

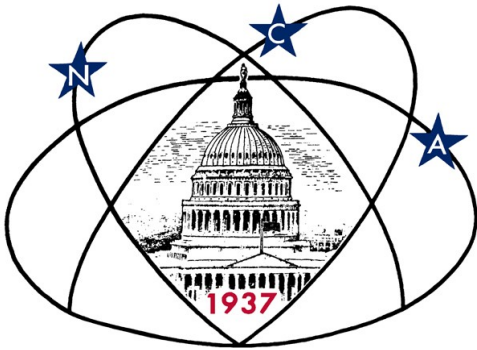
Star Dust

Newsletter of National Capital Astronomers, Inc.

capitalastronomers.org

March 2014

Volume 72, Issue 7



Next Meeting

When: Sat. Mar. 8th, 2014

Time: 7:30 pm

Where: UMD Observatory

Speaker: Elizabeth Hays

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Directions to Dinner/Meeting

Our time and location for dinner with the speaker before each meeting is 5:30 pm at Mulligan's Grill and Pub on the UM 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 <http://mulligans.umd.edu/>

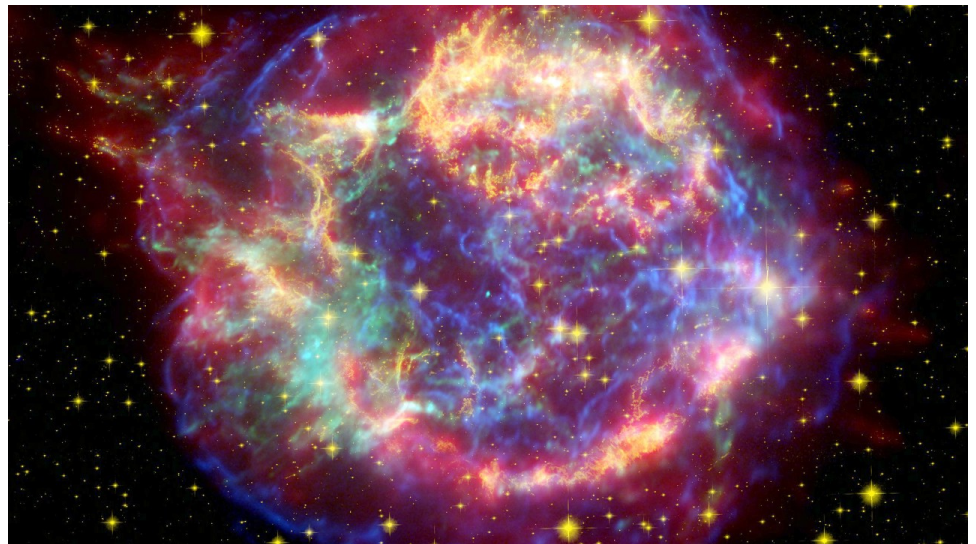
The meeting is held at the UMD Astronomy Observatory on Metzgerott Rd about halfway between Adelphi Rd and University Blvd.

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.

Cosmic Ray Protons from Supernova Remnants

Elizabeth Hays, GSFC



Supernova remnant, Cassiopeia A (Cas-A)

Abstract: The Earth is continuously barraged from all directions by cosmic rays, a stream of highly energetic particles made up of electrons, positrons, protons, and other nuclei. Supernova remnants have been considered prime suspects as the accelerators of cosmic rays within our Galaxy for a long time. Gamma-ray observations have offered the promise of turning that suspicion into a certainty for almost as long because energetic particles readily emit radiation at those wavelengths. In particular, protons produce a distinctive feature in the gamma-ray spectrum that can be distinguished from the other types of radiation common to supernova remnants. Recently, high-energy gamma-ray telescopes, both the Fermi Large Area Telescope and AGILE, have finally provided data that can be used to look for direct evidence of protons accelerated in these sources. Fermi observations of two bright supernova remnants in the Galaxy have revealed unmistakable signs of the accelerated protons for the first time. Fermi continues to pursue measurements of protons in additional supernova remnants. Now that the

continued on page 2

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.

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.

AR1990 Solar Flare February 24, 2014:



Courtesy NASA/SDO/GSFC
<http://youtu.be/jukJsH5L-Ss>

The History of Fermi in 5 minutes



Courtesy NASA/GSFC
<http://youtu.be/F0ELBnoVCsM>

Cosmic Ray Protons from Supernova Remnants – continued from page 1

protons have been spotted, important work remains to answer deeper questions about whether all of the accelerated protons originate in supernova remnants and how they reach high energies and escape the remnant to embark on a long journey through the Galaxy.



