Star Dust

Newsletter of National Capital Astronomers, Inc.

capitalastronomers.org

February 2018 ***Volume 76, Issue 6***

Celebrating 81 Years of Astronomy

Next Meeting

When: Sat. February 10th, 2018

Time: 7:30 pm

Where: UMD Observatory

Speaker: Dr. Brett Denevi

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Directions to Dinner/Meeting

Our time and location for dinner with the speaker before this meeting is 5:30 pm at "Hunan Treasure" at 7537 Greenbelt Road, Greenbelt, MD 20770 in Greenway Center just east of where Greenbelt Road crosses over the Baltimore-Washington Parkway.

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

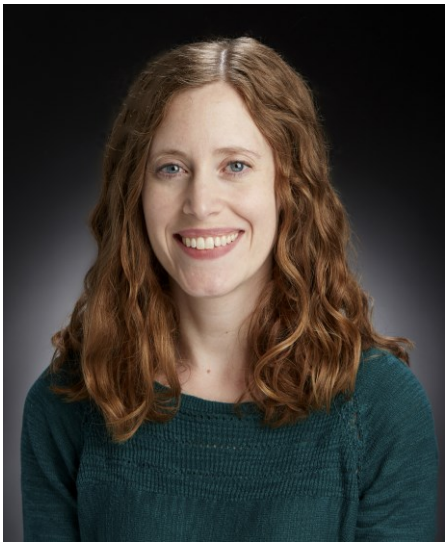
Following the meeting, members and guests are welcome to tour through the Observatory. Weather-permitting, several of the telescopes will also be set up for viewing.

The New Moon

Brett Denevi

Johns Hopkins Applied Physics Laboratory

Abstract: Although we may not think of the Moon as a dynamic place (The first lunar explorers described the landscape's "magnificent desolation."), its past was one of intense bombardment, floods of lava, and intrusive volcanism, and even today it continues to change. Understanding the Moon's past and present may provide our best opportunity to gain new insights into diverse topics such as the early evolution of the Solar System, the timeline of the first development of life on Earth, how a planetary body evolves from a fiery magma ocean to a solid world still cooling off today, and how often asteroids and comets have struck the surface of the Moon (and thus the Earth) in the past and the present day. The last decade has seen a renaissance in lunar science due to a host of new missions and reexamination of old data and samples; this talk will focus on highlights of these recent results, their significance for our big-picture view of the Solar System, and where we should go next to answer some of our most important outstanding questions.



Biographical Sketch: Dr. Brett Denevi is a planetary scientist at Johns Hopkins Applied Physics Laboratory, and the Deputy Principal Investigator of the Lunar Reconnaissance Orbiter Camera. Her research focuses on the origin and evolution of the surfaces of planets and asteroids, particularly each body's history of volcanism, the effects of

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Recent Astronomy Highlights

A Black Hole with Bad Table Manners

Astronomers have found a supermassive black hole which appears to have fed on gas twice in the past hundred thousand years or so, "burping" off some of that gas on each occasion. Such burps are similar to those scientists have suspected of Sagittarius A*, the supermassive black hole at the center of the Milky Way. Such behavior is theorized to have formed the Fermi Bubbles, clouds 30,000 light years in diameter, discovered above and below the plane of our Galaxy. More information can be found in the article at www.sciencedaily.com/releases/2018/01/180111162934.htm

Measuring the Sun's Rate of Weight Loss

Using radio tracking data from the recent MESSENGER (Mercury Surface, Space Environment, Geochemistry, and Ranging) mission, scientists have been able to measure the orbit of Mercury with more precision than previously possible. Using that information, they were also able to infer the rate at which the Sun is losing mass through the solar wind. That rate – slightly less than 0.1% of the Sun's mass over a period of ten billion years. Not much, but it is enough to cause slight changes in the planets' orbits. More information is at www.sciencedaily.com/releases/2018/01/180118141822.htm

First Detailed Imaging of a Giant Star

Using the four telescopes of the PIONIER (Precision Integrated-Optics Near-infrared Imaging ExpeRiment) instrument, scientists have been able to obtain images of the surface of π1Gruis, a giant star in the constellation of Gruis (Latin for Crane). Such images of giant stars give clues to what will become of our Sun when it grows in size near the end of its life. More information, as well as the star image, can be found at: www.sciencedaily.com/releases/2018/01/180123102007.htm

Biographical Sketch – continued from page 1

impact cratering, and space weathering. Brett is the recipient of the 2015 Maryland Academy of Sciences outstanding young scientist award, a NASA early career fellowship, six NASA group achievement awards, and asteroid 9026 Denevi was named in her honor.

