be caused by utility switching operations (capacitors, breakers, etc.).

Undervoltage (Voltage Drop)—A customer who experiences a long duration (several seconds or longer) service or utilization voltage less than the proper nominal operating low voltage limits (the ANSI Range [A] service and utilization low voltage limits are 114 volts and 110 volts respectively) can be considered to be experiencing an undervoltage situation. Such a condition may be caused by a number of factors such as overloaded or poor house wiring, poor connections and/or voltage drop on the utility system.

Continued on Page 6

DAS SCHEDULE

NOVEMBER

- 1-3 EGK Dark Sky weekend
- 3 Daylight Saving Time Ends
- 9 Open House (Open House begins at 5:00 P.M.)
- 11 Veterans Day
- 15 General Membership Meeting at Olin Hall (Begins at 7:30 P.M.) Members Show-n-Tell
- 22 E-Board Meeting at Chamberlin (Begins at 7:30 P.M.)
- 27 Chanukah begins at sundown

- 28 Thanksgiving Day
- 29-1 EGK Dark Sky weekend

DECEMBER

- 7 Open House (Open House begins at 5:00 P.M.)
- 14 DAS Holiday Banquet (See Page 5)
- 20 E-Board Meeting at Chamberlin (Begins at 7:30 P.M.)
- 21 Winter Solstice
- 25 Christmas Day

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.

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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

NOVEMBER SKIES

(CONTINUED FROM PAGE 1)

sand stars—NGC 7789—just west of $00^{\text{h}} 00^{\text{m}} +56^{\circ}$. As you skip east along Cassiopeia's W to Gamma, go northwest a ways to $00^{\text{h}} 30^{\text{m}} +63^{\circ}$ for more difficult to observe clusters, NGC 133 and NGC 146. If you want to try imaging some faint nebulosity (no-named as far as I could tell) try the area around $00^{\text{h}} +67^{\circ}$ and $+68^{\circ}$. Farther east along the W to δ (delta) Cas, and then southwest, is the bright cluster NGC 457 at $01^{\text{h}} 20^{\text{m}} +58^{\circ}$, and the rather remote, open cluster M103. This fan-shaped cluster, according to *Peterson's Field Guides: Stars and Planets*, is just up the line towards ϵ (epsilon) Cas. If you're still stoked up about planetary nebulae from last month, barely southeast of the Epsilon star of the W is IC 1747, and far below the Delta star is M76 at $01^{\text{h}} 45^{\text{m}} +51.5^{\circ}$. East of that is the famous Double Cluster, H and Chi Persei, lying $2/3$ of the way down, southeast, towards the pointy head of Perseus (the star η [eta] Per), although a bit south of the imaginary line connecting ϵ (epsilon) Cas to η (eta) Per (see Darrell Dodge's image in the October 2013 *Observer*).

Below Cassiopeia is the Great Square of Pegasus, and also Andromeda, which houses the famous M31 galaxy. M31 is the largest member of our Local Group and a naked-eye object under dark skies at about $+41^{\circ}$. See if you can see the prominent dark gas and dust clouds in the foreground part of its disk. This large spiral galaxy has a greater percentage of small red stars than does the Milky Way (see Scott Leach's cover image in the October 2013 *Observer*). Next, if you were to slide southeast down from M31 to β (beta) Andromeda and keep on going the same distance farther southeast, you'd run into another Local Group spiral galaxy, M33. This one is smaller than the Milky Way and M31 but large and rather faint in our almost face-on view of it. Peterson's guide, page 189 (2nd Ed.) says that ι (iota) Triangulum is a yellow and blue double that can be found by skidding straight east at $+40.3^{\circ}$ to about $02^{\text{h}} 15^{\text{m}}$, below-left of the acute triangle of that constellation.

A beautiful orange and green double is farther south in Aries called A1457 at $01^{\text{h}} 48^{\text{m}} +22^{\circ}$.

Now, go and read about Comet ISON! ★



THE DAS'S FIRST ISON IMAGE

C/2012 S1 (ISON): This image was taken on October 2, 2013 at the Okie-Tex star party near Kenton, OK at 10:22 UT. Joe used his SBIG ST-2000XM ccd camera on an 18-inch f/4.5 Newtonian telescope. He made 8/5/4/5-minute LRGB exposures respectively with 1-minute sub-exposures. He used a newer image processing software called Pixinsight®. The image was taken through the bright zodiacal light. Bravo, Joe!

Image © Joe Gafford

WELCOME NEW DAS MEMBERS!

