Star Dust

Newsletter of National Capital Astronomers, Inc.

capitalastronomers.org

April 2018 ***Volume 76, Issue 8***

Celebrating 81 Years of Astronomy

Next Meeting

When: Sat. April 14th, 2018

Time: 7:30 pm

Where: UMD Observatory

Speaker: Dr. Jonathan Gagné

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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.

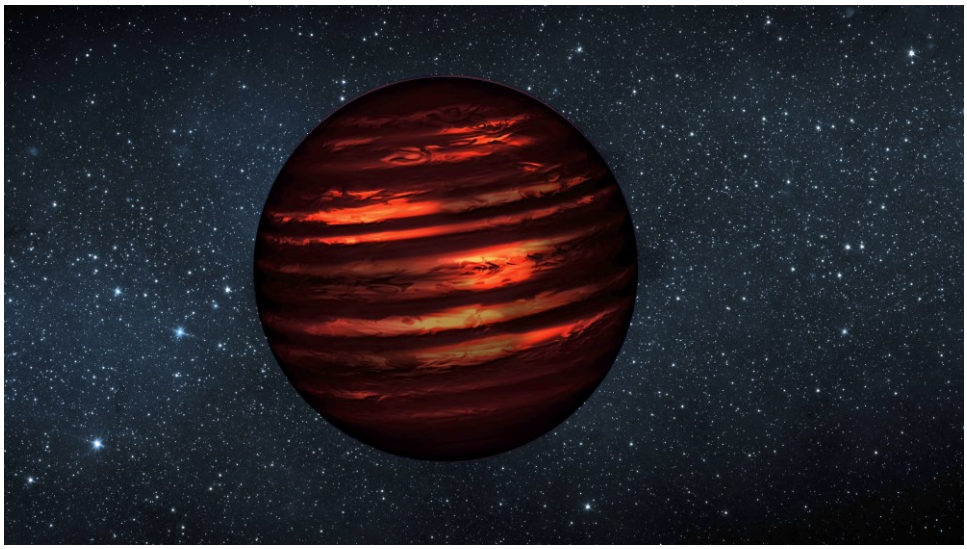
Observing after the Meeting

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.

Isolated Planetary-Mass Objects

Jonathan Gagné
Carnegie Institution for Science
Department of Terrestrial Magnetism

Abstract: I will present new developments on the discovery and characterization of giant planet analogs that are not in orbit around a star, also called isolated planetary-mass objects. These objects may have formed alone like stars do, or in a gas disk around a star like regular planets, only to be later ejected from their planetary systems. We only know a handful of isolated planetary-mass objects yet, but we already have high quality spectroscopic data that will allow us to perform a detailed characterization of their atmospheric properties. I will focus my talk on our methodology to identify such new isolated planetary-mass objects, and the spectroscopic follow-up that I am leading at Las Campanas Observatory in Chile.

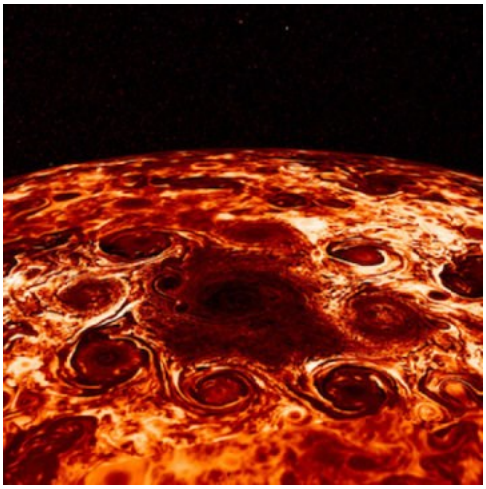


Artistic conception of SIMP J013656.5+093347. SIMP stands for Sondage Infrarouge de Mouvement Propre, a near-infrared all-sky survey that began in 2005. The purpose of the survey was to find brown dwarfs with large proper motions (angular motions across the sky). SIMP J013656.5+093347 is now considered to most likely be a planetary-mass object. (Image is courtesy of NASA/JPL, slightly modified by Jonathan Gagné.)

