Star Dust

Newsletter of National Capital Astronomers, Inc.

capitalastronomers.org

June 2019 ***Volume 77, Issue 10***

Celebrating 82 Years of Astronomy

Next Meeting

When: Sat. June 8th, 2019

Time: 7:30 pm

Where: UMD Astronomy Observatory

Speakers: Science Fair Winners as well as Dean Howarth and Rachel O'Connell

Table of Contents

Directions to Dinner/Meeting

Our time and location for dinner with the Science Fair Winners before this meeting is 5:30 pm at **Azteca Restaurant and Cantina** at 9505 Baltimore Avenue (Route 1), College Park, MD 20740 across from the Honda dealership.

The National Capital Astronomers meeting is held at the UMD Astronomy Observatory on Metzerott Rd about halfway between Adelphi Rd and University Blvd.

Observing after the Meeting

Following the meeting, members and guests are welcome to tour through the Observatory. Weather-permitting, several of the telescopes will also be set up for viewing.

Science Fair Winners

John Hornstein

Each spring, the NCA sends judges to local regional science fairs in order to identify good projects in astronomy. Our awards consist of:

- A certificate
- An invitation to speak at our June meeting
- One year of free membership in the NCA
- A one-year subscription to Sky & Telescope

Congratulations to the 2019 Winners

(in alphabetic order)

Yash Anand - Analysis of Quasars with Different Redshifts, Montgomery County Science Fair

Justin Chen* and **Joshua Wang** - Using Python to Source Neutrinos to their Corresponding Blazars, Montgomery County Science Fair

Dennis Chunikhin - Simulation of a Star-Planet-Moon System and the Effect of a Large Orbital Inclination on the Moon's Weather, Montgomery County Science Fair

Devin Hoover - An Orbital Survey of Meteor Showers Using SAAMER, Montgomery County Science Fair

Sannijdhi Reddy Korisepati - Galactic Gas, Montgomery County Science Fair

Siobhan Light - Analyzing Hypervelocity Impacts into Metal to Reveal the Impact History of Asteroid Psyche 16, Montgomery County Science Fair

Camille Nelson - Launching Satellites into Space Using Electromagnets, PG County Science Fair

*Justin Chen was an awardee last year as well.

Image composite from video of a fireball on March 31, 2019 at 11:42 p.m.
Image Credit: University of Maryland Astronomy Observatory

Recent Astronomy Highlights

Exocomets
These days the discoveries of new exoplanets seem to hardly warrant a notice. But exocomets? Astronomers claim to have discovered three of them around the star Beta Pictorus based on data obtained by the Transitting Exoplanet Survey Satellite (TESS). At 63 light years distance from Earth, Beta Pictorus is considered to be a young star, approximately 23 million years old. Such young stars are thought to be more likely to have comets. The claim bolstered a paper from 1999 predicting that the star had comets based on signals believe to be from the gas evaporating off of the comets. More information can be found at: https://www.sciencedaily.com/releases/2019/05/190522120525.htm

Ancient Galaxies Unexpectedly Bright
Astronomers were surprised to find that NASA's Spitzer Space Telescope was able to see the light from galaxies. This discovery was possible because those galaxies, which had formed within a billion years of the Big Bang, emitted unexpectedly high amounts of ionizing radiation, the type of radiation that stripped electrons from the neutral hydrogen of the early Universe in what is known as the Epoch of Reionisation. The results imply that these early galaxies were dominated by massive stars composed almost exclusively of hydrogen and helium. A link to the paper reporting the results is at: https://academic.oup.com/mnras/advance-article/doi/10.1093/mnras/stz940/5427918

Possible Black Hole- Neutron Star Merger and Other Discoveries
The two LIGO instruments and the European VIRGO Gravitational Wave Detectors began searching the Universe again on April 1. With increased sensitivity in all of the detectors, the teams running them claim the discoveries of several additional black-hole mergers and one neutron-star merger. In addition, on April 26th, all three instruments detected a possible black-hole-neutron-star merger. More information can be found at: https://www.ligo.org/news.php

continued on page 4

(Editor's Note: The following Abstract and Biography were originally in the January 2019 issue of Star Dust. The presentation was postponed until the upcoming meeting due to inclement weather.)

