CONSTELLATION

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Solar Film Workshop

BMAA co-president Dwight Dulsky held a workshop on July 9, for making solar viewing filters with Baader film, in preparation for the August solar eclipse. Here are some of the tips he presented [-ed]:

1. It is very important that the material you use for the filter frame and holder is light proof. Very thin lightweight cardstock is not lightproof. So you need to use something that is rigid enough to hold the Baader film securely, plus a material that will bend and contour to the cylinder shape of optical tubes and camera lenses. The material that I will bring to the workshop is a heavy weight "chipboard" that is sturdy, yet flexible. If you must use something lightweight, you can cover it with either Aluminum foil or layers of black plastic electrical tape. Pay particular attention to the seam between the part that slips on your optical tube/lense and the holder. Usually a nice layer of black electrical tape along that seam seals the light out. If you are using a camera, your filter must be absolutely lightfast. The slightest side leak will show up in your exposure.

2. The film **should not** be stretched when attaching to your filter frame/holder. Just let it lie naturally. A few ripples is not a problem. Try not to get fingerprints on the surface of the solar film.

3. Always inspect any solar filter prior to use. fix (cover) any pinholes. Pinholes can occur in glass type filters and can be fixed by dotting over with a black marker. Any holes or tears can be covered with a small piece of black electrical tape.

4. Fit - the filter should be snug and not easily blow off in a sudden gust of wind. Filters can be secured with pieces of your handy black electrical tape or perhaps the blue "painter's tape" that removes easily. However, if you are photographing in the line of "totality", you will want to be able to remove your filters quickly and easily. One solution is a longer "tube" that slides over the end of your optical tube, this will be less likely to blow off unexpectedly.

5. During construction, cover the end of your optical tube with clear plastic wrap. We do not want any glue dripping onto your lens glass.

6. Some rubber bands may help hold the cardboard in place while the glue sets for a few minutes. However these may not stretch on big optical tubes.

7. Work in a calm environment free of wind and nosy cats! The solar film is very light and will blow away in a fan breeze.

In use, finding the Sun can be a challenge with a solar filter that blocks 99.9% of the sunlight. You are either "on it" or "not", you don't get much of an indication if you are even close or not. So, using some kind of sun spotter finder (homemade or commercial) can work. Or get used (practice) by using the old shadow on the ground technique. Some clever ideas here: https://www.cloudynights.com/topic/376092-solar-aiming-device/

Create a "Sun Shield" to block the light from shining on your face while observing. These can be made from foamboard, cardboard or plastic. However, if it is windy, they can catch the wind and make for "jiggly" observing or imaging. So, big enough, but not too big.

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Bucks-Mont Astronomical Association, Inc

General Meeting Minutes

June 7, 2017

Location: Upper Dublin Lutheran Church, 411 Susquehanna Road, Ambler PA 19002
Officers present: Gary Sprague (co-president), Dwight Dulsky (co-president),
Lee Zagar (vice-president),Ed Radomski (treasurer) and Robert Mittel-Carey (secretary)

Meeting called to order by Gary Sprague at 7:30p. In attendance: 27 members and guests

- Gary reviewed several photos from the May meeting and our eclipse presentation at UDLC.
- Calendar review for June – July
- Review of eclipse outreach program
- Starwatch calendar reviewed through September.
- Vahan gave a powerpoint presentation on his Eagle Scout project: "Trip Through The Solar System" set up at Northampton Park.
- Solar Safety review, and some eclipse trivia.

➢ **Main Topic: video presentation – Fred Espanek NEAF 2016 2017 U.S. Eclipse**

A very well thought out video with just enough information.