Recent Astronomy Highlights

Jupiter's Deep, Long-Lived Storms

Gravitational measurements from NASA's Juno probe have shown that the weather layer of the planet extends down 1900 miles. At the poles, that layer contains storms that can be over 4000 miles in diameter with winds of up to 220 miles per hour. Those same gravitational measurements show that below the weather layer, Jupiter seems to rotate as a rigid body. More information on these and other findings of the Juno mission can be found at: www.sciencedaily.com/releases/2018/03/180307183418.htm

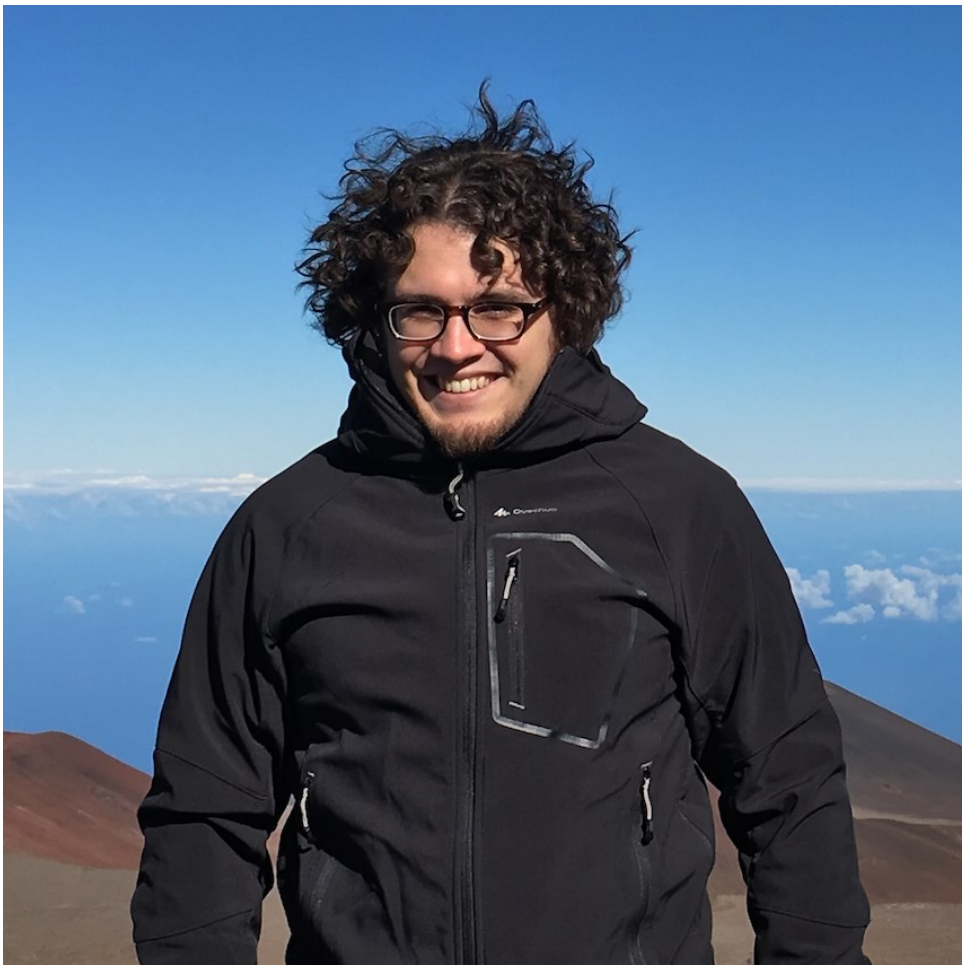


Infrared Image from the Juno probe shows eight storms surrounding a massive central storm at Jupiter's North Pole. Image Credit: NASA/JPL-Caltech/SwRI/ASI/INAF/JIRAM

Oumuamua Likely Originated in a Binary-Star System

Astronomers were surprised in discovering that the first detected interstellar visitor was an asteroid and not a comet. Since comets develop farther out from stars they are therefore less gravitationally bound and more likely to be ejected from a star's system. But a recent study shows that binary star systems are more efficient at ejecting their closer-in asteroids. A paper from the study is at - arxiv.org/abs/1712.04435

continued on page 4



Biographical Sketch:

Jonathan Gagné completed his PhD thesis at Université de Montréal in Canada, where he worked on statistical algorithms to discover young brown dwarfs in nearby stellar associations. During his PhD, he also spent 6 months at Caltech with the team of Peter Plavchan to detect exoplanets with the method of precise near-infrared radial velocities as part of the IPAC fellowships. After his PhD, he moved to Carnegie DTM as a Sagan Fellow to work on the detection and kinematic characterization of cold isolated planetary-mass objects.