(Editor's Note: Dr. Denevi wrote an article concerning recent Moon research in the June 2017 issue of Physics Today. The article is at the following link: http://physicstoday.scitation.org/doi/10.1063/PT.3.3593.)

Tales of the Eclipse – Part 3

Since this month's talk by Dr. Denevi concerns the Moon, it seems appropriate to share a couple more stories of the eclipse of August 21st from NCA members, one a veteran of previous eclipses and one a first-time eclipse watcher.

Jeff Norman – Madras, Oregon (Total Eclipse)

I went on an organized Travel Quest tour sponsored by Astronomy Magazine.

The tour was huge; we had 5 buses with a total of 160 passengers plus a trip leader and bus driver on each bus; there was lots of sightseeing other than just the eclipse. Most of the passengers were Americans; but we also had passengers from England, Sweden, Holland, Germany and possibly other countries.

The tour started in Seattle, went to Portland and other cities in Oregon including Madras, where we saw the eclipse, and ended in San Francisco. Some other highlights of the trip included a visit to Humboldt State Park in California where we saw many giant redwood trees and the Golden Gate Bridge visitor center in California, where we had great views.

For the eclipse itself, we stayed at hotels in the medium-size resort town of Bend, Oregon where there were enough hotels to accommodate a group of our size and which is only about a 45-minute drive to the very small town of Madras, which has only a few small hotels. Travel Quest rented a local middle school athletic field in Madras which was reserved just for our group. Madras is in the high desert of eastern Oregon where it is usually dry during the summer months and where many meteorologists predicted that weather prospects would be the best for this eclipse. The weather was perfectly clear on the day of the eclipse, so everyone got a good view of totality as well as of all the partial phases. Local farmers rented their land out to thousands of people who arrived in campers for a 3-day music festival which ended on eclipse day.

I had previously successfully observed 3 total eclipses, all in foreign countries: Curacao (a Dutch colony) in 1998, Turkey in 1999 and Zimbabwe in 2001. Even though there had been some interesting sightseeing in each of those foreign countries, I was thrilled to go to this eclipse in my own country because I didn't need to worry about carrying a passport or getting foreign currency. If I'm still in good health, I also plan to go to the next American eclipse in 2024.

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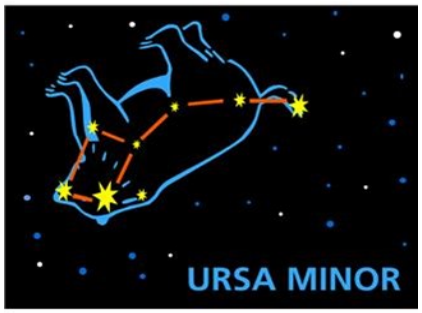
Exploring the Sky



*"**Exploring the Sky**"* is an informal program that, for over 60 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

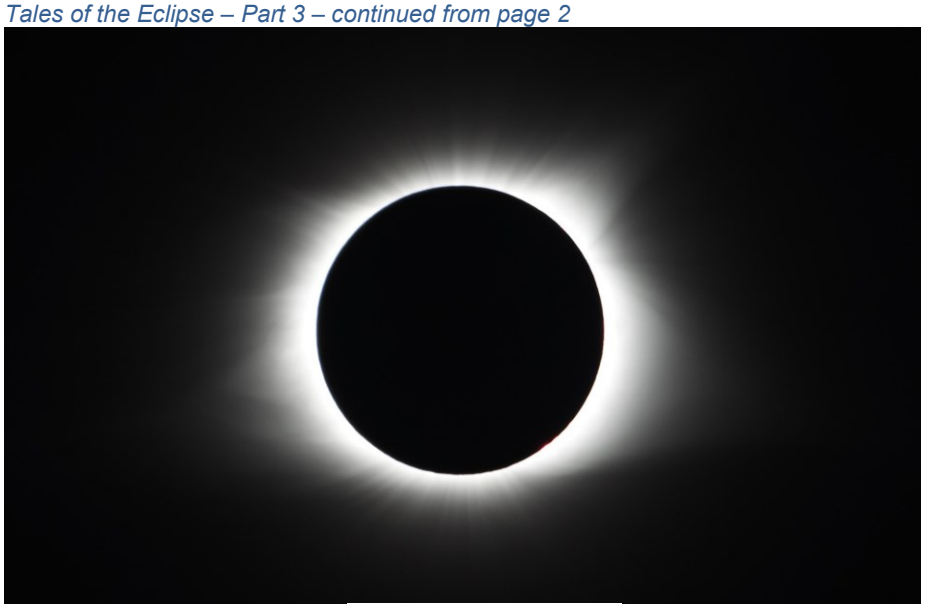
With the winter months, the Exploring the Sky program will take a hiatus until April 2018.

