Star Dust

Newsletter of National Capital Astronomers, Inc.

capitalastronomers.org

April 2022 ***Volume 80, Issue 8***

Celebrating 85 Years of Astronomy

Next Meeting

When: Sat. Apr. 9th, 2022

Time: 7:30 pm

Where: Online (Zoom)

See instructions for joining the meeting on Page 8.

Speaker: Dr. Johanna Teske

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Image Credit - ESA/Hubble & NASA, D. Sand, K. Sheth

NGC 1097 is a barred spiral galaxy which lies about 48 million light years away. The image was taken by two of Hubble's instruments - the Wide Field Camera 3 (WFC3) and the Advanced Camera for Surveys (ACS). More information on the image can be found at phys.org/news/2022-03-image-hubble-eye-galaxy.html.

A Review of the Exoplanet-Host Star Composition Connection

Johanna Teske

Carnegie Earth and Planets Lab

We will never observe most exoplanets directly, but can only infer their properties based on observations of their host stars. High resolution spectroscopy has given us an important window into the compositions of exoplanets, via the chemical abundances in their host stars. We think host star abundances, to some extent, are like "genes" passed on to their orbiting planets, and thus provide insight into the building blocks that went into forming planets. Host star abundances have also been used to infer likely evolution pathways in different categories of exoplanets. From the first giant exoplanet detections, to the current era of bulk density characterization, and looking toward the upcoming era of atmospheric characterization, host star abundances have been - and will continue to be - an important ingredient to understanding exoplanet demographics. In this talk, I will present a brief review of what we have learned thus far about the connection between host star and exoplanet composition, and what new information/techniques in this subfield will help make progress in discerning underlying planet formation pathways.

Biography: Johanna Teske grew up in rural Pennsylvania and received her B.S. in Physics from American University in Washington, DC in 2008. After college, Johanna attended the University of Arizona for graduate school, receiving her Ph.D. in Astronomy in 2014, and then moved back to DC for two years of the Origins Postdoctoral Fellowship at the Carnegie Department of Terrestrial Magnetism. In 2016 Johanna continued her Origins Fellowship at Carnegie Observatories in Pasadena,

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Recent Astronomy Highlights

Dust Cloud From Planetary Collision Detected

Recently astronomers detected the presence of a dust cloud orbiting a star 330 light years from our Solar System. At around ten million years old, HD 166191 is a relatively young star, with a planetary system still in the process of forming. Starting in 2018, the astronomers detected the cloud three times in 142-day intervals. The detection came about because of a decrease in visible light from the star and an increase in infrared light received from the dust cloud. Between the first and second times, the cloud grew significantly, then the third time the cloud appeared to have mostly dissipated. The likely cause of the cloud, according to the astronomers, was the collision of two planetesimals, about the size of dwarf planets. More information on the collision and its discovery can be found at www.sciencealert.com/two-planet-seeds-collided-near-a-distant-star-we-ve-just-seen-the-fallout

Part of the Milky Way Is Older Than Expected

Using data gathered on a quarter million stars by the GAIA mission and China's Large Sky Area Multi-Object Fiber Spectroscopic Telescope, LAMOST, astronomers have discovered that the thick disk of the Milky Way Galaxy, the part of the disk farther from the galactic plane than the thin disk in which our Sun and most stars reside, must have started forming two billion years earlier than previous theorized, only 0.8 billion years after the Big Bang. Specifically, the stars that were studied are known as Sub Giant stars, which are in the process of becoming red giants. The relatively short amount of time that such stars spend in the sub-giant phase allowed for astronomers to more precisely infer the ages of those stars. The discovery implies that the Milky Way's disk formed in two stages, with the thin disk starting to form two billion years after the thick disk began to form. More information can be found at phys.org/news/2022-03-gaia-mission-milky-older.html

continued on page 4

Abstract and Biography – continued from page 1

CA, where in 2017 she was awarded the NASA Hubble Postdoctoral Fellowship. Last year Johanna switched coasts one more time after accepting a Staff Scientist (permanent) position at the new Carnegie Earth and Planets Lab (formerly DTM). Her research focuses on finding and characterizing planets around other stars, and she also cares deeply about making science more inclusive and supportive of a diverse community.

