Monthly Notices of the Everglades Astronomical Society

Naples, FL
March 2014

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President's Message

Greetings! Nothing seems to be slowing down as requests keep coming in to support various outreach programs. The next 30 days will be another full month for EAS members. We have many opportunities for volunteering. You can offer your help at the meeting or you can contact Charlie Paul or me to offer assistance. Thanks again to all who assisted in making the last 30 days of outreach programs a success.

For those that attended the Annual Winter Star Party in the Keys, the weather shaped up and allowed for one of the finest Winter Star Party events in its 30 years. Those that attended will be sharing pictures and stories over the next few monthly meetings. A great time was had by all again. Start planning your vacation and join us next year in the Keys! I will include dates when published for the next WSP in our newsletter.

The EAS will be busy with something new this summer. We are currently planning to work with the YMCA Naples to share our passion for astronomy in their summer camp programs. This will likely include providing a daytime solar and nighttime lunar viewing in conjunction other activities. The YMCA also would like to offer a science/astronomy related class during summer camp week(s). If you have a teaching background and are interested, please contact me ASAP. Details are yet to be set and will be highly contingent on support.

This Tuesday's meeting should be interesting with Mr. Brian McGaffney, one of our newer members from Canada, presenting on activities at his Nutwood Observatory (http://www.nutwood-observatory.com/). Our typical meeting agenda includes the first 15-30 minutes for club business discussions, a quick break to socialize and then into the presentation.

Clear Skies,
President Todd Strackbein

Dates for the "Fak"

Usually the best times to go out to the Fakahatchee Strand viewing site are moonless nights. Below is a list of upcoming Saturday nights that you will often find fellow club members out there enjoying the skies with you (weather permitting).

Date	Moonrise	Moonset
March 29	5:23 a.m.	5:50 p.m.
April 19	11:21 p.m.	9:30 a.m.

Sky Events

Mar 1 - New moon
Mar 8 - First quarter
Mar 16 - Full moon
Mar 23 - Last quarter

Next Meeting

March 11, 2014: Time 7:00 – 9:00 pm
At the Norris Center, Cambier Park

Winter Star Party 2014

By Jackie Richards

Rick Piper – Orion 80 mm Refractor f5, German Equatorial Mount. Setting up for imaging. Eric Uthus in background.

While we all celebrated the 30th year of the Winter Star Party (WSP), it was only my second, but this year was just as exciting as my first. EAS members who attended were Bob Francis, Bob Gurnitz, Charlie Paul, Chuck Pavlick, Rick Piper, Jackie Richards, Todd Strackbein, Mike Usher, Eric Uthus, and Mary Ann Wallace, and hopefully next year there will be more. Besides star gazing and astrophotography, members took advantage of sightseeing and nature as can be seen in the many photos below.

Left to right: Jim Francis (of Cazenovia, NY), Bob Francis and Kevin Francis (of Carson City, Nevada).


Left to right: Jon Paul, Bob Gurnitz, Charlie Paul and James Paul.



Left picture taken Feb. 1; right picture taken Feb 28 @ WSP. It is shrinking. Look at the supernova in M82 (top star in galazy) compared with the star on the right in each picture.

Left to right – Eric Uthus, Jackie Richards, Rick Piper and Mike Usher enjoying the WSP 30th anniversary BBQ.


Mike Usher's Dobsonian mounted 20" f5 Reflector.


Mary Ann Wallace – Explore Scientific EDT 127 Triplet Apochromatic Carbon Fiber Refractor 127 mm (5") - f7.5.

Jackie Richards – Meade Lightbridge 10” f5 Reflector.

Photo taken by Bob Gurnitz.

Key Deer. Photo taken by Mary Ann Wallace.


Dubbed the official tent of EAS members. Ozark Trail Outdoor Equipment – 12 x 8 Dome Tent.


Photo by Chuck Paclick. Sunset WSP 2014.


Photo by Todd Strackbein.

Fak & Other Photos

Photo by Chuck Pavlick at WSP 2014. Seagull Nebula. Canon 70-200 w/1.4 extender at 280 mm; Hap Griffin Modified Canon 1000d; AP mach 1 w/PHD autoguiding, 50mm w/starshoot 1; six exposures @ 600 seconds, ISO 1600; captured in Nebulosity; Processed in PinInsight.

