Monthly Notices of the Everglades Astronomical Society

Naples, FL
February 2014

Officers: **President:** Todd Strackbein; VP/**Secretary:** TBD; **Treasurer**: Bob Gurnitz
Newsletter Editor: Jackie Richards (jmrichards2005@yahoo.com)
Home Page: http://naples.net/clubs/eas **Webmaster:** Martin Zombeck (mvz@alum.mit.edu)
Fack Coordinator & information on viewing: Charlie Paul (cpaul651@earthlink.net) 410-8192

President's Message

Greetings to all! The next 30 days will be another full month for EAS members. Between meetings, we completed what has been the busiest outreach schedule we have ever had. The weather cooperated somewhat except for two attempts at Cypress Palm Middle School. We'll try at another make-up night when we can get it in. A big thank you to all who assisted in making the outreach programs a huge success. In several cases members drove in excess of an hour each way and attended multiple back-to-back events. We could have never done it without those who come out to help whenever the call goes out. Please consider helping in future outreach programs which we outline at monthly meetings. Any level of experience with or without a telescope, you can still help.

Also this month, several members will be attending the 30th annual Winter Star Party (WSP) in the Florida Keys. The WSP runs from Feb. 23rd thru March 2nd. Those of us that attend always share our experiences and pictures at the next few meetings. If you have never attended a large organized star party, this is a great place to learn from and share knowledge with like-minded amateur astronomers.

We are fortunate to have lined up for this Tuesday's meeting Mr. John Berninger presenting "The Search for Alien Life." I would expect a packed room again and suggest you get there early if planning on attending. 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
February 22	12:38 a.m.	11:49 a.m.
March 1	6:49 a.m.	7:06 p.m.

Sky Events

Jan 30 - New moon
Feb 6 - First quarter
Feb 14 - Full moon
Feb 22 - Last quarter

Next Meeting

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

Supernova 2014J in M82

By Jackie Richards

How often do you get to see a supernova (exploding star) and even better, photograph one? Well we did. Supernova 2014J (SN2014J) in M82 (a/k/a the Cigar Galaxy) was first observed by Steve Fossey and astronomy workshop students, Ben Cooke, Tom Wright, Matthew Wilde and Guy Pollack at the University of London Observatory on January 21st. M82 is located in Ursa Major and is 12 million light years away

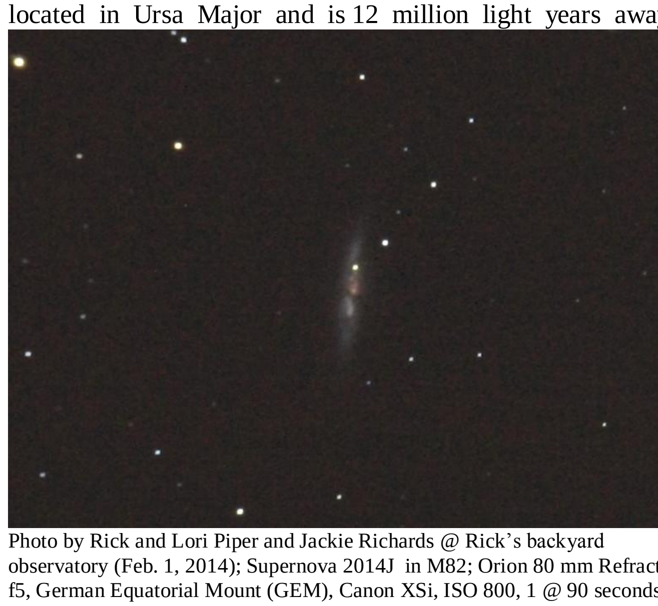

Photo by Rick and Lori Piper and Jackie Richards @ Rick's backyard observatory (Feb. 1, 2014); Supernova 2014J in M82; Orion 80 mm Refractor f5, German Equatorial Mount (GEM), Canon XSi, ISO 800, 1 @ 90 seconds.

which means that the supernova occurred 12 million years ago and the light has just reached us now. SN2014J is an exploded white dwarf with debris expanding at up to 20,000 km per second. Club members got their first glimpse of the supernova at the Fak on January 25th and it looked awesome through former President's, Mike Usher, telescope, as well as through everyone's.