Call for 2022-2023 NCA Officer and Trustee Candidates

Elections for the 2022-2023 NCA Officers and one Trustee will take place at the June 11th meeting of the National Capital Astronomers. All offices are open for candidacy and NCA members are encouraged to consider running. The terms of the president, vice-president, secretary-treasurer and assistant secretary-treasurer are one year. The term for the trustee is four years. If you are willing to serve in any office or as a trustee, please consider nominating yourself by sending an email to Jack Gaffey, head of the NCA Officer Nominating Committee, before the June meeting. His email address is jdgaffeyjr@gmail.com.

The duties of the officer are specified in the NCA Constitution, which is at capitalastronomers.org/documents/NCAconstitutionAdoptedNov2011.pdf. For convenience, those duties are also quoted below.

*"The **president** shall serve as the chief executive officer and shall carry out the decisions of the board of directors or, where pertinent, the resolutions of the membership. He shall serve ex-officio, as a member and chairman of the board of directors. He shall appoint all standing and special committees and designate their chairman, and shall appoint members to special functional positions such as webmaster, Star Dust editor, and the manager of the National Parks program. He shall otherwise promote the aims and objects of the corporation."*

*"The **vice-president** shall preside at all meetings of the members during the absence of the president and shall be available to perform services on behalf of the president, including committee work and services."* The Vice-President is also responsible for obtaining speakers for the monthly meetings.

Please note that the secretary and treasurer positions have been combined into the offices of **secretary-treasurer** and **assistant secretary-treasurer** which carry out the tasks listed below for the secretary and treasurer.

*"The **secretary** shall keep the minutes of the meetings, maintain the membership records, and serve as the custodian of the books and records and shall be the custodian of the official seal. The secretary shall also serve ex-officio as the secretary of the board of directors."*

*"The **treasurer** shall serve as custodian of the funds of the corporation and as its chief financial officer. He shall also serve as the budget officer."*

Finally, although the Constitution does not have a specific section regarding trustees, it stipulates that trustees serve on the Board of Directors, along with all of the NCA Officers.

So, once again, please consider serving.

Exploring the Sky

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

Due to the ongoing Coronavirus Pandemic, Exploring the Sky sessions are canceled. When the situation changes, sessions will once again be scheduled.

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

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The article-submission deadline for May's issue of Star Dust, is April 21st.

Clear Skies!

JWST Update – Alignment Continues

Image Credit – NASA/STSci

On March 16th, NASA released the image above, taken by the Near-Infrared Camera, NIRCam. Still focused on the same star as in previous images, 2MASS J17554042+6551277, the image nevertheless is much sharper, with far-off galaxies and nearer stars also making an appearance as all eighteen mirror segments act as one mirror. A 'selfie' of the mirror (below) shows all of those mirror segments collecting light from 2MASS J17554042+6551277 at the same time. Based on this image, NASA officials report that the instruments on the space telescope that have been checked out so far are working at levels above expectation.

