

CONSTELLATION

the official publication of Bucks-Mont Astronomical Association, Inc

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Co-Presidents' Message

Celebrating 25 years as BMAA

In January, 25 years ago, a group of amateur astronomers put the finishing touches on a charter, making BMAA a “legal” organization. Many of the original founding members are still involved with the activities of BMAA, along with a number of new members.

We continue our goals of working to improve the appreciation and knowledge of astronomy and to improve observational and astrophotography skills; 2016 marks a good year for us at BMAA.

This is the first full year with our new website, which is operating pretty-much as designed.

We have established a good, relatively dark sky observing site at Lake Nockamixon.

We continue to have good attendance at our public star watches and respond to many requests for special outreach programs and activities.

Many of our members have established themselves, and BMAA by it's association with them, as outstanding astrophotographers.

Our monthly meetings are well-attended with interesting presentations by our knowledgeable members and outside experts.

We also have some interesting events and activities to look forward to this year.

- View the Mercury transit on May 9.
- Making plans for the 2017 total Solar eclipse.
- Increasing our utilization of the Nockamixon observing location.

We're looking forward to seeing you at one of our coming events, meetings or star watches!

BMAA co-president Gary Sprague provided this article [-ed]

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2016 BMAA Officers:

Gary Sprague and Dwight Dulsky, Co-Presidents

Lee Zager, Vice President

Robert Mittel-Carey, Secretary

Ed Radomski, Treasurer

info@bma2.org

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Bucks-Mont Astronomical Association, Inc
General Meeting Minutes
April 2016

Location: Upper Dublin Lutheran Church, 411 Susquehanna Road, Ambler PA 19002
Meeting called to order by Gary Sprague at 7:30p. In attendance: 23 members and 2 guests
Officers present: Gary Sprague (co-pres), Lee Zager (vice-pres), Robert Mittel-Carey (sec'y)

Lee discussed the April 13th outreach at St. John the Baptist School.

Gary discussed other upcoming outreach events.

Announced: May 14th Astronomy Day

Igor presented a slide show of the Pleiades

Bernie reviewed his March observing challenge

– **Main topic: Solar Observing**

Lee and Terry presented on safe methods of solar observing including a “show and tell” of their personal solar observing set-ups. Additional input was provided by Bernie.

Respectfully submitted,
Robert Mittel-Carey, secretary

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Editor's Note

The CONSTELLATION is your BMAA club newsletter and its success depends solely on your input. Please submit articles to me at: constellation@bma2.org. I am trying to maintain a quarterly publication cycle, on or about the Solstices and Equinoxes with supplements as required. Thanks.

- Scott Petersen, editor

The CONSTELLATION is the official publication of the Bucks-Mont Astronomical Association, Inc, a 501(c)(3) non-profit organization incorporated in the Commonwealth of Pennsylvania and exists for the exchange of ideas, news, information and publicity among the BMAA membership, as well as the amateur astronomy community at large. The views expressed are not necessarily those of BMAA, but of the contributors and are edited to fit within the format and confines of the publication. Unsolicited articles relevant to astronomy are welcomed and may be submitted to the Editor. Reprints of articles, or complete issues of the CONSTELLATION, may be available by contacting the Editor at the address listed below, and portions may be reproduced with permission, providing proper acknowledgment is made and a copy of that publication is sent to the Editor. Contents of this publication, and format (hard copy or electronic) are copyright ©2016 BMAA, Inc. Submission deadline for articles is the 15th of the month prior to quarterly publication.

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Leap Year

- by *Dwight Dulsky*

Leap years are required to keep our calendar in sync with the Earth's motion around the Sun and 2016 is such a year. Unfortunately the amount of time for one complete trip around the sun is $365 \frac{1}{4}$ days long - not exactly an elegant number. If we always used a calendar with 365 days, in about 100 years our seasons would be about 24 days off their usual beginning dates. Seasonal dates and holidays are important and this time correction must be made to keep us on track.

Back in ancient times we woke up with the Sun, did whatever we humans do during the day and then went back to sleep at sunset. We made other observations in the sky, too. Our days were longer in the summer and shorter in the winter. The Sun rose and set in different places along the horizon throughout the year. The Moon changed almost every night while it moved across the sky. Every month (29.5 days to be more exact) the Moon repeats its cycle of phases from New Moon to full and back again to New Moon. The first calendars were developed around the 12 lunar cycles, which would equal 354.37 days. This is OK for keeping track of the Moon, but in short order the seasons become out of alignment.

The next major change in timekeeping was a shift from lunar cycles to solar. Ancient astronomers tracked the position of the sun against the sky and began to notice certain patterns. Soon great monuments were erected to track the angles of the Sun. Special stones and openings were often placed at strategic points to catch the rays of the Sun on those special days that marked the Equinoxes and Solstices (first day of Spring, Fall, Summer and Winter). But, over the course of several lifetimes even these events started not to line up in the usual places at the expected times.

