Star Dust

Newsletter of National Capital Astronomers, Inc.

capitalastronomers.org

September 2018 ***Volume 77, Issue 1***

Celebrating 81 Years of Astronomy

Next Meeting

When: Sat. Sept. 8th, 2018

Time: 7:30 pm

Where: UMD Observatory

Speakers: Dr. Erik Blaufuss

Table of Contents

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.

High Energy Neutrinos Detected by the IceCube Neutrino Observatory

Erik Blaufuss
University of Maryland

Abstract: IceCube is the world’s largest neutrino detector, instrumenting a cubic-kilometer of Antarctic glacial ice at the geographic South Pole. Using signals from the more than 5000 sensors buried ~ 2km below the surface, IceCube is able to measure high-energy neutrinos above ~100 GeV and perform astro-particle observations of the Universe. Astrophysical neutrinos are expected to be created in the birthplaces of high-energy cosmic rays, and point the way back to these elusive sources. Since IceCube's detection of a diffuse flux of high-energy astrophysical neutrinos in 2013, identifying their sources has been the primary science goal. This talk will present the latest measurements of the astrophysical neutrino flux and highlight results from realtime alerts generated by astrophysical neutrino detections that trigger rapid follow-up observations by the community. In particular, a neutrino alert in September 2017 triggered world-wide astronomical observations, and provide evidence that the Fermi-LAT identified blazar TXS 0506+056 is the first multi-messenger source producing neutrinos, as well as an accelerator of cosmic rays.

Photo Credit: Sven Lidstrom (IceCube/NSF)

Recent Astronomy Highlights

Summer 2018 saw the reporting of a number of discoveries in astronomy, just a few of which are highlighted below.

A Star Consuming a Planet?
RW Aur A, a star that is part of a young binary system, has dimmed several times in recent years. Using NASA's Chandra X-Ray Observatory, scientists have found that the amount of iron in the star's corona has also risen significantly in recent years. One theory is that the rise in the amount of iron may have happened after a couple of the star's planetesimals, or perhaps even a planet and planetesimal, collided, creating a cloud of debris subsequently consumed by the star. For more information - arxiv.org/abs/1807.06995

Oumuamua Was A Comet
Studies of the first detected interstellar visitor to our solar system indicate that non-gravitational forces caused changes in its trajectory. While Oumuamua passed within the orbit of Mercury, scientists saw no evidence of it emitting gas, leading to initial speculation that the cigar or pancake shaped object was solid rock. However, the gas release necessary to cause the trajectory change would have been less than what could have been detected. For more information - www.skyandtelescope.com/astronomy-news/oumuamua-comet/

12 New Jovian Moons Discovered
Three of the new moons recently discovered are in prograde orbits, in the same direction as Jupiter's rotation, and nine are in retrograde orbits, moving opposite the direction of Jupiter's rotation. One of the prograde moons, less than a kilometer in diameter, has an orbit highly inclined to the orbital plane of other Jovian moons. All of these moons may be fragments from larger moons destroyed by collisions with other objects. For more information - www.sciencedaily.com/releases/2018/07/180717101256.htm

continued on page 4

Biography: Erik Blaufuss is a research scientist in the Physics Department at the University of Maryland, College Park. He's been studying neutrinos his entire career, from looking for hints of neutrino oscillations in neutrinos from the Sun at the Super-Kamiokande detector in Japan, to using neutrinos as an astrophysical messenger to study the most extreme objects in the Universe. He helped build the IceCube online data filtering systems that operates at the South Pole, and now leads the realtime alert effort within the IceCube collaboration.

Light Echoes Give Astronomers a Second Chance to Study the 'Great Eruption'

In March of 1843, Eta Carinae, a binary star system approximately 7500 light years from Earth, brightened over a period of several days to become the second brightest star in the sky, only fading years later. Obviously, something very dramatic had happened, but astronomers of the day, without modern telescopes and cameras, as well as little understanding of astrophysics, were not up to the task of determining the nature of the event. Fortunately, in recent years the Universe has been giving astronomers another opportunity.

