

Star Dust

National Capital Astronomers, Inc.
March 2013 Volume 71, Issue 7

capitalastronomers.org

Celebrating 75 years 1937-2012



Next Meeting

When: Sat. March. 9, 2013
Time: 7:30 pm
Where: UMD Observatory
Speaker: Paul Ray (NRL)

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Directions to Dinner/Meeting

Our new location for dinner with the speaker before each meeting is at Mulligan's Grill and Pub on the UMD Golf Course. Mulligan's is one intersection closer to the observatory on Route 193 than UMUC. One turns on to "Golf Course Road" and drives a few hundred feet to the golf course building, where "Mulligan's Grill and Pub" is located.

The dinner menu can be downloaded from mulligans.umd.edu/

The meeting is held at the UMD Astronomy Observatory on Metzert Rd about halfway between Adelphi Rd and University Blvd.

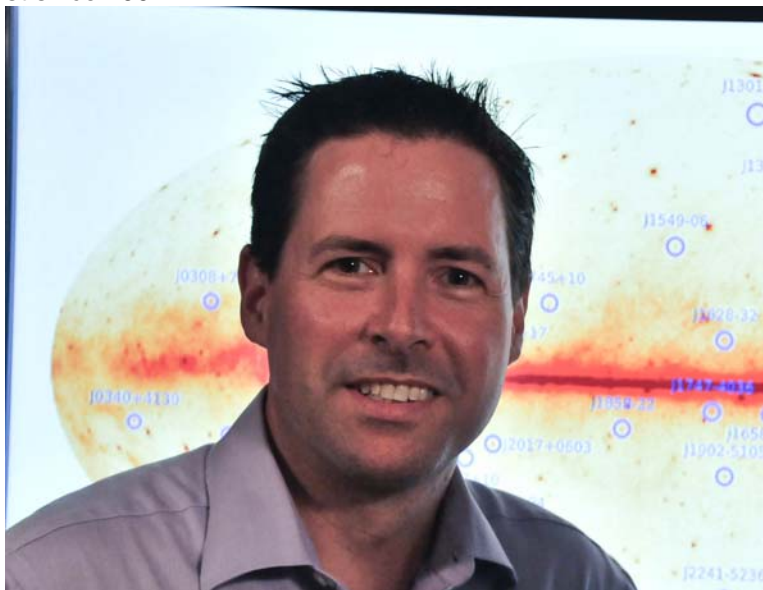
Need a Ride?

Please contact Jay Miller, 240-401-8693, if you need a ride from the metro to dinner or to the meeting at the observatory. Please try to let him know in advance by e-mail at rigel1@starpower.net.

March 2013: Paul Ray, Naval Research Laboratory Attack of the Gamma-Ray Spiders from Space!

Abstract: The Fermi Gamma-ray Space Telescope has been surveying the sky in the gamma-ray band (photon energies of 100 MeV and greater) since August 2008. The Large Area Telescope, Fermi's prime instrument, has revealed a large population of γ -ray sources associated with active galactic nuclei, pulsars, and several other source classes. However, about a third of the γ -ray sources are unassociated with any known γ -ray emitting object. A worldwide effort to search for pulsars powering these sources has been extremely successful, discovering 47 new millisecond pulsars (MSPs), about 1/4 of all known MSPs in the Galaxy. A striking feature of these new MSPs is that many of them are so-called 'black widow' systems that are eating away their companions with powerful beams of particles and high energy radiation. Another class being found is the 'redback', named after the Australian cousin of the black widow spider. These systems may be the missing link between accreting X-ray binaries and millisecond pulsars. I will describe the Fermi mission, our radio searches and some of the surprising systems we have discovered.

Biography: Paul Ray is an Astrophysicist at the Naval Research Laboratory. He is an active member of the Fermi Large Area Telescope collaboration and the leader of the Fermi Pulsar Search Consortium. He has been studying neutron stars, predominately pulsars, at radio, X-ray, and γ -ray wavelengths for over twenty years. He did his undergraduate work in physics at Berkeley and then went on to a Ph.D. in physics at Caltech. He started at NRL in 1995 as an NRC postdoc and has been a civil servant scientist since 1997.



