

Star Dust

Newsletter of National Capital Astronomers, Inc.

capitalastronomers.org

November 2022

Volume 81, Issue 3

**Celebrating 85 Years
of Astronomy**

Next Meeting

When: Sat. Nov. 12th, 2022

Time: 7:30 pm

Where: Online (Zoom)

See instructions for joining the meeting on Page 8.

Speaker: Dr. Jens Barosch

Table of Contents

Preview of Nov. 2022 Talk.....	1
Recent Astronomy Highlights.....	2
President's Corner.....	2
Henry Bofinger.....	2
Exploring the Sky.....	3
Sky Watchers.....	4
Occultations.....	5
Calendar of Events.....	7

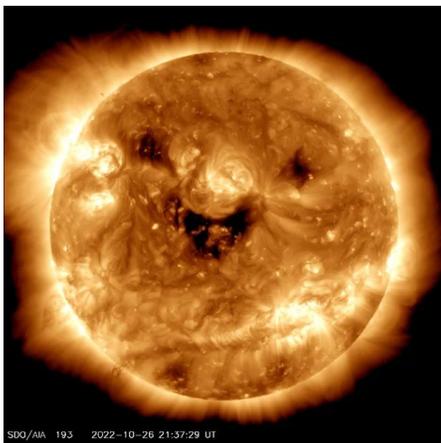


Image Credit - NASA/GSFC/SDO

NASA's Solar Dynamics Observatory captured this 'smiling face' ultraviolet image of the Sun. More info is at www.npr.org/2022/10/29/1132361678/nasa-caught-the-sun-smiling-down-on-us-but-the-grin-could-signal-a-solar-storm.

Annual Membership Dues are Due

Please support NCA by joining or renewing your membership! The membership form, p7, can be printed and mailed in with a check. Or, [you may also fill it out online](#) and pay via PayPal! Thank you.

Presolar Stardust in Asteroid Ryugu

Jens Barosch (Carnegie Earth & Planets Laboratory)

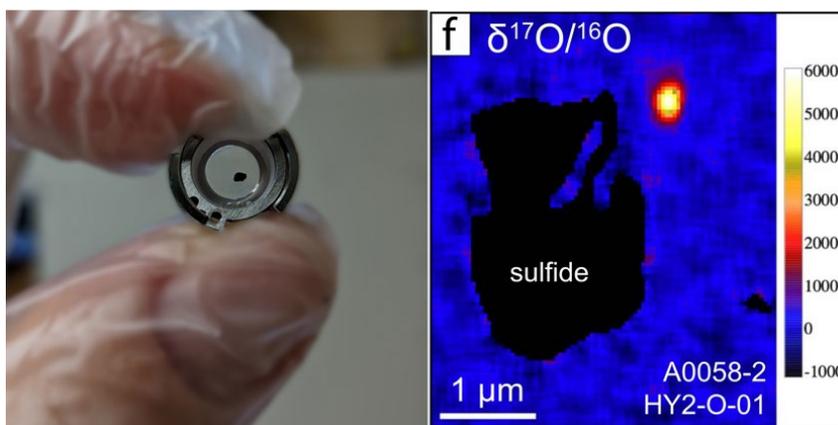


Image Credit - Jens Barosch, Larry R. Nittler, et al

The Japanese Hayabusa2 mission collected and returned ~5g of material from the carbonaceous asteroid Ryugu. Since the successful delivery to Earth in late 2020, several international science teams have been working on the initial analysis of these precious samples. It was recently discovered that the Ryugu samples contain tiny and rare presolar stardust grains*. These stardust grains were produced in winds and explosions of ancient dying stars and were part of the molecular cloud from which the Solar System formed. Some of these dust grains were trapped in asteroids, where they survived for billions of years.

Studying presolar grains is the only known way to directly examine some of the building blocks of the Solar System in the laboratory. Presolar grains can tell us what type of material and which processes ultimately formed the Sun and planets. They can also be used as tracers for secondary processes that occurred on asteroids such as aqueous alteration and thermal metamorphism.

In this talk, we will examine the presolar grains found in Ryugu, and explore what they can tell us about the early evolution of our Solar System.

