Star Dust

Newsletter of National Capital Astronomers, Inc.

capitalastronomers.org

December 2022 ***Volume 81, Issue 4***

Celebrating 85 Years of Astronomy

Next Meeting

When: Sat. Dec. 10th, 2022

Time: 7:30 pm

Where: Online (Zoom)

See instructions for joining the meeting on Page 8.

Speaker: Dr. Igor Andreoni

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Image Credit - ESA/NASA/JPL-Caltech

The false-color image shows clouds of dust in the Orion Nebula. The image was created with data from NASA's Spitzer Space Telescope and the Wide-Field Infrared Survey Explorer (WISE). More info is at phys.org/news/2022-11-nasa-esa-reveal-tale-death.html.

How to Catch Transient Astronomical Events

Igor Andreoni (University of Maryland)

(Editor's Note – Dr. Andreoni has kindly stepped in when the originally scheduled speaker had to postpone his talk.)

We are living in a golden era for time-domain astronomy in the optical band of the spectrum. Wide-field surveys such as the Zwicky Transient Facility (ZTF) image most of the observable sky every night, opening a discovery space historically difficult to explore in the optical. The ability to crunch big data efficiently has become key to discovery. I will present results obtained with ZTF searching for optical emission from gamma-ray bursts, binary neutron star mergers, and a rare class of tidal disruption events. I will also talk about prospects for the upcoming Vera C. Rubin Observatory, which is expected to produce millions of transient alerts every night.

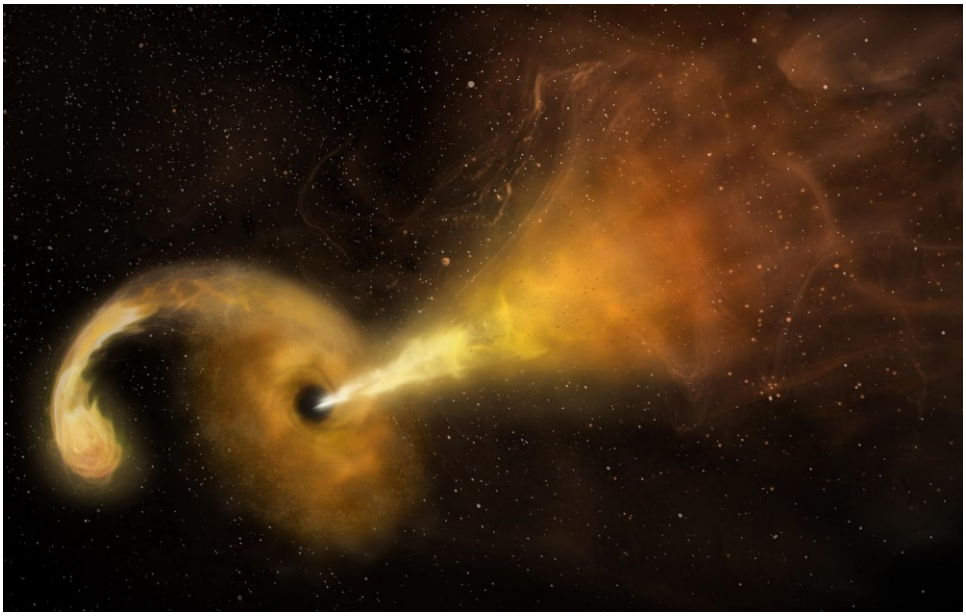

Illustration Credit - NRAO/AUI/NSF/NASA

Biography: I grew up in Italy, where I obtained a Bachelor's and Master's degree in Physics at the University of Milan. After completing a PhD program in Astronomy at Swinburne University of Technology in Melbourne, Australia, I moved to California for a three-year postdoc at Caltech. From 2021, I have been a Neil Gehrels postdoctoral fellow at the

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Recent Astronomy Highlights

JWST Makes Measurements of an Exoplanet's Atmosphere

Spectrographic instruments on NASA's James Webb Space Telescope took measurements of the atmosphere of WASP-39 b, a planet known as a hot Saturn, having the mass of Saturn, but orbiting its star closer than Mercury orbits the Sun. The observations took place while WASP-39 b was transiting its star. During transit, JWST could observe light passing through the atmosphere, some of which was absorbed by the various chemical components of that atmosphere. The observations confirmed the presence of water and carbon dioxide. Sulfur dioxide was also found. The findings seem to indicate that WASP-39 b actually formed much farther out from its star before spiraling in to its current orbit. More information about the conclusions can be found at www.nasa.gov/feature/goddard/2022/nasa-s-webb-reveals-an-exoplanet-atmosphere-as-never-seen-before

