



BACK BAY observer

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

EPHEMERALS january 2014

1/02, 7:30 pm
BBAA Monthly Meeting
Virginia Beach Planetarium
Plaza Middle School, VA Beach

1/04
Nightwatch
Chippokes State Park
Surry, VA

1/10, 7:00 PM
Garden Stars
Norfolk Botanical Gardens

1/24
Skywatch
Northwest River Park



Looking Up!

Editor's Note: This month's Looking Up column was written by newly elected Vice President, George Reynolds.

Greetings! The holiday season has come and gone once again. Best wishes for a prosperous New Year, with lots of clear, dark nights.

This column is traditionally entitled, "Looking Up", for a couple of reasons. Of course, as astronomers we are always looking up into the skies, at the awesome array of stars, planets, galaxies, nebulae (or nebulae), and the occasional comet. But also, I have found that amateur astronomers are among the most optimistic people in the world. Yes, we are always "looking up". We anticipate good conditions for our observing sessions. Even when the weather forecast is bad, we are optimistically looking and hoping for clear, dark skies. Amateur astronomers are among the most helpful and friendly people I know of. When visitors come, we share the views through our telescopes. When a newbie comes, we try to help him or her in any way we can, answering questions, giving guidance, sharing our knowledge and experience. Need an eyepiece? You can borrow one of mine. Need a filter? You can use one of mine. Yes, in many ways we follow the advice of the immortal Jack Horkheimer, Stargazer, whose motto was, "Keep looking up."

But as amateur astronomers, we also need to keep looking around. When Chuck Jagow goes stargazing out in the wilds of Colorado, he carries a gun, in case of a visit by a wolf or a bear. When we are out in a dark spot, we need to look around to keep from tripping on something or stepping in a hole. It's a good idea to set up or at least reconnoiter a new site before the sun goes down.

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December 5, 2013 Meeting Minutes

The Meeting at TCC was called to order at 7:30 PM by president Courtney Flonta.

Those in attendance were: Robert Beuerlein, Kenny Broun, Tom Flatley, Courtney Flonta, Mark Gerlach, Bill Holmes, Chuck Jagow, Chris Jarvis, Thomas Jarvis, Leigh Anne Lagoe, Matt McLaughlin, Joey Quinn, George Reynolds, Kevin Swann, Jim Tallman, Paul Tartabini, Bird Taylor.

Visitors: Michelle Phillips & Janice Taylor, who are in town for awhile from the New York area.

Calendar

- Jan 2 (Thu) Monthly Meeting, KIVA Room at Plaza Middle School in VA Beach, 7:30 PM
- Jan 4 (Sat) Nightwatch @ Chippokes, 5:00 PM
- Jan 10 (Fri) Garden Stars @ Norfolk Botanical Gardens, 7:00 PM
- Jan 24 (Fri) Skywatch @ Northwest River State Park, Equestrian Area, 5:00 PM
- Feb 6 (Thu) Monthly Meeting @ TCC, 7:30 PM
- Feb 21 (Fri) Greenbrier Middle School Science Night
- Chuck Dibbs is the Virginia Beach Parks and Recreation Coordinator for Boardwalk Astronomy and he stated for the 2014 year, the city prefers to keep Tuesday as the primary & Thursday as the secondary days.
- Virginia Beach SPCA requested 'Animals in the Night Sky' presentation again. George Reynolds presented it 2 years ago. We will schedule it.

Treasurer's Report

- General Fund \$1659.24
- Scholarship Fund \$2374.67
- Total \$4033.91
- \$1000 outreach check was received.

Observing Reports

- At the Fall East Coast Star Party, Comet ISON was observed. Comet Lovejoy also provided good views to star party attendees.

- Bird Taylor showed a few pictures from James Bittner's Eagle Scout Project: Installation of a Personal Observing Dome (POD) at the Grundland Astronomical Park (GAP) in Hampton, VA. Bird described how James raised \$500 for mounting hardware and led a team of Scouts and volunteers in assembling the POD at the GAP on Nov. 24 when the dome installation was completed. More pictures are on the VPAS website (<http://groups.yahoo.com/groups/vpas>). The City of Hampton plans to pay for a 20'x20' deck that will eventually include four concrete pier observing stations. The project was made possible with the donation of the POD by the late Cecil Nichols (former BBAA member).