Most everyone has heard sound echoes. In astronomy there is a similar phenomenon. When light from a bright, faraway astronomical event hits dust, it can be redirected, some of it toward Earth. Since that light does not travel infinitely fast, it takes longer to reach us than does light that was originally emitted in our direction by that event. In the case of the 'Great Eruption', as it came to be known, that light has taken about an additional 170 years to reach us.

First seen in 2010, the light echoes from the region around Eta Carinae have been observed and studied since then to determine what happened. A current theory is that the system was actually a trinary-star system in which two stars collided to form a larger star. Whatever happened, it certainly was a violent event, ultimately emitting around ten solar masses of gas at speeds of 10,000 to 20,000 kilometers per second, speeds normally only seen in the gas released by supernovae.

Eta Carinae's eruption is not the only event in which light echoes have been observed. In February of 1987, a star in the Tarantula Nebula of the Large Magellanic Cloud, went supernova. The nebula itself is full of dust, so it has provided a lot of light echoes, seen as rings of light that have widened as the years have passed, as shown in the picture below in which a pre-supernova image is subtracted from a post-supernova image.

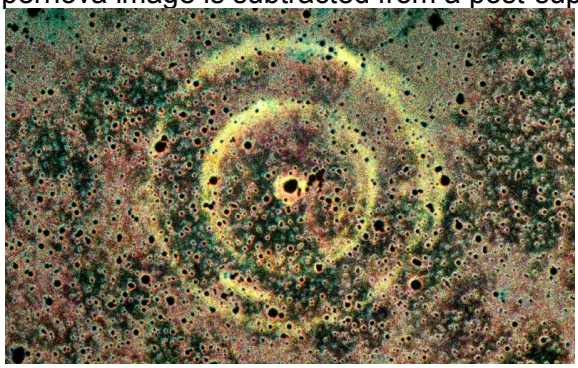

Image Credit: David Malin, Australian Astronomical Observatory

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
06 Oct 7:30 pm – Saturn, Mars

17 Nov 7:00 pm – 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

Jay Miller provided the following report on the August Session of Exploring the Sky – "The forecast was very uncertain, but I decided to bring my telescope, anyway. There were some clouds, but observing really wasn't bad. There were only two telescopes, my 100 mm AP Starfire and the Park Service dob. We both only looked at Jupiter, Saturn and Mars, but that was fine for everyone. We had about 80 people show up."

The submission deadline for October's Star Dust, is September 21st.

Clear Skies!

Sky Watchers

September/October

In mid-September, Mercury transitions from the morning sky to the evening sky. At that time, all of the visible planets – Mercury, Venus, Mars, Jupiter and Saturn - will be viewable for a little while after sunset although Mercury and Venus will be very low to the horizon.	
9/7	Neptune at Opposition – Neptune will be at its brightest, although still only visible through high-power telescopes.
9/11	Comet Giacobini-Zinner makes its closest approach to Earth, approximately 0.39 AU away (36.5 million miles). It is visible in binoculars. Comet Giacobini-Zinner is the source of the Draconids Meteor Shower (see below). Information on the comet's position from night to night can be found at: www.universetoday.com/139765/catch-comet-21-p-giacobini-zinner-at-its-best/
9/22	9:54 p.m. Autumnal Equinox – Summer ends and Autumn begins with the Sun shining directly over the equator.
9/24	Full Moon at 10:53 p.m.
10/8	Peak of Draconids Meteor Shower – 10 meteors/hour. No moon will interfere with viewing this year.

Times in EDT

Minutes of the Annual Meeting of the National Capital Astronomers (July 21, 2018)

Heinrich Bofinger, Secretary-Treasurer

Attending (in alphabetical order): Heinrich C. Bofinger, Michael Brabanski, Jack Gaffey, John Hornstein, Jeff Norman, Benson Simon and Harold Williams

The core of the meeting was the treasurer's financial report (attached), which shows the club being quite stable both financially and in membership. Of issue was the fact that there has been an attempt to draw down the bank balance a bit, which, due to the kind donation of Joe Morris's equipment, and the resulting auction, did not happen.