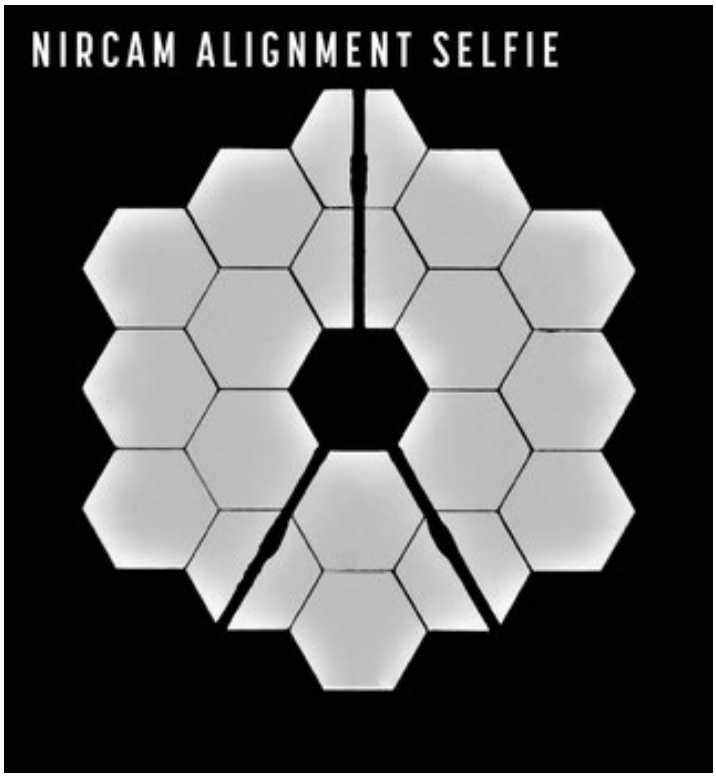

Image Credit – NASA/STSci

Sky Watchers

April/May

Mercury will be the only planet visible in the post-sunset sky, reaching Greatest Eastern Elongation on 4/29 (see below). Meanwhile Venus, Mars, Jupiter and Saturn will be in the predawn sky. Fast-moving Venus will have 'close encounters' with Neptune and Jupiter (see below).	
4/16	Full Moon at 2:57 EDT
4/22, 23	The peak of the Lyrids Meteor Shower which produces about 20 meteors/hour. Unfortunately, a waning gibbous Moon will interfere with seeing some of the meteors.
4/27	Conjunction of Venus and Neptune – The two planets will appear extremely close to each other in the pre-dawn sky, with Neptune visible with a telescope, on their way to Venus passing within a single arc-second (1/3600 of a degree) at 3:07 p,m. that day.
4/29	Mercury reaches Greatest Eastern Elongation – Mercury will will be 20.6° from the Sun in the evening sky.
4/30	Conjunction of Venus and Jupiter – The two brightest planets will be within a quarter of a degree of each other (half the width of the Moon) in the predawn sky.
5/6,7	The peak of the Eta Aquarids Meteor Shower which produces about 30 meteors/hour in the Northern Hemisphere, with more in the Southern Hemisphere. With the waxing crescent Moon setting early in the evening, viewing conditions should be ideal for most of the night.

All times are in EDT (Eastern Daylight Savings Time)

JWST Update – Alignment Continues – continued from page 3

Calibration of the telescope continues, with JWST members working on additional instruments besides NIRCam. Those instruments include the Near-Infrared Spectrograph, NIRSpec, which can take the spectrograph of 100 objects simultaneously, the Mid-Infrared Instrument, MIRI, made up of a camera and spectrograph for studying the mid range of the infrared part of the electromagnetic spectrum, as the name implies, and the Fine Guidance Sensor/Near InfraRed Imager and Slitless Spectrograph , FGS/NIRISS, which will be used to study exoplanets and for detecting the light from the first stars and Active Galactic Nuclei, AGN, in our Universe.

NASA's March 16th press release, from which one can access a high-resolution copy of the Telescope Alignment Evaluation Image by clicking on the image there, can be found at www.nasa.gov/press-release/nasa-s-webb-reaches-alignment-milestone-optics-working-successfully. Further updates on the mission can be found at blogs.nasa.gov/webb/.

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

ISSN: 0898-7548

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Thank you!

Recent Astronomy Highlights – continued from page 2

Pulsar Emits 40-Trillion-Mile-Long Beam of Matter and Antimatter

A pulsar, a rapidly spinning neutron star which is sending out radio waves at regular intervals, has also recently been found to be emitting a beam of matter and antimatter that is 40 trillion miles long, according to results obtained by the Chandra X-Ray Observatory. The pulsar, designated PSR J2030+4415, is only 1600 light years from our Solar System and spins at a rate of approximately three rotations per second. The surprising amount of antimatter it is generating may help explain the high amount of that substance being detected within our galaxy. More information is available at phys.org/news/2022-03-tiny-star-unleashes-gargantuan-anti-matter.html

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Occultation Notes

- D following the time denotes a disappearance, while R indicates that the event is a reappearance.
- 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. E indicates a lunar eclipse is in progress, and the value is the percent of the Moon's disk that is NOT in the umbra. So 0E means during the total phase.
- 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". Often, rather than the separation, I give “dTime” or “dT”, the time difference of the secondary star occultation relative to the primary star’s occultation.
- 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

