

Bays Mountain Astronomy Club

☞ *Next Meeting: Apr. 5* ☞

REFLECTIONS

Greetings fellow star watchers. Welcome to this month's installment. With the advent of spring, I can hardly wait for the clear nights that herald great viewing. We opened our meeting with the annual clean up of the observatory for the upcoming start of StarWatches and SunWatches. After the cleanup, we went back down to the Discovery Theater for Constellation Quest which was presented by BMAC'er Bob Smith. Bob presented Leo the Lion and his presentation detailed yet another complex constellation that is easy to view with eye, binoculars or telescope. After Bob's very informative presentation, our keynote speakers, BMACers Brandon Stroupe and Dan Merrick, explained astrophotography from the basics through intermediate levels. Brandon and Dan talked and showed different cameras and explained their features, and how they work together to get the best raw data. They also explored the available computer software and gave some information on how to use it to come up with the final great picture. Thanks Brandon and Dan for sharing



BY WILLIAM TROXEL

and expanding our knowledge of astrophotography.

I think this year should be called the "year of the comets," as we have the rare chance to 3 different ones. I have seen pictures or video of them, but my hope is to see one in person.

We had hopes of that by setting public viewing dates in addition to our StarWatches. To aid our members and the public with seeing these comets in person, we have scheduled some CometWatch dates listed on the web site. By the time you read this, both of those additional dates will have passed. But, I hope that you will be able to work one of the regular StarWatch viewings later on in March and all of the Saturdays of April. The comet will still be a binocular object up through late April. In May, it will be telescopic, but high-ish in the North.

The two best comets for viewing are PANSTARRS and ISON. A third comet, which will be modest in viewing, is Lemmon. PANSTARRS peaks in mid-march 2013 and ISON grows in greatness starting in the fall up through December. I have started reading about comets in preparation for the viewings. Adam

Calendar

Special Events

Apr. 20 Astronomy Day.

SunWatch

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

Mar. - Oct., weather permitting.

BMACers are always welcome to help.

StarWatch

8 p.m.: Mar. 30

8:30 p.m.: Apr. 6, 13, 20, & 27

BMACers need to arrive 30 min. early to set up.

BMAC Meetings

7 p.m., Discovery Theater

Apr. 5 Planetarium - "Under the Milky Way." Const. Quest: Nate Wentzel - Coma Berenices.

May 3 Dr. Joseph Pollock from the Appalachian State University Astronomy Department will speak on "Specifically Paired & Binary Asteroids." Const. Quest: Sally Hale - Ursa Minor the Small Bear

shared at the last meeting that the park is working on a program that would run in the planetarium starting in the fall until the end of the year to help the public's understanding about comets. I hope you will also seek out a better understanding as well. I will post some of the sites I found interesting in my study of comets on bmaastro.

I want to remind you about the park's SunWatch program that we help the staff on each clear Sat. and Sun. The real interesting thing is that we are in one of the more active periods of our star, the sun. I have not been able to go out on the weekends as yet to be a part of the SunWatches yet this year, I hope to get out soon. I encourage you to come as well. This event is a half hour, but is a great way to reach out to the public. This is another great event that we amateur astronomers can get out and enjoy.

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STAR STUFF

BY TERRY ALFORD

By the time you receive this newsletter, Spring will have officially arrived. Last Fall had some nice nights, but it seemed like the only clear nights we had last Winter were either super cold and windy or there was a blindingly bright Moon. With this in mind, I am proposing my arbitrary list of the 10 "best" double stars of Spring and Summer. My reasons for choosing these particular multiple stars was position in the sky (no object below -19° in declination), ease of splitting, and any unusual features such as color or contrast. Some of these are not as famous as others but all are well worth seeking out. So, listed in order of right ascension, here is my list of must-see double/multiple stars.