The problem was recognized by the ancient Egyptians that it actually took 365 and a quarter days for the Earth to make one complete trip around the sun (365 days 5 hours and 46 minutes, but who's counting?). They ignored the extra $\frac{1}{4}$ day, and just let them accumulate. Eventually this really got out of hand as centuries passed, with holidays and seasons way out of their normal order.

In 45 BC, the great Roman Emperor Julius Caesar consulted the Egyptian astronomer Sosigenes of Alexandria about this problem. Sosigenes suggested that an extra day be added to the calendar every four years to compensate for the extra quarter day or 6 hours. Caesar then instituted his new and improved Julian calendar, complete with a leap day to be added to the calendar once every 4 years. Julius was never shy about also naming the month of July after himself and August was named by his successor, Caesar Augustus.

[BTW the days of the week were named after the celestial bodies known at the time: Sunday/Sun, Monday/Moon, Tuesday/Mars, Wednesday/Mercury, Thursday/Jupiter, Friday/Venus, Saturday/Saturn]

But, unfortunately the problem of time shifting still did not fully go away. The actual length of the solar year was 365 days 5 hours and 48 minutes and 46 seconds. 1500 years after Caesar, an 11 minute 14 seconds per year shortfall was causing the first day of spring to occur around March 11th instead of the 21st of the month. In 1582, Pope Gregory XIII made a very critical adjustment to the calendar. He jumped 11 days forward and instituted a new rule. A century year is only a leap year if it is divisible by 400. With this correction now in place it will take another 3,300 years till we would need again to adjust the calendar by a day. This Gregorian calendar is the modern calendar we still use to this day.

Now, our time is computed to unbelievably accurate degrees. The US Naval Observatory Clock in Washington D.C. keeps our time within 10 nanoseconds of Universal Time in Greenwich, England (10 1-billionths of a second). Modern day devices such as GPS navigation, computers and communications require such precision. <http://tycho.usno.navy.mil/time.html>

- *BMAA co-president Dwight Dulsky provided this article* [-ed]

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Observing Report

The Pleiades (M45)

– *by Igor Peshenko*

Combined subs from three imaging sessions I had November 2015 and January 2016 at Coyle Field and Lake Nockamixon, over 3.5 hours of total exposure.



Orion ED80T CF Triplet Apochromatic Refractor with Astro-Tech AT2FF field flattener; Baader UV/IR cut filter, Celestron AVX mount, Canon EOS 1100D (Digital Rebel T3) full spectrum, cooled - EXIF temperature -5 to -11C, 43 x 5 min ISO 800. Processing: IRIS v. 5.59 and Photoshop CS2

BMAA member Igor Peshenko provided this article and image [-ed]

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Hubble Shatters The Cosmic Record For Most Distant Galaxy