In the photo above taken by Rick and Lori Piper and me on February 1st, SN2014J is the bright star at the top of the galaxy. We took 12 pictures and stacked them, but because stacking pictures collects more light, the supernova wasn't as prominent when blown up, so the above picture is one single picture taken for 90 seconds. The photo below was stacked with ten pictures and you can see the supernova in the cigar shaped galaxy (M82) as well as the spirals in the beautiful spiral galaxy, M81, at the top right of the photo.

We plan to take a picture of M82 when the supernova is no longer visible, for comparison, probably at the Winter Star Party at the end of the month. WSP HERE WE COME!

Fak & Other Photos

Photo by Rick and Lori Piper and Jackie Richards @ Rick's backyard observatory (Feb. 1, 2014); Supernova in M82 (bottom left) and M81 (top right); Orion 80 mm Refractor f5, German Equatorial Mount (GEM), Canon XSi, ISO 800, 10 @ 90 seconds; stacked with Deep Sky Stacker.

Photo by Chuck Pavlick (Jan. 2014) Christmas Cluster Photo; Telescope: WO FLT 100 w/reducer; Mount: AP Mach1; Camera: SBIG 8300c; 2 @ 900 secs; Guide Scope: Orion Mini Guide Scope, Orion Mini Guider, PHD Guiding; Site: Fak; Captured in Nebulosity, Processed in Pixinsight

* * *

Measuring Stellar Distances using Periodic Stars

By Dennis C. Albright

Determining the distance to any star is quite difficult because they are so far away and because they vary in brightness by several orders of magnitudes. For example, the brightest stars, hypergiants and luminous blue variables, can be many millions of times as bright as the sun. However, the faintest stars: white, red and brown dwarfs may be only a thousandth or even a millionth as bright as the sun.

Stellar distances are measured in light years (ly), the distance that light can travel in one year. Although, the nearest star, α Centauri, is only 4.4 light years away, it appears almost as bright as Betelguese which is 643 light years away. This is because Betelguese is roughly a million times as bright as the sun and all 3 stars in α Centauri are only about twice as bright as the sun.

One of the methods used to obtain the distance to a star is to determine its brightness and determine its distance from its visual brightness. A star's brightness is parameterized by its magnitude. An astronomer with the proper instruments, CCD's, or photographic plates can easily determine the visual magnitude of the star, M_v. If they can determine the absolute visual magnitude, M_A, which is the visual magnitude of the star at a standard distance, they can then calculate the distance of the star from the visual magnitude.

Periodic stars are stars whose variations in brightness have a reasonably definite period. This is due to the periodic expansion and contraction of the radius of the star. This is shown in figure 1.

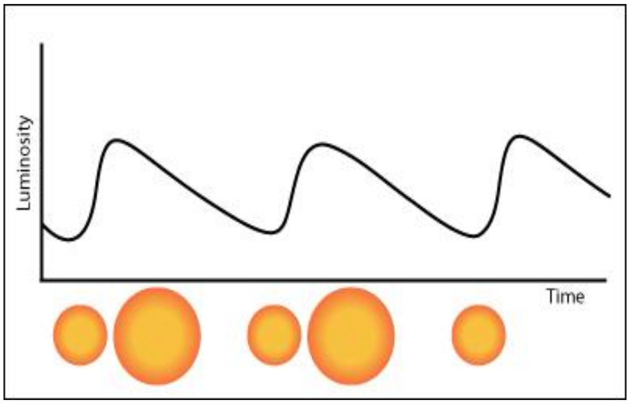

Figure 1. The Light Curve for a Periodic Star

Furthermore, for many types of periodic stars there is a correlation between the period and the absolute magnitude of the star, shown in Figure 2.

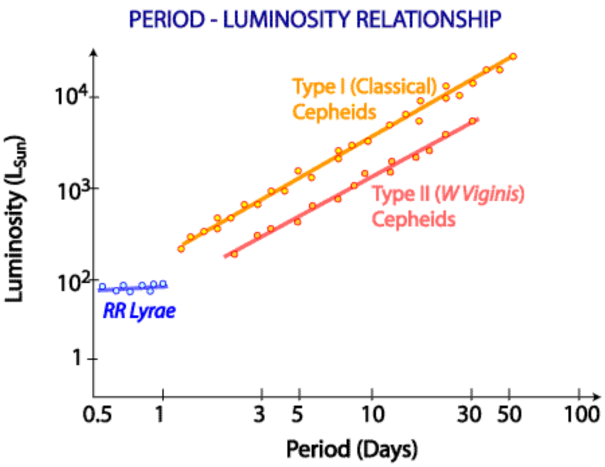

Figure 2. Period-Luminosity Correlation

The properties of the variable stars described in this article were calculated by the STARSDAW code, which is based on Wikipedia data. It accurately models several properties of the stars, including the stellar surface temperature, T_S, the luminosity, L_S, stellar mass, M_S, and radius, R_S and the stellar evolutionary history. It can also be used to determine the distance to stars using either spectroscopic parallax or the period-luminosity relationship of periodic stars. The STARSDAW code has been used to calculate the properties of 427 stars and 42 planets.