The board approved the re-hiring of Dean Howarth for his planned impersonation and re-enactment of Albert Einstein early next year, without any objections or abstentions.

A motion was approved to offer a lifetime membership category at a price of US$ 200.00. Many professional organizations have lifetime memberships, and this offers the opportunity to those that might wish to donate more to get something in return. This membership class is different from the honorary lifetime membership, of which the club currently has one.

The meeting was adjourned around 1:40 pm.

NCA Financial Position 2017-2018

Heinrich Bofinger, Secretary-Treasurer

Membership: 81, 23 attrition or passed, 24 new.

Table 1: Membership history

Fiscal Year	2017-18	2016-17	2015-16	2014-15
Members end of year	81	79	87	75
New	24[1]	20	50	22
Attrition	23	27	23	50
Lifetime	1	2	2	2

Table 2: Net Income and Expenses - unadjusted

Item	2017-18		2016-17		2015-16	
	Amount	Per member	Amount	Per member	Amount	Per member
Auction	$3,027.00	37.37				
Income	$920.00	11.36	$1,100.45	$13.93	$940.00	$10.80
Expenses	1,620.44	20.01	$1,467.12	$18.57	$1,729.65	$19.88
Net	$2,326.56	28.72	-$318.23	-$4.70	-$789.65	-$9.08

Table 3: Expense Items

Item	Yearly Amounts			
	2017-18	2016-17	2015-16	2014-15
No of Members	81	79	87	75
Misc (incl. dinners)	209.04	$198.44	$170.56	$222.66
Insurance & Legal	$480.00[2]	$320.00	$400.00	$320.00
Stardust	$426.40	$436.68	$664.09	$631.84
Astronomical League	$405.00	$400.00	$395.00	$920.00
Intl Dark Sky Association	$100.00	$100.00	$100.00	$100.00
Telescope Making Class				$903.98
Total	**$1,620.44**	**$1,467.12**	**$1,729.65**	**$3,098.48**

[1] Includes four award members for 2018-19 and four additional new members for 2018-19.

[2] US$ 80 may be reimbursed for overpaying DC corporate filing charges.

Item	Per Member			
	2017-18	2016-17	2015-16	2014-15
Misc (incl. dinners)	2.58	$2.51	$1.96	$2.97
Insurance & Legal	5.93	$4.05	$4.60	$4.27
Stardust	5.26	$5.53	$7.63	$8.42
Astronomical League	5.00	$5.06	$4.54	$12.27
Intl Dark Sky Association	1.23	$1.27	$1.15	$1.33
Telescope Making Class				$12.05
Total	**20.01**	**18.57**	**$19.88**	**$41.31**

continued on page 6

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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

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Thank you!

Recent Astronomy Highlights – continued from page 2

General Relativity Confirmed Again by a Star Orbiting the Milky Way's Supermassive Black Hole

Gravitational redshift, the lengthening of the wavelength of light as it travels up out of a gravitational field, has previously been observed on the Earth and in the solar system. Now it has been observed in light coming to Earth from a star known as S2 in orbit around Sagittarius A*, the 4-million-solar-mass black hole at the Milky Way's center. A team of astronomers, using instruments on the ESO's Very Large Telescope (VLA) detected the subtle changes in the wavelengths of light from S2 when its orbit took it closest to the black hole. For more information - phys.org/news/2018-07-gravity-relativity-galactic-centre-massive.html