Editor's Note - Dr. Gagné's paper concerning SIMP J013656.5+093347 can be found at - arxiv.org/abs/1705.01625

The Auction of Joe Morris' Equipment

At the March 10th meeting of the National Capital Astronomers, Guy Brandenburg led a discussion about how the organization would sell the telescopes and pieces of astronomical equipment donated to the NCA as part of long-time member Joe Morris' estate. By a large margin, the members of NCA voted to have a 3-step sale. The first step was to put the equipment up for internet auction exclusively among NCA members. The second step would have involved a more open internet auction of any remaining equipment among local clubs. And finally, any equipment still remaining unsold would have been put up for sale on sites such as Astromart and Cloudy Nights.

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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

2018 Exploring the Sky Sessions

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

The Auction of Joe Morris's Equipment – continued from page 2

Afterward Guy created a Google Docs spreadsheet, containing a listing of the various pieces of equipment up for bid. Bids came in up until the auction ended on March 24th. As it turned out, nearly all of the equipment from Joe, as well some other equipment that belonged to the NCA, was bid on by NCA members, resulting in $2995 being raised for the National Capital Astronomers. Payment and pickup of the equipment at the UMD Observatory was organized by Elizabeth Warner. The purposes to which the proceeds will go will be discussed by members at a future NCA meeting.

Special thanks to Guy and Elizabeth for their efforts in making the auction such a success. And thanks to all of the bidders and buyers who ensured that Joe Morris' equipment will continue to be used for looking out at the wonders of the Universe.

Sky Watchers

April/May

Among the planets visible to the naked eye, Venus has the early Spring evening sky all to itself as it rises toward its maximum elongation which will take place in August. Jupiter rises in the early evening with Saturn rising approximately three hours later and Mars following soon after. Mercury rises shortly before dawn on its way to it greatest elongation as listed below.	
4/22-23	The Lyrids Meteor Shower peaks with approximately 20 meteors per hour. Conditions will be ideal for viewing in the early morning hours after the Moon sets.
4/29	Mercury reaches greatest Western Elongation. It will be 27 degrees from the Sun and the highest in the sky for pre-dawn viewing.
4/29	Full Moon. Full Pink Moon 8:58 p.m. (also known as the Sprouting Grass Moon, the Growing Moon and the Egg Moon)
5/6 – 7	The Eta Aquarids Meteor Shower peaks with approximately 30 meteors per hour. Unfortunately, a waning gibbous Moon will interfere with viewing of fainter meteors.
5/9	Jupiter reaches opposition (the opposite side of the sky from the Sun and the closest to Earth). The planet will be its brightest of the year and will be visible for the entire night.

Times in EDT

Occultation by Asteroid 372 Palma

For approximately twelve seconds on the night of February 20th, a star in the constellation of Auriga known as TYC 2933-01592-1 appeared to blink out in the Washington area, its light blocked by Asteroid 372 Palma. The event certainly didn't receive the fanfare that accompanied the Great American Eclipse of August 21, 2017. Indeed, few people knew about it, and certainly nobody would have noticed it if they weren't looking for the event with a very good telescope. However, Elizabeth Warner and three of her students were doing just that at the UMD Observatory as part of a collaborative effort with other members of the International Occultation Timing Association (IOTA) to provide data for determining the size and profile of 372 Palma more accurately than had previously been done. The length of the occultation, along with an asteroid's orbital velocity, go into calculating the size of that asteroid and determining its profile.

Elizabeth (right) and her students witness the occultation.

Discovered by August Charlois in 1893, 372 Palma is a B-type, or carbonaceous, asteroid. It is also one of the largest main belt asteroids at approximately 190 kilometers in diameter, with an uncertainty of several kilometers.

To record the occultation, Elizabeth and her students used a Point Grey Grasshopper Express Camera mounted on a 152mm f/9 Astrophysics Refractor telescope. The software used to collect the pictures taken was ADVS – Astronomical Digital Video System, while the software later used to process and analyze those images was Tangra 3. Lots of high-tech equipment, but ultimately one of the biggest challenges, making sure the telescope is pointed at the right star, generally involved comparing paper star field charts with what was displayed on a screen hooked up to the camera. Confirming the location, everyone watched as the asteroid approached the star. The recording of the starfield began well before the actual occultation.

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Thank you!