An Interview with Einstein

Dean Howarth and Rachel O'Connell

Abstract: The year 2019 marks the centennial of the observational proof of Einstein's General Theory of Relativity by British astronomer, Arthur Eddington. At the time, the newspapers were agog with claims that all was "askew in the heavens" and claimed that only a dozen wise men could even understand the theory! Today, relativity is part of the fabric of science, but many are still "agog" at the thought of warped space-time.

Enjoy an "Interview with Herr Professor" and hear some of Einstein's insights and recollections on the events of 100 years ago, when Newton was unseated as the master of gravity. Historical interpreter Dean Howarth portrays Dr. Einstein as he is interviewed by a curious journalist (played by Rachel O'Connell).

Biographies: Dean Howarth is a veteran physics teacher in northern Virginia. He has developed a unique set of living history skits - *Living Histories of Science* - that vividly convey the personalities and the achievements that led to our present understanding of the physical world. In many of these skits Dean is accompanied by a colleague. Rachel O'Connell, an adjunct performer with *Living Histories of Science*, has collaborated with Dean for 11 years. Dean and Rachel conduct historical science narratives at museums and historic sites under the moniker, *The Natural Philosopher LLC*. Their work can be seen at http://www.livinghistoriesofscience.com/ . Their presentations are designed for all ages, and have been given at sites such as Mount Vernon, Gadsby's Tavern, Claude Moore Farm, the Banneker Historic Park, the Society of the Cincinnati, Rippon Lodge, and the Stabler-Leadbeater and Hugh Mercer Apothecaries.

Exploring the Sky

*"**Exploring the Sky**"* is an informal program that, for 70 years, has offered monthly opportunities for anyone in the Washington area to see the stars and planets through telescopes from a location within the District of Columbia. Presented by the National Park Service and National Capital Astronomers, sessions are held in Rock Creek Park once each month on a Saturday night from April through November, Beginners (including children) and experienced stargazers are all welcome—and it's free!

Hosted by: National Capital Astronomers, Inc and Rock Creek Park

2018 Exploring the Sky Sessions

6 July 9:00 p.m. – Moon, Jupiter, M13
10 Aug. 8:30 p.m. – Moon, Jupiter, Saturn, M13
7 Sep. 8:00 p.m. – Moon, Jupiter, Saturn
5 Oct. 7:30 p.m. – Moon, Saturn
2 Nov. 7:00 p.m. – Moon, Saturn, Uranus

More information can be found at NCA's web site, www.capitalastronomers.org or the Rock Creek Park web site, www.nps.gov/rocr/planyourvisit/expsky.htm. You can also call the Nature Center at (202) 895-6070. For general information on local astronomical events visit www.astronomyindc.org

The submission deadline for September's Star Dust, is August 21st. Have a great Summer and…

Clear Skies!

Slate of Officer and Other Board Member Positions for 2019-2020

John Hornstein, reporting for the Nominating Committee, May 2019

	Current =======	Candidate =========
President	Harold Williams	Harold Williams
Vice President	John Hornstein	John Hornstein
Secretary-Treasurer	Henry Bofinger	Henry Bofinger
Asst. Sec.-Trsr	Jeff Norman	Jeff Norman
Trustee	Wayne Warren (to June 2019)	Guy Brandenburg (to June 2023)
Trustee	Jack Gaffey (to June 2020)	N/A
Trustee	Benson Simon (to June 2021)	N/A
Trustee	Mike Brabanski (to June 2022)	N/A

Please note that additional nominations for all offices are allowed during the upcoming election.

Bring Your Astrophotos to the June NCA Meeting

John Hornstein

Our members make striking photos of astronomical objects, and we all want to see them. Therefore, bring favorite photos that you have made of astronomical objects this year to show at the June 8th meeting. Please bring them on a USB data stick. Also, to save time, please have only your photos of astronomical objects on the USB stick. Expect some audience members to come up to you after everyone has shown their photos, to ask you how you made yours.