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.

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Thank you!

Reminder

After the meeting, everyone is invited to join us at Plato's Diner in College Park. Plato's is located at 7150 Baltimore Ave. (US Rt. 1 at Calvert Rd.), just south of the university's campus. What if it's clear and you want to stick around and observe? No problem -- just come over when you're through. This is very informal, and we fully expect people to wander in and out.

Arecibo Up Close

Sarah Elieti Brown

These photos were from a 2005 trip to Arecibo and I included them just to give folks an idea of the magnitude of the site. When you walk out of the building and see the receiver/transmitter room (1000 tons suspended on cables), you are amazed at the size of it (as portrayed in the photo)... but more breath taking is when you walk to the edge of the viewing platform and you can see the sheer drop to the edge of the telescope you get an idea of the magnitudes involved. The telescope is not a perfectly circular valley and the feedhorn is designed to compensate for the irregularities of it's shape. The size of the support towers are shown in other photos and I included a photo of what I believe to be the smallest observer resident at the facility. I really went to the site because I was interested in (and participating in) the SETI program and a managerial study of the site construction philosophy. I've since changed the focus of my computers (they're much larger now) to participate in the SETI Astropulse program (search for pulsars) and other BOINC astronomy projects (most deriving their information from Arecibo).



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APS Mid-Atlantic SeniorPhysicists Group

<http://www.aps.org/units/maspg/>

March 2013 Event

Date: Wednesday, March 20, 2013

Speaker: Harry Dowsett
 U. S. Geological Survey &
 George Mason University

Topic: The Analysis of Past (Pliocene) Global Climate as an Aid in Understanding Future Climate Change

Time and Location: 1:00 PM, with Q&A to follow, in a 1st floor conference room at the American Center for Physics (www.acp.org), 1 Physics Ellipse, College Park, MD-- off River Rd., between Kenilworth Ave. and Paint Branch Parkway.

Abstract: The Pliocene world provides an unequalled paleo-laboratory to test the sensitivity of the physical models we rely upon to estimate future warming impacts. It challenges our understanding of the sensitivity of key components of the climate system and how we simulate that system. The USGS Pliocene Research, Interpretation and Synoptic Mapping (PRISM) Project is a collaborative data analysis and climate simulation effort that strives to 1) accurately and comprehensively reconstruct and understand Pliocene climate and climate dynamics in order to gain insight into a warmer than present world that may resemble a future climate; and 2) construct Pliocene paleoenvironmental / paleoclimatic boundary conditions as an aid to general circulation model experiments designed to explore the impacts of climate forcings and feedbacks.

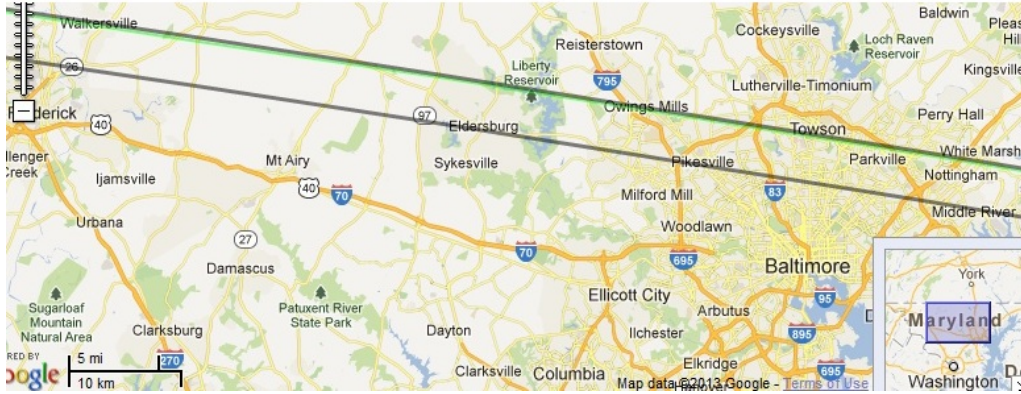
In recent years, PRISM has developed new surface and deep ocean temperature, topographic, land cover and ice volume reconstructions based upon new climate proxy data and refinements in methodologies. These reconstructions are analyzed within the framework of an internally consistent digital data set that is being used by 8 international climate modeling groups in the Pliocene Model Intercomparison Project (PlioMIP) arm of the Paleoclimate Modeling Intercomparison Project (PMIP). Joint USGS-PlioMIP experimental results are being utilized to assess the performance of models in the North Atlantic, tropics and upwelling cells, to define the role of changes in bathymetric gateways in past global warming, to reconstruct changes to deep ocean circulation, and to improve understanding of the sensitivity of the Earth climate system to changes in radiative trace gasses. PRISM's current work focuses on improved data collection in geographic regions where data – model discord is greatest and refining our products to better serve the climate modeling community.