Flame and Horse Head Nebula taken by Rick Piper and Jackie Richards; WSP 2014; Orion 80 mm Refractor f5, German Equatorial Mount, Canon XSi, ISO 1600; six @ 6 mins.

Omega Centauri taken by Rick Piper and Jackie Richards at the WSP 2014, Orion 80 mm Refractor f5, German Equatorial Mount, Canon XSi, ISO 1600.

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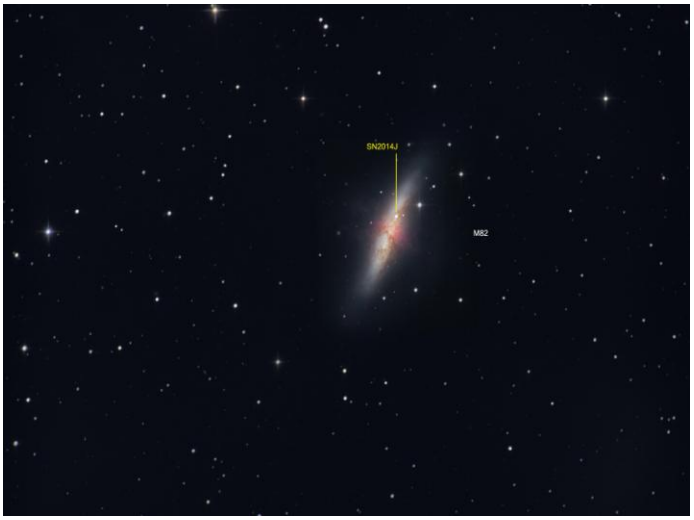

M82 with supernova taken on Jan. 30, 2014 by Brian McGaffney, Nutwood Observatory, Canada.

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What is a Type Ia Supernova?

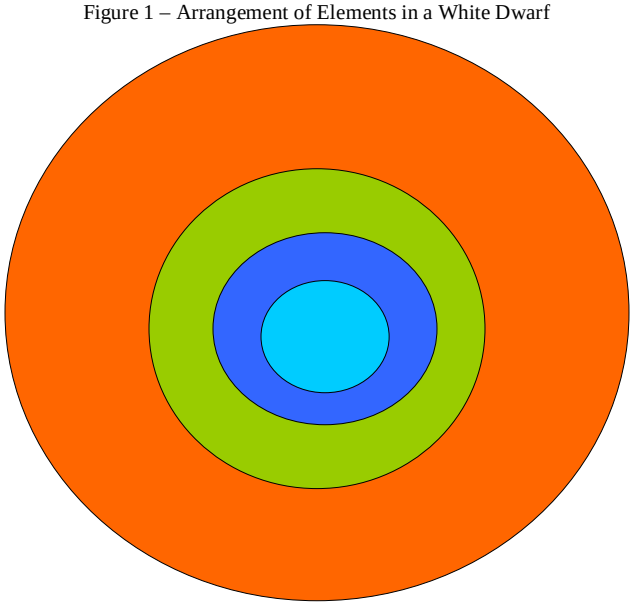
By Dennis C. Albright

A supernova is a huge stellar explosion that when at its peak luminosity is several billion times as bright as the sun. There are several different types of supernovae including Type II supernovae which occur at the end of the luminous life of massive stars when the star runs out of nuclear fuel and collapses into either a neutron star or a black hole.

Type Ia supernovae are very significantly different from the Type II supernovae in that they occur in binary systems. For a Type Ia supernova to occur at least two stars are necessary one of which is a white dwarf. The other star should be a giant star near the end of its luminous life that is starting to run out of nuclear fuel in its core. Because of this it has a very large radius, many times that of the sun. Furthermore, because of its high luminosity and large radius the giant star is rapidly losing mass.

A white dwarf is a faint star about the size of the Earth with a mass similar to that of the sun. A white dwarf is a stellar remnant left when a star runs completely out of usable nuclear fuel and then explodes in a nova. Depending upon the mass of the precursor stage the white dwarf may consist of any number of light elements including Hydrogen, **Helium**, **Carbon**, **Oxygen**, **Neon** and **Magnesium**. These elements will be arranged in layers as shown in Figure 1 with the heaviest elements in the center and the lightest in the outer layers.