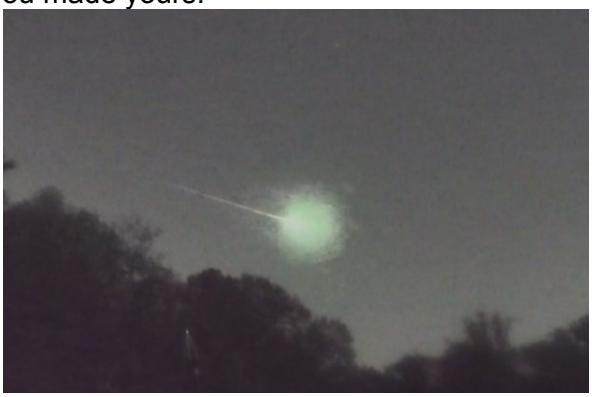

Image composite from video of a fireball on April 16, 2019 around 11:00 p.m.
Image Credit: University of Maryland Astronomy Observatory

Sky Watchers

Summer Overview

Mercury is in the evening sky until late July when it transits to morning, then in early September it transits back to evening. Venus is in the dawn sky until it transits to the evening sky in mid August. As Summer begins, Jupiter rises near sunset while Saturn comes up about two hours later. Mars gets lower in the western sky after sunset as Summer passes until it transits to the morning sky in September.

Late June

6/10	Jupiter at Opposition and closest to Earth.
6/17	Full Moon. 4:31 a.m.
6/19	Conjunction – Mercury will be 14' north of Mars at 10:34 a.m.
6/21	Summer Solstice – 11:54 a.m.
6/23	Mercury at Greatest Eastern Elongation. It will be 25.2^{o} from the Sun.

July

7/2	Total Solar Eclipse (Only visible in the Southern Hemisphere)
7/9	Saturn at Opposition and closest to Earth.
7/16	Full Moon. 5:38 p.m.
7/28, 29	Peak of the Delta Aquarids Meteor Shower – 20 meteors/hour. A waning crescent Moon should not interfere with viewing. Best viewing in the hours before dawn.

August

8/9	Mercury at Greatest Western Elongation, 19^{o} from the Sun.
8/12, 13	Peak of the Perseids Meteor Shower – 60 meteors/hour. The Moon will be almost full and will interfere with viewing. Best viewing in the hours before dawn.
8/15	Full Moon. 8:30 a.m.
8/24	Conjunction – Venus 19' north of Mars at 8:34 a.m.

Early September

9/3	Conjunction – Mercury 42' north of Mars at 6:44 a.m.
9/13	Conjunction – Mercury 20' south of Venus at 5:35 p.m.

Times in EDT

Star Dust is published ten times yearly September through June, by the National Capital Astronomers, Inc. (NCA).

ISSN: 0898-7548

Editor: Todd Supple

Editorial Advisors:

- Michael Chesnes
- John D. Gaffey, Jr.
- Jeffrey Norman
- Elizabeth Warner
- Wayne Warren
- Marjorie Weissberg
- Harold Williams

Electronic Distributor: Jay Miller

Please Get Star Dust Electronically

NCA members able to receive Star Dust, the newsletter of the NCA, via e-mail as a PDF file attachment, instead of hardcopy via U.S. Mail, can save NCA a considerable amount of money on the printing and postage in the production of Star Dust (the NCA's single largest expense), save some trees and have one-click access to all the embedded links in the document. If you can switch from paper to digital, please contact Henry Bofinger, the NCA Secretary-Treasurer, at hbofinger@earthlink.net

Thank you!

Recent Astronomy Highlights – continued from page 2

Possible Ocean Beneath Pluto's Surface

2019 began with the New Horizons spacecraft making a flyby of Ultima Thule. Meanwhile data from New Horizon's 2015 flyby of Pluto is still generating discoveries and speculation. Scientists were amazed by the complicated topography that they saw in the images of the dwarf planet, topography that seemed to imply geologic activity. One theory now is that Pluto harbors a subsurface ocean. But scientists believed such an ocean should have frozen long ago. However, some scientists have speculated that such an ocean could remain unfrozen if insulated by a layer of gas hydrates. For more information: https://www.global.hokudai.ac.jp/blog/gas-insulation-could-be-protecting-an-ocean-inside-pluto/

