

# Bays Mountain Astronomy Club

☞ *Next Meeting: Sept. 6 @*

*ETSU Observatory* ☞

## REFLECTIONS

Greetings fellow amateur astronomers and friends.

Have you noticed how fast this year is passing? The August meeting was, in my opinion, another wonderful enlightenment into the Cosmos. I hope you were able to attend and hear the interesting topic that our keynote speaker, Dr. Pollock of Appalachian State University, shared with us. During his presentation, he tried to connect with one of the observatories in South America, but they had the dome locked and he could not reach anyone to see if they would open it for the members to view the night sky. Even with the unexpected issue with the dome, I think Dr. Pollock was well received. After the presentation, Dr. Pollock invited the club to come to Appalachian State University campus to their observatory for one of our meetings in the future. I am working with them on the date and time and will announce the details in the next few months.



BY WILLIAM TROXEL

August's Constellation Quest presentation was led by our own Terry Alford. Terry talked about Gemini the Twins.

August was the month that we could have seen the Perseid Meteor Shower. The peak time was to be on August 11-12. We had arranged to go out to Natural Tunnel State Park on the night of the 11th with the rain date as the 12th. Neither night allowed enough clear skies to make the trip over. Maybe we can try again another time.

Like many of you I am still learning about astronomy. I still have to look up more than I can repeat without reference guides. One of my personal goals is to be able to know enough about the night sky to be able to pick out 40% of the celestial objects without help from any reference material. I have decided to try to reach this goal by recording my viewing in journals. I have been looking for a good journal to help me with this task. My first direction was to look for an electronic method. I am still looking for one. I was surfing on the web

## Calendar

### Special Events

Oct. 11-13 *StarFest 2013, our 30<sup>th</sup> Anniversary!* You *must* register in advance with payment to attend this fantastic astronomical convention/star party. See the club's website for details and registration form. Deadline to register is Sept. 20.

### SunWatch

Every Sat. & Sun., 3 - 3:30 p.m.,

Mar. - Oct., weather permitting.

BMACers are always welcome to help.

### StarWatch

Oct. 5, 12, 7:30 p.m.

Oct. 19 & Nov. 2 7 p.m.

Nov. 9, 16, 23, 30 6 p.m.

BMACers are always welcome to help with this nighttime viewing program for the public. Please show up about 30 min. prior to help set up.

### BMAC Meetings

7 p.m., ETSU Observatory

Sep. 6 ETSU Observatory Field Trip; "Remote Astronomy." We'll be using the remote access to far away observatories to make some scientific observations!

7 p.m., BMP Observatory

Oct. 4 6:30 p.m.! Observatory cleanup and observing.

7 p.m., Discovery Theater

Nov. 1 Topic and speaker TBA.

one night and found an astronomical observers log web site that listed a log book that seemed to be the perfect solution. I'll let you know what I think after it has arrived and I've tried it out. The weather has not been working with us very much so far this year. I am hoping that with the fall, I will be able to start recording the night sessions. I will try to bring them with me to StarWatches and meetings to share with anyone who is interested. Maybe they will be something you can work into your sessions as well.

*(Continued on page 5)*

## STAR STUFF

BY TERRY ALFORD

Let's discuss some of the more interesting Solar System events as seen from near latitude  $36^\circ$  North in the September night sky.

Mercury never gets high enough in the western sky to get a good telescopic view. It does have an interesting pairing with Spica on the 24th when they will be just  $\frac{3}{4}^\circ$  apart. You will need a very low western horizon. If it is clear, find bright Venus in the west-southwest. To the right will be Saturn. Take your binoculars and scan to the right a little then down to the horizon. If it is low enough, you should observe that Mercury and Spica are nearly holding hands.

Venus starts the month low in the southwest. On the 5th and 6th, look a couple of degrees to the right and down to see fainter Spica. Binoculars will help. On the 8th, Venus is very close to a 3 day old Moon with a thin crescent. Spica is nearby to the right and Saturn a few degrees to the left. If the sky is clear and transparent, use binoculars or a wide-field scope to spot all four in the same field of view.

Unfortunately, Saturn will "leave us" soon. Saturn moves into Libra on September 1st. On this date, the ringed world is pretty low in the southwest. It will be tough to get a good high-power, telescopic view unless the air is particularly steady. By the end of the month, Saturn will set a little more than an hour after the Sun. Enjoy Saturn while you can!