New Business

- ALCOR – Nick Anderson earned the Master Observer award. He's the 3rd to earn it from BBAA.
- The meeting was adjourned at 8:02PM to the Planetarium for the evening presentation.
- Kenny Broun operated the Planetarium and gave us a star tour highlighting the prior locations of Comet Ison before it died in the sun. He also showed current and future locations of Comet Lovejoy.
- Following the sky tour, he showed three Planetarium presentations for our viewing entertainment: "The Story of the Pleiades", "The Secret Lives of Stars" and "Schrodinger's Birds"

Minutes taken by Secretary Kevin Swann.

Editor's Note: This is the last set of meeting minutes by BBAA Secretary **Kevin Swann** as his two-year term ends this month. Special thanks to Kevin who admirably took a key officer role despite having a job that frequently keeps him out of town.

Also, special thanks to our other retiring officer, President **Courtney Flonta**. Courtney brought abundant enthusiasm and new ideas to BBAA. We wish her well and look forward to interacting with her as a fellow club member in the coming years.

The other two officers, **Chuck Jagow** and **Jim Tallman**, have recently been elected to different officer positions (see page 7).

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:

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BBAA Meetings

The BBAA meet the first Thursday of every month except for July. The next meeting will be held on Jan. 2, 2014 in the [Virginia Beach City Public Schools Planetarium](#) at [Plaza Middle School](#) located at 3080 South Lynnhaven Rd in Virginia Beach at 7:30 pm.

BBAA Internet Links

BBAA Website
www.backbayastro.org

Yahoo! Groups
tech.groups.yahoo.com/group/backbayastro

BBAA Observer Newsletter
www.backbayastro.org/observer/newsletter.shtml

Looking Up, continued from page 1



George Reynolds teaching a new generation the joy of "Looking Up" at one of the countless outreach events he has supported over the years.

A couple of years ago, while staying at our timeshare in Williamsburg, next to a golf course, I took my scope out on the ninth tee to look at the stars. Before I knew it, I was getting wet! The timed sprinkler system had come on. I grabbed my scope and hightailed it off the course, laughing all the way. I'll say it again: If you go to an unfamiliar observing site, it's a good idea to get there before dark, and look around for obstacles: holes to fall in, logs to trip over, and other potential ankle-busters. You might also want to watch out for sprinklers! And don't forget to...

KEEP LOOKING UP!

George Reynolds

The Most Volcanically Active Place is Out-of-this-world!

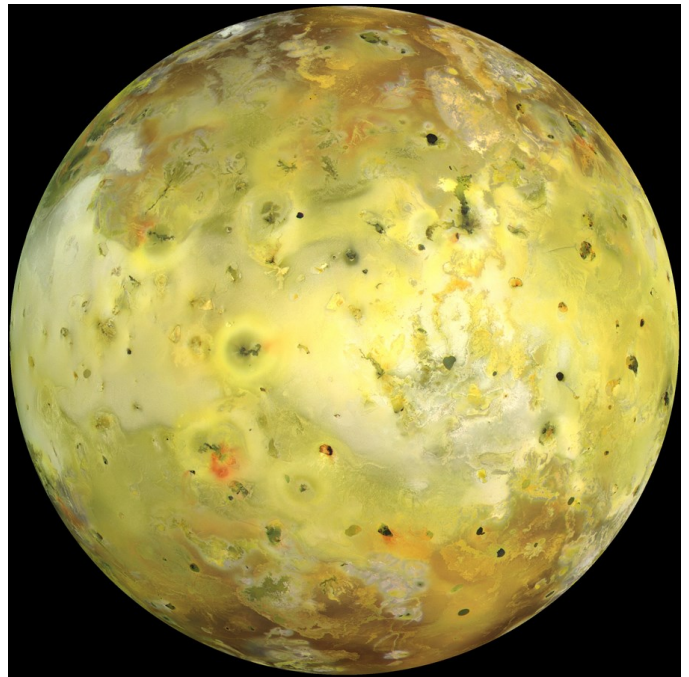
By Dr. Ethan Siegel

Volcanoes are some of the most powerful and destructive natural phenomena, yet they're a vital part of shaping the planetary landscape of worlds small and large. Here on Earth, the largest of the rocky bodies in our Solar System, there's a tremendous source of heat coming from our planet's interior, from a mix of gravitational contraction and heavy, radioactive elements decaying. Our planet consistently outputs a tremendous amount of energy from this process, nearly three times the global power production from all sources of fuel. Because the surface-area-to-mass ratio of our planet (like all large rocky worlds) is small, that energy has a hard time escaping, building-up and releasing sporadically in catastrophic events: volcanoes and earthquakes!