Biography: Harry Dowsett earned a Ph.D. in Geological Sciences from Brown University in 1988, studying under John Imbrie. He is currently the Project Chief of the Pliocene Research, Interpretation & Synoptic Mapping group (PRISM) at the U.S. Geological Survey in Reston, Virginia. His primary research focus includes all aspects of Pliocene paleoclimate, but he specializes in the application of planktic foraminifera to climate change research. PRISM's research is a vital part of the Pliocene Model Intercomparison Project (PlioMIP), providing the only existing Pliocene climate dataset to participating model groups.

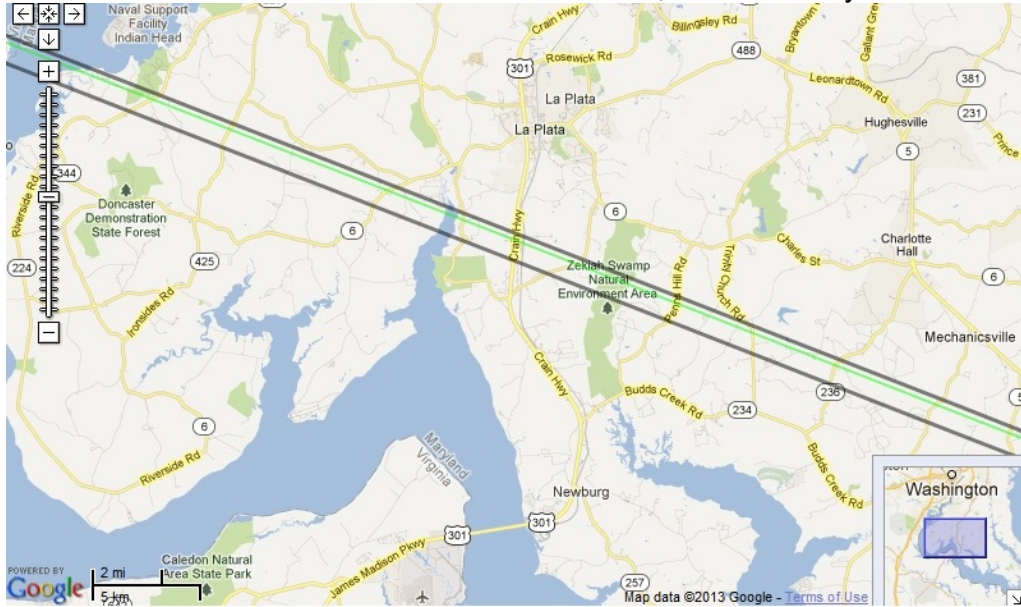
Harry also serves as Editor of the journal Micropaleontology and is an adjunct professor of Geology at George Mason University. From 2002 to 2003, Dr. Dowsett was Associate Director of the Paleoclimatology Program at the National Science Foundation. His start at the USGS came after being awarded a National Research Council Post-Doctoral Fellowship in 1987. In 2012 Harry was awarded the Palaeontological Associations's President's Medal in recognition of his "outstanding contributions to micropalaeontology and palaeoclimatology."