*Barosch J., Nittler L. R., Wang J. et al. (2022) Presolar stardust in asteroid Ryugu. The Astrophysical Journal Letters 935, L3.

continued on page 2

Recent Astronomy Highlights

JWST Images An Ancient Cosmic Knot

NASA's James Webb Space Telescope captured images of a cluster of galaxies forming around an ancient quasar. A quasar is a system in which a supermassive black hole feeds on large amounts of gas and emits enormous amounts of radiation. Named, J165202.64+172852.3, the quasar, which existed 11.5 billion years ago, had previously been studied and believed to be the site of a single galaxy. However, JWST was able to show that the region is actually a galaxy cluster. The revelation may help improve understanding of galaxy and galaxy-cluster formation. More information about the image and the conclusions can be found at www.nasa.gov/feature/goddard/2022/nasa-s-webb-uncovers-dense-cosmic-knot-in-the-early-universe.

DART Mission Success



Image Credit - NASA, ESA, STScI, Jian-Yang Li (PSI); Image Processing: Joseph DePasquale
Scientists report that the probe from NASA's Double Asteroid Redirection Test (DART) that impacted with the asteroid Dimorphos on Sept. 26th did indeed redirect the orbit of the asteroid around its larger companion Didymos. The impact also led to the release of an enormous amount of debris that streamed out from Dimorphos in a comet-like tail that could be seen by a number of telescopes for weeks. The successful mission is a first step in developing the ability to redirect any asteroids that might be a future threat to Earth. More details can be found at www.nasa.gov/press-release/nasa-confirms-dart-mission-impact-changed-asteroid-s-motion-in-space.

continued on page 4

Abstract and Biography – continued from page 1

Biography: Jens Barosch received a B.Sc. and M.Sc. in Geoscience from Heidelberg University, Germany. In 2020, he completed his PhD in cosmochemistry at the University of Cologne. He has since been working as a postdoctoral researcher with Dr. Larry Nittler at Carnegie Institution, Earth and Planets Laboratory, Washington, DC. Jens uses advanced microanalytical techniques to study the mineralogy and petrology of extraterrestrial samples and determine their chemical and isotopic compositions. Currently, he studies presolar stardust grains in meteorites, as well as samples returned from asteroid Ryugu as part of the Hayabusa2 mission. Jens aims to understand how the Solar System formed and evolved.

Henry Bofinger

Jeff Norman

I am sorry to announce that Henry Bofinger, the former Treasurer of NCA, passed away on September 27, 2022 from a rare disease, progressive supranuclear palsy. He was only 56 years old. Like all the other NCA officers, Henry was a volunteer.

In his professional life, Henry was a distinguished transport economist who worked for the World Bank for many years. He also served as an economic consultant to several nations in Africa, the West Indies, SE Asia, the EU and Canada.

President's Corner

Guy Brandenburg

Are inexpensive, manually-operated Dobsonian telescopes useless except under dark skies?

I was beginning to think so, until Alin Tolea told me about a very inexpensive but reasonably accurate setting circles fix he made to one of his telescopes. He measured the circumference of the base of his rocker box, marked the degrees in azimuth, attached an inexpensive inclinometer to the tube, and used a cell phone app such as Stellarium. With it, he can find targets in even a very light-polluted sky.

If it works, it's revolutionary!

I'll let you know how well it actually works at the end of this article, after I try it out when the skies clear up tonight.

It was certainly very easy to make, and cheap! The tubing and barb clamp – the only new parts I needed -- cost me about six dollars. The most expensive part was a \$30 digital clinometer, which I already owned. A cheaper analog one would work as well. The whole thing took me about an hour to make.

As we all know, steadily increasing light pollution means that the vast majority of the US population (and maybe of the world) cannot see the Milky Way at night from their homes. If you can only see two or three stars, then star-hopping is essentially impossible. At the big Astronomy Festival on the National Mall this past June, surrounded by bright lights and tall trees, with my 8" dob, I could hardly find a thing in the night sky.

One can overcome this with modern technology, but most of those fixes are rather expensive. A good equatorial mount able to carry 40 pounds of optics costs thousands of dollars and can require 30 to 60 minutes to get properly aligned. Or, you can pay \$450 for a device called StarSense that attaches to an existing scope. It uses a small camera and a built-in computer to do plate solving;

Exploring the Sky



With the Nov. 5th session at 7:00 p.m. being the last of 2022, 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/expssky.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 December's issue of Star Dust, is November 18th.

Clear Skies!

President's Corner – continued from page 2

after a while, it figures out what the telescope is pointing to, and will then indicate where the user should move the scope to find any target. Unfortunately, the cost of this device roughly doubles the price of a plain, manually-operated commercial or home-made 8" Dob.