Mars is small at only  $4''$  wide and doesn't rise until 3 a.m. Its magnitude is about +1.6. It will be fascinating to watch it rapidly move from Cancer to Leo in September. Along the way it passes through M44, the Beehive Cluster. This will be on the mornings of September 8th and 9th. Looks like this might be a good photo opportunity. Another photo opportunity could occur on September 27th when the much awaited Comet ISON (Comet C/2012 S1) passes  $2.0^\circ$  North of Mars. The most optimistic predictions I

have seen say the comet MIGHT be 10th magnitude at this time.

Jupiter rises right after midnight and is high in the sky by dawn. It is fairly bright starting the month at  $-2.0$  magnitude and a diameter of  $34.8''$ . It brightens to  $-2.2$  magnitude and grows to a diameter of  $37.5''$  by the end of September. Jupiter has, by far, the largest apparent diameter of any planet in the Solar System this month.

*(Continued on page 5)*



## StarFest 2013 - 30<sup>th</sup> Anniversary! October 11-13, 2013

Six keynote speakers, 5 fantastic meals, all StarFest activities plus free access to the Park's activities, observing, planetarium shows, a commemorative fleece jacket, a special filter worth \$80 (a gift from Burgess Optical), free sleeping in the Park and more! \$85/person; \$75 for full-time students and those  $\leq 21$ .

We've also arranged for a special rate at the Marriott MeadowView Resort. Follow the link on the website or call 423-578-6600.

Registration for this annual astronomical convention/star party will be open until Sept. 20. You must pre-register with payment to attend.

The registration form is on the website at:

<http://www.baysmountain.com/astronomy/astronomy-club/>.

*HAPPY BIRTHDAY GALILEO-JUPITER IMPACT**BY ROBIN BYRNE*

This month we honor the end of a highly successful mission. I was tempted to replace “Birthday” with “Deathday” in the article title, but that seemed too morbid. Construction of the Galileo spacecraft began in 1977. It was launched from the Space Shuttle Atlantis on October 18, 1989 [Ed.: in which the author and editor witnessed from the Causeway within NASA grounds], arrived at Jupiter December 7, 1995, and ended its mission in spectacular style ten years ago on September 21, 2003.

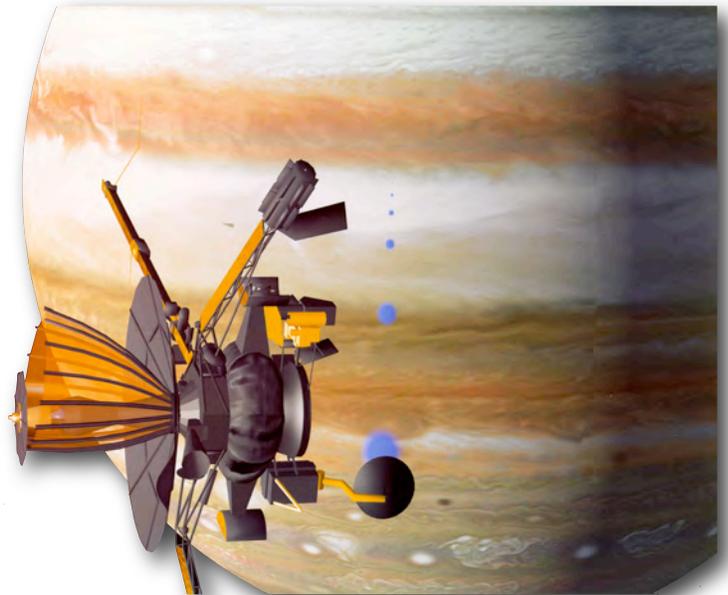
Due to delays in the scheduled launch for a variety of reasons, including the hiatus in Shuttle missions after the Challenger disaster, plus a change in policy concerning the type of boosters allowed on the Shuttle, the planned route to Jupiter for this spacecraft had to be dramatically altered. Instead of a fairly direct path using a more powerful booster, a highly ingenious circuitous path was taken, using gravity assists from Venus, and twice from Earth. This resulted in two passes into the Asteroid Belt, with Galileo chalking up important firsts each time. The initial trip into the Asteroid Belt provided the opportunity for the first fly-by of an asteroid - Gaspra. The second trip, which was passing through the belt toward Jupiter, allowed Galileo to fly near the asteroid Ida. This led to the discovery of the first known moon orbiting an asteroid - Ida's moon, Dactyl.