Catalogue of Short Gamma-Ray Bursts

On August 17, 2017, the LIGO and VIRGO gravitational-wave detectors caught a signal from the merger of two neutron stars. At nearly the same time, space telescopes detected a burst of gamma rays coming from NGC 4993, a galaxy approximately 140 million light years away. These observations proved that at least some Short Gamma-Ray Bursts must be due to mergers of neutron stars. But, so far, this is the only case in which such a confirmation has been made. Now a team of astronomers at the Northwestern University has catalogued eighty-four Short Gamma-Ray Bursts and has been studying the environments in which they take place in hopes of understanding them better and understanding when they seeded heavier elements into surrounding space. One conclusion the astronomers have reached is that such bursts happened more frequently in the early Universe. More details can be found at phys.org/news/2022-11-short-gamma-ray-distant-universe.html.

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Abstract and Biography – continued from page 1

Joint Space-Science Institute, which is a partnership between the University of Maryland and NASA/Goddard.

John "Jack" Gaffey, Jr.

It is with sadness that we report the passing of John "Jack" Gaffey Jr., longtime member and supporter of the National Capital Astronomers, on November 29, 2022. As noted by friend and fellow NCA member, John Hornstein, "*Jack was a notably warm, kind, and principled human being who always insisted on fairness. He stood out also for his deep interest in the advancement of human knowledge, especially physics, mathematics, and the understanding of human nature. He gave good advice, and much time and energy, to the National Capital Astronomers, and to the Senior Physicists. He wanted every group he was in - including his country - to work as well as possible. He will be sorely missed and well-remembered.*"

2023 Schedule of Speakers (Partial)

John Hornstein

Jan 14 **TBD**

Feb 11 Thaddeus Komacek (UMD), **Hot Jupiters**

Mar 11 **TBD**

Apr 8 Joe Pesce (GMU), **What We Are Discovering With ALMA and The James Webb Space Telescope?**

May 13 Dana Louie (GSFC), **Exoplanets Viewed by the James Webb Space Telescope**

Jun 10 **Science Fair Winners, Astro-photo Show-and-Tell, Election**

Call for Science-Fair Judges

John Hornstein

On Saturday, March 25, 2023 the NCA will be judging astronomy projects at the Zoom-based Montgomery County Science Fair. Jay Miller and I will be among the judges from the NCA, but it is both instructive and a lot of fun to see the projects and to interact with the students. We would very much like to have other NCA members join us in the judging. Anyone who is interested can contact me by email at jshgwave@yahoo.com.

Exploring the Sky

The Exploring the Sky program will take a hiatus until April of 2023.

Exploring the Sky is a joint public observing program between the National Capital Astronomers and the National Park Service. We have been holding these sessions for more than 70 years. We supply the telescopes and you supply the eyes. We meet in the field just south of the intersection of Military and Glover Roads, NW, near the Rock Creek Park Nature Center. A parking lot is located next to the field. The sessions will be canceled in the event of rain or cloudy skies.

Although this is not an optimal observing site, many of the objects people are interested in looking at are visible. At times we can see some of the planets, double stars, open clusters, globular clusters, the occasional comet or asteroid, nebulae and fuzzy galaxies. The latter two will never look like the magazine pictures!

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 article-submission deadline for January's issue of Star Dust, is December 18th.

Clear Skies!

November's Exploring the Sky Session a Success

Although the skies looked less than ideal at first, with partly cloudy conditions on the evening of November 5th, Exploring the Sky ended its 2022 season with a great session that night. Approximately 50 people, young and old, showed up for the event to view the Moon, Jupiter, Saturn and one or two other objects. Jay Miller brought his 140 mm refractor and Todd Supple brought his 8-inch SCT. Guy Brandenburg brought his 8-inch Dob with a mirror he ground and polished himself 30 years ago, as well as the low-tech setting circles that he also built (see the President's Corner in the November 2022 issue of Star Dust). And, in a first test, the setting circles were a success. Participants were amazed in hearing that Guy had built the entire setup himself.