The accuracy of this code in determining the stellar distances of periodic stars, d_s, is amply demonstrated in Table 2 and Figure 3. In this figure several points lie directly on the agreement line which indicates almost perfect agreement between the calculated results and the measured data. These figures show very good qualitative agreement between the stellar distances calculated for periodic stars and the measured stellar distances with most of the points in these figures on or near the agreement line.

The mean error for the stellar distances of all of the periodic stars, ε_{dsTot}, is 16.87%, which is an adequate approximation. For example, in the 1970's and early the 1980's, until the Hubble telescope was launched, the many measurements gave stellar distances that were accurate to between 25% and 50%.

It is also comparable to results calculated using spectroscopic parallax where the mean error for the stellar distances of all of the stars obtained using, ε_{dsTot}, is 20.90%. However, since most of the periodic stars are not main sequence stars or white dwarfs, a better comparison is with the results for stars in luminosity classes I through IV. The mean error of the stars in these luminosity classes determined by spectroscopic parallax is 25.94% which is significantly larger than that for periodic star.

Luminosity Classes	Type of Variable Star	N_{SPds}	ε_{Msj}(%)
Iab-Ib	Type I Cepheid Variables	7	20.55
Ib	Type II Cepheid Variables	1	7.14
V	Dwarf Cepheid Variables	5	8.63
III	RR Lyrae Stars	1	20.98
III-IV	β Cepheid Variables	9	18.28
	Long Period Variables		
III	Mira Variables	4	25.79
I-III	Semi-Regular Variables	6	10.72
III	Carbon Stars	2	21.71
I-V	All Periodic Stars	35	16.87
I-VII	Using Spectroscopic Parallax	384	20.90
II-IV	Using Spectroscopic Parallax	103	25.94

Table 2 Comparison of Results for the Stellar Distances

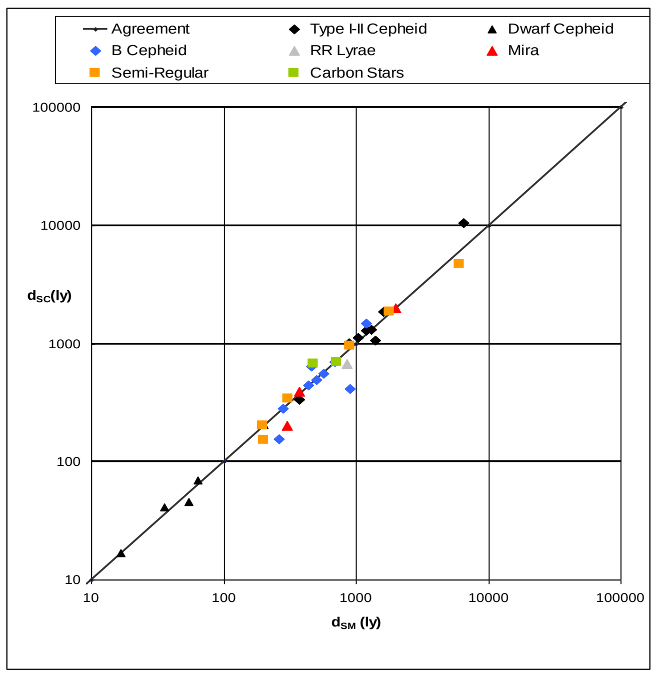

Figure 3 Comparison of Results – Stellar Distances

* * *

NASA Space Place

Surprising Young Stars in the Oldest Places in the Universe

By Dr. Ethan Siegel

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!

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!

Globular Cluster NGC 6397. Credit: ESA& Francesco Ferraro (Bologna Astronomical Observatory) / NASA, Hubble Space Telescope, WFPC2.

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.](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*.

* * *

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

* * *

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.

Name:
____

Address:

____

____

Phone:
____

Email:
____