2018 Exploring the Sky Sessions

7 April	9:00 p.m. - Orion Nebula, Beehive Cluster
5 May	9:00 p.m. – Jupiter, Beehive Cluster
2 June	9:00 p.m. – Jupiter, M13
14 July	9:00 p.m. – Jupiter, Saturn, M13
11 Aug.	8:30 p.m. – Jupiter, Saturn, M13
1 Sep.	8:00 p.m. – Jupiter, Saturn, Mars
6 Oct.	7:30 p.m. – Saturn, Mars
17 Nov.	7:00 p.m. – Saturn, Mars, Uranus, Moon

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

Tales of the Eclipse – Part 3 – continued from page 2



Picture by Jeff Guerber

Dale S. Brown – Greenville, South Carolina (Total Eclipse)

I really wanted to see the eclipse in totality. Unfortunately, my desire only became intense two weeks before the date. Yet I decided to try to go despite hearing about the extreme traffic, the sold-out hotels, and fake eclipse glasses. I called people I knew. Many had made their plans years in advance. I made a list of cities and then a list of hotels in each of them. All sold out.

I found and bought a $140.00 Megabus ticket to Columbia, South Carolina. But it arrived there at 3:30 AM. The police, the chamber of commerce, and tourism staff could not help me locate a safe place to stay while I would have waited for the eclipse.

I contacted astronomy clubs in the area. Jeff Norman from National Capitol Astronomers called me and, after a lot of strategy sessions, told me that Greenville South Carolina was in the path of totality and on the AMTRAK train line. To my joy and surprise, I was able to buy a ticket with my points!

I called people in Greenville, looking for a hotel and an organized event. Everyone sounded eager to talk to me and cheerfully gave information and directions. I found a hotel room (the last one, I suspect), and reviewed a lot of sold out events. I finally discovered that Furman University was offering a free program in their football stadium. It was exactly what I had hoped to find - An astronomer to tell us about it. A NASA Feed on video in case of cloud cover. And safe eclipse glasses.

I took the train the night before. It had special seats that stretched out so you could lie down and sleep. The event of the eclipse drew us passengers together, and we had great conversations. Diane, the lady sitting next to me asked if we could have breakfast the next day.

I took a cab to Furman University and arrived a few hours early. It was not crowded. There was no line at the stadium. I studied exhibits about the eclipse and easily found a place to sit.

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Tales of the Eclipse – Part 3 – continued from page 3