continued on page 7

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 and TNO Occultations

2018 Date	Day	EDT	Star	Mag.	Asteroid	dmag	dur. s	Ap. "	Location
Sep 9	Sun	4:58	2UC40798534	12.3	*Saldanha	2.8	9	8	se-nVA,wMD,Ohio
Sep 9	Sun	5:49	4UC58932955	12.4	*Modestia	3.2	1	10	nVA,nMD,cNJ;DC?
Sep 9	Sun	23:32	4UC44067774	14.8	Varda	5.3	67	14	TNO,cUSA;eUSA?
Sep 15	Sat	1:57	2UC45955030	12.3	Tone	3.4	6	7	wVA,wMD,cPA;DC?
Sep 16	Sun	5:07	TYC06650736	10.3	*Geisha	4.6	1	5	WV,nMD,nDE,cNJ
Sep 17	Mon	4:05	4UC61029551	13.9	*Fidelio	1.1	3	12	WV,wMD,ePA;nVA
Sep 18	Tue	3:47	4UC54129827	14.2	Patria	2.2	1	13	nVA,DC,MD,nDE
Sep 20	Thu	22:15	4UC475-1510	13.4	*Poesia	1.9	4	11	ePA,MD,nVA;DC?
Sep 21	Fri	3:57	TYC07591475	11.2	Kleopatra	1.1	5	7	sMS,sAL,sGA,sSC
Sep 27	Thu	1:32	4UC65136550	13.9	Hispania	0.4	10	12	eVA,DC,e&cMD,NJ
Oct 1	Mon	21:48	SAO 186579	9.8	Lilaea	3.6	4	4	WV,nMD,sPA;DC?
Oct 1	Mon	22:47	4U403130061	14.4	*Kallisto	0.3	6	13	PA,neMD,DE;DC?
Oct 4	Thu	21:00	4UC608-7592	13.0	Hedwig	0.7	16	11	ePA,MD,DC,n&wVA
Oct 9	Tue	2:29	4U580123831	12.9	*Aethra	2.1	3	11	sMD,cVA,sWV;DC?

Event details at www.asteroidoccultation.com/

Lunar Grazing Occultations

2018 Date	Day	EDT	Star	Mag	% alt	CA	Location, Notes
Oct 2	Tue	3:52	ZC 1010	7.9	50- 46	12N	*NwWndsr,nWstmnstr,MD Line,MD
Oct 3	Wed	4:00	SAO 79546	8.3	39- 36	11N	*IAD,VA;sRockvill,N.Laurel,MD

* No expedition from DC planned (for all above, asteroids, too)

Lunar Total Occultations

2018 Date	Day	EDT	Ph	Star	Mag	%	alt	CA	Sp.	Notes
Sep 15	Sat	21:23	D	ZC 2408	6.6	41+	17	61S	K5	
Sep 16	Sun	20:10	D	SAO185535*	8.9	50+	28	81S	A0	
Sep 16	Sun	20:57	D	SAO 185544	8.4	50+	24	41S	K5	
Sep 16	Sun	21:08	D	SAO185548*	8.1	50+	23	49S	A2	Close equal double
Sep 19	Wed	19:57	D	ZC 2938	7.5	77+	27	65S	F0	Sun altitude -10 deg.
Sep 21	Fri	18:58	D	delta Cap	2.9	91+	13	46S	A5	Sun +1, Az. 123 deg.
Sep 21	Fri	20:03	R	= ZC 3190	2.9	91+	22	-65S	A5	AA243deg.,Deneb Algedi
Sep 22	Sat	23:34	D	ZC 3327	6.8	96+	39	27S	K2	Terminator Dist. 17"
Sep 23	Sun	3:33	D	LQ Aquarii	6.7	96+	17	49N	M0	ZC3339; 2011 Antiope
Sep 28	Fri	1:40	R	mu Ceti	4.3	90-	53	82S	F1	ZC 405, close double?
Sep 28	Fri	23:08	R	ZC 516	6.9	83-	20	42N	G5	maybe close double??
Sep 29	Sat	2:01	R	ZC 526	6.7	82-	51	10S	G5	
Sep 30	Sun	2:39	R	SAO 94019*	6.7	73-	51	43S	K5	maybe close double??
Sep 30	Sun	4:35	R	SAO 94047*	7.9	72-	67	14S	F0	
Sep 30	Sun	5:19	R	ZC 705*	7.9	72-	69	10S	K0	
Oct 1	Mon	4:25	R	SAO 94684	7.2	62-	61	39S	B9	mag2 11 sep .8" PA 68
Oct 2	Tue	0:48	R	16 Gem	6.2	52-	12	70N	A2	Azimuth 73 deg., ZC 991
Oct 2	Tue	1:05	R	nu Gem	4.1	52-	15	38S	B6	Az. 76,ZC 995,mg2 5 .1"
Oct 2	Tue	1:06	R	SAO 78420	8.0	52-	15	46S	A0	Az. 76, close double?
Oct 2	Tue	1:58	R	SAO 78453	8.1	51-	25	72S	A0	
Oct 2	Tue	4:00	R	ZC 1010	7.9	50-	48	27N	F2	
Oct 2	Tue	6:29	R	SAO 78609	8.0	50-	70	19S	M0	Sun altitude -8 deg.
Oct 3	Wed	4:37	R	ZC 1150	6.7	39-	43	66S	K0	Maybe close double?
Oct 3	Wed	5:46	R	SAO 79583	7.3	38-	56	65S	F0	Close double?
Oct 4	Thu	3:06	R	SAO 97918	7.4	28-	14	55S	K1	Azimuth 78 degrees
Oct 4	Thu	5:26	R	SAO 98008*	8.9	27-	41	70N	A2	
Oct 4	Thu	5:36	R	SAO 98011*	9.1	27-	42	67S	F0	
Oct 4	Thu	7:04	D	AsellusAus.	3.9	27-	57	-75S	K0	Sun -1,AA 104,ZC1310
Oct 4	Thu	8:19	R	=delta Cnc	3.9	27-	67	68S	K0	Sun+13,close double?
Oct 5	Fri	4:30	R	SAO 98676	8.0	18-	17	27S	F2	
Oct 6	Sat	4:58	R	SAO 99198	7.3	10-	10	59N	K2	Az83,mg2 10 60" 331d