Joseph Cannavo
Ted Fidger
Micah Oltmann
X Sorin
Kevin Weller

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-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.

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



ISON UPDATES

C/2012 S1 (ISON)

Magnitude: 4.28 (extincted to: 5.18)
 Absolute Magnitude: 7.50
 RA/DE (J2000): 13h56m33.0s/-14°19'39.0"
 RA/DE (of date): 13h57m18s/-14°23'41"
 Hour angle/DE: 20h02m3s/-14°23'41" (geometric)
 Hour angle/DE: 20h02m15s/-14°20'37" (apparent)
 Az/Alt: +121°12'55"/+12°38'53" (geometric)
 Az/Alt: +121°12'55"/+12°43'04" (apparent)
 Distance: 0.85679613AU



Roger Clark created a series of views (here we see just one) of the eastern sky with comet ISON marked using *Stellarium*, a planetarium software. This view shows November 20, 2013 at 6:00 a.m. To see the entire series, go to: <http://www.clarkvision.com/articles/astro-ison-position/>.

Predictions for Comet ISON (C/2012 S1) have been all over the map. These predictions have ranged from it being the comet of the century to, perhaps, a complete bust. At the meetings of the American Astronomical Society's Division for Planetary Sciences in Denver last month, most folks were taking a wise "wait and see" attitude. We don't know the comet's size, its density or rotation, or how it will hold up to the sun's tidal forces. Many feel it will survive its rendezvous with the sun but no one is sure what kind of shape it will be in after that bout. During that meeting, Alex Witze reported in *Nature* that it is expected to survive: <http://www.nature.com/news/comet-expected-to-survive-close-sun-encounter-1.13924>.

Sky and Telescope magazine says, "The comet may become as bright as Venus, but only for a few hours when it will probably be invisible just a couple degrees from the Sun in the daytime sky!"

Your *Observer* editor excitedly awaits any and all images of this comet (or any comet, for that matter: Evidently Comet Lovejoy is out-shining ISON by almost two magnitudes as of 10/27/13, according to a poster on the MPML Yahoo list-serve!) We'll do our very best to publish everyone's images. Additionally, Darrell Dodge will be posting member photos on the DAS website at: www.denverastro.org/ison_c2012.html. AND, *Sky & Telescope* has announced an ISON photo contest at: <http://www.skyandtelescope.com/observing/home/Announcing-the-Comet-ISON-Photo-Contest-229152181.html>

Boom or bust, people the world over will be observing this alien visitor with crossed fingers and hopes for a great show.—Patti Kurtz, Editor ★

ISON TIMETABLE: NOVEMBER 2013

From *Sky & Telescope* Magazine:

- Nov. 19th: ISON will pass closest to Mercury, with *Messenger* as its witness.
- Nov. 28th: Comet ISON whips through the outer solar corona, passing within 1.2 million km of the Sun's visible surface.

S&T linked to: <http://isonatlas.wordpress.com/november-2013/> where the following is posted:

"WHEN VISIBLE: Before Dawn

THROUGH: Binoculars until mid-month, then naked-eye

... During November the comet will be screaming in towards the Sun, in advance of its sweep around it on **Nov 28th/29th**, so each morning in the month it will be a little closer to the Sun and a little harder to see in the brightening sky.

... On November 28th and 29th, the comet will be so close to the Sun that its tail will probably be drowned out by the Sun's glare. BUT, there's a chance we MIGHT be able to see the comet's head shining *in the daytime,* looking like a fuzzy star, or spark, close to the Sun itself. It might be visible to the naked eye, but more likely it will require binoculars to find it. Even then it will only be visible if the brilliant Sun is obscured by a cloud, a building or maybe even a raised hand. Consequently, seeing it will require **INCREDIBLE care**, you must absolutely make sure there's not even a hint of a chance of catching a glimpse of the Sun while you're looking for the comet, especially if you're looking for it with binoculars or a telescope! But there's a tantalising possibility that, with a lot of care and a little luck, we might be able to see Comet ISON in the daytime sky on the 28th and/or 29th." ★

BEGINNERS BITS: MAGNITUDES

by Lisa Judd

If you're a casual stargazer that doesn't like scientific terms, rest assured that there are a few simple ones that just require a definition. The term "magnitude," in astronomy, is simply brightness: the lower the number, the brighter the object. So the stars in the Big Dipper are about 1, and on a dark night we can see stars as dim as magnitude 6 naked-eye. Binoculars can take you down to 8 or 9, and larger telescopes allow you to see dimmer and dimmer things; Hubble sees to 22. The numbers can go negative, too (Sirius is -1, Venus can get up to -4, and the sun is -26), and variable star observers know very well how to estimate the decimal interpolations. These are the basics, but there are a few details about this concept, specific to astronomy, which every observer should know.