Respectfully submitted,
Robert Mittel-Carey, BMAA secretary

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Bucks-Mont Astronomical Association, Inc
General Meeting Minutes
July 5, 2017

Location: Upper Dublin Lutheran Church, 411 Susquehanna Road, Ambler PA 19002
Officers present: Gary Sprague and Dwight Dulsky (co-presidents), Lee Zager (vice-president)
Ed Radomski (treasurer) and Robert Mittel-Carey (secretary)

Meeting called to order by Gary Sprague at 7:30p. In attendance: 27 members and guests

- Recap of 7/2/17 starwatch – The Moon, Jupiter, and Saturn were the only visible targets.
- July 22 (rain date 29) club picnic & starwatch at Nockimixon
- Eclipse presentations: 12 scheduled through September.
- Starwatch calendar recap through October.
- Show & Tell:
  - Igor – astrophotos of Makemake, comet C/2015 V2 (Johnson), M90, NGC3718 & 3729, NGC6946 w/ a supernova. Presentation on the "triple click" shortcut red filter for iOS 10
  - Chris: Presentation "Solar Eclipses and Gravity"
  - Bernie: astrophoto of Jupiter double transit using a point and shot camera held to eyepiece.

➢ **Main Topic: Photographing the Eclipse: Should You? If so, how?**

Several club members shared their experiences and opinions on the topic. Highlights:

Lee: How to figure image size, set up equipment beforehand, use solar filters!

Brad: know your camera.

Ed: Don't do it! Look around during the eclipse; clouds often dissipate during the partial phase

Respectfully submitted,
Robert Mittel-Carey, BMAA secretary

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Solar Eclipse Outreach

July/August 2017

- by Dwight Dulsky

About a year ago BMAA started planning for the 2017 "coast to coast" Total Solar Eclipse. Some of our planning is focused on special meeting activities related to the event. Other aspects are our solar filter making workshops, where members build their own safe solar filters to use on eclipse day. Another initiative is to provide an outreach program to the general public about the eclipse.

Since we have had some successful programs at a few libraries in the past we decided to reach out to the library systems in Bucks and Montgomery counties. Our goals are to offer programs in various communities within these two large areas and efforts are concentrated between July 18th and August 7th.

- See a review of our library outreach programs in the summer supplement, Vol32 No3a [-ed]

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Total Solar Eclipse of 2017 Aug 21

Ecliptic Conjunction = 18:31:19.6 TD (= 18:30:11.2 UT)
Greatest Eclipse = 18:26:40.3 TD (= 18:25:31.8 UT)

