



# BACK BAY observer

The Official Newsletter of the Back Bay Amateur Astronomers  
P.O. Box 9877, Virginia Beach, VA 23450-9877

## EPHEMERALS November 2013

11/22  
Skywatch  
Northwest River Park

12/06, 7:30 pm  
BBAA Monthly Meeting  
TCC Campus, VA Beach  
Building J, Rm. JC-12

12/07  
Nightwatch  
Chippokes State Park  
Surry, VA

12/14, Noon  
Fire & Vine Restaurant  
VA Beach  
[\(Directions & Sign-up Info Here\)](#)



## Looking Up!

Have you caught comet fever yet? Quite a few of us amateur astronomer types have had comets-on-the-brain since the first wildly exuberant predictions last year that Comet ISON was to be the 'comet of the century'.

Not that that meant anything, of course. Comets are notorious for having a mind of their own. As BBAA's guru member Kent Blackwell put it, "Comets are like cats, they do exactly what they want." How right he was!

For months it seemed that ISON would play hard to get, staying well below brightness predictions. Online astronomy forums were filled with posts by numerous star gazers complaining that they had been duped. At the East Coast Star Party, Nick Anderson and I viewed ISON and found it to be nothing special, merely an also-ran next to the stunning Comet Lovejoy. But that was then.

Just the other day a post on the BBAA forum from member Ted Forte alerted us that ISON had brightened by two magnitudes practically overnight! Excitedly, I awoke at 4:30 AM the next morning to see for myself, and ISON did not disappoint. I was wowed with how bright it had become since I last viewed it. The tail was easily seen, and quite bright with averted vision. It was long and thin and reminded me of the flame from a blow torch. The coma was very bright and compact and glowed with an otherworldly green.

Is the increase in brightness an outburst or is ISON breaking up? Will it survive perihelion? No one knows, but it's exciting that we can watch for ourselves. And if it's cloudy, no worries, you can still follow what's happening via the [BBAA forum](#), [Sky & Telescope's updates](#) and astrophotographer, [Damian Peach's amazing images](#).

Until next time, clear skies, y'all, *Paul Tartabini*

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## How to Hunt for Your Very Own Supernova!

By Dr. Ethan Siegel

In our day-to-day lives, stars seem like the most fixed and unchanging of all the night sky objects. Shining relentlessly and constantly for billions of years, it's only the long-term motion of these individual nuclear furnaces and our own motion through the cosmos that results in the most minute, barely-perceptible changes.

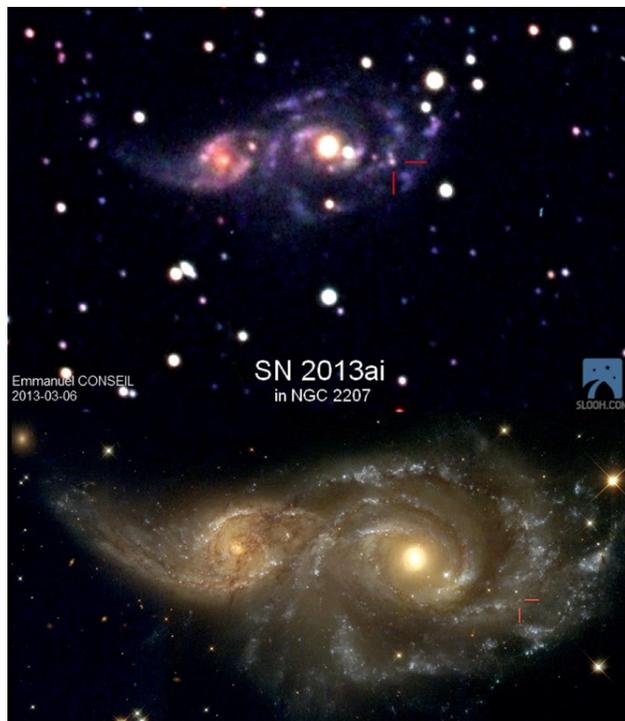
Unless, that is, you're talking about a star reaching the end of its life. A star like our Sun will burn through all the hydrogen in its core after approximately 10 billion years, after which the core contracts and heats up, and the heavier element helium begins to fuse. About a quarter of all stars are massive enough that they'll reach this giant stage, but the *most* massive ones -- only about 0.1% of all stars -- will continue to fuse leaner elements past carbon, oxygen, neon, magnesium, silicon, sulphur and all the way up to iron, cobalt, and nickel in their core. For the rare ultra-massive stars that make it this far, their cores become so massive that they're unstable against gravitational collapse. When they run out of fuel, the core implodes.