Meanwhile Renée Maher, the Park Ranger on duty, took the low-light, flash-less pictures shown below. The session went until approximately 9:40 p.m. when thicker clouds rolled in, obscuring even the Moon. As the pictures below will attest, it was a successful and fun event for everyone.

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Sky Watchers

December/January

Mercury will rise higher as December progresses, reaching Greatest Eastern Elongation on December 21st (see below). Venus will be low on the horizon at the start of the same period, but appear higher in the evening sky as the days progress. Saturn and Jupiter are high in the sky after sunset. Mars will be viewable most of the night.	
12/13 – 14	The Geminids Meteor Shower peaks on the evening of the 13th into the morning of the 14th with approximately 120 meteors/hour. Unfortunately, a waning gibbous Moon will interfere with seeing some of the dimmer meteors. Best viewing conditions will be in the early morning hours.
12/21	Winter Solstice - At 4:40 p.m. EST, the Sun will shine directly over the Tropic of Capricorn at 23° 26'.
12/21	Mercury at Greatest Eastern Elongation – the planet will be 20.1 degrees away from the Sun and viewable in the western sky after sunset.
12/21-22	The Ursids Meteor Shower peaks on the 21st into the morning of the 22nd with 5-10 meteors/hour. With the Moon setting before sunset, the viewing conditions will be ideal for most of the night.
1/3 - 4	The Quadrantids Meteor Shower peaks with approximately 40 meteors/hour. Unfortunately, a nearly full Moon will interfere with viewing.
1/6	Full Moon at 6:09 p.m.

All times are in EST (Eastern Standard Time).

November's Exploring the Sky Session… – continued from page 3

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Recent Astronomy Highlights – continued from page 2

JWST Images a Protostar's Environment

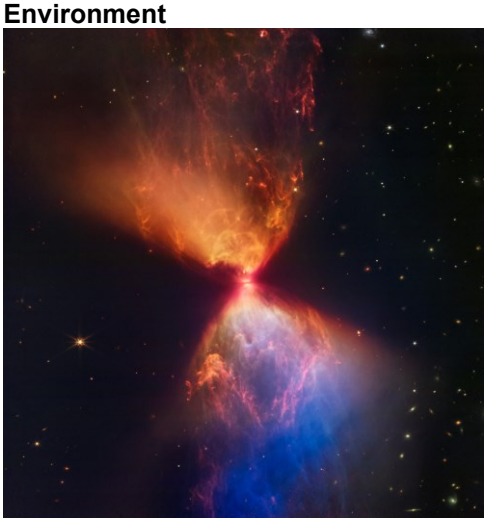

Image Credit - NASA, ESA, CSA, and STScI, J. DePasquale (STScI)

The James Webb Space Telescope captured an infrared image of the clouds of dust in the region in which a protostar is forming. Not yet massive enough to trigger fusion at its core, the protostar lies in the Taurus Molecular Cloud approximately 430 light years from Earth. It is designated L1527. Rendered into false colors, the image above shows the regions where the density of dust is highest in orange and regions where it is lowest in blue. Astronomers estimate that the protostar is approximately 100,000 years old and believe it will eventually bulk up enough to trigger fusion. More information is at phys.org/news/2022-11-nasa-webb-fiery-hourglass-star.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