Yet volcanoes occur on worlds that you might never expect, like the tiny moon Io, orbiting Jupiter. With just 1.5% the mass of Earth and despite being more than one quarter of the Earth's diameter, Io seems like an unlikely candidate for volcanoes, as 4.5 billion years is more than enough time for it to have cooled and become stable. Yet Io is anything but stable, as an abundance of volcanic eruptions were predicted before we ever got a chance to view it up close. When the Voyager 1 spacecraft visited, it found no impact craters on Io, but instead hundreds of volcanic calderas, including actual eruptions with plumes 300 kilometers high! Subsequently, Voyager 2, Galileo, and a myriad of telescope observations found that these eruptions change rapidly on Io's surface.

Where does the energy for all this come from? From the combined tidal forces exerted by Jupiter and the outer Jovian moons. On Earth, the gravity from the Sun and Moon causes the ocean tides to raise-and-lower by one-to-two meters, on average, far too small to cause any heating. Io has no oceans, yet the tidal forces acting on it cause the world itself to stretch and bend by an astonishing **100**

meters at a time! This causes not only cracking and fissures, but also heats up the interior of the planet, the same way that rapidly bending a piece of metal back-and-forth causes it to heat up internally. When a path to the surface opens up, that internal heat escapes through quiescent lava flows and catastrophic volcanic eruptions! The hottest spots on Io's surface reach 1,200 °C (2,000 °F); compared to the average surface temperature of 110 Kelvin (-163 °C / -261 °F), Io is home to the most extreme temperature differences from location-to-location outside of the Sun.



Io. Image credit: NASA / JPL-Caltech, via the Galileo spacecraft.

Just by orbiting where it does, Io gets distorted, heats up, and erupts, making it the most volcanically active world in the entire Solar System! Other moons around gas giants have spectacular eruptions, too (like Enceladus around Saturn), but no world has its surface shaped by volcanic activity quite like Jupiter's innermost moon, Io!

Learn more about Galileo's mission to Jupiter: <http://solarsystem.nasa.gov/galileo/>.

Running Late in a Relativistic Spaceship | Nick Anderson

Ever been bothered by time-pressed commuters that recklessly drive at high speeds on the interstate just to save a few minutes time on their way to work? Ever wanted to watch them get to work later than if they had just gone the speed limit in the first place? Their trick might work some of the time, but it won't play out every time, thanks to the sweet karmic payback ensured by the laws of special relativity!

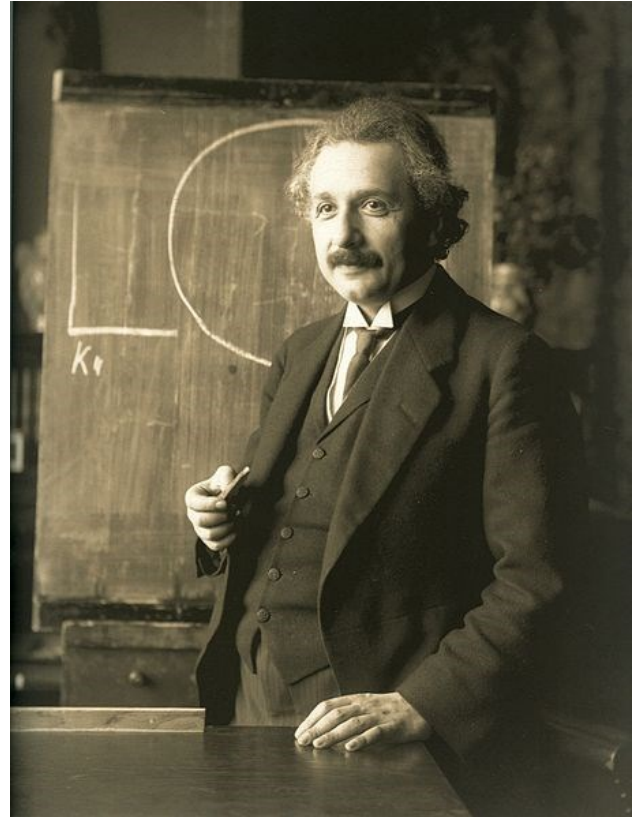
Albert Einstein first published his "Special Theory of Relativity" in 1905. It tied together a major problem in physics at the time: the assumption that physics behaves the same if you are traveling at any constant velocity and the observed invariable speed of light, regardless of how fast one travels toward or away from a light source. He noted that Isaac Newton's explanation of mechanics was only an approximation and only worked well for velocities far below the speed of light. Special relativity begins to make a major difference once speeds exceed one-tenth of the speed of light.