The intruding matter approaches the center of the star, then rebounds and bounces outwards, creating a shockwave that eventually causes what we see as a core-collapse supernova, the most common type of supernova in the Universe! These occur only a few times a century in most galaxies, but because it's the most massive, hottest, shortest-lived stars that create these core-collapse supernovae, we can increase our odds of finding one by watching the most actively star-forming galaxies very closely. Want to maximize your chances of finding one for yourself? Here's how.

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Pick a galaxy in the process of a major merger, and get to know it. Learn where the foreground stars are, where the apparent bright spots are, what its distinctive features are. If a supernova occurs, it will appear first

as a barely perceptible bright spot that wasn't there before, and it will quickly brighten over a few nights. If you find what appears to be a "new star" in one of these galaxies and it checks out, report it immediately; you just might have discovered a new supernova!



SN 2013ai, via its discoverer, Emmanuel Conseil, taken with the Slooh.com robotic telescope just a few days after its emergence in NGC 2207 (top); Image by NASA, ESA and the Hubble Heritage Team (STScI) of the same interacting galaxies prior to the supernova (bottom).

This is one of the few cutting-edge astronomical discoveries well-suited to amateurs; Australian Robert Evans holds the all-time record with 42 (and counting) original supernova discoveries. If you ever find one for yourself, you'll have seen an exploding star whose light traveled millions of light-years across the Universe right to you, and you'll be the *very first* person who's ever seen it!

Read more about the evolution and ultimate fate of the stars in our universe at <http://tinyurl.com/SNhunt>

The Back Bay Amateur Astronomer's  
**Observer**

The BBAA Observer is published monthly; the monochrome version is mailed to members who do not have internet access. Members who do have Internet access can acquire the full color version on the Internet at <http://www.backbayastro.org/observer/newsletter.shtml>

Please submit articles and items of interest no later than the date of the monthly meeting in order to be in the next month's edition.

Please submit all items to:  
bbaa.newsletter@gmail.com or BBAA Observer, P.O. Box 9877, Virginia Beach, VA

**President**  
Courtney Flonta  
757-580-0644  
president@backbayastro.org

**ALCOR**  
Bill McLean  
alcor@backbayastro.org

**Vice President**  
Chuck Jagow  
vp@backbayastro.org

**Librarian**  
Bill Newman  
billn59@verizon.net

**Treasurer**  
Jim Tallman  
treasurer@backbayastro.org

**Scholarship Coordinator**  
Ben Loyola  
benito@loyola.com

**Secretary**  
Kevin Swann  
757-424-6242  
kjswann@yahoo.com

**RRRT Coordinator**  
Lawrence "Bird" Taylor  
Lawrence.W.Taylor@nasa.gov

**Webmaster**  
Nick Anderson  
nranderson.deepskyobserver@gmail.com

**Newsletter Editor**  
Paul Tartabini  
bbaa.newsletter@gmail.com

## BBAA Meetings

The BBAA meet the first Thursday of every month except for July. While school is in session, we meet at the VA Beach TCC Campus. The December 5, 2013 meeting will be held at TCC in Virginia Beach, Building J, Room JC-12 at 7:30 PM.

Directions available at [www.backbayastro.org](http://www.backbayastro.org)

## BBAA Internet Links

BBAA Website  
[www.backbayastro.org](http://www.backbayastro.org)

Yahoo! Groups  
[tech.groups.yahoo.com/group/backbayastro](http://tech.groups.yahoo.com/group/backbayastro)

BBAA Observer Newsletter  
[www.backbayastro.org/observer/newsletter.shtml](http://www.backbayastro.org/observer/newsletter.shtml)

## October 3, 2013 BBAA Meeting Minutes

The Meeting at TCC was called to order at 7:29 PM by President Courtney Flonta.