En route to Jupiter, Galileo was positioned for another important observation: it was the only object in our Solar System in the right place to directly observe Comet

Shoemaker-Levy 9 impact Jupiter in 1994. From Earth, all of the impacts would occur on the side facing away from us, and then the impact sites would rotate into view a few hours later. Galileo was aligned with the impact sites directly and sent back stunning images of the collision.

Five months prior to Galileo arriving at Jupiter, it released a small probe to enter Jupiter's atmosphere and send back data. Without any braking, the 750 pound device plunged into the cloud tops at a speed of almost 30 miles per second. Slowing to subsonic speeds in less than 2 minutes, the spacecraft experienced an acceleration of 230 g's. For 58 minutes, it traversed 98 miles of Jupiter's upper atmosphere, sending back data until pressures 23 times that of Earth and temperatures over 300 °F began to destroy the probe. It discovered that we don't understand Jupiter's atmosphere as well as we thought. Conditions were hotter than expected, and much more turbulent than anticipated. There wasn't as much helium, water, or lightning as thought, and the winds were much faster, sustaining 330 mph during the entire time it sent back data.

Originally scheduled to spend 2 years orbiting the Jupiter system, the



Galileo probe was granted three extensions to its mission. The orbit around Jupiter was highly elongated to provide several opportunities to fly near some of the moons and to measure Jupiter's magnetosphere from a variety of positions. Each orbit took about two months. The four largest moons were prime targets, though close encounters with Io were saved for the extended missions due to the unknown results of flying through the intense radiation found in its vicinity. Toward the end of the mission, in 2002, the radiation finally took its toll when the cameras became too damaged to use, but other instruments continued to operate to the end, despite being exposed to four times the radiation the spacecraft was designed to withstand. During the eight years and 35 orbits of Jupiter, it made several important discoveries:

*(Continued on page 6)*

## NASA SPACE PLACE

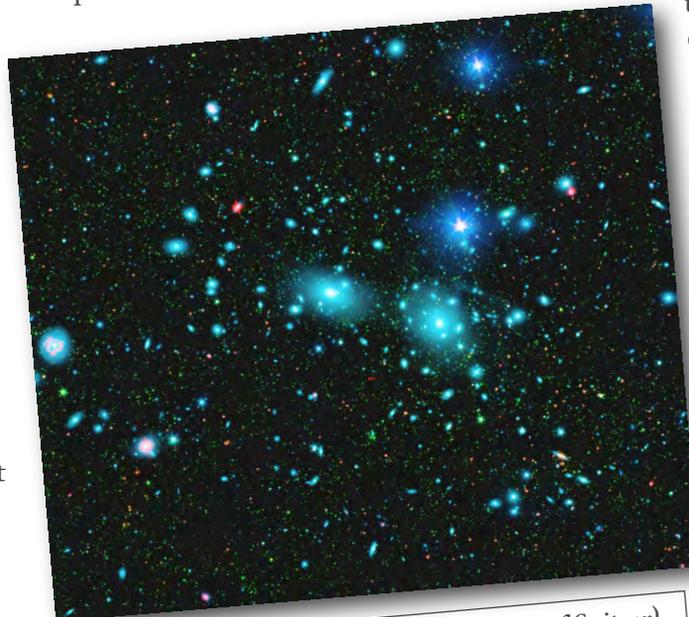
**Size Does Matter, But So Does Dark Energy****By Dr. Ethan Siegel**

Here in our own galactic backyard, the Milky Way contains some 200-400 billion stars, and that's not even the biggest galaxy in our own local group. Andromeda (M31) is even bigger and more massive than we are, made up of around a trillion stars! When you throw in the Triangulum Galaxy (M33), the Large and Small Magellanic Clouds, and the dozens of dwarf galaxies and hundreds of globular clusters gravitationally bound to us and our nearest neighbors, our local group sure does seem impressive.

Yet that's just chicken feed compared to the largest structures in the universe. Giant clusters and superclusters of galaxies, containing thousands of times the mass of our entire local group, can be found omnidirectionally with telescope surveys. Perhaps the two most famous examples are the nearby Virgo Cluster and the somewhat more distant Coma Supercluster, the latter containing more than 3,000 galaxies. There are millions of giant clusters like this in our observable universe, and the gravitational forces at play are absolutely tremendous: there are literally quadrillions of times the mass of our Sun in these systems.