Or, if you love building things, and you have a lot of experience with electronics, machining, computer programming, and motor control, then you can spend some months making an OnStep motorized system to turn your Dob into a Go-To tracking system. THIS IS NOT FOR THE FAINT OF HEART. It took us just about a year of hard work at the Hopewell Observatory to convert an old push-to equatorial tracking system into a modern go-to system. Without the very generous assistance of a local electrical engineer and expert trouble-shooter (Arlen Raasch) we would never have completed the job. (It really works well! Un-guided 4-minute exposures generally produce almost perfectly round stars!)

So, I was very interested when Alin told me of the manual setting circles he made with some tape and an inclinometer. He wasn't sure where he got the idea. Today, I looked up the topic and found that someone had come up with an even more ingenious variation that avoids the difficulty of having to subtract a bunch of azimuth numbers in the dark, as in Alin's system, or needing to print out an enormous protractor (as in a different video).

Here is the link to a YouTube video by someone in the Brisbane (Australia) Astronomical Society:

[Simple Setting Circles for Dobsonian Telescope - YouTube](#)

It's brilliant!

The narrator used semi-rigid black irrigation pipe to make a sort of hula-hoop that fits around the base of his scope, and on that he did a little computation (circumference divided by 36) to mark every ten degrees of azimuth. His astro-hoop has little flanges to hold it in place and keep it still rotatable.

My version uses translucent PVC tubing that I bought this afternoon at my local hardware store. I cut enough to fit loosely around the ground board of the very same 8" Dob I made almost 30 years ago under Jerry Schnall at the NCA telescope-making class. My setup doesn't need flanges, because the feet hold the tube in place very securely. I used a black magic marker to mark every 10 degrees – by luck, 10 degrees of rotation on my telescope equaled almost exactly 4 centimeters, which made placing the dots relatively easy. (I'll need to figure out a way to keep the numbers and marks from getting rubbed off.) Pushing the brass barb into both ends of the tube was difficult and taking it out again was even harder!

Here is how it is supposed to work:

1. First, locate a bright object in the sky by eye, and aim your scope right at it.
2. Once that object is centered in the eyepiece, look up that same object in whatever astro app you have on your cell phone (e.g. Sky Safari or Stellarium). Find the current azimuth of that object (but don't worry about the minutes and seconds of degrees).
3. Then rotate the astro-hoop until the pointer on the base of your rocker box points to that same azimuth number on the hoop. Your azimuth is now aligned on True North!
4. Double-check the altitude that your inclinometer reads, to see if that agrees with the software. (If your scope's base is not level, this will likely be in error, and your inclinometer might also very well be a degree or two "off" of the optical axis of your Dobsonian.)

continued on page 4

Sky Watchers

November/December

Extremely close to the Sun in mid-November, Mercury may be viewable low in the western sky after sunset by mid-December. Venus will also be low on the horizon and likely unviewable. Saturn and Jupiter will continue moving higher in the sky after sunset. Mars will reach opposition on December 8th (see below) and be viewable throughout the night.

11/17 - 18	The Leonids Meteor Shower peaks from the evening of the 17 th into the morning of the 18 th with approximately 15 meteors/hour. Unfortunately, a quarter Moon rising around midnight will cause less-ideal-viewing conditions.
12/7	Full Moon – 11:09 p.m.
12/8	Mars reaches Opposition, rising at sunset and will be viewable throughout the night.

All times are in EST (Eastern Standard Time).

President's Corner – continued from page 3

- Then decide on a target you would like to find. Ask your smartphone's app what the current azimuth and altitude are for your target.
- Rotate the base of your scope until your azimuth marker is pointing the same number as what the app says it should be.
- Then incline your tube in elevation until the angle on your inclinometer reads what it is supposed to.
- Your target should be at least in the field of view of your finder!

We will see if this works!

Here is the work in progress:



If it does work as advertised, then any owner of a Dobsonian can make it much more usable inside city limits, for almost nothing!