Recent Astronomy Highlights – continued from page 2

Evidence of the First Stars

Radio astronomers at Australia's Murchison Radio Observatory have reported a deficit at a specific radio wavelength in the Cosmic Microwave Background spectrum. In the era from 180 to 270 million years after the Big Bang, a time when cosmologists predicted that the first stars existed, UV light from those stars is theorized to have warmed the surrounding hydrogen, causing increased absorption of 21-centimeter radiation from the CMB. But mysteriously the detected absorption is twice as much as predicted, hinting possibly at Dark Matter interactions. The paper on this finding can be found at: www.slideshare.net/sacani/an-absorption-profile-centred-at-78-megahertz-in-the-skyaveraged-spectrum

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	EDT	Star	mag.	Asteroid	dmag	dur. s	Ap. "	Location, Notes
2018									
Apr 16	Mon	5:33	2UC30033315	12.1	Chaldaea	0.8	11	8	e&nVA,w&cMD,DC
Apr 16	Mon	5:33	2UC30033315	12.1	Chaldaea	0.8	11	8	e&nVA,w&cMD,DC
Apr 16	Mon	23:58	4UC53143258	11.9	Ottegebe	3.3	2	8	sOH,nWV,nVA,sMD
Apr 20	Fri	23:53	4UC61236804	12.5	Arabis	3.0	2	9	n&eVA;DC,wMD?
Apr 22	Sun	2:19	4UC43357099	12.6	Eurynome	0.5	7	9	DE,MD,s&nwPA;DC?
Apr 22	Sun	22:20	4UC60131413	13.4	Arosa	2.2	2	10	cOH,nWV,n&eVA
Apr 24	Tue	5:33	4UC32286385	13.1	Ottilia	1.7	12	10	nw Penn., Ohio
Apr 27	Fri	20:50	SAO 117802	8.2	Henyey	7.4	2	2	nPA,nNJ,NYC,LI
Apr 28	Sat	2:57	2UC25392579	11.9	Asterope	1.3	18	7	AL,cKY,wOH,IN
Apr 30	Mon	22:46	TYC04110597	10.7	Elektra	2.2	18	5	NC,sVA,nSC,TN
May 4	Fri	0:32	2UC35575348	12.4	Thuringia	3.2	6	8	cOH,cWV,c&seVA
May 5	Sat	21:31	TYC13560370	9.9	Virginia	4.9	3	4	nw-sePA,c&sNJ
May 6	Sun	2:07	TYC49720102	11.4	Circe	1.1	14	7	s&wNC,neSC,swVA

* 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	EDT	Star	Mag	% alt	CA	Location & Remarks
2018							
Apr 19	Thu	21:35	SAO 94510	7.3	19+ 24	1S	*Clvlnd,OH;Carlisle&Oxford,PA
Apr 23	Mon	0:25	theta Cnc	5.3	53+ 24	3N	*Konarok,VA;Tramway,Falcon,NC