Let's say you're running late for work in the Alpha Centauri star system, and your only means to get there is a spaceship that can travel at relativistic speeds. You want to get there as fast as possible, but you sit back and think for a minute: although it might be human instinct to travel at the fastest speed possible, this will not be the shortest amount time for your impatient boss, due to time dilation as a result from special relativity. The increased speed will only mean a decreased time in *your* reference frame, not necessarily the one that your boss is in.

So what is the optimal speed to go so that the least amount of time passes by for your boss (i.e., so that you arrive as early as possible according to *his* clock, the only one that counts)?

We will first approximate this problem by assuming you travel directly from the Solar System to the Alpha Centauri system and that there is no interstellar commuter traffic, meaning you travel at a constant velocity throughout your journey. Our goal is to figure out when the effects of special relativity begin to surpass the effects of increased velocities and it no longer pays to go faster.

For our discussion, it is useful to introduce the



Albert Einstein in 1921.

concept of the relativistic factor (denoted by the Greek letter, γ). It measures the extent in which time differs between observers in different reference frames. In everyday situations, we are accustomed to a γ of 1. When $\gamma = 1$, going twice as fast results in getting to your destination in half the time in any reference frame, whether you are driving or waiting at the destination. However, once we reach velocities around one-tenth the speed of light, everyday physics starts to become distorted and special relativity must be factored into our physics calculations.

From the Special Theory of Relativity, the relativistic factor, γ , can be determined from the following equation:

$$\gamma = \frac{1}{\sqrt{1 - v^2/c^2}}$$

Where v is the velocity you are traveling and c is the speed of light. As velocities approach the speed of light, the relativistic factor gets increasingly greater than 1, and approaches infinity when $v = c$.

Relativistic Spaceship, continued from page 5

When γ becomes significantly larger than 1.0, the effect of *time dilation* becomes noticeable. Time dilation refers to the difference between the “proper time” as measured by the moving observer and the time measured in a non-moving frame of reference. In our situation, “Commuter Time” is the proper time measured by the commuter driving the spaceship, and “Boss Time” is the time measured by the boss in the Alpha Centauri system, which, to him at least, is a non-moving reference frame.

The relation between these two times is given by the following formula:

$$\text{Boss Time} = \gamma * (\text{Commuter Time})$$

In order to solve for the optimal speed of our relativistic spaceship, we will consider traveling at different speeds ranging from 10% to 100% of the speed of light. Once our speed is selected, we can compute “Commuter Time” by dividing the distance we are going (4.4 light years to Alpha Centauri) by the speed:

$$\text{Commuter Time} = \frac{\text{distance}}{\text{speed}}$$

Now all we have to do is plug into the equations to solve for “Boss Time” for each of the corresponding velocities:

Speed (% speed of light)	Relativistic Factor, γ (no units)	Commuter Time (Years)	Boss Time (Years)
0.00%	1.00	∞	∞
10.00%	1.01	44.00	44.22
20.00%	1.02	22.00	22.45
30.00%	1.05	14.67	15.37
40.00%	1.09	11.00	12.00
50.00%	1.15	8.80	10.16
60.00%	1.25	7.33	9.17
70.00%	1.40	6.29	8.80
70.71%	1.41	6.22	8.80
80.00%	1.67	5.50	9.17
90.00%	2.29	4.89	11.22
100.00%	∞	4.40	∞

While the velocity increments are a constant increase, the relativistic factor, γ , becomes increasingly inflated and the “Commuter Time” diminishes at a decreased rate. While the “Boss Time” initially lessens, it reaches a minimum at a speed near 70% of the speed of light before beginning to increase. In actuality, the optimal speed happens to be precisely $\sqrt{2}/2c$ (approximately 70.7% the speed of light).