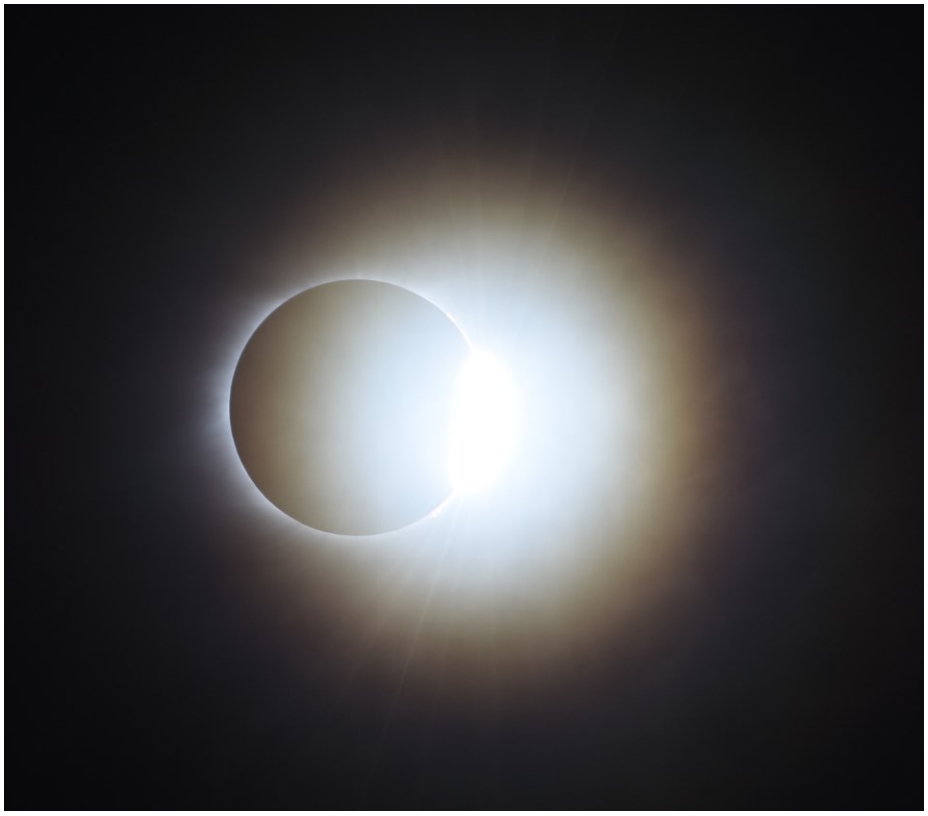
The darkness was gradual. It was different from anything I had experienced- a combination of dawn and dusk. I put on my eclipse glasses to see the Sun get eaten up. Half gone. Quarter gone. Then almost all gone.

"Glasses off," the astronomer/announcer stated. I took them off and saw the sight we all saw- the ring of fire around a black disc. I relaxed and felt a part of an ancient line people through history who had also gazed together at eclipses. And part of a crowd of people connected together experiencing the movement of our planet, the Moon, and the Sun - in real time and real life.

Suddenly, a bright band of fire flashed. "Diamond ring," said the astronomer. I swiftly put my glasses on. I watched the black disc move and the bright crescent expand.

Everyone started to leave. I wondered why. If watching the Sun move into the Moon was interesting, why not watch it move out? I enjoyed the rest of the eclipse alone. I felt a sense of deep joy. I remembered studying the stars through my childhood telescope. I wondered if this day would be the start of something big.

I went sightseeing the next day. The train left at midnight. It was delayed and the passengers talked to each other like friends. I met someone who knew a friend of mine and we went home together. And I joined the National Capital Astronomers - hoping for more opportunities to view our great Universe.



Diamond Ring – Picture by Jeff Guerber

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Thank you!

Journey to the Center of the Galaxy

Have you ever wanted to be at the center of the Milky Way? Well, here's your chance. Using data from the Chandra X-ray Observatory, as well as other telescopes, a 360-degree video has been created of the central region of the Milky Way from the viewpoint of Sagittarius A*, the supermassive black hole at the center of the Galaxy.

Using a mouse or touchpad, you can swing the view around to explore the region, seeing the various stars and clouds of gas near to the black hole as they move about over a time span of approximately 500 years.

The video is available at the link below: www.youtube.com/watch?v=YKzxmeABbkU&feature=youtu.be

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

Date	Day	EST	Star	mag.	Asteroid	dmag	dur. s	Ap. "	Location, Notes
2018									
Feb 5	Mon	5:49	4UC37596168	12.2	Meliboea	1.7	4	8	sWV,s&cVA,nNC
Feb 6	Tue	2:48	4UC64144252	13.6	Faina	0.3	10	12	eMD,DE,cPA,sON
Feb 11	Sun	19:59	4UC43442169	12.5	Tyumenia	3.8	3	9	DE,MD,swPA;DC?
Feb 18	Sun	19:50	TYC23961670	11.5	Olbersia	4.7	3	7	swNY,nc-sePA,sNJ
Feb 19	Mon	2:12	2UC19415684	11.6	Erminia	2.3	9	7	eMD,DE,sNJ,ePA
Feb 20	Tue	21:29	4UC51548749	11.8	Deikoon	6.0	4	7	nMD,sPA;DC,nVA?
Feb 20	Tue	21:45	TYC29331592	11.5	Palma	0.9	14	6	cPA,MD,DC,n&eVA
Feb 27	Tue	20:02	TYC12091044	9.9	Bower	5.9	1	4	cOH,swPA,nMD,sNJ
Mar 5	Mon	5:33	2UC28734460	12.4	Eurynome	0.6	8	8	MD,DC,nVA,swPA
Mar 7	Wed	0:09	4UC52836436	12.7	Pomona	0.5	24	9	sOH,nMD,sPA,NJ

* before the asteroid name indicates an event in the list of high-interest asteroidal occultations of the ESO Large Programme.