March 17 Grazing Occultation Maps

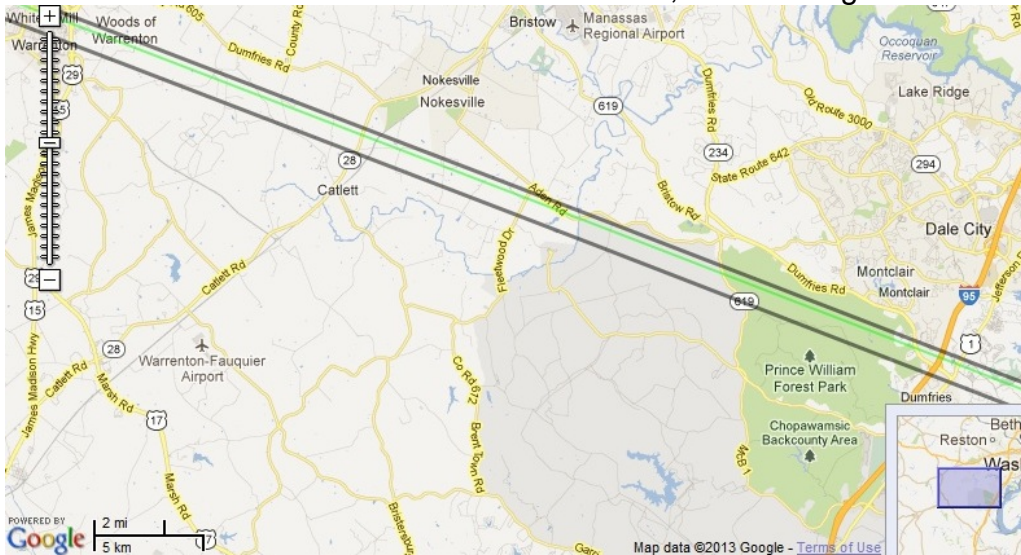
Graze zone for SAO 93941 on Mar. 17, 2013



Graze zone for SAO 93973 on Mar. 17, 2013 in Maryland



Graze zone for SAO 93973 on Mar. 17, 2013 in Virginia



Thank you Nancy Grace Roman for composing this article.

Center of the Milky Way Galaxy

Based on Articles from Science Now and NASA Press Releases

The Milky Way's center houses a supermassive black hole so sleepy that it probably hasn't swallowed a decent meal for years. Yet a growing body of evidence indicates that the now-dormant beast, about as massive as 4 million Suns, fueled a firestorm of activity just a few million years ago, including the sustained emission of some of the highest energy radiation in the universe. A new study offers a dramatic explanation for these past fireworks: The sleeping giant woke when a smaller black hole from another galaxy smashed into it.

Last year, astronomers discovered a pair of gamma-ray emitting gas bubbles, each the size of a small galaxy, emanating from the Milky Way's center and apparently fueled by some kind of violent event at the core of the galaxy. The core also contains an unusually high abundance of newborn stars and a lower-than-expected number of elderly stars.

All three phenomena could result from the same event: the dregs of a small satellite galaxy, housing an intermediate-mass black hole about as heavy as 10,000 Suns, smacking into the Milky Way's center about 10 million years ago. The Milky Way's gravity would slowly have stripped the satellite galaxy of most of its mass since the body first began falling toward the Milky Way about a billion years after the big bang but would still be hefty enough to make a stir.