Occultation Notes

- D following the time denotes a disappearance, while R indicates that the event is a reappearance.
- When a power (x; actually, zoom factor) is given in the notes, the event can probably be recorded directly with a camcorder of that power with no telescope needed.
- The times are for Greenbelt, MD, and will be good to within +/-1 min. for other locations in the Washington-Baltimore metropolitan areas unless the cusp angle (CA) is less than 30 deg., in which case, it might be as much as 5 minutes different for other locations across the region.
- Some stars in Flamsteed's catalog are in the wrong constellation, according to the official IAU constellation boundaries that were established well after Flamsteed's catalog was published. In these cases, Flamsteed's constellation is in parentheses and the actual constellation is given in the notes following a /.
- Mag is the star's magnitude.
- % is the percent of the Moon's visible disk that is sunlit, followed by a + indicating that the Moon is waxing and - showing that it is waning. So 0 is new moon, 50+ is first quarter, 100+ or - is full moon, and 50- is last quarter. The Moon is crescent if % is less than 50 and is gibbous if it is more than 50.
- Cusp Angle is described more fully at the main IOTA Web site.
- Sp. is the star's spectral type (color), O,B,blue; A,F,white; G,yellow; K,orange; M,N,S,C red.
- Also in the notes, information about double stars is often given. "Close double" with no other information usually means nearly equal components with a separation less than 0.2". "mg2" or "m2" means the magnitude of the secondary component, followed by its separation in arc seconds ("), and sometimes its PA from the primary. If there is a 3rd component (for a triple star), it might be indicated with "mg3" or "m3". Double is sometime abbreviated "dbl".
- Sometimes the Axis angle (AA) is given. It is the angle measured around the Moon's disk, from the Moon's axis of rotation. It can be used with a lunar map to tell where a star will reappear relative to lunar features.

Mid-Atlantic Occultations

David Dunham

Asteroidal Occultations

2019	Day	EDT	Star	Mag.	Asteroid	dmag	dur. s	Ap. "	Location
Jun 28	Fri	0:45	4U431105211	12.2	Brambilla	1.7	7	8	s&wMD,DC,nVA,cOH
Jul 4	Thu	0:40	TYC51450432	10.1	Rosalinde	4.2	3	4	cNJ,sePA,nMD,sOH
Jul 5	Fri	0:27	4U340101228	12.7	Houzeau	3.3	3	10	sPA,MD,DC,nVA,OH
Jul 11	Thu	2:25	4U331182297	11.5	Gratia	2.4	6	7	ePA,nMD,nwVA;DC?
Jul 11	Thu	2:29	4U344181710	11.5	Bohemia	0.9	5	7	DE,MD,DC,nVA,sOH
Jul 14	Sun	1:58	TYC62951696	10.6	Saturn	98min	12?		USA
Jul 15	Mon	0:53	TYC56941680	11.0	Melpomene	0.2	15	8	sePA,MD,DC,nwVA
Jul 16	Tue	3:00	4U353179139	13.2	Huenna	0.5	9	11	NJ,MD,DC,n&wVA
Jul 23	Tue	3:32	HIP 17094	9.6	Edna	5.1	3	4	eNC,seVA,seMD,DE
Aug 3	Sat	5:32	4UC57721638	9.6	Ampella	3.7	1.4	4	wNC,cVA,sMD,sDE
Aug 3	Sat	22:14	TYC11031941	10.7	Praxedis	2.4	7	5	sePA,cMD,nVA;DC?
Aug 11	Sun	23:34	4U448137056	11.9	Endymion	2.4	5	7	sePA,cMD,nVA;DC?
Aug 19	Mon	21:05	4UC38069839	12.2	Flora	0.4	7	8	sPA,MD,DC,n&eVA
Aug 22	Thu	23:43	PPM 237880	9.3	Hirayama	6.7	2	3	PA,wMD,eWV;nwVA?
Sep 6	Fri	5:17	SAO 93698	9.0	Felicia	6.3	7	3	cMO,nKY,sWV,cVA

Most event details at http://www.asteroidoccultation.com/

Lunar Grazing Occultations

2019	Day	EDT	Star	Mag	% alt	CA	Location, Notes
Jun 26	Wed	4:29	ZC 151	8.2	41- 30	5N	PtRoyl,VA;Mechncsvl,Easton,MD
Jul 29	Mon	4:44	SAO 77714	8.2	10- 14	9N	Chstrfd,Varina,VA;Fruitlnd,MD
Aug 25	Sun	1:59	ZC 808	6.8	33- 10	10N	nw Clearfield&se Covington,PA
Aug 25	Sun	5:12	SAO 77235	9.8	31- 45	13N	Strasburg, VA; Woodsboro, MD
Sep 5	Thu	21:20	ZC 2401	5.6	49+ 21	3N	n.York,Lancastr,PA;Trenton,NJ