First of all, the scale is a little different than in other areas of science. Most people think of magnitude as being powers of 10, like they are on the Richter scale for earthquakes and just about any other measurement system of the same name. But in astronomy, the difference of one magnitude unit is measured as the 5th root of 100. The reason for this is kind of ridiculous, though—someone decided that 6 was a good number of magnitudes to categorize with the naked eye, then did the math to figure what kind of physical light-output difference that concept would quantify.

A star's brightness to our eyes depends on how far away it is, so the meaning of the term "brightness" or "magnitude" often depends on whether you're talking to a hobby observer or a stellar physicist. "Apparent brightness/magnitude" is how

we see it, and "intrinsic brightness/magnitude" is independent of our view and measures how much energy a star puts out, also called "luminosity." If we could map all the sky's stars according to their intrinsic rather than apparent brightness, the sky would look much the same, with a few very noticeable differences for nearby stars like Sirius and Procyon.

This difference is well pronounced between the two Summer Triangle stars Vega and Deneb. Vega looks slightly brighter to us, but it's only 26 light-years away—whereas Deneb is 1,500 light-years away and still about as bright. Since any light's brightness drops by the square of distance, you can imagine how much more luminous Deneb really is—in fact, it's a class of object that some astronomers like to call a superstar, with 50,000 times the output of our sun.

Deep sky objects and comets also have a particular brightness, but the monkey wrench is that the total light output is measured across the expanse of sky the object covers. Observing literature will report that M33 is a magnitude 4 object, but when you look at it and see nothing, you'll get a lesson in how big it is. If we could shrink it to an average Sombrero-galaxy size, it'd be very bright, but instead that light covers several times the area of the full moon. So, don't always trust the literature—it takes experience to learn what to expect you'll see.

As with anything I contribute, addenda, questions, comments and corrections are welcome. My email address is lm_judd@hotmail.com. ★

BEAUTIFUL ISON AND MARS

C/2012 S1 (ISON) as seen on October 9, 2013. Roger used a Canon 1D Mark IV 16-megapixel digital camera with a Canon 200 mm f/2.8 lens at f/2.8. He made five exposures of 90 seconds each at ISO 1600 and then combined (7.5 minutes total exposure). Tracking was made with an Astro-trac tracking mount.

Image © Roger Clark



Season's Greetings!

The Denver Astronomical Society invites you to the annual holiday party at **Embassy Suites, 7525 East Hampden, on December 14th, 2013.**

Directions: From I-25, go east on Hampden, turn left at the fifth traffic light, and follow through to the hotel entrance.

Dinner includes Chicken Scallopini, with a vegetarian alternative and beverages; there are also a cash bar, decorations and music! Price is \$20, payable by check to the DAS and sent to our treasurer, Brad Gilman, at 7003 S Cherry St., Centennial, CO., 80122. You may also pay on the website at: www.denverastro.org/holidayparty.html

We hope to see you there for a relaxing and fun time!

MEET YOUR FELLOW ASTRONOMER

by Dena McClung

November's DAS member profile features Kyle Williams, who joined the club six months ago.

Kyle became interested in astronomy while watching live NASA video feeds from the ISS in 2009. In early 2010, news about Mars being "close" to Earth caught his attention, and he decided he had to check out the night skies for himself. He obtained a pair of binoculars and used them to get his first look at Jupiter before acquiring his first telescope.

Kyle's favorite astronomical activity is astrophotography. In particular, he likes taking shots of galaxies and globular clusters. He is presently using his second telescope, an Astronomy Technologies 8-inch f/4 Astrograph with a Canon T3i camera, to capture his images. He had the camera modified to remove the infrared and ultraviolet light filter, which would block segments of the light spectrum that he wished to include. Citing the example of the Horsehead Nebula, he told me that he prefers to include the rich red tones in his photos that otherwise would not be present.

Kyle likes the challenge of creating astronomy images in part because it requires him to be knowledgeable and adept in many technical areas: engineering, optics, camera operation, electronics, and scripting (a technique used to automate the photography portion of his projects), to name a few. Tying all of those facets together is very rewarding for him. He says that most people don't understand that his images can involve fifteen hours or more of computer time, processing as many as 300 separate images in a variety of combinations to achieve his de-

sired results. He described his efforts as a learning process, saying that every time he creates an image, he learns something that enables him to do a better job the next time around.