Continued on Page 6

Mid-Atlantic Occultations and Expeditions

David Dunham

Asteroidal and Planetary Occultations

Date	Day	EDT	Star	Mag.	Asteroid	dur. dmag	Ap. s	Location
2013								
Mar 23	Sat	2:00	2UC28203267	12.4	2000 GY146	12.4	4 8	TNO; Americas?
Mar 24	Sun	0:36	SAO 139450	9.2	Nevanlinna	5.7	3 4	neNC, cVA, cWV, cOH
Mar 24	Sun	2:24	2UC25784167	11.9	Fulvia	3.5	16 8	NC, VA, MD, NJ; DC?
Mar 25	Mon	20:13	TYC128700041	10.1	Irakli	6.8	1 5	VA; NC? Sun -10
Mar 26	Tue	1:56	2UC38952096	11.4	Isolda	1.8	10 7	PA, MD, DC; alt. 9d
Mar 29	Fri	4:58	TYC68090680	11.1	Lacadiera	2.4	10 7	OH, PA, NJ; MD?
Apr 2	Tue	23:07	2UC34802741	12.1	Wilhelmina	3.2	3 8	OH, PA, NJ; MD; DC?
Apr 10	Wed	22:33	2UC35366530	13.4	Tergeste	0.8	4 10	KY, TN, VA, NC
Apr 11	Thu	4:23	TYC73360428	10.5	Chandra	4.9	5 6	Delmarva, eVA, eNC

Lunar Grazing Occultations (*, Dunham plans no expedition)

Date	Day	EDT	Star	Mag.	% alt	CA	Location
Mar 17	Sun	19:45	SAO 93941	7.5	34+ 59	10N	*Syksvil, Towson, MD; Milford, DE
Mar 17	Sun	21:50	SAO 93973	7.1	34+ 36	11N	*Warntn&Dumfres, VA; BelAltn, MD
Mar 19	Tue	19:43	SAO 95293	9.0	52+ 70	12N	*Eldrsbg, Pkksvil, MiddleRivr, MD
Mar 20	Wed	22:54	SAO 96442	8.5	63+ 51	14N	*Charltsv, Henrico, Langley, VA
Mar 22	Fri	21:56	45 Cancr	5.6	80+ 60	13N	*Toronto; Walden, NY; Stratfrd, CT