The largest superclusters line up along filaments, forming a great cosmic web of structure with huge intergalactic voids in between the galaxy-rich regions. These galaxy filaments span anywhere from hundreds of millions of light-years all the way up to more than a billion light years in length. The CfA2 Great Wall, the Sloan Great Wall, and most recently, the Huge-LQG (Large Quasar Group) are the



*Digital mosaic of infrared light (courtesy of Spitzer) and visible light (SDSS) of the Coma Cluster, the largest member of the Coma Supercluster. Image credit: NASA / JPL-Caltech / Goddard Space Flight Center / Sloan Digital Sky Survey.*

largest known ones, with the Huge-LQG -- a group of at least 73 quasars -- apparently stretching nearly 4 billion light years in its longest direction: more than 5% of the observable universe! With more mass than a million Milky Way galaxies in there, this structure is a puzzle for cosmology.

You see, with the normal matter, dark matter, and dark energy in our universe, there's an upper limit to the size of gravitationally bound filaments that should form. The Huge-LQG, if real, is more than double the size of that largest predicted structure, and this could cast doubts on the core principle of cosmology: that on the largest scales, the universe is roughly uniform everywhere. But this might not pose a problem at all, thanks to an unlikely culprit: dark energy. Just as the local group is part of the Virgo Supercluster but recedes from it, and the Leo Cluster -- a large member of the Coma Supercluster -- is accelerating away from Coma, it's conceivable that the Huge-LQG isn't a single, bound structure at all, but will eventually be driven apart by dark energy. Either way, we're just a tiny drop in the vast cosmic ocean, on the outskirts of its rich, yet barely fathomable depths. Learn about the many ways in which NASA strives to uncover the mysteries of the universe: <http://science.nasa.gov/astrophysics/>. Kids can make their own clusters of galaxies by checking out The Space Place's fun galactic mobile activity: <http://spaceplace.nasa.gov/galactic-mobile/>

*This article was provided by the Jet Propulsion Laboratory, California Institute of Technology, under a contract with the National Aeronautics and Space Administration.*

## MISCELLANEOUS

**Reflections****by William Troxel***(continued from page 1)*

I am not sure how many of you are aware of the trouble I had with my telescope mount. I have been saving money to replace the mount, but just like buying a telescope, there are many factors to consider. Being a newbie to astronomy, I am the first to admit I still have lots to learn. I hope by the time I make my purchase, I will understand a little more about mounts in order to pick the correct mount for the next step in my personal growth. Why am I writing about this? The reason is simple. My personal goal is to become advanced enough to be able to be a part of some amateur support teams that help professional astronomers with their work or research. Over the past year, many of our keynote speakers have shared their research, but have also talked about the importance of the role of amateur astronomers like you and I. I still want my endeavors in astronomy to be fun. I also think being part of a group that helped professional astronomers explain something in more detail would be fun as well.

September moves us closer to the 30th StarFest which will be held on October 11-13. I hope that you have sent in your registration to the StarFest Chair, Adam. I know it will be a wonderful weekend as have all the StarFest's in the past. Be sure to check out the StarFest section of the web site. [Ed.: StarFest's deadline for registration is Sept. 20. Turning in the registration form along with

payment is necessary. Unfortunately, there are no walk-ins.]

September also brings back an event that we have not had as part of the Bays Mountain Astronomy Club for a few years. We will be going to the campus of ETSU to the Powell Observatory to do remote viewing from South America. The meeting will be at 7 p.m. Please check out the ETSU website for directions. I will try to put details on bmaastro. We will still have our business meeting part, but it will be shorter because I want to allow as much time as we can for the experience of remote viewing. I hope you will be able to come out to the ETSU Observatory in September. I believe you will enjoy the field trip and meeting. Also, please study the map to the Observatory. It is not the easiest to find if you haven't been there before.

I sent out one thank you e-mail for visiting the club this month. Hope to see each of you very soon, until next time....

Clear skies.

**Star Stuff****by Terry Alford***(continued from page 2)*

Of course, it is always the largest planet in physical size. If you get out on the morning of either the 8th and 9th to view Mars traveling through the Beehive, take a telescope and peek at Jupiter, too.

Neptune is faint at 7.8 magnitude but is still a binocular target in Aquarius. It has a 2.4" disk, rather small and faint. Uranus is only a

**Regular Contributors****WILLIAM TROXEL**

William is the current chair of the club. He serves as activities coordinator for a local retirement living community.

**TERRY ALFORD**

Terry is also a founding member since 1980 and has been chair many times, as well. He has worked as an astronomy lab instructor at ETSU since 2001.

**ROBIN BYRNE**

Robin has been writing the science history column since 1992 and was chair in 1997. She is an Associate Professor of Astronomy & Physics at Northeast State Community College (NSCC).