Links for interactive maps are at http://iota.jhuapl.edu/exped.htm

Lunar Total Occultations

2019	Day	EDT	Ph	Star	Mag	%	alt	CA	Sp.	Notes
Jun 16	Sun	2:56	D	ZC 2401	5.6	99+	20	74N	F3	close double?
Jun 20	Thu	2:26	R	4 Cap	5.9	92-	27	83N	G8	ZC 2961
Jun 24	Mon	5:19	R	ZC 3480	7.2	60-	39	12S	F5	Sun altitude -5 deg.
Jun 30	Sun	4:30	D	delta1 Tau	3.8	7-	6	-34N	G8	Az. 72,ZC 648, spec.
Jun 30	Sun	5:02	R	=Hyadum II	3.8	7-	11	39N	G8	Sun -8,Az. 77 \binary
Jun 30	Sun	5:37	R	delta2 Tau	4.8	7-	18	87N	A7	Sun -2, ZC 653, double?
Jul 10	Wed	0:14	D	SAO139528*	7.2	58+	13	54N	K0	Azimuth 251 deg.
Jul 20	Sat	1:46	R	56 Aquarii	6.4	90-	30	23S	B8	ZC 3304
Jul 21	Sun	0:59	R	ZC 3413	6.1	83-	21	66S	K5	Mag2 11, sep. 4",PA 258
Jul 22	Mon	2:54	R	30 Piscium	4.4	75-	35	86S	M3	ZC3536, close double?
Jul 22	Mon	5:21	R	33 Piscium	4.6	75-	46	41S	K1	Sun -7,ZC 5,close dbl?
Jul 28	Sun	3:00	R	97 Tauri	5.1	18-	5	86N	A7	Azimuth 70 deg., ZC 730
Aug 5	Mon	21:03	D	ZC 1923	7.0	31+	26	54S	K0	Sun -9,mag2 11 sep. .4"
Aug 7	Wed	23:21	D	SAO 159111	7.5	54+	12	22N	G1	Azimuth 240 deg.
Aug 7	Wed	23:24	D	ZC 2180	6.8	54+	12	68N	M2	Azimuth 241 deg.
Aug 9	Fri	0:01	D	ZC 2313	7.0	65+	11	57S	G1	Azimuth 236 deg.
Aug 21	Wed	0:52	R	ZC 291	6.8	73-	23	72S	G5	close double??
Aug 21	Wed	5:28	R	ZC 306	6.8	72-	58	86N	F0	Sun alt. -11 deg.
Aug 21	Wed	23:57	R	mu Ceti	4.3	64-	7	55S	F1	Az 83,ZC 405,close dbl?
Aug 24	Sat	2:07	R	SAO 93963*	6.9	43-	18	77S	F6	close double?
Aug 24	Sat	3:51	R	ZC 684*	6.2	42-	38	26S	B9	mg2 7,sep 3" R 2s early
Aug 25	Sun	2:07	R	ZC 808	6.8	33-	10	35N	B0	Az. 72,mag2 11 sep .04"
Aug 25	Sun	4:30	R	ZC 826	7.1	32-	37	54S	B5	
Aug 26	Mon	3:00	R	14 Gem	6.5	22-	10	65S	G5	Az 70,ZC 984,close dbl?
Aug 26	Mon	5:36	R	ZC 1001	7.3	21-	39	47N	A0	Sun alt. -11 deg.
Aug 27	Tue	3:14	R	63 Gem	5.3	13-	2	39S	F5	Az 64,ZC1129,close dbl
Aug 27	Tue	3:34	R	SAO 79410	7.2	13-	6	62S	G5	Azimuth 67 deg.
Aug 28	Wed	5:20	R	SAO 97941	7.5	6-	13	38S	A2	Azimuth 75 deg.
Sep 5	Thu	21:12	D	ZC 2401	5.6	49+	23	17N	F3	PA graze; close double?
Sep 6	Fri	20:03	D	52 Oph	6.5	59+	29	34N	Ap	Sun alt. -7, ZC 2529
Sep 7	Sat	20:01	D	ZC 2682	7.0	69+	28	86N	G8	Sun -7,mag2 12 sep 1.3"
Sep 9	Mon	20:53	D	4 Cap	5.9	85+	27	68N	G8	ZC 2961

*in Kepler2 program so occultation light curves are sought.