Those in attendance were: Neill Alford, Bob Beuerlein, Ken Broun, Courtney Flonta, Mark Gerlach, Jeff Goldstein, Bill Holmes, Chuck Jagow, Karen Jagow, Chris Jarvis, Thomas Jarvis, Curt Lambert, Ben Loyola, Matt McLaughlin, Bill McLean, Joey Quinn, George Reynolds, Kevin Swann, Matt Swingle, Jim Tallman, Bird Taylor and Mike Webster

### Calendar:

- Oct. 31— Nov. 3, East Coast Star Party, Coinjock, NC (partial solar eclipse)
- Nov. 2, Sat., Nightwatch @ Chippokes, 5:00PM

- Nov. 7, Thu., Monthly Meeting @ TCC, 7:30PM
- Nov. 8, Fri., Garden Stars @ Norfolk Botanical Gardens, 7:00 PM
- Nov. 22, Fri., Skywatch @ Northwest River Park, Equestrian Area, 4:00 PM
- Dec. 5, Thu., Monthly Meeting @ TCC, 7:30 PM
- Dec. 7, Sat., Nightwatch @ Chippokes, 5:00 PM
- Dec. 14, Sat., BBAA Anniversary Luncheon @ Fire & Vine Restaurant, Noon.

### Treasurer's Report

General fund	1254.44
Scholarship fund	1203.67
Total	2458.11

[Continued on page 4](#)

## October Meeting Minutes, continued from page 3

- We are awaiting Boardwalk Astronomy check.
- Two motions were made not to read the Secretary's report.

### Visitors

No visitors were noted.

### Astronomical League Correspondent

- Nick Anderson completed: Binocular Messier, Deep Sky Binocular & Lunar Programs.

### Scholarship

- \$1500 was awarded last year but should this year be greater or the same? Does all boardwalk money earned need to go to one fund? Can it be moved to another fund? It was suggested 60/40 scholarship fund/general fund.
- The scholarship amount is set after boardwalk astronomy payments are in. The income is \$200 or \$250/event having 4 or 5 events. In the past, general expenses were made through membership dues but this year it came very very close. BBAA was 100 members but now we are 80. Ben Loyola suggested bringing the most recent Treasurer's report to the next meeting which will be a business meeting. Matt McLaughlin suggested possibly increasing dues.
- Motion to table this discussion until the next meeting was 1st/2nded.
- Scholarship committee members are voted in every year per by-laws. Next month's meeting will elect these members also.

### Old Business

- President & secretary positions must be vacated due to 2 year limit.
- Treasurer & Vice President positions are up for election also but they can extend for 1 more year. Note: the treasurer will need to be "Pay Pal" savvy.
- Nominations for the following positions were taken:

Ben Loyola for scholarship committee chair  
Matt McLaughlin for scholarship committee  
Bill McLean for scholarship committee  
Jim Tallman for president

- Royal Astronomy Society of Canada (RASC) Handbook is \$24 each. It is an annual magazine (since 1907) with monthly events & a chapter on sun, moon & planets. 12 people put in requests for it.

### New Business

None was discussed.

### Observing reports:

- Jim Talman was at Northwest River State Park where many people visited. Even non-members brought their own scopes. Viewing was ok until clouds took over.
- Bird Taylor was at a church camp near Toano where they had an 8' dome with a 12" Meade that does astro-imaging. They got to view Orion & a little more.
- This evening's raffle winner was Chuck Jagow who won a book (field guide) titled: *Stars & Planets*.

### Presentation

Ben Loyola on binoculars

- He mentioned Porro prism style were better than Roof prism due to less light loss.
- Anti-reflective coatings are also better.
- He recommended binoculars as a good start to familiarize oneself with the sky.
- He showed a diagram showing Uranus close to Pegasus at this time. This was used as a guide after the meeting.
- At the end of his presentation, he gave away a star chart field disk & a small set of binoculars.

The meeting was adjourned at 8:25 PM

- After the meeting approximately 4 binoculars were setup in an adjacent field for viewing. M31 & Uranus were viewed.

*Minutes taken by Secretary, Kevin Swann*

# Dark Energy and our Evidence for the Accelerated Expansion of the Universe

By Nick Anderson

Supernovae constitute the violent death of stars (see [pg. 2](#)), and their random occurrences have grabbed our attention for millennia, even when we had no explanation as to the origins of these bright “guest stars”. These events release high-energy radiation and cosmic rays, which if close enough to Earth, could destroy our ozone layer and inevitably life itself.

Not all stars, however, are massive enough to fuse into heavier elements -- including eventually iron -- to end their lives as a massive supernova. Instead their cores become degenerate (a collection of non-interacting particles) before reaching the required ignition temperature for additional nuclear fusion into heavier elements. The fuel-exhausted star's outer gas layers are then ejected into space—where they can become ionized as a planetary nebula—and all that remains is the degenerate core: a white dwarf star.