Eclipse Magnitude = 1.0306 Gamma = 0.4367

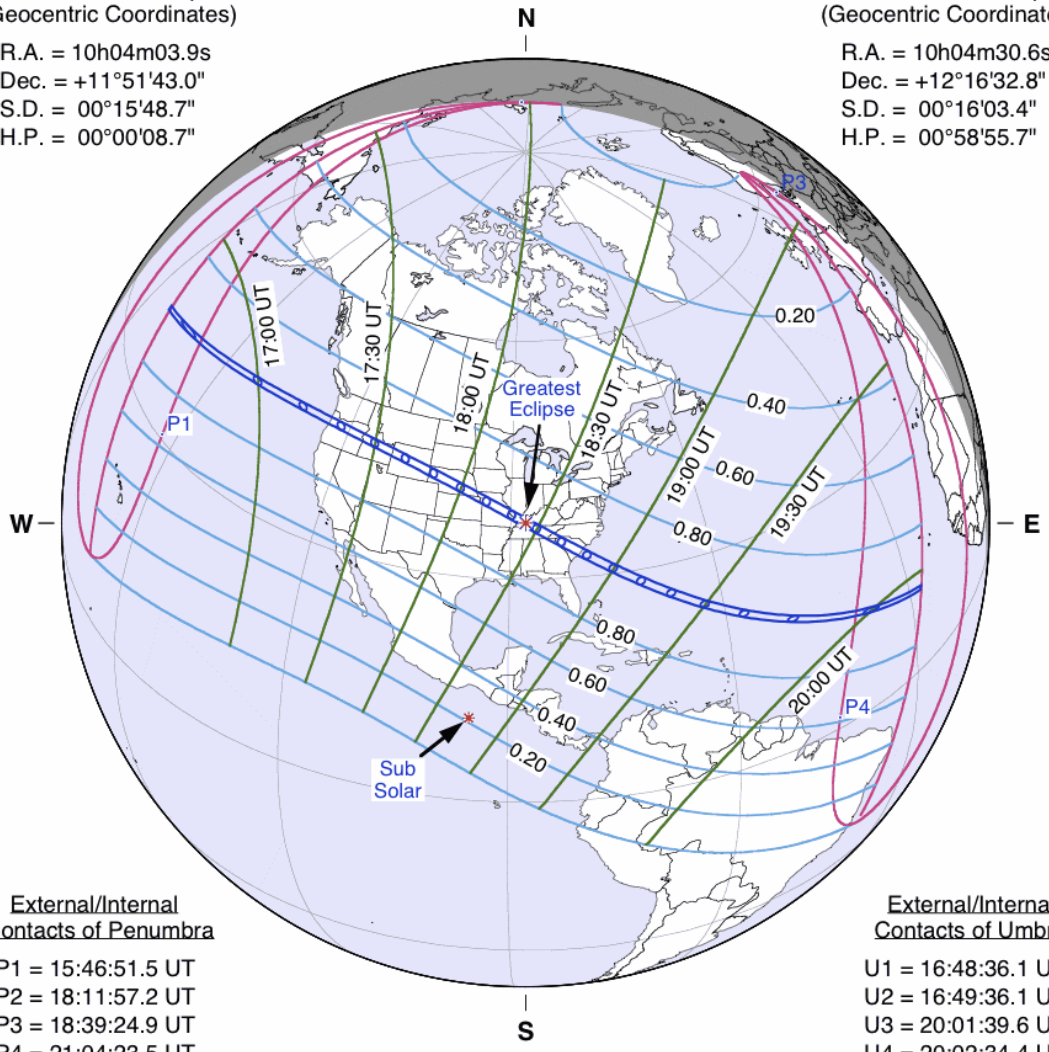
Saros Series = 145 Member = 22 of 77

Sun at Greatest Eclipse
(Geocentric Coordinates)

R.A. = 10h04m03.9s
Dec. = +11°51'43.0"
S.D. = 00°15'48.7"
H.P. = 00°00'08.7"

Moon at Greatest Eclipse
(Geocentric Coordinates)

R.A. = 10h04m30.6s
Dec. = +12°16'32.8"
S.D. = 00°16'03.4"
H.P. = 00°58'55.7"



External/Internal Contacts of Penumbra

P1 = 15:46:51.5 UT
P2 = 18:11:57.2 UT
P3 = 18:39:24.9 UT
P4 = 21:04:23.5 UT

Constants & Ephemeris

ΔT = 68.4 s
k1 = 0.2725076
k2 = 0.2722810
Δb = 0.0" Δl = 0.0"
Eph. = JPL DE405

Circumstances at Greatest Eclipse: 18:25:31.8 UT

Lat. = 36°58.0'N Sun Alt. = 63.9°
Long. = 087°40.3'W Sun Azm. = 197.9°
Path Width = 114.7 km Duration = 02m40.1s

Circumstances at Greatest Duration: 18:21:49.2 UT

Lat. = 37°35'N Sun Alt. = 63.8°
Long. = 089°07'W Duration = 02m40.2s

0 1000 2000 3000 4000 5000
Kilometers

External/Internal Contacts of Umbra

U1 = 16:48:36.1 UT
U2 = 16:49:36.1 UT
U3 = 20:01:39.6 UT
U4 = 20:02:34.4 UT

Geocentric Libration
(Optical + Physical)

l = 4.64°
b = -0.57°
c = 21.90°

Brown Lun. No. = 1171

F. Espenak, NASA's GSFC
eclipse.gsfc.nasa.gov
2014 Feb 22

Space Place

June 2017

The Shape of the Solar System

- by Marcus Woo

When Stamatios (Tom) Krimigis was selected for the Voyager mission in 1971, he became the team's youngest principal investigator of an instrument, responsible for the Low Energy Charged Particles (LECP) instrument. It would measure the ions coursing around and between the planets, as well as those beyond. Little did he know, though, that more than 40 years later, both Voyager 1 and 2 still would be speeding through space, continuing to literally reshape our view of the solar system.