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In conclusion, you might wonder how late you will be for work: with the Alpha Centauri system 4.4 light years away, it will take you a minimum of 8.8 years (as observed by the boss) to get there. It's probably best that you look for another job!

Meet Our New Officers!

Jim Tallman (President) - Jim has been a member of the BBAA since 2010 and has served as club treasurer twice since then. He lives in the Ocean View area of Norfolk and owns a variety of telescopes. Jim enjoys helping out at outreach events and usually hosts the monthly Skywatch at Northwest River Park. He is currently straying into the "dark side" of the hobby and trying out astrophotography. He hopes that 2014 will be an exciting and busy year for the BBAA.



George Reynolds (Vice President) - George has been a member of the BBAA since 2000, and was the first one in the club to earn the Lunar Award (the first BBAA lunatic!). He is also a "Solar System Ambassador", a volunteer with NASA to tell people about space and space exploration. In his shed and garage he has a slew of telescopes, some of which were gifts (a Tasco and other "starter" department-store scopes). His own telescopes include an Orion 10" IntelliScope, Celestron Omni XLT150 Newtonian, Orion 5" refractor, Orion 90-mm Maksutov-Cassegrain, Orion 4.5" Dobsonian reflector, and Orion ShortTube 80-mm refractor. He also has a collection (accumulation?) of binoculars: several pairs of low-cost 10x50 binos, Simmons 8x21, Vivitar 5x30, Barska 15x70, and his favorite, Orion 8x42 binoculars. He wishes he had stock in the Orion Telescope and Binocular Company.



Chuck Jagow (Treasurer) - Chuck joined the BBAA in January of 2004 after his wife bought him a ETX-70 for Christmas. That fall Chuck was elected as club Secretary. While serving as Secretary Chuck took over the BBAA Newsletter. When his stint as Secretary was over he was elected as Vice President. While serving as VP he was instrumental in setting up the web site (backbayastro.org). After finally moving the Newsletter to Erica Smith-Llera and the web page maintenance to Nick Anderson, Chuck was elected as Treasurer. Due to commitments at work Chuck only served one year as Treasurer. After a year of just being a regular member he was again elected as Vice President, and in the true nature of things he was again elected in Nov. 2013 as Treasurer. Chuck also tried very hard to own as many telescopes as possible in his search for just the right ones. During this quest for the "right scope", he bought and sold many telescopes. Many of the members still have and use some of these scopes. Chuck finally settled on his 14" Orion goto Dob and his Orion 127mm & 80mm refractors for imaging. He still has a Meade LX-200GPS and the original ETX-70 his wife started this all with.



Leigh Anne Lagoe (Secretary) - Leigh Anne joined the BBAA in April 2013. Leigh Anne has had a fascination with looking up for most of her life. But it wasn't until 2011, when she purchased her first 8 inch dob, that she really started getting involved with the night sky. Favorite viewing includes Jupiter, M42, M13, double star Almach in Andromeda, the thrill of the hunt that is called "star-hopping", and of course pre-dawn meteor showers with coffee and a blanket. She looks forward to all that there is to learn from the more seasoned astronomers, as well as sharing her experiences with others.



January 2014

BBAE Events	Special Outreach	Astronomical Events
1/02 BBAE Monthly Meeting		1/03 Quadrantids Peak
1/04 Nightwatch @ Chippokes State Park		1/07 First Quarter Moon
1/10 Garden Stars @ Norfolk Botanical Gardens		1/15 Full Moon
		1/24 Last Quarter Moon
1/24 Skywatch @ Northwest River Park		1/30 New Moon



Sneak Peek into February

Sat 2/01/2014 Nightwatch at Chippokes State Park, Surry VA.

Thu 2/06/2014 BBAE Monthly Meeting, TCC Campus, 7:30 pm

Fri 2/07/2014 Garden Stars at Norfolk Botanical Gardens, 7:00 pm

Fri 2/21/2014 Skywatch at Northwest River Park