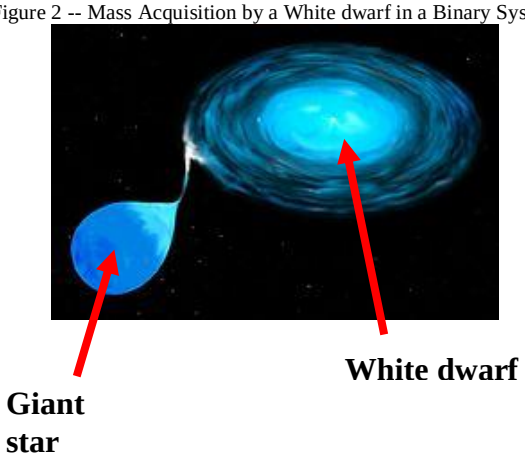
Figure 1 – Arrangement of Elements in a White Dwarf



Since a white dwarf generates no energy from nuclear reactions it glows due to the stored heat in it. A white dwarf does not collapse into a black hole because it does not have enough mass to overcome electron degeneracy pressure.

Due to its small size and high density the white dwarf is able to acquire mass from both the mass flow and possibly the outer envelope of the other nearby star, shown in Figure 2.

Figure 2 -- Mass Acquisition by a White dwarf in a Binary System



However, when the white dwarf acquires enough mass such that its mass exceeds 1.38 solar masses, electron degeneracy pressure alone cannot keep it from collapsing. When it collapses, it also heats ups and a large fraction of the elements in the white dwarf fuse to form Silicon:

Mg, O, Ne, C, He -> Si

It is this reaction that generates the distinctive Silicon spectral lines that are characteristic of Type Ia supernovae. Furthermore, the energy from this reaction keeps the white dwarf from collapsing in on itself and generates the tremendous luminosity of the supernova. The luminosity, L_S, and absolute visual magnitude, M_A, compared with that of the sun and two types of novas in Table 1.

This data was calculated using the STARSDAW code which uses the data that can be easily gathered using a telescope with either a spectrograph or charged coupled device to determine the stellar parameters of the star. This data can also be obtained from Wikipedia web pages or popular astronomy literature.

Table 1 Comparison of Stellar Objects

Stellar Object	Luminosity, L_s (suns)	Absolute Visual Magnitude, M_A
Sun	1.0	4.83
Slow Nova	23949.0	-3.53
Fast Nova	896460.0	-7.45
Type Ia Super Nova	69600,000,000.0	-19.04

Since for all Type Ia supernovae the nuclear reactions and the mass of the precursor white dwarf are identical, these supernovae are excellent standard candles. Standard candles are standard light sources whose measured magnitudes can be used to determine distances to stars, star clusters and galaxies. Furthermore, they are relatively common compared to other types of supernovae occurring in all types of galaxies including spiral, elliptical and irregular galaxies. They are also bright enough to be detected by the Hubble space telescope even if they are at the very edge of the visible universe.

The distances obtained from Type Ia supernovae were used to determine the acceleration of the expansion of the Universe. This acceleration is caused by the presence of dark energy. The discovery of this acceleration using the results from surveys of Type Ia supernovae billions of light years from the Earth and therefore, the discovery of dark energy was the topic of the 2011 Nobel Prize in physics.

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NASA Space Place

A Two-Toned Wonder from the Saturnian Outskirts

By Dr. Ethan Siegel

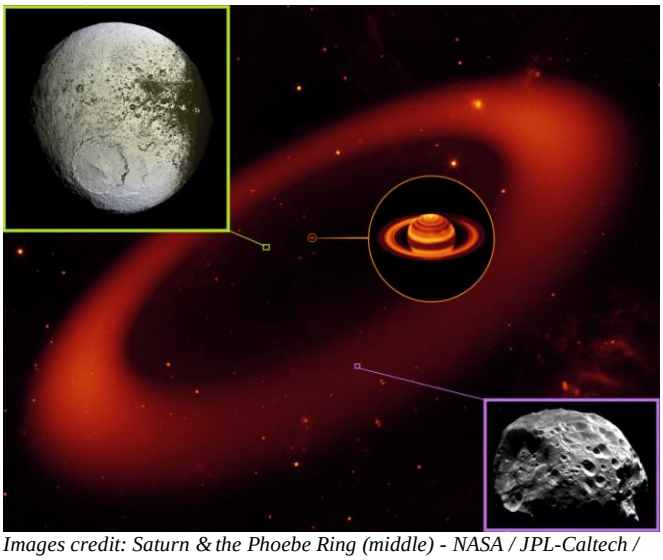
Although Saturn has been known as long as humans have been watching the night sky, it's only since the invention of the telescope that we've learned about the rings and moons of this giant, gaseous world. You might know that the largest of