Most white dwarf stars quietly cool off over billions of years, but this is not the case for all. Some may receive additional mass from a companion star. Due to the balance of gravity directed inward and electron degeneracy pressure (at the quantum level) directed outward, a white dwarf will collapse and explode as a different kind of supernova should its mass exceed 1.4 solar masses, an upper mass limit known as the Chandrasekhar limit.

*By looking into the past, we see that the Universe was not expanding at the same rate as it is today.*

*The plot on the right shows the size of the Universe (relative to today) versus time. Present time is located near the center, on the dotted line. The data points (black dots) denote observed white dwarf supernovae. Hubble's Law holds that the universe is expanding at a constant rate. If that were always true, the data points would lie on a straight line. Instead, they lie on a curve that appears to be steepening, suggesting the expansion rate of the universe is actually accelerating. (source: Berkeley Lab)*

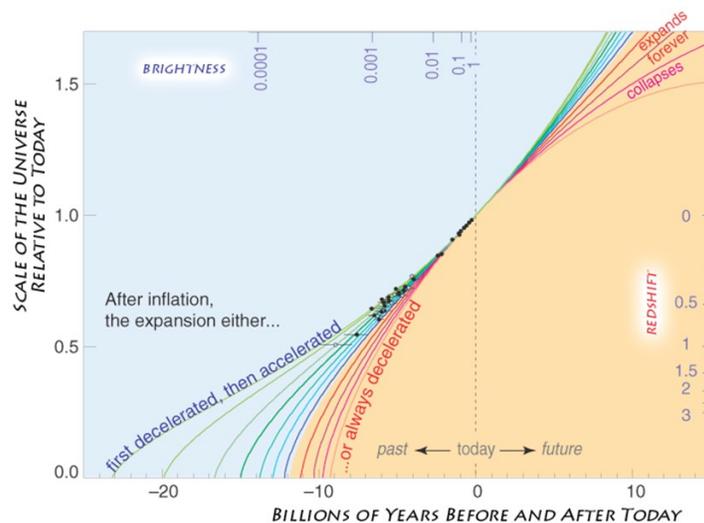
Because these specific supernovae consistently consume the same amount of mass, each will always have the same peak luminosity. This is important for cosmologists because white dwarf supernovae can be used as “standard candles” for measuring distances. In order to calculate the distance to an object with a known intensity, all that one must do is solve for the distance using the inverse square law of light:

$$I \propto \frac{1}{d^2}$$

In the 1990's, the first-ever systematic survey of white dwarf supernovae was performed, and its results toppled the model of the Universe that was accepted at the time. Researchers calculated the distances to each of the supernovae and measured their redshifts, then compared them to the expected redshift values at each distance (as dictated by Hubble's law).

The results were quite surprising. By plotting observed redshift values with the calculated distances, it became clear that not only that the Universe wasn't expanding at a constant rate, but the rate was actually accelerating! This is illustrated in the plot below:

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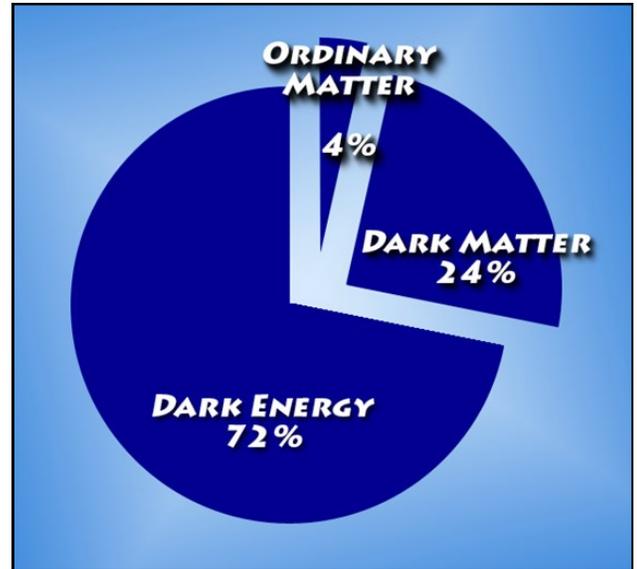


## Dark Energy, continued from page 6

In order to explain this unexpected result, the concept of “dark energy” was developed. It is postulated to permeate all space and be the cause of the Universe’s accelerating expansion rate. Unlike gravity forces we observe elsewhere, dark energy’s gravitational force is repulsive rather than attractive.