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

Total Lunar Occultations

Date	Day	EDT	Ph	Star	Mag	%	alt	CA	Sp.	Notes
2018										
Apr 18	Wed	20:53	D	SAO 93895	7.9	11+	20	25N	G4	
Apr 18	Wed	20:55	D	SAO 93901	8.1	11+	20	74N	A0	Maybe close double
Apr 18	Wed	21:05	D	63 Tauri	5.6	11+	18	37N	A1	ZC 650
Apr 18	Wed	21:22	D	SAO 93909	8.2	11+	14	42S	G0	Az.280,mg2 11 2",PA257
Apr 18	Wed	22:17	D	SAO 93936*	8.1	11+	5	66N	G8	Az.288,mg2 11 .4"PA192
Apr 19	Thu	20:14	D	ZC 800	7.9	19+	39	82N	G0	Sun -6,mg2 9 .3",PA 20
Apr 19	Thu	20:49	D	SAO 94501	7.6	19+	33	61N	G0	
Apr 20	Fri	20:28	D	SAO 78306*	9.4	29+	48	88N	F0	Sun altitude -8 deg.
Apr 21	Sat	20:49	D	SAO 79370	7.6	40+	55	27N	A0	Sun altitude -12 deg.
Apr 21	Sat	22:57	D	ZC 1135	6.7	41+	31	71N	K0	
Apr 22	Sun	19:23	D	20 Cancri	5.9	51+	69	89S	A9	Sun +4 deg., ZC1259
Apr 22	Sun	22:03	D	SAO 97833	7.9	52+	51	84N	F5	
Apr 24	Tue	2:58	D	7 Leonis	6.3	65+	4	78S	A1	Az.285,ZC1415,double?
Apr 25	Wed	0:02	D	SAO 99103*	8.2	74+	45	49S	F5	
Apr 25	Wed	0:12	D	SAO 99111	7.5	74+	43	61S	K0	
Apr 25	Wed	1:03	D	ZC 1529	6.6	75+	34	41N	G5	
Apr 26	Thu	1:33	D	ZC 1645	6.7	84+	35	78S	F8	
Apr 26	Thu	2:27	D	ZC 1648	6.9	84+	25	70N	G5	
May 2	Wed	2:57	R	SAO159919*	7.2	95-	33	14N	F5	AA 339, TermDist. 7"
May 2	Wed	4:36	R	SAO 159935	7.2	95-	29	47N	A0	Axis Angle 306 deg.
May 4	Fri	1:23	R	SAO 186305	7.7	83-	16	48S	F8	
May 4	Fri	2:08	R	SAO 186341	7.7	83-	22	48S	WC	
May 4	Fri	6:01	R	mu Sgr	3.8	82-	27	52N	B2	Sun alt. -2, ZC2633
May 5	Sat	1:00	R	xi2 Sgr	3.5	76-	6	60N	G8	Azimuth 123, ZC2759
May 5	Sat	4:56	R	ZC 2778*	7.3	75-	29	25S	F8	mg2 8 1",PA183;VAgraze
May 5	Sat	8:02	D	Al Baldah	2.9	74-	20	-57N	F2	Sun +21,AA 58,ZC2797
May 5	Sat	9:10	R	= pi Sgr	2.9	74-	10	63N	F2	Sun+35,Az.232,closeDbl
May 8	Tue	4:36	R	ZC 3157	7.3	47-	21	51N	F6	mag2 10 sep. .9",PA 20
May 9	Wed	5:44	R	SAO 165049	7.7	37-	26	47S	M3	Sun altitude -4 deg.
May 12	Sat	5:31	R	ZC 106*	6.6	12-	10	50N	K0	Sun -6, Azimuth 99deg.

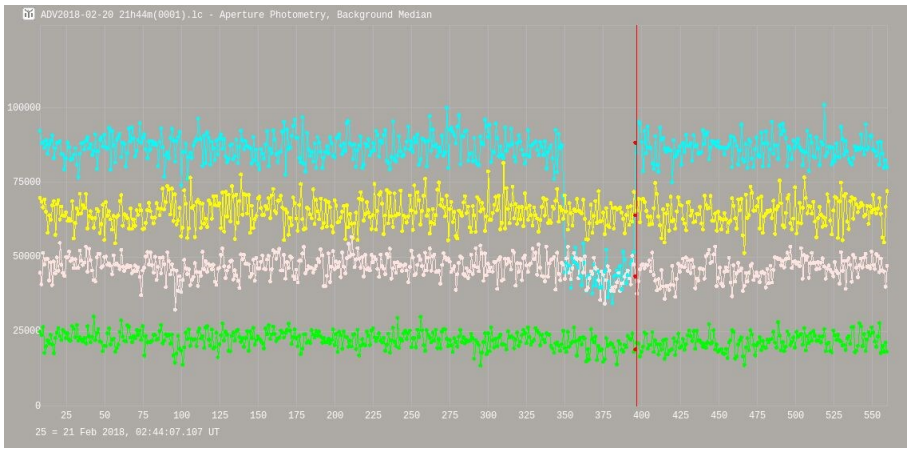
*The star is in the Kepler 2 exoplanet search program so lightcurves of the occultation are desired to check for close stellar duplicity

Further explanations & more information is at iota.jhuapl.edu/exped.htm .
David Dunham, dunham@starpower.net