Results: It works, more or less, but it did better in altitude (elevation) than in azimuth, which tended to be off by a few degrees. I think I can get more accuracy in azimuth by shortening the hula hoop by a few millimeters by pushing the left-hand end of the tube a bit further onto the brass barb. I hope this small reduction in the circumference will help improve azimuth accuracy.

continued on page 6

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[Recent Astronomy Highlights – continued from page 2](#)

JWST Views The Pillars of Creation



Image Credit - NASA, ESA, CSA, STScI; Joseph DePasquale (STScI), Anton M. Koekemoer (STScI), Alyssa Pagan (STScI)

The James Webb Space Telescope provided an updated image of the region that became known as the Pillars of Creation when an iconic image of it from the Hubble Space Telescope was released in 1995. The JWST image may help astronomers better understand the dynamics of star formation. More information is at

www.nasa.gov/feature/goddard/2022/nasa-s-webb-takes-star-filled-portrait-of-pillars-of-creation

continued on page 7

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 Date	Day	EST	Star	Mag.	Asteroid	dmag	dur. s	Ap. " Location
Nov 10	Thu	19:40	4U473120147	12.3	Ennomos	4.3	4 6	sIA,SOH,c-seVA
Nov 13	Sun	3:14	4UC56141866	14.2	Hamburga	0.5	18 11	nVA,DC,n+CMD,SNJ
Nov 14	Mon	0:33	4UC57905990	10.3	1999 RJ32	6.8	1.2 3	CMD,nVA,sOhio
Nov 14	Mon	5:53	TYC08060754	10.2	Didymos	6.2	.33 4	cenFL,eNC,seMA
Nov 15	Tue	2:26	4UC61722708	13.6	Gyldenia	1.7	7 9	cVA,swMD,nwV,COH
Nov 16	wed	20:59	TYC06270383	11.7	Iphigenia	1.5	12 5	seMD,seVA,CNC,GA
Nov 19	Sat	0:18	4UC62629609	13.8	Tanete	0.6	8 10	s+CMD,DC,nVA,COH
Nov 19	Sat	3:00	4UC51049211	11.9	Dannymeyer	5.7	3 5	COH,c+seVA,neNC
Nov 24	Thu	3:02	4UC42951411	12.4	2000 AM203	6.2	1.1 6	noH,nVA,DC,w+SMD
Nov 25	Fri	1:44	4UC51720898	13.4	Patria	1.7	4 8	CNJ,neMD,DC,cVA
Nov 25	Fri	2:43	TYC23752087	9.8	Mally	7.4	0.9 3	nSC,nGA,nOK,CCA
Nov 26	Sat	1:16	4UC56241253	13.4	Hamburga	0.7	67 9	eNC,se-nVA,wMD
Nov 28	Mon	2:03	4UC57515198	14.0	Deimos	0.2	2 12	SMD,nVA,COH;DC?
Nov 30	wed	21:48	4UC50404745	10.9	Yuudurunosato	6	0.7 4	SNJ,CMD,nVA,cwV
Dec 2	Fri	0:56	4UC54550229	11.8	Yoshitoki	6.9	1.8 5	nVA,DC,neMD,CNJ
Dec 4	Sun	4:14	4UC55518110	10.5	Pheidias	6.5	4 4	CVA,swV,CMO,nAZ
Dec 5	Mon	1:39	4UC48804427	13.8	Kakabadze	3.6	0.8 9	eMD,DC,nVA,nOK
Dec 5	Mon	4:09	4UC58213026	13.1	Eurymedon	4.3	2.2 8	neMD,swPA,nOhio
Dec 6	Tue	21:12	TYC07353285	11.3	Kronstadt	5.0	0.8 4	SNJ,CMD,nVA;DC?
Dec 7	wed	20:31	4UC57634514	13.9	2000 EV47	3.9	0.6 9	SNJ,eMD,DC,nVA
Dec 8	Thu	23:38	4UC58144368	10.7	Portlandia	3.3	6 5	sGA,SC,eNC,seVA
Dec 9	Fri	5:29	4UC56920150	9.7	Stodola	6.1	2.2 3	LI,se+wNY,nePA
Dec 9	Fri	6:06	4UC38067237	12.4	Piccolo	3.8	0.7 8	neOH,w-sePA,neMD
Dec 10	Sat	18:49	4UC62318341	14.0	Desiderata	0.4	7 11	nNJ,sePA,nMD,nVA
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