Interactive detailed maps at <http://www.timerson.net/IOTA/>

Total Lunar Occultations

DATE	Day	EST	Ph	Star	Mag.	% alt	CA	Sp.	Notes
Mar 17	Sun	19:35	D	SAO 93941	7.5	34+ 61	20N	A0	Sun -5; good n MD graze
Mar 17	Sun	23:01	D	SAO 93998	7.4	34+ 23	26S	K0	
Mar 18	Mon	19:54	D	ZC 793	6.2	43+ 66	66N	G8	Sun -8; mg2 10, 9", PA204d
Mar 18	Mon	21:10	D	ZC 798	6.2	43+ 53	46S	K0	
Mar 18	Mon	22:58	D	SAO 94517	8.4	44+ 33	65N	F5	
Mar 19	Tue	22:18	D	SAO 95402	7.8	53+ 49	88S	G5	
Mar 19	Tue	23:05	D	71 Orionis	5.2	53+ 40	62S	F6	ZC 947; mg2 11, 13", PA202
Mar 19	Tue	23:54	D	SAO 95461	7.7	54+ 31	56S	G5	
Mar 20	Wed	0:08	D	SAO 95475	7.2	54+ 28	51S	F5	mag2 11, sep. 5", PA 135
Mar 20	Wed	0:36	D	SAO 95485	7.0	54+ 23	34S	K0	
Mar 20	Wed	20:29	D	SAO 96393	7.6	62+ 69	78S	A2	
Mar 20	Wed	21:20	D	NP Gem	6.0	62+ 65	36S	M1	ZC1072; maybe close dbl
Mar 20	Wed	23:40	D	SAO 96487	7.2	63+ 42	77N	B9	
Mar 21	Thu	1:12	D	ZC 1083	7.6	63+ 24	49N	F5	mag2 9, sep. ".3, PA 57
Mar 22	Fri	21:34	D	45 Cancr	5.6	80+ 64	49N	A3	ZC1309, maybe close dbl
Mar 23	Sat	0:15	D	50 Cancr	5.9	81+ 48	84N	A1	ZC1318
Mar 23	Sat	18:37	D	omega L	5.5	87+ 30	56S	F9	Sun+8, ZC1397, close dbl
Mar 25	Mon	0:02	D	RX Sex	6.7	94+ 54	72S	A3	ZC1528, close double?
Mar 25	Mon	21:42	D	69 Leonis	5.4	98+ 39	69N	A0	ZC 1623
Mar 28	Thu	4:37	R	49 Vir	5.2	99- 27	62S	K2	AA 255, ZC1884, TermD 18"
Mar 29	Fri	0:52	R	ZC 2002	6.8	96- 31	86N	K0	AA 277
Mar 29	Fri	4:35	R	ZC 2017	6.4	95- 30	34S	K1	AA 217
Mar 29	Fri	5:08	R	SAO 158333	7.2	95- 27	75S	G6	AA 257
Mar 30	Sat	1:07	R	ZC 2136	6.6	90- 24	36N	K1	
Mar 31	Sun	5:24	R	SAO 184105	7.4	80- 30	33S	K3	close double?
Apr 1	Mon	4:18	R	SAO 185015	7.1	70- 27	31S	K0	
Apr 3	Wed	4:30	R	ZC 2787	6.3	48- 19	57N	B8	mag2 9 sep ".7, PA 104d
Apr 3	Wed	5:22	R	ZC 2794	6.6	47- 25	64S	K3	close double??
Apr 3	Wed	5:31	R	SAO 162239	7.0	47- 26	58N	F2	
Apr 5	Fri	5:40	R	SAO 164080	7.1	26- 18	59S	K4	close double??
Apr 12	Fri	20:05	D	ZC 482	7.8	6+ 22	86N	F0	Sun altitude -5 degrees
Apr 13	Sat	21:56	D	SAO 93825	8.1	12+ 11	51S	F0	Azimuth 286 degrees
Apr 14	Sun	22:16	D	ZC 760	6.6	19+ 17	56N	A5	mg2 7.5 sep 1.0", PA 297

Explanations & more information are at <http://iota.jhuapl.edu/exped.htm> .

David Dunham, dunham@starpower.net ,

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Continued from Page 5

The collision would have churned up gas orbiting within the innermost 5000 light-years of the Milky Way, pushing the gas into the center. Some of the incoming gas would have fallen onto the Milky Way's supermassive black hole, generating the bubbles of gamma ray-emitting gas like a belch after a good meal. Other inflowing gas would provide the raw material for making the young stars observed at the center today. And interactions between the Milky Way's black hole and the smaller one from the satellite galaxy could have flung out old stars from the center as the two black holes merge.

NASA's newest set of X-ray eyes in the sky, the Nuclear Spectroscopic Telescope Array (NuSTAR), has caught its first look at the giant black hole parked at the center of our galaxy. The observations show the typically mild-mannered black hole during the middle of a flare-up. These data will help us better understand the gentle giant at the heart of our galaxy and why it sometimes flares up for a few hours and then returns to slumber."

NuSTAR, is the only telescope capable of producing focused images of the highest-energy X-rays. Active black holes tend to gobble up stars and other fuel around them. Sgr A* is thought only to nibble or not eat at all, a process that is not fully understood. When black holes consume fuel -- whether a star, a gas cloud or, as recent Chandra observations have suggested, even an asteroid -- they erupt with extra energy.