Dark matter (a different bizarre cosmological construct) and dark energy both make up over 95% of all mass in the Universe. So where does that leave the remaining 4-5%? Well, that’s more or less all just a bunch of hydrogen and helium .

*BBAA member, Nick Anderson is currently a physics major at Virginia Tech and hopes to pursue a career in cosmology.*



The distribution of mass in the Universe.

## Making a Dew Heater Junction Box | Jim Tallman

With the weather being bad this weekend, I decided I would get some things ready for the East Coast Star Party. I needed a second Dew Heater junction box and I didn’t want to buy an expensive controlled one, so I decided to make my own today. I did this last year with BBAA members Paul Tartabini and Nick Anderson, but I didn’t make one for myself.

I headed out to Radio shack in the morning and grabbed the parts I needed. I picked up one

project box, two bags of RCA female jacks, and a bag of RCA Male plugs -- total cost about \$25. You will also need some thin wire, a soldering iron, solder, wire cutters, and wire strippers.

**Step one:** Decide how many output jacks you will have. I decided on four so I drilled four holes and one extra for the input jack. I then inserted the jacks and tightened everything down. (interior of box shown in Fig 1)

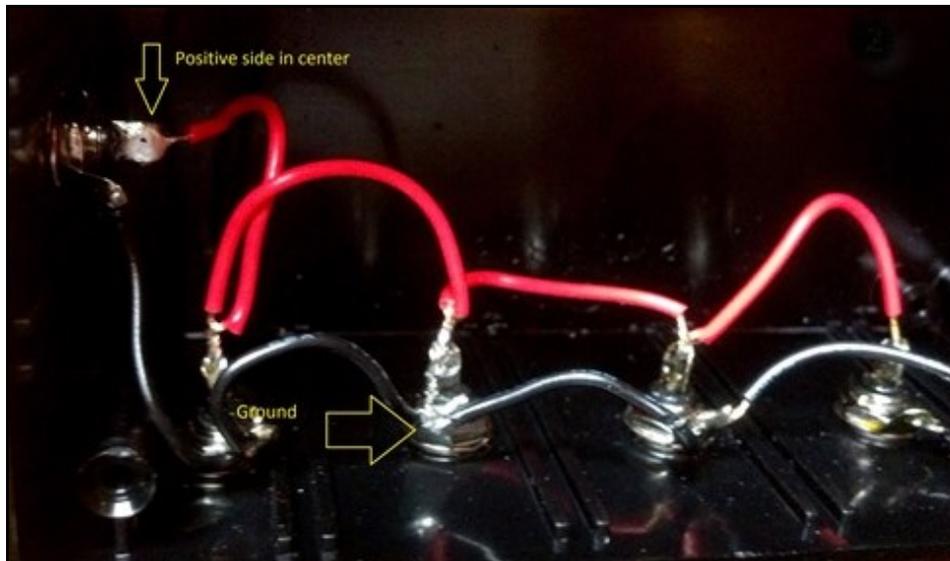
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Figure 1

## Dew Heater Junction Box, continued from page 6

**Step two:** Cut your wire into small sections and strip each end. I twisted mine together in a chain to make soldering easier. Once stripped and twisted together I “tinned” the ends. Tinning is a process where you flow solder into the braided wire to make it solid. I then soldered the red wire ends into the centers of each of the RCA jacks, and I soldered the ends of the black wires onto the ground post of each RCA jack. (Fig 2).



*Figure 2*

**Step three:** Check your work and close up your new junction box. (Fig 3).



*Figure 3*

For a power input cable you can make a cable using an old thin household extension cord. Just cut it the length you want. Strip and tin both ends, then put a male DC auto plug on one end and one of the RCA plugs on the other end. You could also just skip the input plug on the box, and hardwire your 12 volt DC wire directly into the box and leave off the input jack; it's up to you. This is a fun project to do on a cloudy day!



## November-December 2013

BBAA Events	Special Outreach	Astronomical Events
11/22 SkyWatch @ Northwest River Park		11/17 Full Moon
12/06 BBAA Monthly Meeting		11/25 Last Quarter
12/07 Nightwatch @ Chippokes State Park		11/28 Comet ISON Closest Approach to the Sun
12/14 <a href="#">Anniversary Luncheon</a> , Fire & Vine, VA Beach		12/02 New Moon
		12/09 First Quarter
12/27 SkyWatch @ Northwest River Park		12/13 Geminids Peak