2022 Date	Day	EDT	Star	Mag.	Asteroid	dmag	dur. s	Ap. "	Location
Apr 11	Mon	22:56	4UC32765639	12.4	Gunila	1.6	7	6	sNJ,neMD,se-ncPA
Apr 12	Tue	23:14	4UC51344730	14.5	Prokne	0.4	12	11	sAZ,c+nVA,DC,MD
Apr 15	Fri	22:44	4UC42755739	13.5	Hermitage	4.1	1.3	9	ec-ncMD,nwPA,nOH
Apr 16	Sat	2:20	4UC41453941	13.7	Falta	3.2	2.2	9	sMD,sDE,sDC,nVA
Apr 17	Sun	1:09	TYC08330216	12.1	Siegena	1.4	30	5	c+nVA,DC,cMD,NJ
Apr 17	Sun	23:58	4UC43464575	13.8	Parysatis	1.2	5	9	sMD,nVA,nWV,cOH
Apr 19	Tue	21:57	TYC18641170	9.7	Louise	8.2	0.2	3	nOH,swPA.cMD,sDE
Apr 19	Tue	23:48	TYC18730596	10.4	Horrocks	7.2	0.9	4	nwOH,wPA,c+seMD
Apr 20	Wed	0:02	TYC55980127	10.5	2012 FN87	12.0	4	4	North America
May 3	Tue	0:37	SAO 121051	8.8	2000 EF29	8.5	1.0	3	sNJ,cMD;DC,nVA?
May 5	Thu	3:10	4UC40461754	14.1	Centesima	0.8	4	10	sNJ,neMD,sc+wPA
May 5	Thu	22:37	SAO 95034	8.9	Polyxo	5.0	3	4	swOhio,sVA,neNC
May 10	Tue	2:46	4U343177841	14.1	Bredichina	0.5	25	10	cPA,DMV,seVA,eNC
May 11	Wed	3:29	4U314207939	12.4	Brauna	3.7	8	7	e+nVA,sMD,sDC
May 16	Mon	21:42	4UC53160264	14.4	Chao	1.4	4	11	sNJ,cDE,DMV

Lunar Grazing Occultations

2022 Date	Day	EDT	Star	Mag	% alt	CA	Location, Notes
Apr 8	Fri	21:40	SAO 79164	7.4	48+ 55	7N	RndTp,PA;DpRn,Sprks,Brdshw,MD
Apr 19	Tue	2:38	Dschubba	2.3	92- 31	13S	Vrna,sStnyCk,VA;Gatv,nAvon,NC
Apr 21	Thu	2:53	X150546	7.2	74- 16	10S	swBethsda,MD;USNO;WlpsVwng,VA
May 16	Mon	0:51	SAO 159328	9.3	0E 32	57U	Mt Airy,Laurel, sw Crofton,MD