Lunar Grazing Occultations

2022 Date	Day	EST	Star	Mag	% alt	CA	Location, Notes
Nov 8	Tue	6:40	X 63561	10.4	0E 11	26U	StnyFrk,PA;Params,NJ;Ynkrs,NY
Nov 20	Sun	6:32	ZC 1849	6.1	14- 36	8S	Freedom,PA; Havre de Grace,MD
Nov 26	Sat	18:02	ZC 2784	3.3	12+ 11-13N	n.	Rale.&RoanK,NC;FtEustis,VA
Dec 3	Sat	23:24	ZC 238	6.4	84+ 43	11S	n.Doswel,VA;n.St.MarysCity,MD
Dec 11	Sun	2:07	ZC 1169	5.3	91- 76	8S	Getysbrg&Hanovr,PA;Colora, MD

Lunar Total Occultations

2022 Date	Day	EST	Ph Star	Mag	% alt	CA	Sp. Notes
Nov 12	Sat	5:30	R ZC 958	6.7	85- 57	83S	K1 spectroscopic binary
Nov 12	Sat	21:56	R SAO 78957	7.5	80- 19	88S	G8
Nov 12	Sat	23:39	R SAO 79022	8.0	79- 38	58S	K0
Nov 13	Sun	4:39	R 47 Gem	5.8	78- 74	69S	A4 ZC 1088
Nov 14	Mon	2:10	R omega Cnc	5.9	70- 56	60S	G8 ZC 1206
Nov 14	Mon	5:18	R SAO 79936	8.1	70- 74	21N	K5
Nov 16	wed	4:37	R ZC 1435	6.5	51- 61	87S	K0
Nov 16	wed	5:44	R ZC 1436	6.8	51- 69	87S	K0
Nov 17	Thu	2:15	R ZC 1532	7.6	42- 25	76N	K0
Nov 17	Thu	5:02	R ES Leonis	5.4	41- 55	69S	M2 ZC 1544
Nov 19	Sat	2:28	R 7 Virginis	5.4	23- 5	50S	A1 Azimuth 89 deg.,ZC 1733
Nov 19	Sat	3:09	R SAO119169*	7.8	23- 12	81S	F5 Azimuth 96 degrees
Nov 19	Sat	5:00	R SAO119211	8.4	23- 32	25N	K2 mag2 12 43" dTime +3min
Nov 19	Sat	5:20	R SAO 119204	7.9	23- 36	88N	K2
Nov 28	Mon	17:18	D ZC 3102	7.0	31+ 29	60N	A0 Sun -6, close double??
Nov 28	Mon	19:22	D SAO190197	8.0	32+ 20	48N	F5
Nov 29	Tue	21:04	D SAO164975*	8.2	43+ 19	59N	F6
Dec 3	Sat	23:12	D CY Piscium	6.4	84+ 46	30S	M0 ZC 238
Dec 4	Sun	1:51	D ZC 247	6.3	85+ 18	63N	F2 close double?
Dec 10	Sat	1:53	R ZC 1042	6.7	96- 78	83N	A2 Axis Angle 266 degrees
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 epsilon2Cnc	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

*in Kepler2 program so occultation light curves are sought.

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

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President's Corner – continued from page 4



Optically, I found stars and star clusters to be visible from Burroughs Park in NE DC, but I was unable to find the Andromeda galaxy. More tests will come after fixing the azimuth hoop.

Other news:

I have finally removed the oxidized blocking filter from the NCA's Coronado Solar Max 90 mm Hydrogen-alpha double-stack scope, and have heard from the US supplier (Maier) that they will have those parts back in stock next week. The cost to the club will be about \$80. (The German supplier is still not in operation.)

Here is a photo of one side of that filter. Note the hazy surface.



Soon, NCA can once again use this great hydrogen-alpha scope to show folks the amazing thermonuclear fusion reactor that's only 8 light minutes away from us – not just its sunspots but also the plages, granules filaments and prominences.

Astro-Imaging today:

I am on the email list for the NOVAC Astro-imaging group. The best Astro images from this group are insanely great -- Hubble- or Webb-like.

For example, see these three images: www.astrobin.com/cnep2a/ and www.astrobin.com/5t9eac/ and www.astrobin.com/6tfhej/

The authors, Linda Thomas-Fowler and Greg Vaughan, and a dozen or so other NOVAC members, do outstanding work. Their hardware is also very expensive. In those links, Linda and Greg list exactly what equipment they are using, and if you click on those items, you soon realize that the scope, mount, camera, and filters together add up to tens of thousands of dollars. The public should be warned that they won't ever get details like that looking through an eyepiece, and that there is a lot of art involved in extracting beautiful details from the raw data that was collected over a period of hours by all that finely-calibrated equipment. Gigabytes of data are processed for each image with great skill and today's absolutely incredibly sophisticated software to produce those images.