Alpha Ursae Minoris RA 01H Dec $+89^\circ$, Polaris, our "North Star." The brightness of Polaris can sometimes make it difficult to see the much fainter companion star. Try higher magnifications and perhaps averted vision to see the pair's contrasting yellow and blue colors. A 6-in or larger scope will definitely split Polaris. On a steady night, a 3-inch scope will work.

Gamma Leonis RA 10H Dec $+20^\circ$, Algeiba. This is a splendid double star, bright orange and greenish yellow. My favorite view of this double was about 5 years ago at the Green Bank StarQuest in West Virginia. Bill Burgess and I were standing in a light rain and testing out the then new 80 mm f/11.25 Planet Hunter refractor. Observing through gaps in the clouds, we got a great view of Jupiter. Then Algieba became visible and it was absolutely stunning. Recently, I learned there

was a planet discovered in this system.

Zeta Ursae Majoris RA 13H Dec $+55^\circ$, Mizar, the "Gem of the Big Dipper." Located in the bend of the handle of the Dipper, this multiple star system is easy to locate and nearly any optical aid at all will easily split it. Actually, a lot of people with keen vision can split two main components with their naked eyes. Mizar, the brighter one has been found to be a double spectroscopic binary as well as the fainter star Alcor. So, six stars for the price of one! Even a 3-inch scope at 60X will show four stars for Mizar. This is a favorite of the public during StarWatches.

Upsilon Scorpius, RA 16H Dec -19° . This is a quadruple system with stars varying from 4.3 to 8.5 magnitude. Binoculars or a finder scope will split the two brightest components. Very lovely in a scope at 60x or higher. This is also a great area to just scan around in. Other bright and pretty easy doubles nearby. I like using my 4-in f/4 RFT refractor to study this area of the Scorpion's northern "arm." This is the most southerly target on the list.

Alpha Herculis, RA 17H Dec $+14^\circ$, Rasalgethi. Just to the west and a little farther north than brighter star Rasalhague (in Ophiuchus), this is a fine contrasting pair with a brighter orange-red primary and a fainter companion that is blueish-green. A scope in the 3-4-inch range will split this pair nicely at a little over 100X. The primary also varies between 3rd and 4th magnitude.

Epsilon Scutum RA 18h Dec -15° . Two stars of similar magnitude, yellow and deep blue. Very striking.

This pair is located in the heart of the Milky Way so it may be a little difficult to locate without setting circles or a Go-To system but worth seeking out.

Epsilon Lyra RA 18H Dec $+40^\circ$. The famous "Double Double." This system is a couple of degrees east of Vega and is pretty easy to locate. Through binoculars or finder scope, the first split can be made. A three inch or larger scope used at magnifications around 60X or higher should split each component again.

Beta Cygni RA 19H Dec $+28^\circ$, Albireo, the "beak of the bird" of Cygnus, the Swan. For a lot of amateur astronomers this is THE best double star visible in our latitudes. Easily split with even small scopes. The bold colors of gold and deep blue (some people see green) are quite vivid and often startles first time visitors at our StarWatches. A real crowd pleaser.

Gamma Delphini RA 20H Dec $+16^\circ$. This beautiful double is the tip of the snout of Delphinus, the dolphin. This somewhat faint constellation can be difficult to find as it lies near to the heart of the Milky Way. It is easy to look at this constellation and imagine a dolphin leaping out of the water.

8 Lacerta RA 22H Dec $+39^\circ$. Lacerta is yet another faint constellation that can be difficult to find but take the time to locate and observe this beautiful quadruple star system. It is well worth the effort to do so.