Lunar Total Occultations

2022 Date	Day	EDT	Ph	Star	Mag	%	alt	CA	Sp.	Notes
Apr 9	Sat	0:46	D	SAO 79277	8.1	49+	22	84S	F0	mg2 11 sep .6" dT -1s
Apr 9	Sat	1:59	D	SAO 79319	7.9	49+	9	80N	K2	Azimuth 296 deg.
Apr 11	Mon	0:27	D	ZC 1348	8.1	68+	41	64S	G5	
Apr 13	Wed	22:54	D	ZC 1669*	6.7	91+	59	34S	F5	
Apr 14	Thu	4:06	D	SAO118952*	7.1	92+	17	44S	A2	
Apr 18	Mon	3:58	R	ZC 2147	6.9	97-	29	53N	K0	AA310,mg2 9,dTime +0.2s
Apr 19	Tue	2:22	D	Dschubba=	2.3	92-	27	-11S	B0	AA173, ZC2290, close
Apr 19	Tue	2:52	R	del Sco	2.3	92-	28	35S	B0	double; VA+NC graze
Apr 19	Tue	4:11	R	SAO184045*	7.3	91-	27	71S	B9	
Apr 20	Wed	3:17	R	28 Oph	6.7	84-	24	40N	B9	ZC2452,close doublw??
Apr 21	Thu	2:13	R	SAO 186271	7.3	74-	11	83N	G1	Azimuth 139 degrees
Apr 21	Thu	2:58	R	X150546	7.2	74-	16	17S	G8	DMV graze
Apr 21	Thu	3:19	R	SAO 186339	7.9	74-	18	86S	K0	
Apr 21	Thu	3:29	R	ZC 2621	7.5	74-	19	59S	K0	
Apr 21	Thu	3:44	R	SAO 186361	7.2	74-	20	74S	K5	
Apr 21	Thu	6:00	R	ZC 2634	7.2	73-	23	21N	B8	Sun alt. -5 deg.
Apr 24	Sun	5:03	R	SAO 190222	8.1	40-	14	82N	K0	Azimuth 134 deg.
May 5	Thu	21:06	D	SAO 78853	7.7	23+	39	87S	A0	Sun alt. -12 deg.
May 5	Thu	23:34	D	39 Gem	6.2	23+	12	23S	F8	Az 294,ZC1061,mg2 12
May 8	Sun	1:12	D	ZC 1317	8.2	42+	10	44S	A2	Azimuth 291 deg.
May 9	Mon	23:13	D	42 Leonis	6.2	61+	45	43S	A1	ZC 1514
May 10	Tue	2:49	D	ZC 1535	6.9	62+	4	66N	K0	Azimuth 285 deg.
May 10	Tue	21:34	D	ZC 1612	7.3	70+	60	5S	F5	Term. Dist. 15"
May 12	Thu	0:36	D	7 Virginis	5.4	80+	38	43S	A1	ZC 1733
May 12	Thu	1:04	D	SAO119169*	7.8	80+	34	80S	F5	
May 12	Thu	20:49	D	ZC 1825	5.9	87+	43	28S	G8	Sun alt. -8 deg.
May 14	Sat	1:34	D	82 Vir	5.0	95+	33	24N	M2	ZC1962,Term.Dist. 18"
May 15	Sun	23:59	D	SAO159316*	8.9	0E	29	42U	F0	companion of ZC 2214
May 16	Mon	0:00	D	ZC 2214	6.3	0E	29	42U	A5	dTime -25s, see above
May 16	Mon	0:47	D	SAO159328*	9.3	0E	31	56U	G8	MD graze; see above
May 16	Mon	0:54	R	SAO159328*	9.3	1E	33	58U	G8	This occ longer in DC
May 16	Mon	1:14	R	SAO159316*	8.9	31E	31	52U	F0	companion of ZC 2214
May 16	Mon	1:15	R	ZC 2214	6.3	32E	31	53U	A5	dTime -23s, see above

*in Kepler2 program so occultation light curves are sought.

May 16th events are during a lunar eclipse;
SAO 159316 is 11" from ZC 2214 in PA 280 deg.
More information is at iota.jhuapl.edu/exped.htm; sometime soon,
the URL will change to iota.jhuapl.edu/exped.htm.
David Dunham, dunham@starpower.net

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Imaging X-Ray Polarimetry Explorer

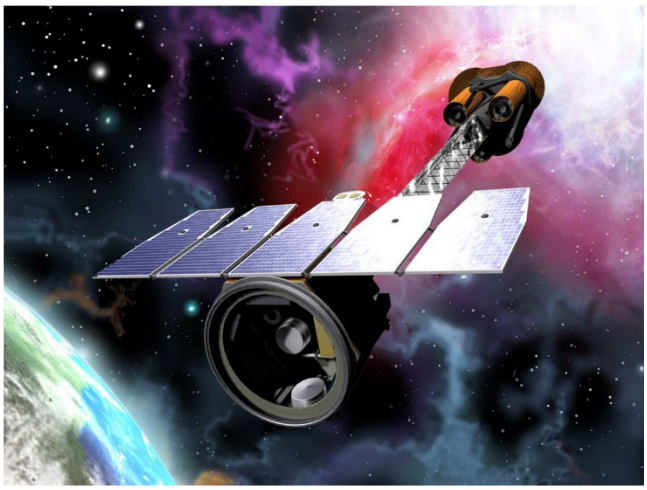

Image Credit – NASA/MSFC

All of the well-deserved excitement surrounding the launch of the James Webb Space Telescope overshadowed the start of another mission. The Imaging X-Ray Polarimetry Explorer (IXPE) was launched into orbit from NASA's Kennedy Space Flight Center on December 9, 2021. It now orbits 372 miles above the Earth with a two-year primary mission of detecting X-rays from black holes, supernovae, pulsars and other high energy objects. As the telescope name implies, it will also measure the polarization, or orientation, of the incoming X-rays, information which can provide further clues to the nature of the objects being studied.