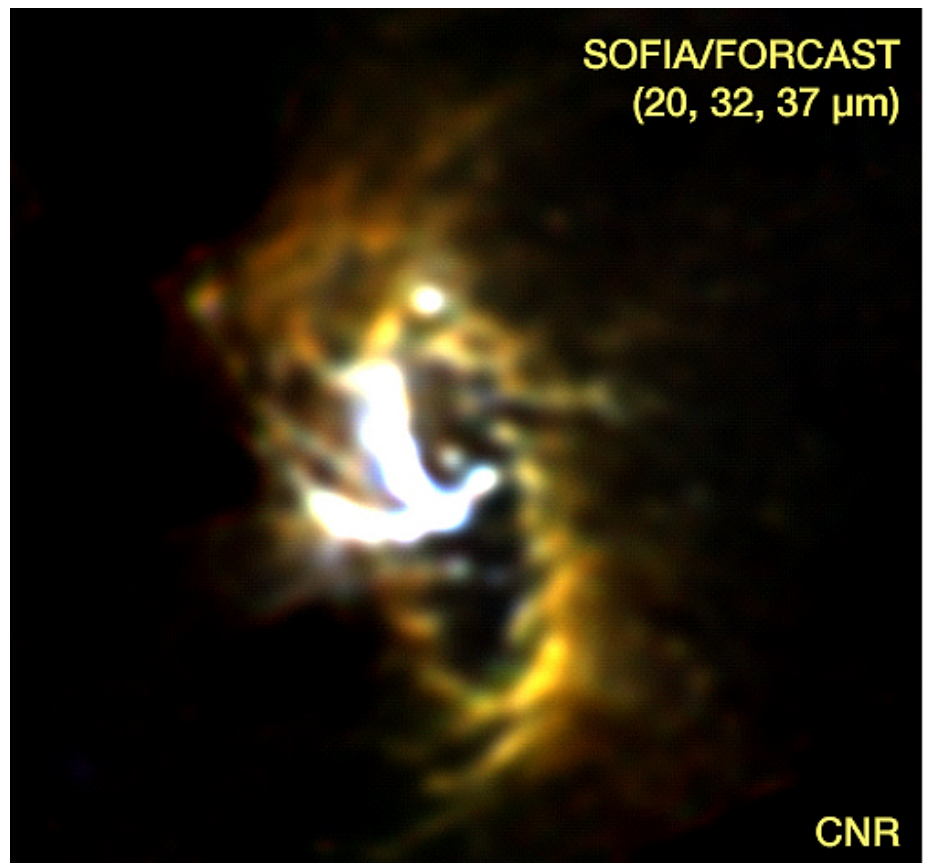
NuSTAR, is picking up X-rays emitted by consumed matter being heated up to about 180 million degrees Fahrenheit (100 million degrees Celsius) and originating from regions where particles are boosted very close to the speed of light.

Continued on next column

The Stratospheric Observatory for Infrared Astronomy (SOFIA) captured images of a Circumnuclear Ring (CNR) of gas and dust seven light-years in diameter surrounding the supermassive black hole. and of a neighboring cluster of extremely luminous young stars embedded in dust cocoons.

The mid-IR images reveal in detail the structure of the warm dust in the CNR, a torus of material orbiting the supermassive black hole at the Galactic center, as well as the prominent streamers of ionized gas and hot dust within the CNR that compose the HII region Sgr A West. The emission at 19.7 microns from the dust in the CNR closely traces the ionized gas emission as observed in the radio and near-IR, whereas the emission at 31.5 and 37.1 microns trace a cooler distribution of dust located at a slightly greater radius in the CNR. This is consistent with the prevailing view that the CNR material is heated and excited by the massive Central Cluster of stars interior to the CNR.

The Quintuplet Cluster (QC), located about 35 pc from the Central Cluster, was also imaged by SOFIA/FORCAST. The QC contains the "Pistol Star", a blue hypergiant that illuminates material of the Pistol Nebula ejected from the star. Cool dust cocoons surrounding the most luminous members of the QC are prominent at mid-IR wavelengths. The Central Cluster, the Quintuplet Cluster, and the Arches Cluster in the Galactic center region have ages between 6 and 1 million years, indicating a series of astronomically recent star formation bursts.



Mid-infrared image of the Milky Way Galaxy's nucleus showing the Circumnuclear Ring (CNR) of gas and dust clouds orbiting a central supermassive black hole. The bright Y-shaped feature is believed to be material falling from the ring toward the black hole that is located where the arms of the "Y" intersect.