Beautiful work it is, which I will never be able to equal, because of my lack of desire to spend so much money on the latest equipment, and my lack of single-minded dedication to such things. I tend to scatter my Astro efforts in too many directions.

What about you?

Recent Astronomy Highlights – continued from page 4

Meteoroid Strike on Mars Reveals Ice near Equator

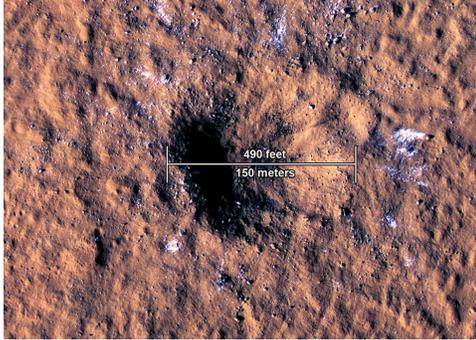


Image Credit - NASA/JPL-Caltech/University of Arizona A Marsquake recorded by NASA's insight lander on Dec. 24, 2021 turned out to be caused by a meteoroid strike on the red planet. The impact crater created by the strike was 70 feet deep and revealed water ice below the surface. More information is available at www.nasa.gov/feature/jpl/nasa-s-insight-lander-detects-stunning-meteoroid-impact-on-mars.

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 gbrandenburg@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: 10 December 7:30 p.m. Joe Pesce, George Mason University, What We Are Discovering With ALMA and The James Webb Space Telescope?

The APS Mid-Atlantic Senior Physicists Group: (Zoom Meeting) November 16th at 1:00 p.m., Dr. Robert M. Hazen, Carnegie Institution for Science and George Mason University, will give a talk entitled "Earth's co-evolving geosphere and biosphere: A mineral evolution perspective". You can register and receive the Zoom link for the meeting at info.aps.org/webmail/640833/784920368/1fe48ec60055a54dbd65c06af77ed7a36531f33f31638e327679674e473ba311.

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.....\$__

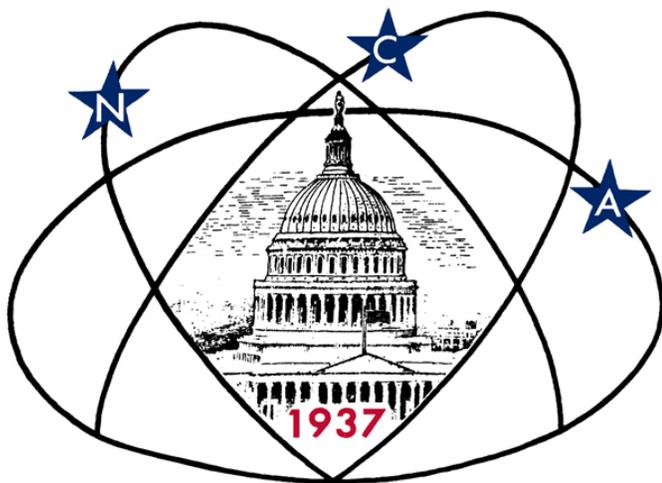
Please indicate which activities interest you:

- 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/Hubble & NASA, ESO, K. Noll

A vast region of empty space in the reflection nebula NGC 1999 is something of a mystery.

More information is available at

www.nasa.gov/image-feature/goddard/2022/hubble-peers-at-mysterious-cosmic-keyhole.

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 November 12th

7:30 pm

(On Zoom)

Dr. Jens Barosch

To join the Zoom meeting, use the following link:

umd.zoom.us/j/98702044833?pwd=UTg1bFJpMmxvcXpEU GtUcDNmZnNrdz09

Please download and import the following iCalendar (.ics) files to your calendar system: umd.zoom.us/meeting/tJwqd-uoqj8iGdfUoJKHH8U2tt2u7IPmVFFS/ics?icsToken=98tyKu CggTsoGtCRuBqERow-B4iga_TwiCIHjadbqRDPKAh7OjaklvYQJ-VzINXm

Please note that NCA Zoom meetings are often recorded.

Inside This Issue

Preview of Nov. 2022 Talk.....	1
Recent Astronomy Highlights.....	2
President's Corner.....	2
Henry Bofinger.....	2
Exploring the Sky.....	3
Sky Watchers.....	4
Occultations.....	5
Calendar of Events.....	7