Planetary and Asteroidal Occultations

2022/2023							dur.	Ap.		
Date	Day	EST	Star	Mag.	Asteroid	dmag	s	"	Location	
Dec 11	Sun	22:55	4UC57435282	13.5	Zhukov	2.2	3	10	sNJ,eMD,DC,nVA	
Dec 12	Mon	1:55	4UC54539330	10.9	Margarita	3.5	4	4	sNJ,eMD,DC,nVA	
Dec 12	Mon	6:05	4UC57036094	12.6	ASP	3.5	3	8	e+nVA,swMD,e+nOH	
Dec 12	Mon	22:15	4UC49118906	13.5	Salvadorsncz	4.1	0.8	9	sNJ,cMD,nDC,nVA	
Dec 14	Wed	1:31	4UC64217531	12.9	Perepadin	2.0	4	8	s+cMMD,DC,nVA,OH	
Dec 16	Fri	3:00	4UC44854520	12.7	Kuzbass	5.4	0.9	7	cOH,nVA,DC,cMD	
Dec 17	Sat	0:08	4UC46938023	13.5	Hormuthia	2.4	8	9	sNJ,cMD,DC,nVA	
Dec 18	Sun	21:56	4UC51901144	13.6	Yerkes	2.3	1.9	9	sOH,nVA,cMD,sNJ	
Dec 21	Wed	18:24	4UC51407062	11.9	Swain	4.7	1.3	5	sNJ,sMD,c+swVA	
Dec 23	Fri	23:32	TYC18930827	11.9	ASP	4.0	2.2	5	sMD,cVA,nOK,AZ	
Dec 24	Sat	18:47	4UC63511049	12.0	Bamberga	0.2	39	6	OH,wMD,n+eVA;DC?	
Dec 27	Tue	1:25	4UC66139764	10.7	Moiwa	6.8	0.9	4	cVA,nKY,cMO,nAZ	
Dec 30	Fri	21:42	4UC52314863	11.4	1998 VU4	5.2	1.9	5	sMD,cVA,sOK,sAZ	
Dec 31	Sat	19:40	SAO 79648	9.0	Didymos	7.6	.25	4	nME,sON,sMI,nIL	
Dec 31	Sat	20:59	4UC51128210	13.5	Pamela	1.3	5	9	sMD,c+swVA,TN,TX	
*** Dates and times above are 2022, those below are 2023 ***										
Jan 2	Mon	20:42	4UC55234371	13.5	Comas Sola	0.7	4	9	sNJ,cMD,nVA;DC?	
Jan 2	Mon	22:29	4UC57311456	12.6	Deimos	0.9	3	8	c+swVA,TN,AR,TX	
Jan 6	Fri	20:31	4UC56834455	11.7	Lina	2.7	4	5	sNJ,cMD,nDC,nVA	
Jan 6	Fri	23:49	TYC19240393	12.6	Josephina	1.2	10	7	sVA,nNC,TN,sAZ	
Jan 8	Sun	2:18	4UC50109738	13.4	Bilkis	0.9	7	9	MD,DC,nVA,nOH	
Jan 8	Sun	22:03	4UC62541432	12.1	Tauris	1.2	7	5	sMD,cVA,sOH,nAZ	
Jan 9	Mon	5:20	4UC37768073	13.2	Meliboea	1.4	5	8	cOH,w+sMD,nVA,DC	
Jan 10	Tue	0:07	4UC55924847	12.8	Solvejg	3.2	3	7	sNJ,c+wMD,swPA	
Jan 14	Sat	17:57	4UC57033030	13.6	Angelina	0.1	6	10	sNJ,cMD,DC,n+cVA	

Lunar Grazing Occultations

2022								
Date	Day	EST	Star	Mag	%	alt	CA	Location, Notes
Dec 7	Wed	22:53	Mars	-1.9	100+	69	77N	UnionTown,Lewsbrg,Scranton,PA
Dec 11	Sun	2:07	ZC 1169	5.3	91-	76	8S	Getysbrg&Hanovr,PA;Colora, MD
Dec 19	Mon	5:30	ZC 2024	8.0	20-	25	16S	Shipnbrg,PA;Herefrd,Jopatn,MD