*In Kepler2 program so occultation light curves are sought.

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

continued on page 6

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 (2017)
- Michael Brabanski (2018)
- 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

Mid Atlantic Occultations by David Dunham – continued from page 5

The map below shows the narrow zone, 600m wide, between the two dark gray lines, for the grazing occultation of 8.3-mag. SAO 79546 that will occur for a few minutes starting at 3:58am EDT of Wed. Oct. 3rd. The graze can also be seen, but with fewer events, for another 500m north of the northern dark line, but north of there, no occultation will occur. You can use an interactive map to zoom in on the path in more detail, to select possible observing sites, that is linked to from the notes for the graze at iota.jhuapl.edu/exped.htm .

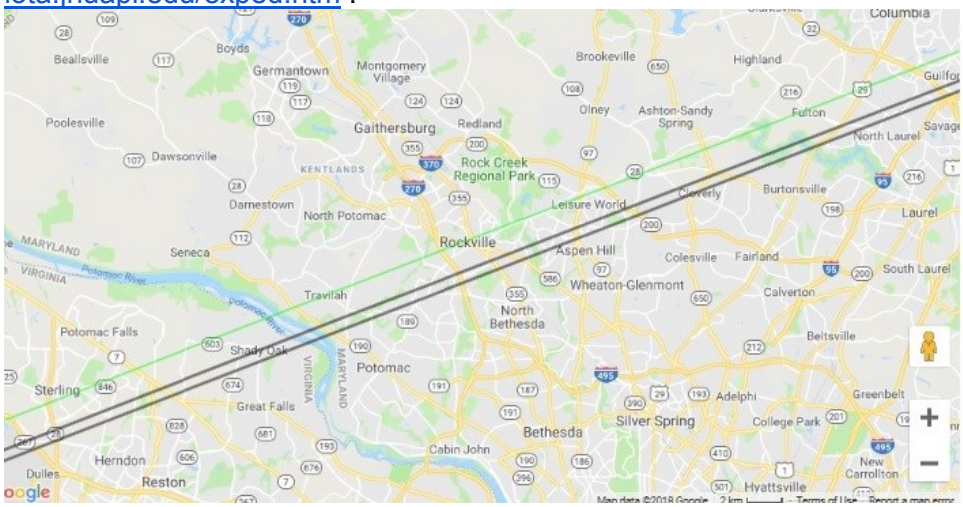

Image Credit: David Dunham and Google Maps

NCA Financial Position 2017-2018 by Heinrich Bofinger – continued from page 4

Figure 1: Breakdown of Expenses

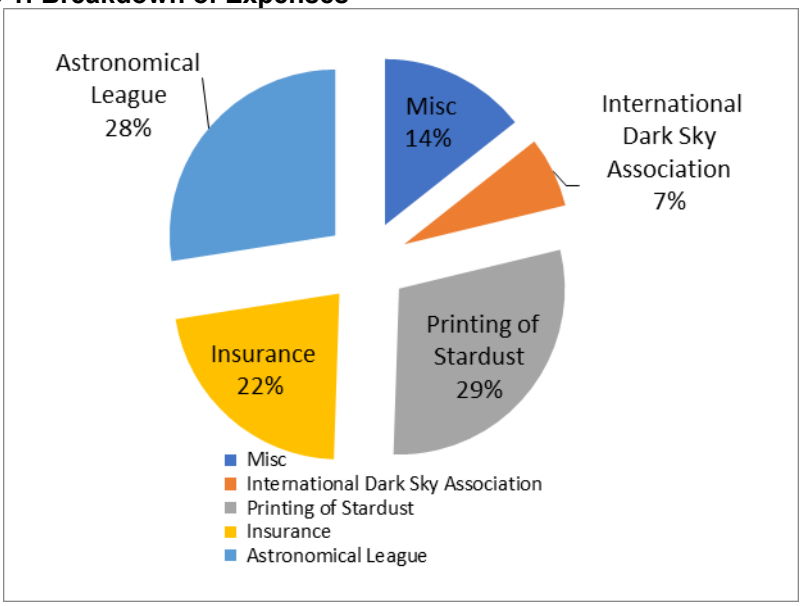

Table 4: Bank balances

	Amount	
Opening Balance	$6,118.24	7/1/2017
Closing Balance	$8,583.84	7/21/2018[1]
Net Change	$2,465.60	
Current Balance, According to Statement	**$8,583.84**	My accounting shows we have $10 less than the Bank statement; still hunting down the discrepancy

[1] Does not include $894.04 in outstanding checks, including insurance pre-payment of $320 for 2018-19.

Recent Astronomy Highlights – continued from page 4

A Planetary-Mass Object with a Powerful Magnetic Field