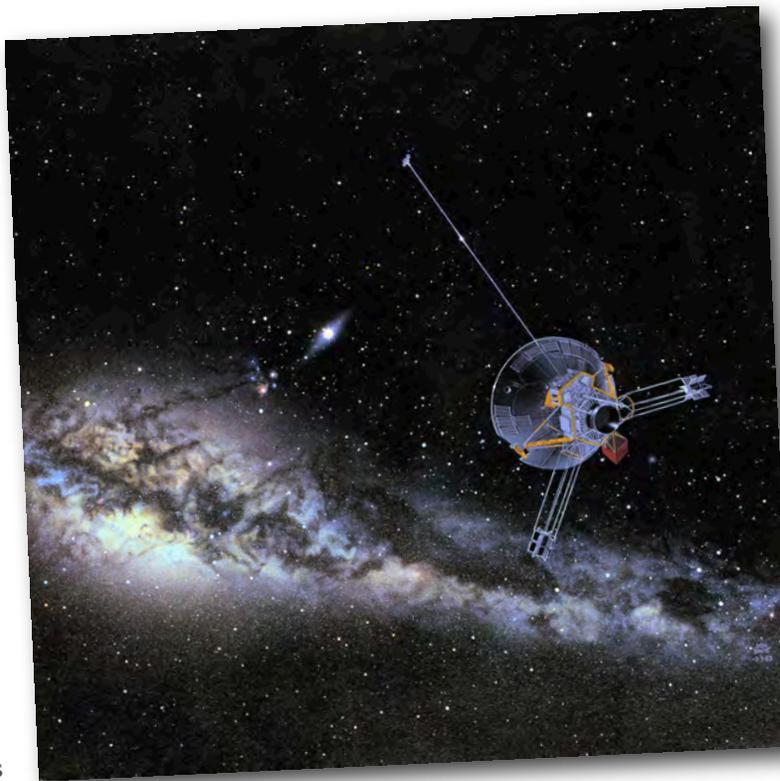
HAPPY BIRTHDAY PIONEER 11

BY ROBIN BYRNE

This month we celebrate the anniversary of the launch of a little spacecraft that was a true pioneer. The plan to send two spacecraft to the outer Solar System was approved in 1969. Three years later, the first of the pair was launched, and the following year, on April 6 1973, Pioneer 11 began its voyage to Jupiter and Saturn.

In order to achieve the various scientific objectives, the Pioneer spacecraft carried a wide array of scientific instruments. The Helium Vector Magnetometer was used to map out the magnetic field of Jupiter and Saturn. The Quadrupole Plasma Analyzer measured charged particles originating in the solar wind. The Charged Particle Instrument and the Cosmic Ray Telescope both were used to detect and measure cosmic rays. There were a variety of devices designed to detect charged particles. The Meteoroid Detectors recorded impacts from small particles during the trip to the Jovian planets, and a second device imaged nearby small meteoroids and more distant asteroids. The Imaging Photopolarimeter was responsible for the images obtained of the planets. And the Infrared Radiometer is what was used to measure the cloud top temperatures of the planets and Titan.

Almost exactly one year after launch, Pioneer 11 became only the second spacecraft to fly through the Asteroid Belt. Because the two Pioneers would be the first to make this journey, studying the belt's structure was an important objective that would help future missions to the outer Solar System, such as the Voyagers, Galileo, Cassini, and New Horizons.



Pioneer on its final journey. Art by Don Davis.

While Pioneer 10 would be the first to Jupiter, Pioneer 11 would follow-up on its fly-by in November of 1974. Flying as close as 26,600 miles from the cloud tops (three times closer than Pioneer 10), Pioneer 11 obtained detailed images of the Great Red Spot, took the first images of Jupiter's polar regions, and

measured the mass of Callisto. During the fly-by, Pioneer 11 was traveling faster than any manmade object had ever moved, at a rate of 171,000 km/h (106,000 mph). This extra speed minimized the effects of radiation as it traveled through Jupiter's magnetic field and the charged particles trapped there. A gravity assist from Jupiter was then used to send the spacecraft on to its next objective; Saturn.