Saturn's moons is Titan, the second largest moon in the entire Solar System, discovered by Christiaan Huygens in 1655. It was just 16 years later, in 1671, that Giovanni Cassini (for whom the famed division in Saturn's rings—and the NASA mission now in orbit there—is named) discovered the second of Saturn's moons: Iapetus. Unlike Titan, Iapetus could only be seen when it was on the west side of Saturn, leading Cassini to correctly conclude that not only was Iapetus tidally locked to Saturn, but that its trailing hemisphere was intrinsically brighter than its darker, leading hemisphere. This has very much been confirmed in modern times!

In fact, the darkness of the leading side is comparable to coal, while the rest of Iapetus is as white as thick sea ice. Iapetus is the most distant of all of Saturn's large moons, with an average orbital distance of 3.5 million km, but the culprit of the mysterious dark side is *four times* as distant: Saturn's remote, captured moon, the dark, heavily cratered Phoebe!

Orbiting Saturn in retrograde, or the opposite direction to Saturn's rotation and most of its other Moons, Phoebe most probably originated in the Kuiper Belt, migrating inwards and eventually succumbing to gravitational capture. Due to its orbit, Phoebe is constantly bombarded by micrometeoroid-sized (and larger) objects, responsible for not only its dented and cavity-riddled surface, but also for a huge, diffuse ring of dust grains spanning *quadrillions* of cubic kilometers! The presence of the "Phoebe Ring" was only discovered in 2009, by NASA's infrared-sensitive Spitzer Space Telescope. As the Phoebe Ring's dust grains absorb and re-emit solar radiation, they spiral inwards towards Saturn, where they smash into Iapetus—orbiting in the opposite direction—like bugs on a highway windshield. Was the dark, leading edge of Iapetus due to it being plastered with material from Phoebe? Did those impacts erode the bright surface layer away, revealing a darker substrate?

In reality, the dark particles picked up by Iapetus aren't enough to explain the incredible brightness differences alone, but they absorb and retain *just enough* extra heat from the Sun during Iapetus' day to sublimate the ice around it, which resolidifies preferentially on the trailing side, lightening it even further. So it's not just a thin, dark layer from an alien moon that turns Iapetus dark; it's the fact that surface ice sublimates and can no longer reform atop the leading side that darkens it so severely over time. And that story—only confirmed by observations in the last few years—is the reason for the one-of-a-kind appearance of Saturn's incredible two-toned moon, Iapetus!



Images credit: Saturn & the Phoebe Ring (middle) - NASA / JPL-Caltech / Keck; Iapetus (top left) - NASA / JPL / Space Science Institute / Cassini Imaging Team; Phoebe (bottom right) - NASA / ESA / JPL / Space Science Institute / Cassini Imaging Team.

Learn more about Iapetus here: http://saturn.jpl.nasa.gov/science/moons/iapetus.

Kids can learn more about Saturn's rings at NASA's Space Place: http://spaceplace.nasa.gov/saturn-rings.

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Items For Sale or Trade or Wanted:
http://www.naples.net/clubs/eas/equipment_sales.html

Useful links (software, telescope making, telescope and equipment suppliers, astronomical data sources, iPhone and iPad Apps and more):
http://www.naples.net/clubs/eas/links.html

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EAS 2014 DUES

For the bargain price of only $20.00 per family, all this can be yours this year:

- Meet with your fellow astronomy enthusiasts at least 10 times a year;
- Learn about astronomy and telescopes. Check out our club scope;
- Many opportunities to view planets, nebulae and other celestial objects (even if you don't have your own telescope); and
- Enjoy the many astronomy programs at our regular monthly meetings.

Don't miss out! Fill out this form (please print clearly) and send it with your $20 check to the Everglades Astronomical Society, P. O. Box 1868, Marco Island, Florida, 34146.

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