Discovered in 2016, and the first such object detected with a radio telescope, SIMP J01365663+0933473 is planetary-mass object estimated to be 12.7 times the mass of Jupiter. SIMP stands for Sondage Infrarouge de Mouvement Propre, a near-infrared all-sky survey that began in 2005 (about which Dr. Jonathan Gagne gave a talk at NCA in April 2018). Without a parent star and lying 20 light years from Earth, its mass puts it at the dividing line between a planet and a brown dwarf. Recent observations show that SIMP J01365663+0933473 has a surprisingly strong magnetic field two hundred times more powerful than Jupiter's. Study of its magnetic field promises to give new insights into the behavior of magnetic fields of stars and planets. More information can be found at: www.sciencedaily.com/releases/2018/08/180803103336.htm

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 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

Mid-Atlantic Senior Physicists Group: **(Note that this talk is on the third Thursday of the month, not Wednesday.)** "Fermi's Decade of Observing the Extreme Universe" by Dr. Elizabeth Ferrara, Deputy Lead Scientist, Fermi Science Support Center, UMD. Thurs., September 20, at 1:00 p.m. at the American Center for Physics (1st floor conference room) with Q&A to follow. 1 Physics Ellipse, College Park, MD-- off River Rd., between Kenilworth Ave. and Paint Branch Parkway. www.aps.org/units/maspg/

Next NCA Meeting at the University of Maryland Observatory:
13 October: 7:30 p.m., Derek Richardson, UMD, *The Double Asteroid Redirection Test (DART): Defending the Earth from Asteroids*

Montgomery College's Planetarium – "Mayan Astronomy – Numbers and Calendars, Sept. 15th 7:00 p.m. For directions, go to: www2.montgomerycollege.edu/departments/planet/

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:
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Celebrating 81 Years of Astronomy

Next NCA Meeting:

2018 September 8th

7:30 pm

@ UMD Observatory

Dr. Erik Blaufuss

Inside This Issue