More, esp. total lunar occultations, at http://iota.jhuapl.edu/exped.htm
David Dunham, dunham@starpower.net

2018-2019 Officers

President:
Harold Williams
haroldwilliams@me.com or
Harold.Williams@montgomerycollege .edu

Vice-President:
John Hornstein
jshgwave@yahoo.com
301-593-1095 (h)

Secretary-Treasurer:
Henry Bofinger
hbofinger@earthlink.net
202-675-1075

Asst. Secretary-Treasurer:
Jeffrey B. Norman
jeffreynorman@comcast.net

Trustees:
- Benson Simon (2021)
- Michael Brabanski (2022)
- Wayne Warren (2019)
- Jack Gaffey (2020)

Appointed Officers and Committee Heads:

Exploring the Sky
Jay Miller
jhmiller@me.com

Telescope Making
Guy Brandenburg
gfbrandenburg@yahoo.com
202-635-1860

NCA Webmaster
Elizabeth Warner
warnerem@astro.umd.edu
301-405-6555

Star Dust Editor
Todd Supple
NCAStardust@gmail.com
301-595-2482 (h)

Social Media
Liz Dervy
Twitter: @NatCapAstro

Spectacular Lunar Passage Across the Preasepe Cluster (M44) Observed May 10 from Indiana

David and Joan Dunham

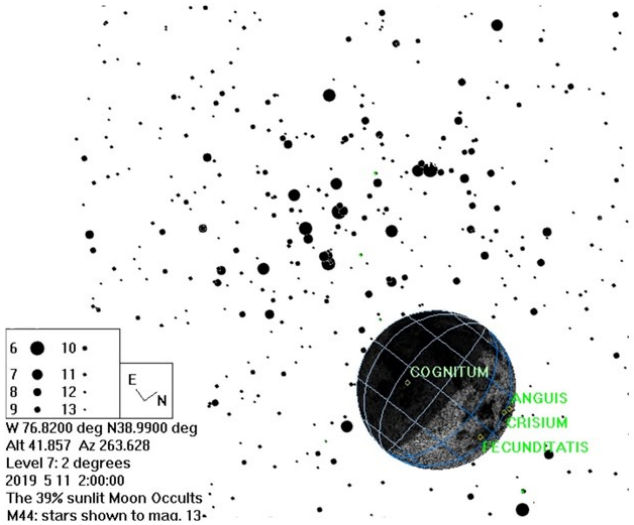

Image Credit - Project Pluto's Guide8 program and David Dunham

A picture showing the Moon in the Praesepe cluster Friday evening, May 10, is shown above and on p. 6 of last month's Star Dust. Unfortunately, it rained and was very cloudy over most of the Mid-Atlantic region that night. Following weather forecasts, we drove to southern Michigan, the closest area where a "bubble" of clear sky was predicted.

We ended up making most of our observations, using video cameras on a 10-in. "suitcase" reflector and a 5-in. refractor, from a site near the small De Kalb County airport a few miles south of Auburn, Indiana, and about 25 miles north of Ft. Wayne. We recorded about 40 occultation events, including 8 during a grazing occultation of 6.4-mag. ZC 1298 (the reason, besides weather, that we selected the location), during the passage. Before midnight, there was a lull in the action, during which we drove back to our motel in Coldwater, Michigan, about 25 miles southeast of Battle Creek. Before moonset, we recorded the last 4 events from the motel parking lot. Overall, it was the largest number of occultations that either of us ever recorded in one night.