Lunar Total Occultations

2022/2023										
Date	Day	EST	Ph	Star	Mag	%	alt	CA	Sp.	Notes
Dec 11	Sun	21:53	R	28 Cancri	6.1	86-	22	55N	F0	ZC 1270, spec. binary
Dec 11	Sun	23:27	R	upsilon1Cnc	5.7	85-	40	53N	F0	ZC 1274
Dec 12	Mon	0:12	R	upsilon2Cnc	6.4	85-	48	34N	G9	ZC 1279
Dec 12	Mon	4:18	R	ZC 1290	6.9	85-	71	27N	F8	
Dec 12	Mon	22:46	R	SAO 80764	7.8	78-	21	40S	K2	
Dec 13	Tue	1:25	R	ZC 1390	7.7	78-	51	63S	G0	
Dec 13	Tue	22:54	R	eta Leonis	3.5	70-	12	56N	A0	Az78,ZC1484,close dbl??
Dec 14	Wed	3:23	R	ZC 1499	7.1	69-	60	30N	K0	
Dec 18	Sun	5:25	R	SAO139281	8.4	29-	35	2N	F2	mg2 10 dTime +0.2s
Dec 19	Mon	5:45	R	SAO158378	7.9	20-	26	59N	K2	
Dec 21	Wed	5:38	R	Dschubba	2.3	5-	2	2N	B0	Az121,ZC2290,close dbl
Dec 26	Mon	17:48	D	ZC 3202	6.2	17+	25	11N	F0	Sun altitude -11 deg.
Dec 26	Mon	20:30	D	ZC 3214	6.8	18+	2	11N	A0	Azimuth 245 degrees
Dec 27	Tue	21:05	D	75 Aquarii	6.9	28+	9	86N	K2	Azimuth 246, ZC 3358
Dec 28	Wed	22:22	D	SAO 146908	7.6	39+	9	53S	F8	Azimuth 256 deg.
Dec 29	Thu	18:15	D	ZC 61	7.8	49+	51	43N	G6	Spectroscopic binary
Dec 30	Fri	18:23	D	SAO 109791	7.7	60+	57	29N	G5	
Dec 30	Fri	19:44	D	CV Pscium	7.8	60+	55	61N	M4	SAO 109810
Dec 30	Fri	21:46	D	109838	7.9	61+	39	65S	K0	
*** Dates and times above are 2022, those below are 2023 ***										
Jan 1	Sun	17:35	D	ZC 423	6.3	78+	48	64N	F5	Sun altitude -8 deg.
Jan 2	Mon	2:53	D	53 Arietis	6.1	81+	7	70S	B1	Az288,ZC455,close dbl?
Jan 2	Mon	18:28	D	ZC 534	6.1	86+	52	70N	A0	Spectroscopic binary
Jan 3	Tue	1:18	D	SAO 76311	7.2	87+	35	54N	B8	
Jan 5	Thu	0:38	D	ZC 849	6.5	97+	64	89S	G9	close double??
Jan 11	Wed	7:09	R	ZC 1578	6.9	83-	36	5N	K0	Sun-4,TmD5",close dbl??
Jan 11	Wed	23:29	R	SAO 118841	7.6	77-	21	48N	F5	
Jan 12	Thu	23:57	R	10 Vir	6.0	68-	14	23S	K3	Azimuth 100, ZC 1749
Jan 14	Sat	6:57	R	PX Vir	7.7	56-	42	28N	G5	Sun-6,ZC1874,close dbl?

More information at http://iota.jhuapl.edu/exped.htm.

David Dunham, dunham@starpower.net

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Discovery of Text from the Oldest Star Catalog

Many treasures are buried beneath the ground, but some can be buried on a piece of parchment. Scientists working with a document known as the *Codex Climaci Rescriptus* which is kept in the 6th-century St. Catherine's Monastery in Sinai, found Greek lettering beneath the Christian writings for which the document is now known. With parchment being valuable in ancient times, scholars would often clean old text off in order to reuse a piece of parchment. But remnants of the old lettering still remain, creating a document known as a palimpsest.

The revealed text seems to concern the star catalogue of the ancient astronomer Hipparchus, a catalog he created around 129 BCE. That text actually goes on to describe the boundaries of some constellations. Due to the precession of the equinoxes, the wobbling of the Earth's axis of rotation, which happens at a rate of approximately one degree every 72 years, the descriptions have been confirmed to have come close to the time the ancient astronomer was creating his famous catalog.

One interesting takeaway from the discovery is that it seems to disprove the theory that Ptolemy, another ancient astronomer, simply copied the information from Hipparchus' Star Catalog into his own. But differences in the entries in Ptolemy's catalog bolster the conjecture that he did his own work.

While only the coordinates of several of the constellations are described in the recovered text, the information gleaned will help as researchers try to rebuild Hipparchus' Star Catalog. In addition, researchers are hopeful that they may be able to recover additional sections of the catalog from other palimpsests in the monastery or in other collections around the world. More information about the discovery can be found in the following article - www.space.com/hipparchus-oldest-star-map-found. In addition, the article published by the researchers is available at journals.sagepub.com/doi/pdf/10.1177/00218286221128289.