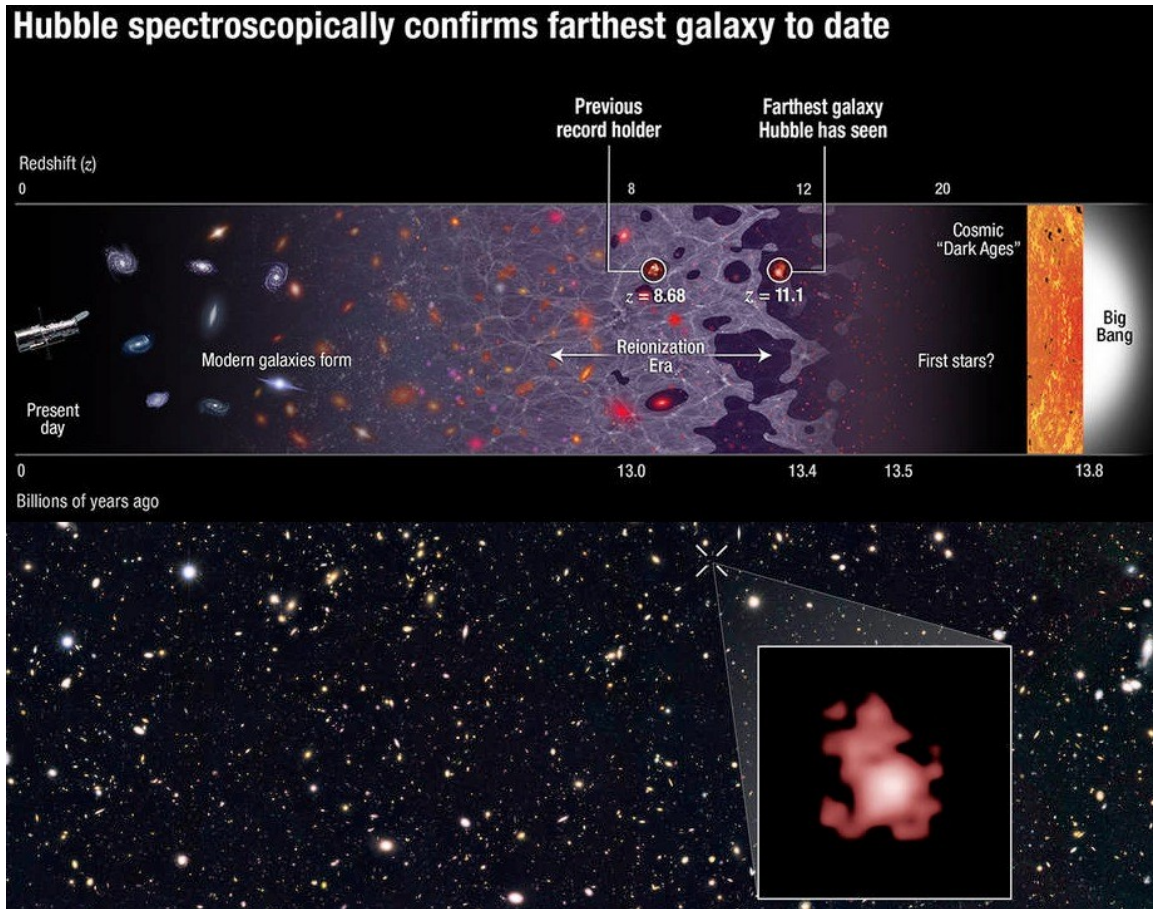
- by *Ethan Siegel*

The farther away you look in the distant universe, the harder it is to see what's out there. This isn't simply because more distant objects appear fainter, although that's true. It isn't because the universe is expanding, and so the light has farther to go before it reaches you, although that's true, too. The reality is that if you built the largest optical telescope you could imagine -- even one that was the size of an entire planet -- you still wouldn't see the new cosmic record-holder that Hubble just discovered: galaxy GN-z11, whose light traveled for 13.4 billion years, or 97% the age of the universe, before finally reaching our eyes.

There were two special coincidences that had to line up for Hubble to find this: one was a remarkable technical achievement, while the other was pure luck. By extending Hubble's vision away from the ultraviolet and optical and into the infrared, past 800 nanometers all the way out to 1.6 microns, Hubble became sensitive to light that was severely stretched and redshifted by the expansion of the universe. The most energetic light that hot, young, newly forming stars produce is the Lyman- α line, which is produced at an ultraviolet wavelength of just 121.567 nanometers. But at high redshifts, that line passed not just into the visible but all the way through to the infrared, and for the newly discovered galaxy, GN-z11, its whopping redshift of **11.1** pushed that line all the way out to 1471 nanometers, more than double the limit of visible light!

Hubble itself did the follow-up spectroscopic observations to confirm the existence of this galaxy, but it also got lucky: the only reason this light was visible is because the region of space between this galaxy and our eyes is mostly ionized, which *isn't true* of most locations in the universe at this early time! A redshift of 11.1 corresponds to just 400 million years after the Big Bang, and the hot radiation from young stars doesn't ionize the majority of the universe until 550 million years have passed. In most directions, this galaxy would be invisible, as the neutral gas would block this light, the same way the light from the center of our galaxy is blocked by the dust lanes in the galactic plane. To see farther back, to the universe's first true galaxies, it will take the James Webb Space Telescope. Webb's infrared eyes are much less sensitive to the light-extinction caused by neutral gas than instruments like Hubble. Webb may reach back to a redshift of 15 or even 20 or more, and discover the true answer to one of the universe's greatest mysteries: when the first galaxies came into existence!

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Images credit: (top); NASA, ESA, P. Oesch (Yale University), G. Brammer (STScI), P. van Dokkum (Yale University), and G. Illingworth (University of California, Santa Cruz) (bottom), of the galaxy GN-z11, the most distant and highest-redshifted galaxy ever discovered and spectroscopically confirmed thus far.

- *Space Place* is provided to local astronomy clubs by NASA [-ed]

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BMAA Member Registration Form

Renewal

New Member

Name _____

Address _____

Telephone

Home _____

Cell _____

E-Mail _____

Dues are **\$30.00** for an individual or **\$40.00** for a family membership (more than one person at same address).

Make check payable to **BMAA** and send to:

BMAA
c/o Ed Radomski
36 Far View Road
Chalfont PA 18914

If you would prefer to register and pay using **PayPal** do not use this form. On the [PayPal](https://www.paypal.com) website send your payment to treas@bma2.org . Send it as a "purchase of goods" so that I receive your address. In the Email section make the subject "Dues" include your telephone # and your preferred Email address in the message area.