2017-2018 Officers

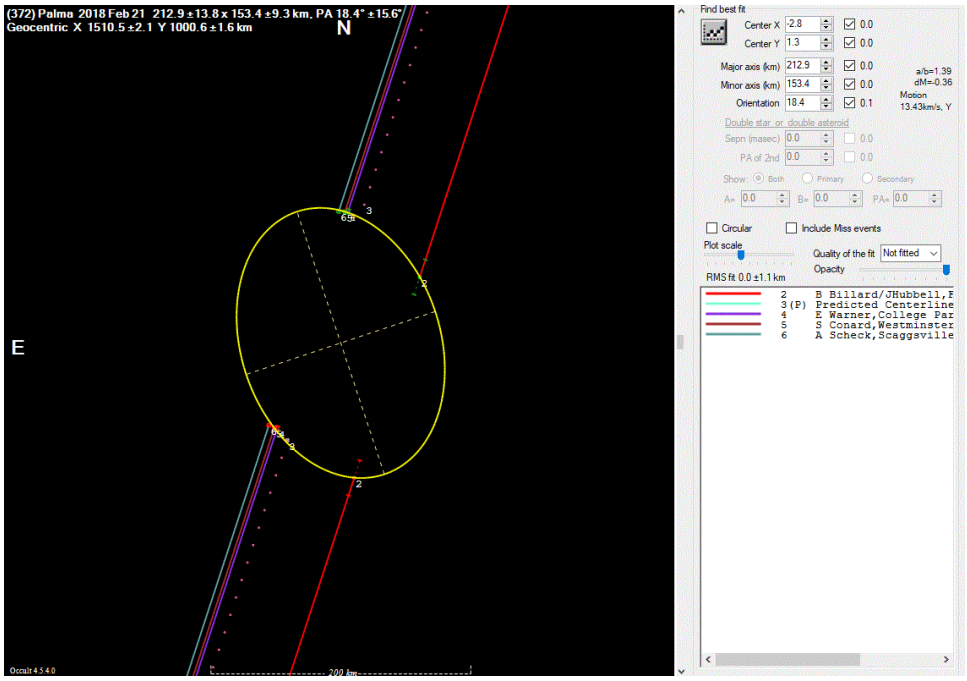
Occultation by Asteroid 372 Palma – continued from page 4

Then all that was left was to watch as the asteroid blocked the star. Or didn't block the star. Even with the most sophisticated techniques, predictions can be off from the actual paths of occultations. Fortunately, while the path of 372 Palma's occultation was off some, the Observatory was still well within that path, as the light curve below attests.



Light curve of the star TYC 2933-01592-1 (top) with three comparison stars.

Several other observers had success as well. Their data were combined with those from the UMD Observatory by IOTA to come up with a best-fit profile for the size and shape 372 Palma, shown below.



The multicolored lines represent the recording locations across the width of the occultation path. The oval represents the best-fit size and profile for Asteroid 372 Palma. Image credit – asteroidoccultation.com

Profiles for many asteroids, calculated from their occultations of stars, can be found at www.asteroidoccultation.com/observations/Results/. Just don't be surprised, if you look at the page, at seeing how often the names J. Dunham and D. Dunham, the NCA's very own Joan and David Dunham, appear among the occultation results. Indeed, at the time of the Palma occultation, they were in Arizona and Australia, working on other occultations.

Spring 2018 Hopewell Observatory Open House and Star Party
Members of the National Capital Astronomers and the general public are invited to Hopewell Observatory for its Spring 2018 Open House and Star Party on Saturday, May 5th into the morning hours of May 6th. The backup date, in case of bad weather, is May 12th.

Located 30 miles from the Beltway, the Observatory is on Bull Run Mountain. More details can be found at Guy Brandenburg's website - guysmathastro.wordpress.com/2017/11/17/fall-2017-hopewell-observatory-open-house-and-star-party-november-25-26/

Do you have an astronomy story to share with your fellow NCA members? The submission deadline for May's Star Dust, is April 20th.

Clear Skies!

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: www.astro.umd.edu/openhouse

Mid-Atlantic Senior Physicists Group: "Prospects for Life & Human Habitability Around Nearby Stars - Many Possible Homes - But the Likely Neighbors Are Microbes" with Carey M. Lisse, Principal Staff Scientist Planetary Exploration Group-Applied Physics Laboratory, Johns Hopkins University. Wed. Apr. 25, at 1 pm 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/

Montgomery College's Planetarium: "Quantum Gravity or how c (the speed of causality), G (the universal gravitational constant), & h (Planck's constant) create the fabric of Reality" Saturday, April 21st at 7:00 p.m. For directions and information, go to the following website: www2.montgomerycollege.edu/departments/planet/

Upcoming NCA Meeting at the University of Maryland Observatory:
12 May: 7:30 p.m Brian Morsony (UMD), *Relativistic Jets Stir Things Up*

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.

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First Class
Dated Material

Celebrating 81 Years of Astronomy

Next NCA Meeting:

2018 April 14th

7:30 pm

@ UMD Observatory

Dr. Jonathan Gagné

Inside This Issue