Later, we learned that, contrary to the forecasts until those made just 12 hours in advance, it cleared up across much of southern Virginia, which was also crossed by the ZC 1298 graze path. So, we probably could have made our observations much closer to home, but the sky at our sites in northern Indiana and southern Michigan was likely more transparent than it would have been in southern Virginia. On the morning of Aug. 28, an M44 passage will be visible from the western USA, but it will not be as favorable since the 5% sunlit Moon will be too close to the Sun to allow observing all of the passage in a dark-enough sky. There won't be another chance to observe an M44 passage in the USA until the next series that will occur in 2025-2026. The Moon also crosses the Pleiades, but that cluster is not as compact as M44 so not as many occultations can be observed during Pleiades events.

Learn the Sky Nights 2019

Do you ever look up at the night sky and wonder about what you see? Which of those lights up there are stars and which are planets? Is that a plane passing over? Or might it be a satellite? Well your chance to finally know the answers to these and other questions is coming this summer. For six nights, one a week, Elizabeth Warner will be teaching classes at the University of Maryland Astronomy Observatory. The beginners' course, 7:00 p.m. to 8:30 p.m., will cover such subjects as satellites, reading star charts, understanding telescopes, and the basics of astrophotography. The advanced course, if there is enough interest, will be from 9:00 p.m. until 10:30 p.m. In past years, the advanced-course participants observed exoplanet transits and asteroid occultations.

Registration information will be placed on the website below when it is finalized:
www.astro.umd.edu/openhouse/2programs/ltsn/Learn_the_sky19.html

Calendar of Events

NCA Mirror- or Telescope-making Classes: Tuesdays AND Fridays, from 6:30 to 9:30 pm at the Chevy Chase Community Center (intersection of McKinley Street and Connecticut Avenue, N.W.) Contact instructor Guy Brandenburg at 202-635-1860 or at gfbrandenburg@yahoo.com. Additional information is at guysmathastro.wordpress.com/ and home.earthlink.net/~gfbranden/GFB_Home_Page.html

Open house talks and observing at the University of Maryland Astronomy Observatory in College Park on the 5th and 20th of every month at 8:00 pm (Nov.-Apr.) or 9:00 pm (May-Oct.). Details: www.astro.umd.edu/openhouse

Next NCA Meeting at the University of Maryland Astronomy Observatory: **September 14** 7:30 p.m.

The Mid-Atlantic Senior Physicists Group usually has a talk on the third Wednesday of the month at 1:00 pm at the American Center for Physics (1st floor conference room). 1 Physics Ellipse, College Park MD -- off River Rd. between Kenilworth Ave. and Paint Branch Parkway. www.aps.org/units/maspg

10th Annual Astronomy Festival on the National Mall – The festival will take place **Saturday, June 22nd, 6:00 p.m. to 11:00 p.m.** in front of the Smithsonian Castle. For more information, go to: www.hofstra.edu/academics/colleges/hclas/physic/physic-nationalmall.html

National Capital Astronomers Membership Form

Name: _____ **Date:** ___/___/___

Address: _____ **ZIP Code:** _____

Home Phone: ____-____-_____ **E-mail:** _____ **Print / E-mail Star Dust (circle one)**

Membership (circle one): Student….. $ 5; Individual / Family…..$10; Optional Contribution…..$__

Please indicate which activities interest you:

- Attending monthly scientific lectures on some aspect of astronomy ____
- Making scientific astronomical observations ____
- Observing astronomical objects for personal pleasure at relatively dark sites ____
- Attending large regional star parties ____
- Doing outreach events to educate the public, such as Exploring the Sky ____
- Building or modifying telescopes ____
- Participating in travel/expeditions to view eclipses or occultations ____
- Combating light pollution ____

Do you have any special skills, such as videography, graphic arts, science education, electronics, machining, etc.?

Are you interested in volunteering for: Telescope making, Exploring the Sky, Star Dust, NCA Officer, etc.?

Please mail this form with check payable to ***National Capital Astronomers*** to:
Henry Bofinger, NCA Treasurer; 727 Massachusetts Ave. NE, Washington, DC 20002-6007

National Capital Astronomers, Inc.

If undeliverable, return to
NCA c/o Elizabeth Warner
400 Madison St #2208
Alexandria, VA 22314

First Class
Dated Material

Celebrating 82 Years of Astronomy

Next NCA Meeting:

2019 June 8th 7:30 pm

@ UMD Astronomy Observatory

Science Fair Winners, *An Interview with Einstein* performed by Dean Howarth and Rachel O'Connell, Elections, and Astrophotos

Inside This Issue