Lunar Grazing Occultations

Date	Day	EST	Star	Mag	% alt	CA	Location & Remarks
2018							
Feb 22	Thu	18:23	ZC 576	8.1	46+ 65	3S	*Chrltsv,Frdkbg,VA;BelAltn,MD
Feb 23	Fri	18:15	ZC 729	7.1	57+ 69	3S	*Petersburg,Toano,VA Sun -5
Feb 24	Sat	18:25	SAO 94913	8.6	68+ 64	7S	*nDuls,VA;nRckvl,APL,Dndlk,MD
Mar 10	Sat	5:25	X 43203	8.4	41- 26	10S	Walkrsvl,Syksvl,sBaltimore,MD

* No expedition from the DC region expected
Interactive detailed maps at http://www.iota.timerson.net/

Total Lunar Occultations

Date	Day	EST	Ph	Star	Mag	% alt	CA	Sp.	Notes
2018									
Feb 11	Sun	4:14	R	16 Sgr	6.0	17- 1	66N	B0	Az.118,ZC2639,double?
Feb 11	Sun	5:04	R	17 Sgr	7.0	17- 9	88N	A7	Az.126,ZC2642,close dbl
Feb 19	Mon	18:54	D	X 1759*	9.1	16+ 30	47S	M0	close double?
Feb 19	Mon	19:09	D	ZC 188*	7.6	16+ 28	64N	F0	
Feb 19	Mon	20:06	D	SAO 109795	7.6	17+ 17	31S	A5	
Feb 20	Tue	18:20	D	ZC 306	6.8	25+ 47	61N	F0	Sun altitude -7 degrees
Feb 20	Tue	18:21	D	SAO 110334	7.8	25+ 47	35S	F2	Sun altitude -7 degrees
Feb 20	Tue	19:34	D	SAO 110349	8.3	25+ 35	27N	F5	
Feb 21	Wed	22:43	D	AQ Arietis	7.1	36+ 12	85N	M1	Az.276, ZC 453, double?
Feb 22	Thu	18:12	D	ZC 576*	8.1	46+ 65	22S	G5	Sun -5,mg2 11 sep. 9"
Feb 23	Fri	17:59	D	ZC 729	7.1	57+ 66	32S	F8	Sun altitude -2 degrees
Feb 24	Sat	18:46	D	SAO 94943	7.9	69+ 67	69S	A0	Sun altitude -11 deg.
Feb 24	Sat	18:59	D	SAO 94934	7.3	69+ 69	13N	B9	
Feb 24	Sat	20:54	D	SAO 95001	8.1	69+ 65	82N	B9	
Feb 24	Sat	20:55	D	SAO 94988	8.2	69+ 65	5N	K0	
Feb 24	Sat	21:34	D	SAO 95031	7.9	69+ 59	61S	B9	
Feb 24	Sat	23:38	D	SAO 95119	7.5	70+ 37	73N	A0	
Feb 25	Sun	18:42	D	SAO 96253	8.0	79+ 58	69S	B8	Sun alt. -10 deg.
Feb 25	Sun	20:26	D	SAO 96312	7.4	79+ 71	86N	A5	
Feb 26	Mon	2:22	D	ZC 1084	7.3	81+ 18	50N	K5	
Feb 26	Mon	20:36	D	ZC 1202	7.1	88+ 65	60N	A0	
Feb 27	Tue	3:55	D	ZC 1241*	6.5	90+ 11	18S	A0	Azimuth 284 degrees
Mar 3	Sat	0:24	R	ZC 1728*	6.7	98- 52	69S	M4	Axis angle 237 degrees
Mar 3	Sat	1:03	R	7 Virginis	5.4	98- 54	28N	A1	AA 320,ZC1733,TrmDst 9"
Mar 5	Mon	2:12	R	SAO139528*	7.2	87- 44	55N	K0	
Mar 5	Mon	4:16	R	ZC 1976	7.0	86- 41	46S	A3	
Mar 5	Mon	4:51	R	88 Vir	6.6	86- 38	38S	K0	ZC1978, close double?
Mar 6	Tue	4:44	R	ZC 2089	6.7	78- 39	28N	G5	
Mar 8	Thu	4:42	R	ZC 2341*	7.4	60- 33	41S	F3	
Mar 9	Fri	3:53	R	SAO 160289	7.6	51- 24	68S	K4	
Mar 9	Fri	4:07	R	SAO160296*	8.1	51- 25	87N	K2	equal dbl, sep. .7"
Mar 9	Fri	5:57	R	ZC 2463*	6.9	50- 32	77S	B8	Sun -7, mg2 8.7 sep .1"
Mar 10	Sat	4:59	R	ZC 2591	6.2	41- 25	40N	K0	