The solar system is enclosed in a vast bubble, carved out by the solar wind blowing against the gas of the interstellar medium. For more than half a century, scientists thought that as the sun moved through the galaxy, the interstellar medium would push back on the heliosphere, elongating the bubble and giving it a pointy, comet-like tail similar to the magnetospheres—bubbles formed by magnetic fields—surrounding Earth and most of the other planets

"We in the heliophysics community have lived with this picture for 55 years," said Krimigis, of The Johns Hopkins University Applied Physics Laboratory in Laurel, Maryland. "And we did that because we didn't have any data. It was all theory."

But now, he and his colleagues have the data. New measurements from Voyager and the Cassini spacecraft suggest that the bubble isn't pointy after all. It's spherical.

Their analysis relies on measuring high-speed particles from the heliosphere boundary. There, heated ions from the solar wind can strike neutral atoms coming from interstellar medium and snatch away an electron. Those ions become neutral atoms, and ricochet back toward the sun and the planets, uninhibited by the interplanetary magnetic field.

Voyager is now at the edge of the heliosphere, where its LECP instrument can detect those solar-wind ions. The researchers found that the number of measured ions rise and fall with increased and decreased solar activity, matching an 11-year solar cycle, showing that the particles indeed originate from the sun.

Meanwhile, Cassini, which launched 20 years after Voyager in 1997, has been measuring those neutral atoms bouncing back, using another instrument led by Krimigis, the Magnetosphere Imaging Instrument (MIMI). Between 2003 and 2014, the number of measured atoms soared and dropped in the same way as the ions, revealing that the latter begat the former. Neutral atoms must therefore come from the edge of the heliosphere.

If the heliosphere were comet-shaped, atoms from the tail would take longer to arrive at MIMI than those from the head. But the measurements from MIMI, which can detect incoming atoms from all directions, were the same everywhere. This suggests the distance to the heliosphere is the same every which way. The heliosphere, then, must be round, upending most scientists' prior assumptions.

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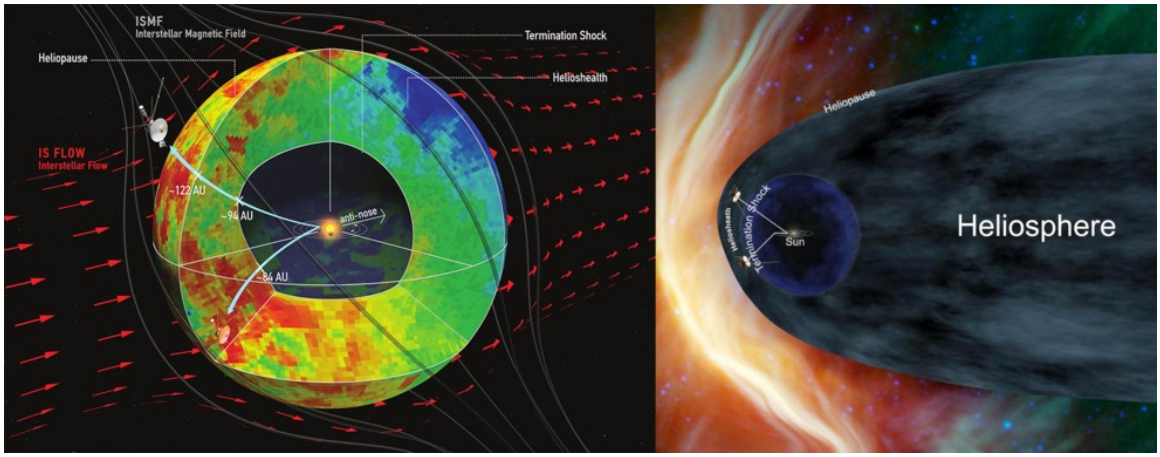
It's a discovery more than four decades in the making. As Cassini ends its mission this year, the Voyager spacecraft will continue blazing through interstellar space, their remarkable longevity having been essential for revealing the heliosphere's shape.