The first image Kyle ever took was featured at *stargazerzlounge.com*, an online forum for astro-photographers. Last month's *Observer* included an image Kyle took of Jupiter (page 6).

Although Kyle has only been to a handful of DAS events, he enjoys being a member because the club gives him exposure to knowledgeable amateurs. He also likes receiving updates on current space exploration, having the opportunity to check out the equipment that others bring to open houses, and the social aspect of being around fellow astronomers.

Kyle would like to have a roll-off observatory setup at some point in the future and looks forward to meeting the challenge of integrating all the necessary systems to make one functional. He'd also like to experiment with filters, doing narrow-band imaging.

Kyle works as a software engineer in the space and engineering industry. He calls Arizona his "home town," having lived there more than anywhere else prior to coming to Colorado in the fall of 2012.

Kyle and his wife, Felicia, have a two-year-old daughter and a three-month old son, all of whom are already in the family hiking mode. He also enjoys mountain biking. They are in the process of moving their growing family from a townhome in Castle Rock to a single-family house. ★



KYLE WILLIAMS

Image courtesy: Felicia Williams

PRESIDENT'S MESSAGE

Harmonics—These are the non-fundamental frequency components of a distorted 60 Hz power wave. They have frequencies which are integral multiples of the 60 Hz fundamental frequency. Harmonics are not generally produced by the utility but rather by the customer's equipment. For example, a large non-linear industrial load may produce harmonics which, if they are of sufficient magnitude, can travel back through the power system and affect other customers.

Voltage Sags—A short severe momentary voltage dip that may last for several seconds is classified as a voltage sag. Voltage sags may be caused by faults on the transmission or distribution system or by the switching of loads with large amounts of initial starting/inrush currents (motors, transformers, large dc power supplies).

Voltage Swell—When a fault occurs on one phase of a 3 phase, 4 wire system, the other two phases rise in voltage relative to ground (about 20%).

This steady state rise in voltage is referred to as a swell. Referred to by some as surges.

Overvoltage—Any steady state (several seconds or longer) voltage delivered to the customer's meter which is above the ANSI Standards upper service voltage limit of 126 volts is classified as an overvoltage. Overvoltages usually occur as a result of improper regulation practices (misadjustments of regulators and capacitors).

If you're using a home computer, you probably have it plugged in to a surge suppression-equipped AC strip, known as point-of-use TVSS. Indeed, many of you probably have the majority of your home electronics gear plugged in to some type of point-of-use TVSS.

But what about your astronomy gear? Commercial power quality can be rather nasty at times, and nearby lightning strikes can cause all kinds of problems.

(CONTINUED FROM PAGE 2)

It's important to understand that consumer grade point-of-use TVSS is not suitable protection from a direct lightning strike. Whole-house lightning protection is beyond the scope of this column, and tends to get complicated and fairly expensive to implement.

What, then, should be done? At the very least, I recommend a point-of-use TVSS whenever astro gear is plugged in to commercial power. Taking things up a notch, think about installation of whole-house surge suppression in the main electrical panel in addition to point-of-use TVSS. Don't forget to protect cable TV, satellite, and telephone lines where they enter the premises, because surges and transients can travel on any conductive path. Protect them all. Finally, consider hiring a licensed electrician to make sure your home and observatory electrical wiring, grounding, etc., are up to snuff.

You know the old saying: An ounce of prevention . . . ★

ASTRONOMY AT THE MUSEUM

Photos by Jeff Tropeano



**SEPTEMBER 29, 3013
SOLAR DAY AT DMNS**
Photos clockwise from the top: A beautiful day in Denver; Dan Wray with his solar setup; DAS members sharing the sun with some folks on the patio; and the greeting table inside with DAS E-Board member Johnny Barela and his wife Eileen. Thanks to everyone who contributes to these very important public events!



**DAS ATTENDEES AT THE
2013 OKIE-TEX STAR PARTY**

Huddled around S&S Optika's Tim Havens's 6-inch home built Takahashi binoculars, are members of the DAS at the Okie-Tex 2013 star party at Camp Billy Joe near Kenton, OK. Top row from left to right are: Dave Spillman, Paul Kaiser, Lisa Judd, Jack Eastman, Joe Gafford, Tim Havens, Ken Takahashi, Chuck Habenicht. Bottom: Barbara Gal, Bonnie Bailey, Cathie Havens, Mark Levinson, Justin Modra.

Image Courtesy Joe Gafford



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