*The star is in the Kepler 2 exoplanet search program so lightcurves of the occultation are desired to check for close stellar duplicity

Further explanations & more information is at
http://iota.jhuapl.edu/exped.htm .
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Sky Watchers

February/March

Mercury and Venus approach each other in the evening sky until they reach the conjunction listed below. Jupiter rises in the early morning hours until, at the end of February, it begins to rise before midnight. Saturn rises about three hours after Jupiter. Meanwhile Mars moves away from Jupiter and closer to Saturn on the way toward its conjunction with the latter in April.	
2/15	New Moon – 4:05 p.m.
3/1	Full Moon – Known as the Full Worm Moon because earthworms begin to emerge from the thawing ground, and the Full Crow Moon. 7:51 p.m.
3/5	Conjunction – Mercury will be 1° 24' north of Venus. 1:28 p.m.

Times - Eastern Standard Time

Calendar of Events

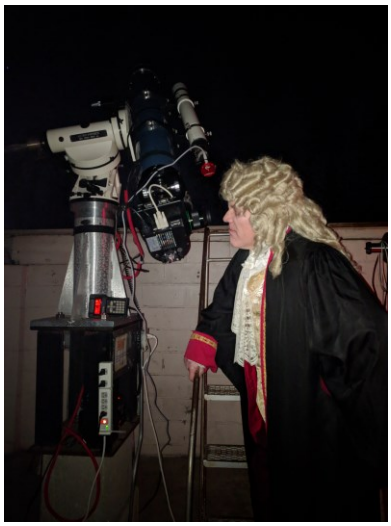
NCA Mirror- or Telescope-making Classes: Tuesdays AND Fridays, from 6:30 to 9:45 pm at the Chevy Chase Community Center (intersection of McKinley Street and Connecticut Avenue, N.W.) Contact instructor Guy Brandenburg at 202-635-1860 or at gfbrandenburg@yahoo.com.

Open house talks and observing at the University of Maryland 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 can be found at: www.astro.umd.edu/openhouse

Upcoming NCA Meeting at the University of Maryland Observatory: 10 March: Ludmilla Kolokolova (UMD), *What We Can Learn from Dust in the Solar System*

UMD Amateur Radio Astronomy Team Meetings: Wednesdays and Saturdays 2:00 p.m. to 5:00 p.m. (and other times when interesting phenomena occur) at the University of Maryland Observatory. For more information, contact Sarah Brown - Sarah.E.Brown@verizon.net

Montgomery College's Planetarium: "African Skies" Saturday, February 17 at 7:00 p.m. As the website below explains about the presentation – "Hear creation myths and how at least 40,000 people got their freedom using Drinking Gourd, the Big Dipper." For directions and information, go to the following website:
www2.montgomerycollege.edu/departments/planet/



What better way could there be to end an evening with Sir Isaac than to share a view of the Universe he helped explain?
(Photos by Elizabeth Warner)

The submission deadline for March's Star Dust, is Feb. 21st.

Clear Skies!

An Evening with Isaac Newton

NCA meetings have been graced by many prominent scientists and researchers, and that was definitely the case at the January 2018 meeting when Sir Isaac Newton (Dean Howarth) and his niece, Catherine Barton Conduitt (Ms. Rachel O'Connell) regaled attendees with tales of his work.

For those who were unable to attend,

- Watch a 2D video at www.youtube.com/watch?v=zirIcJARBzk
- If you have the 3D glasses: www.youtube.com/watch?v=XKMH7bNyUIs.

The videos were prepared by Rupert Chappelle.

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
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First Class
Dated Material

Celebrating 81 Years of Astronomy

Next NCA Meeting:

2018 February 10th
7:30 pm
@ UMD Observatory

Dr. Brett Denevi

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