"Without them," Krimigis says, "we wouldn't be able to do any of this."

To teach kids about the Voyager mission, visit the NASA Space Place:
https://spaceplace.nasa.gov/voyager-to-planets



Caption: New data from NASA's Cassini and Voyager show that the heliosphere — the bubble of the sun's magnetic influence that surrounds the solar system — may be much more compact and rounded than previously thought. The image on the left shows a compact model of the heliosphere, supported by this latest data, while the image on the right shows an alternate model with an extended tail. The main difference is the new model's lack of a trailing, comet-like tail on one side of the heliosphere. This tail is shown in the old model in light blue.

Image credits: Dialynas, et al. (left); NASA (right)

With articles, activities, crafts, games, and lesson plans, NASA Space Place encourages everyone to get excited about science and technology.

Visit **spaceplace.nasa.gov** to explore space and Earth science!

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

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Space Place

July 2017

Twenty Years Ago on Mars . . .

- by Linda Hermans-Killiam

On July 4, 1997, NASA's Mars Pathfinder landed on the surface of Mars. It landed in an ancient flood plain that is now dry and covered with rocks. Pathfinder's mission was to study the Martian climate, atmosphere and geology. At the same time, the mission was also testing lots of new technologies.

For example, the Pathfinder mission tried a brand-new way of landing on Mars. After speeding into the Martian atmosphere, Pathfinder used a parachute to slow down and drift toward the surface of the Red Planet. Before landing, Pathfinder inflated huge airbags around itself. The spacecraft released its parachute and dropped to the ground, bouncing on its airbags about 15 times. After Pathfinder came to a stop, the airbags deflated.

Before Pathfinder, spacecraft had to use lots of fuel to slow down for a safe landing on another planet. Pathfinder's airbags allowed engineers to use and store less fuel for the landing. This made the mission less expensive. After seeing the successful Pathfinder landing, future missions used this airbag technique, too!

Pathfinder had two parts: a lander that stayed in one place, and a wheeled rover that could move around. The Pathfinder lander had special instruments to study Martian weather. These instruments measured air temperature, pressure and winds. The measurements helped us better understand the climate of Mars.

The lander also had a camera for taking images of the Martian landscape. The lander sent back more than 16,000 pictures of Mars. Its last signal was sent to Earth on Sept. 27, 1997. The Pathfinder lander was renamed the Carl Sagan Memorial Station. Carl Sagan was a well-known astronomer and science educator.

Pathfinder also carried the very first rover to Mars. This remotely-controlled rover was about the size of a microwave oven and was called Sojourner. It was named to honor Sojourner Truth, who fought for African-American and women's rights. Two days after Pathfinder landed, Sojourner rolled onto the surface of Mars. Sojourner gathered data on Martian rocks and soil. The rover also carried cameras. In the three months that Sojourner operated on Mars, the rover took more than 550 photos!

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Pathfinder helped us learn how to better design missions to Mars. It gave us valuable new information on the Martian climate and surface. Together, these things helped lay the groundwork for future missions to Mars.

Learn more about the Sojourner rover at the NASA Space Place:
https://spaceplace.nasa.gov/mars-sojourner

Caption: The Mars Pathfinder lander took this photo of its small rover, called Sojourner. Here, Sojourner is investigating a rock on Mars. Image credit: NASA/JPL-Caltech

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BMAA 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 Rd.
Chalfont, PA 18914

If you would prefer to register and pay using **PayPal** do not use this form**.** On the **PayPal** 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.