On July 31, 1979 Pioneer 11 became the first spacecraft to visit Saturn. At its closest approach, it flew within 21,000 km from Saturn's cloud tops. At Saturn, Pioneer 11 would study its magnetic field, measure the temperature of both Saturn and Titan, study the composition and structure of Saturn's upper atmosphere, provide detailed information about the ring system, and determine accurate masses of Saturn and its moons. While Pioneer 11 was traveling toward Saturn, both Voyager 1 and 2 had already begun their journey to the outer Solar System.

Voyager 2 was scheduled to travel through Saturn's rings plane. In order to be sure that maneuver was safe, Pioneer 11 got to blaze the trail and test it out first.

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NASA SPACE PLACE

Your Daily Dose of Astonishment

By Diane K. Fisher

As a person vitally interested in astronomy, you probably have the Astronomy Picture of the Day website at apod.nasa.gov set as favorite link. APOD has been around since practically the beginning of the web. The first APOD appeared unannounced on June 16, 1995. It got 15 hits. The next picture appeared June 20, 1995, and the site has not taken a day off since. Now, daily traffic is more like one million hits.

Obviously, someone is responsible for picking, posting, and writing the detailed descriptions for these images. Is it a whole team of people? No. Surprisingly, it is only two men, the same ones who started it and have been doing it ever since.

Robert Nemiroff and Jerry Bonnell shared an office at NASA's Goddard Space Flight Center in the early-90s, when the term "World Wide Web" was unknown, but a software program called Mosaic could connect to and display

specially coded content on other computers. The office mates thought "we should do something with this."

Thus was conceived the Astronomy Picture of the Day. Now, in addition to the wildly popular English version, over 25 mirror websites in other languages are maintained independently by volunteers. (See http://apod.nasa.gov/apod/lib/about_apod.html for links). An



also maintains a discussion website at <http://asterisk.apod.com/>.

But how does it get done? Do these guys even have day jobs?

Dr. Nemiroff has since moved to Michigan Technological University in Houghton, Michigan, where he is professor of astrophysics, both teaching and doing research. Dr. Bonnell is still with NASA, an astrophysicist with the Compton Gamma Ray Observatory Science

Support Center at Goddard.

APOD is only a very small part of their responsibilities. They do not collaborate, but rather divide up the calendar, and each picks the image, writes the description, and includes the links for the days on his own list. The files are queued up for posting by a "robot" each day.

They use the same tools they used at the beginning: Raw HTML code written using the vi text editor in Linux. This simple format has now become such a part of the brand that they would upset all the people and websites and mobile apps that link to their feed if they were to change anything at this point.

Where do they find the images? Candidates are volunteered from large and small observatories, space telescopes (like the



The January 20, 2013, Astronomy Picture of the Day is one that might fall into the "quirky" category. The object was found at the bottom of the sea aboard a Greek ship that sank in 80 BCE. It is an Antikythera mechanism, a mechanical computer of an accuracy thought impossible for that era. Its wheels and gears create a portable orrery of the sky that predicts star and planet locations as well as lunar and solar eclipses.

archive of every APOD ever published is at <http://apod.nasa.gov/apod/archivepix.html>. Dr. Nemiroff

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MISCELLANEOUS

Reflections

by William Troxel

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Now I want to share with you some exciting news. In September, we will be going over to ETSU's Powell Observatory for our meeting. We will be doing some remote viewing at site around the world. It has been several years since we have gone over to the Powell Observatory. I will be giving you more details in the months to come.

July is our annual picnic month, I would like to ask you to start thinking about where we want to go this year. Just as a reminder, I want to encourage you to check out the web site for updates, as it will be updated regularly.

We had no visitors to our club meeting last month, so no thank you e-mails were sent out this month.

April's meeting will be inside the planetarium with the show "Under the Milky Way." Our constellation quest will be led by Nate Wentzel who will be sharing with us Coma Berenice (Berenice's Hair). There will be a detailed discussion on the upcoming Astronomy Day as well. We need to finalize what we do so we are prepared. I will also be leading the Astro news. Our business meeting will follow after our feature program.

Until next time, clear skies.