New Map of a Slice of the Universe

Exploring the Universe through a telescope can be a lot of fun, but the cold of the winter months can take a lot of the fun out of it. Fortunately, the Universe, or at least a slice of it, can be brought to you. Using two decades worth of data from the Sloan Digital Sky Survey, astronomers at Johns Hopkins University have created a map, entitled The Map of the Observable Universe. The map shows the positions of approximately 200,000 galaxies within a 10-degree slice of the Universe, looking out from our Sun's position in the Milky Way galaxy.

An article describing the development of the map is at hub.jhu.edu/2022/11/17/interactive-universe-map/.The map itself is available for viewing and download at mapoftheuniverse.net/. In the initial map, each of the dots in the map represents an individual galaxy, and the colors of the dots are the actual colors of those galaxies, whether spiral or elliptical. Quasars are displayed as well. There are links to Sky Views which show a mapping of the different types of astronomical objects on a night sky. The night-sky view of the Cosmic Microwave Background, the farthest back that can be observed using the electromagnetic spectrum, is available as well.

So have fun exploring the Universe without having to go out in the cold.

Recent Astronomy Highlights – continued from page 4

Young Super Jupiter Defies Current Planet Formation Theories

An exoplanet designated HD 114082 b, has been measured to have eight times the mass of Jupiter, but is still approximately the size of our Solar System's largest gas giant, giving the planet a density of over twice that of Earth. Estimated to be around 15 million years old, the planet seems to defy current theories of the formation of gas giants. The two most prominent theories are known as Core Accretion and Disk Instability. The former involves a large rocky core forming, then absorbing gas to form the gas giant. The second theory involves dense regions of gas in a planetary accretion disk directly collapsing to form the gas giant. Core accretion seems to be the favored theory for HD 114082 b, but there are discrepancies with that model, specifically with regard to losing the heat of collapse. More info is available at www.mpia.de/news/science/2022-18-hd114082b.

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 7:30 pm at the Chevy Chase Community Center (intersection of McKinley Street and Connecticut Avenue, N.W.) Please contact instructor Guy Brandenburg at 202-635-1860 (leave message) or at gfbrandenburg@yahoo.com if you plan to attend. 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 January** 7:30 p.m. Speaker To Be Determined

The APS Mid-Atlantic Senior Physicists Group: **(Zoom Meeting)** December 21st at 1:00 p.m., Dr. Mario Livio, Astrophysicist, will give a talk entitled "Galileo and the Science Deniers". You can register and receive the Zoom link for the meeting at apsphysics.zoom.us/meeting/register/tZMvcOGvqzsvH9bDV1a9X9esCLMl6QBLqGU2.

National Capital Astronomers Membership Form

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

Address: _____ **ZIP Code:** _____

Home Phone: ____-____-_____ **E-mail:** _____ **(necessary for delivery of Star Dust)**

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:
Jim Simpson, NCA Treasurer; 3845 Wayson Road, Davidsonville, MD 21035

Celebrating 84 Years of Astronomy

Image Credit: ESA/Webb, NASA & CSA, L. Armus, A. Evans

Two galaxies, designated II ZW 96, are interacting in the image above. More information can be found at www.nasa.gov/image-feature/vp-harris-french-president-get-first-look-at-galactic-get-together.

To join or renew online, visit capitalastronomers.org and look in the right column for the Membership Form and PayPal links.

Next NCA Meeting:

2022 December 10th
7:30 pm
(On Zoom)
Dr. Igor Andreoni

To join the Zoom meeting, use the following link: umd.zoom.us/j/98702044833?pwd=UTg1bFJpMmxvcXpEUGtUcDNmZnNrdz09

Please download and import the following iCalendar (.ics) files to your calendar system: umd.zoom.us/meeting/tJwqd-uoqj8iGdfUoJKHH8U2tt2u7lPmVFFS/ics?icsToken=98tyKuCgqTsoGtCRuBqERow-B4iga_TwiClHjadbqRDPKAh7OjakIvYQJ-VzlNXm

Please note that NCA Zoom meetings are often recorded.

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