The first target of the mission was Cassiopeia A, a supernova remnant. The spacecraft's three identical X-ray telescopes studied the remnant for a period of three weeks. On February 14th, a false-color image from that three-week study was released with the most energetic x-rays from the supernova remnant shown below in white and red and the least energetic in violet and blue.

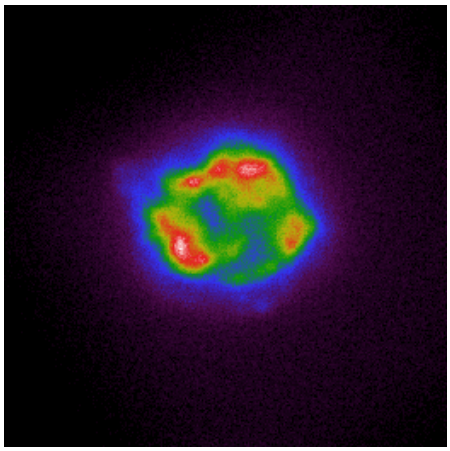

Image Credit - NASA

More information about the mission can be found at the follow links - www.nasa.gov/press-release/nasa-launches-new-mission-to-explore-universe-s-most-dramatic-objects and lasp.colorado.edu/home/missions-projects/quick-facts-ixpe/ and the press release about the supernova image can be read at www.nasa.gov/mission_pages/ixpe/news/nasa-s-ixpe-sends-first-science-image.html.

Recent Astronomy Highlights – continued from page 4

New Type of Solar Waves Discovered
A new type of acoustic waves, designated high-frequency retrograde vorticity waves, have been detected on the surface of the Sun. Moving approximately three times faster than scientists previously thought was possible, the HFR waves present scientists with something of a mystery. Those scientists have looked at mechanisms that might cause the waves to speed up. Those mechanisms include either the Sun's magnetic or gravitational field, or convection currents, but none of these mechanisms seem capable of delivering the force necessary to accelerate the waves up to the observed speed. Some scientists believe that the mystery may be pointing to new physics, which, if discovered, might help explain some of the still unknown processes of the Sun. More information can be found at www.space.com/solar-waves-moving-too-fast.

Calendar of Events

NCA Telescope Making, Maintenance, and Modification Workshop (TM3W) (previously the NCA Mirror- or Telescope-making Classes): The Chevy Chase Community Center has reopened and classes have resumed. Classes will be Tuesdays and Fridays, from 5:00 to 8:30 pm at the Chevy Chase Community Center (intersection of McKinley Street and Connecticut Avenue, N.W.) Please contact instructor Guy Brandenburg at 202-262-4274 (leave message) or at gfbrandenburg@yahoo.com if you plan to attend. Note that masks are mandatory, as in all DC government buildings. More info is at guysmathastro.com.

Open house talks and observing at the University of Maryland Observatory in College Park are temporarily suspended. When they resume, they will be on the 5th and 20th of every month at 8:00 pm (Nov.-Apr.) or 9:00 pm (May-Oct.). Updates are posted at www.astro.umd.edu/openhouse.

Next NCA Meeting: **14 May** 7:30 p.m. Nour Raouafi, Johns Hopkins APL, **The Parker Solar Probe**

The APS Mid-Atlantic Senior Physicists Group: **(Zoom Meeting)** April 20th at 1:00 p.m. Information on the meeting, including the speaker name and topic, will be made available at www.aps.org/units/maspg/meetings/meeting.cfm?name=SENIOR0422. If you're interested in attending the meeting, please email units@aps.org.

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
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First Class
Dated Material

Celebrating 84 Years of Astronomy

Next NCA Meeting:

2022 April 9th
7:30 pm
(On Zoom)
Dr. Johanna Teske

To join the Zoom meeting, use the following link: umd.zoom.us/j/96856095178?pwd=cWhyNE92bGFYUkYxZnl6eWVIK0lKdz09

Please download and import the following iCalendar (.ics) files to your calendar system: umd.zoom.us/meeting/tJIlcu-opz4rHdxfgBb8Lh5wRlgETFQ8lnI5/ics?icsToken=98tyKuCupj4sGt2QsR6PRowAGo_4M_TxmCVcgqdFmhjHAXh_albhBO5FF4ZZIYDc

Please note that NCA Zoom meetings are often recorded.

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