Happy Birthday

by Robin Byrne

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Finding no damaging particles along the path gave Voyager the go ahead to stay on course. Had the trajectory been altered, Voyager 2 would not have been able to go on to visit Uranus and Neptune.

While at Saturn, Pioneer 11 had an unexpected close encounter with one of Saturn's moons, coming within 4000 km (2500 miles). However, which moon it was is unknown, because there are two moons that follow the same orbital path: Epimetheus and Janus. Pioneer 11 is credited with discovering Epimetheus plus one other small moon, as well as being the first to image the F ring. Pioneer 11 also confirmed that Saturn has a magnetic field.

On October 5, 1979 Pioneer 11 began the last phase of its journey - to leave the Solar System. Heading in the direction of the galactic center, it was the fourth spacecraft to cross Neptune's orbit in 1990 (Pioneer 10 went first, and both Voyager spacecraft were traveling faster). Pioneer 10 and 11 each carry a gold covered plaque conveying a message to any life form that may one day find it. On the plaque are the images of a man and woman, Earth's location in the Solar System, and the Solar System's location in the galaxy.

Because the power source for the Pioneers were radioisotope thermoelectric generators (RTG's), they were able to continue operating for a very extended period of time. The last signal from Pioneer 11 was

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.

detected on November 30, 1995. Based on its motion, Pioneer 11 is now a little over 87 Astronomical Units (AUs) from the Sun (more than twice Pluto's distance) and continues to recede at a rate of 2.4 AUs per year.

The second spacecraft to fly through the Asteroid Belt, the second to visit Jupiter, and the first to visit Saturn - this little spacecraft certainly lived up to its name of Pioneer. While Saturn continues to grace our morning skies, and as you gaze at its beauty, pause to reflect on how much we now know because of the spacecraft that have visited there. And it all began with one Pioneer.

References:

Pioneer 11 - Wikipedia

http://en.wikipedia.org/wiki/Pioneer_11

[Pioneer_11](http://en.wikipedia.org/wiki/Pioneer_11)

NASA Solar System Exploration:

Missions: By Target: Saturn: Past:

Pioneer 11

[http://solarsystem.nasa.gov/missions/profile.cfm?](http://solarsystem.nasa.gov/missions/profile.cfm?MCode=Pioneer_11&Display=ReadMore)

[MCode=Pioneer_11&Display=ReadM](http://solarsystem.nasa.gov/missions/profile.cfm?MCode=Pioneer_11&Display=ReadMore)

[ore](http://solarsystem.nasa.gov/missions/profile.cfm?MCode=Pioneer_11&Display=ReadMore)

NASA - NSSDC - Spacecraft -

Details

[http://nssdc.gsfc.nasa.gov/nmc/](http://nssdc.gsfc.nasa.gov/nmc/spacecraftDisplay.do?id=1973-019A)

[spacecraftDisplay.do?id=1973-019A](http://nssdc.gsfc.nasa.gov/nmc/spacecraftDisplay.do?id=1973-019A)

NASA Space Place

(continued from page 4)

Hubble and Spitzer), and independent astronomers and astro-photographers. The good doctors receive ten images for every one they publish on APOD. But, as Dr. Nemiroff emphasizes, being picked or not picked is no reflection on the value of the image. Some of the selections are picked for their quirkiness. Some are videos instead of images. Some have nothing to do with astronomy at all, like the astonishing August 21, 2012, video of a replicating DNA molecule.

Among the many mobile apps taking advantage of the APOD feed is Space Place Prime, a NASA magazine that updates daily with the best of NASA. It's available free (in iOS only at this time) at the Apple Store.

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



Come see "Astronaut" at Bays Mountain Planetarium this spring and learn what it takes to be an astronaut and its toll on your body.

The Bays Mountain Astronomy Club



Edited by Adam Thanz:
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/>

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Bays Mountain Astronomy Club
853 Bays Mountain Park Road
Kingsport, TN 37660