Upcoming Science Fairs

For information on the county science fairs below, or the March 23 Udvar-Hazy Girl Scout event, email Jay Miller at rigel1@starpower.net

Mar. 9 - Prince George's Community College, Largo, MD (PG County)

Mar. 14 – Tuscarora High School (Loudon County)

Mar. 16 – Robinson Secondary School (Fairfax County)

Mar. 16 - Food and Drug Administration White Oak Campus, 10903 New Hampshire Avenue, Silver Spring, MD 20993 (Montgomery County)

Mar. 23 – Wilson High School (District of Columbia)

On 23 March, the Girl Scouts will have their annual science event at the Air & Space Museum's Udvar-Hazy Center near Dulles.

This is from 10 AM to 3 PM and there will be many organizations present. We could use some people to help at the table or you could bring a telescope for indoor or solar viewing.

Calendar of Events

NCA Mirror- and Telescope-making Classes: Tuesdays Mar. 5, 12, 19, 26 and Fridays Mar. 1, 8, 15, 22, 6:30 to 9:30 pm at the Chevy Chase Community Center, at the northeast corner of the intersection of McKinley Street and Connecticut Avenue, N.W. Contact instructor Guy Brandenburg at 202-635-1860 or email him at gbrandenburg@yahoo.com. In case there is snow, call 202-282-2204 to see if the CCCC is open.

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

Dinner: Saturday, Mar. 9 at 5:30 pm, preceding the meeting, at [Mulligan's Grill and Pub](#) at the [University of Maryland Golf Course](#).

Owens Science Center Planetarium: "Before the Equinox: A Percy Jackson Adventure" Fri. Mar. 15 at 7:30 pm; \$5/adult; \$3/students/senior/ teachers/military; children under 3 free. Doors open 7:00 for pre-show activities. www1.pgcps.org/howardbowens

Montgomery College Planetarium: 7621 Fenton Street, Takoma Park, MD (240) 567-1463. Wed. Mar. 20 at 7:00 pm. "Vernal Equinox" in the Planetarium. www.montgomerycollege.edu/Departments/planet/

Mid Atlantic Senior Physicists Group: "The Analysis of Past (Pliocene) Global Climate as an Aid in Understanding Future Climate Change" Wed. Mar. 20 at 1:00pm. American Center for Physics, College Park, MD. See page 3.

Upcoming NCA Meetings at the University of Maryland Observatory:
Mar 09: **Paul Ray** (NRL), X-ray Pulsars
Apr 13: **Holly Gilbert** (GSFC), Results from the Solar Dynamics Observatory
May 11: **Nancy Chabot** (APL) MESSENGER's Surprising Images of Mercury

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

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If undeliverable, return to

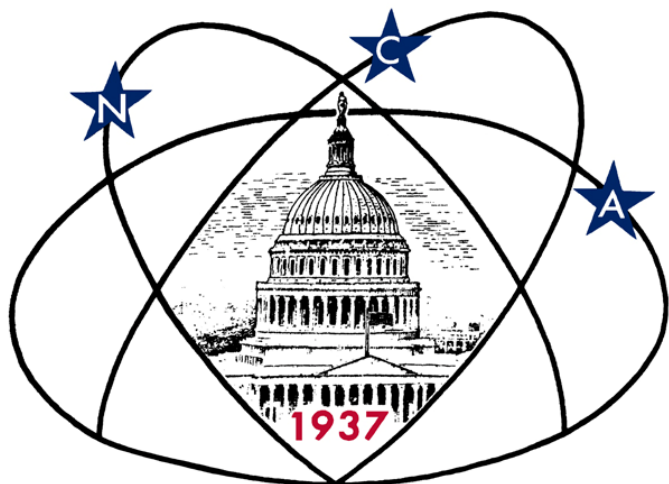
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First Class

Dated Material



Next NCA Mtg:

Mar. 9

7:30 pm

@ UMD Obs

Paul Ray (NRL)

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