**ADAM THANZ**

Adam has been the Editor for almost all of the years since 1992. He is the Planetarium Director at Bays Mountain Park as well as an astronomy adjunct for NSCC.

little bit smaller than Mars at 3.7" but much fainter at 5.7 mag. Since it reaches opposition in early October in Pisces, it can be a decent telescope object at higher powers.

The Moon is new on September the 6th. The Full Moon occurs at 7:14 a.m. on the 19th. This is the famous Harvest Moon since it is the full Moon nearest the Fall equinox. Oops, Fall has officially started.

## Happy Birthday

by Robin Byrne

*(continued from page 3)*

Jupiter's clouds are composed of ammonia ice crystals; Io's volcanic activity is 100 times greater than Earth's; Io's volcanoes create an electrical current that connects to Jupiter's atmosphere; Europa, Ganymede and Callisto have evidence for liquid saltwater under their surfaces; Ganymede is the first moon found to have a magnetic field; and Jupiter's rings are the result of material knocked off of four of its closest moons.

As radiation damage started to pile up, and the power supply began to dwindle, the decision was made to end the Galileo mission. With the confirmation of a large salty ocean under the crust of Europa, the possibility of life existing there became more likely. Because the spacecraft had not been sterilized prior to launch, it was feared that it could contaminate Europa if it impacted there. So, the decision was made to send the spacecraft on a crash course with Jupiter. The final descent began about 600,000 miles from Jupiter, its farthest distance since arrival. Eight hours later, it

crossed the orbit of Io at 262,000 miles - only the third time it had traveled this close to Jupiter. As the radiation levels increased, it could no longer reliably use its star scanner to navigate. At a distance of 89,000 miles, the last magnetic field measurement was made. Beyond this point, the field was so strong the instrument to measure it was saturated. The last scientific experiment occurred as it passed Amalthea. On its previous encounter with the small moon, it detected light that could have been from debris surrounding the moon, so it was scanned again to see if the same signals were detected. This debris may be associated with one of Jupiter's rings. With seven minutes left, the spacecraft passed into the night side of Jupiter. One minute later, it was behind the limb as seen from Earth, and no more signals were received. Traveling at a speed over 30 miles per second, it plunged into the clouds and disintegrated.

During its 14 year lifetime, Galileo traveled more than 2.8 billion miles, gathered 30 gigabytes of data, and took 14,000 pictures. Not bad at all. With Jupiter in our morning sky, take time to gaze at it, whether with your naked eye, binoculars or telescope. While you enjoy its beauty, pause to thank the Galileo spacecraft for all we have learned from its incredible journey.

References:

Galileo (spacecraft) - Wikipedia  
[http://en.wikipedia.org/wiki/Galileo\\_\(spacecraft\)](http://en.wikipedia.org/wiki/Galileo_(spacecraft))

NASA - Surprising Jupiter; Busy Galileo spacecraft showed jovian system full of surprises

[http://www.nasa.gov/vision/universe/solarsystem/galileo\\_end.html](http://www.nasa.gov/vision/universe/solarsystem/galileo_end.html)

End of Mission Sequence of Events - Galileo End of Mission Press Kit

[http://www.jpl.nasa.gov/news/press\\_kits/galileo-end.pdf](http://www.jpl.nasa.gov/news/press_kits/galileo-end.pdf)

NASA - Galileo End of Mission Status

[http://www.nasa.gov/vision/universe/solarsystem/galileo\\_final.html](http://www.nasa.gov/vision/universe/solarsystem/galileo_final.html)

## Hunt the Northern Lights February 2014

We have a travel opportunity for you and your colleagues FEB 21 - MAR 4, 2014 to "Hunt the Northern Lights" in Norway aboard the Hurtigruten MS Nordlys. The basic information is at this link; <http://www.worldcruiseplanners.com/rw/view/2747>.

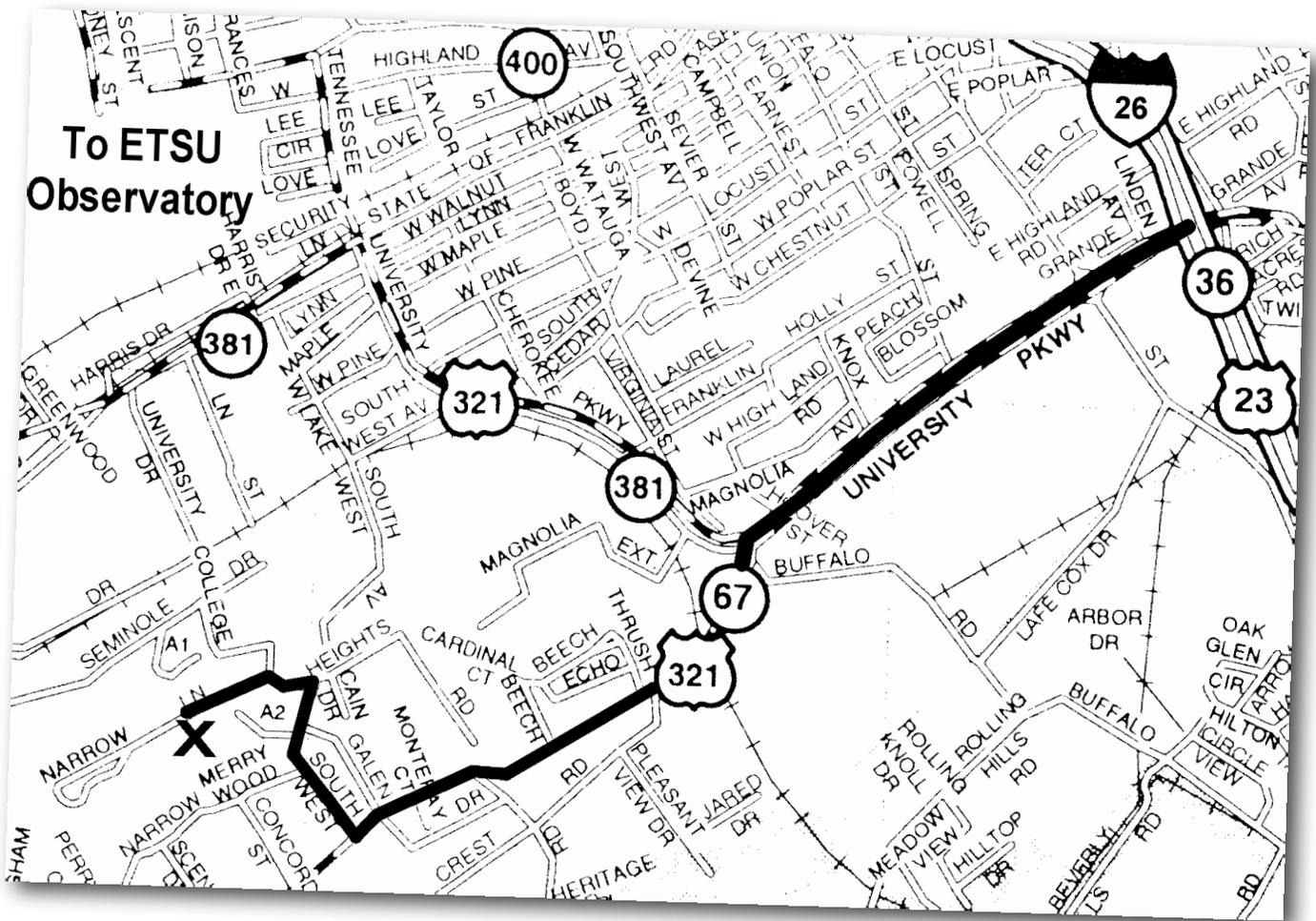
We invite you to contact us for more information and join us on this bucket list opportunity.

The offer is a great way to experience Norway; to meet its people and experience its culture. Our cruise will explore the coastline and hunt for the Northern Lights. Space is limited - enjoy the video - <http://vimeo.com/70107516>

Hurtigruten Web site:

<http://www.hurtigruten.us/Experiences/Northern-lights/>

Kristin Small  
 Travel Specialist  
 423.525.7287  
[www.worldcruiseplanners.com](http://www.worldcruiseplanners.com)



# The Bays Mountain Astronomy Club



Edited by Adam Thanz:  
[thanz@kingsporttn.gov](mailto:thanz@kingsporttn.gov)

## Dues:

The Bays Mountain Astronomy Club requires annual dues for membership. It covers 12 months and is renewable at any time.

## Rates:

\$16 /person/year

\$6 /additional family member

If you are a Park Association member, a 50% reduction in fees is applied.

Find out more at our website:

<http://www.baysmountain.com/astronomy/astronomy-club/>

🍏 Made on a Mac!

## Calendar

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 853 Bays Mountain Park Road  
 Kingsport, TN 37660