Supernova remnant, the Jellyfish Nebula (IC 443) in Gemini Constellation

Biographical Sketch:

Elizabeth Hays is an astrophysicist at NASA's Goddard Space Flight Center in Greenbelt, Maryland. She currently serves as a Deputy Project Scientist for the Fermi Gamma-ray Space Telescope, which has been operating since 2008. Elizabeth has enjoyed the rare opportunity to work with a variety of increasingly sophisticated gamma-ray telescopes during a time when the field of gamma-ray astronomy has begun producing ground-breaking scientific results. In addition to the Fermi observatory, she has spent time as a graduate student at the University of Maryland contributing to early results from Milagro, a first generation instrument in New Mexico that mapped the highest energy sources of gamma rays in the Northern Hemisphere. The newly constructed HAWC observatory in Mexico, a second generation instrument using the same method, now succeeds Milagro and will deepen the view of the highest energy gamma-ray sky. Elizabeth also spent time at the University of Chicago, where she helped to initiate operation of a different type of gamma-ray observatory, the multi-telescope array VERITAS, which is currently one of the most sensitive ground-based gamma-ray telescopes in the world. One of her favorite applications for these amazing facilities is searching for and characterizing the most extreme accelerators in nature.

Exploring the Sky
will resume in April 2014!

“Exploring the Sky” is an informal program that, for over 60 years, has offered monthly opportunities for anyone in the Washington area to see the stars and planets through telescopes from a location within



the District of Columbia. Presented by the National Park Service and National Capital Astronomers, sessions are held in Rock Creek Park once each month on a Saturday night from April through November, Beginners (including children) and experienced stargazers are all welcome—and it’s free!

For more information, check:

National Capital Astronomers, Inc:
<http://capitalastronomers.org/>

Rock Creek Park:
<http://www.nps.gov/rocr/planyourvisit/expsky.htm>

Do Martians Like Jelly Donuts?



Courtesy NASA/JPL-Caltech/Cornell, AZ State U.
“Pinnacle Island,” the red planet’s gauntlet

Hey, who threw that donut rock?! Well, it looks like Rover Opportunity did! The Mars rock (called Pinnacle Island) was captured in the right image on Sol 3540, but was not there in the earlier image on the left on Sol 3528. So, before the idea of sending Mars-bound reinforcements set in, scientists concluded that the rock translocated because it was thrown out from under one of Opportunity’s wheels. The Martians do not like jelly donuts and there was no alien standoff after all!

Sky Watchers

Spring Schedule

March

All month	Early pm to Pre-dawn – Planets , Northern Hemisphere. Features: <i>Jupiter, Mars, Mercury, Saturn & Venus</i> [Note: Saturn rings visible at ~22° tilt from on-edge viewing]
6	11:12 pm EST- Occultation Expedition , Local. Features: <i>Grazing Occultation of ZC 577 (6.0 mag)</i> (best local grazing this year) [Viewing from Thornburg/Bolling Green: Routes US1, VA2 or US 301 sites, contact David Dunham (see p. 5) for more info]
8	Evening – Planets, Asterism , Global. Features: <i>Moon & Jupiter inside the ‘Winter Circle’</i> 7:52 pm EST – NCA Occultation Expedition , Mideast States. Features: <i>Lunar Occultation of CE Tauri (4.3 mag)</i> [Viewing from College Park, MD Observatory Grounds, contact David Dunham (see p. 5) for more info]
16	1:08 pm EDT – Full Moon , Global. Other Moon Names: <i>Full Crow Moon, Full Sap Moon, Full Worm Moon, Lenten Moon (last full Moon of winter),</i>
20	2:03-2:09 am EDT – Occultation , Northeast N. America. Features: <i>(163) Erigone occults Regulus, Possible (163) Erigone Satellite</i> 4:57 pm EDT – Spring Equinox , Northern Hemisphere.

Times EST/EDT

The Occultation of Regulus by (163) Erigone: You Might Discover a Satellite

David Dunham

The International Occultation Timing Association invites everyone who will be within the narrow zone between the red lines shown on the map (see page 4) to observe and time a unique astronomical occultation. On Thursday morning, March 20, everyone in that zone has a very good chance of seeing the occultation of Regulus by the asteroid (163) Erigone. For this rare event (it is the brightest star ever to be predicted to be occulted by a sizeable asteroid as seen from the USA in 40 years of predicting asteroidal occultations), I am planning to travel to New York to deploy several small remote “mighty mini” video stations to record the event; let me know if you might be interested in joining this expedition.

If you can't travel to the path of the occultation of Regulus by Erigone, but you live in the large region between the two gray lines on the map (on page 4), including all of Maryland, Virginia, and DC, you can still make a

continued on page 4

Occultation of Regulus by Erigone – continued from page 3

valuable contribution by watching or recording Regulus from 2:03 to 2:09am EDT, since you could discover and measure a small satellite of Erigone. Erigone is not known to have a satellite, but dozens of other asteroids are known to have satellites; so, there is a small chance that one might be revealed from a brief occultation of Regulus.



Observation Path of Regulus Occultation by (163) Erigone (red lines) and Possible Erigone Satellite (gray lines)

Occultations of bright stars can provide more definitive proof of satellite occultations due to the strong signal that can be seen or recorded. The duration of an occultation by a satellite depends on the satellite's size; it could be anywhere from a brief blink, less than half a second, to as much as two seconds or more (if the satellite was large enough to occult the star for more than 3 seconds, we would probably already know about it from other high-powered astronomical observations).

For much more information about this occultation, including simple finder charts for those not very familiar with the sky, and a simple way to locate Regulus relative to the gibbous Moon on March 20th, see IOTA's special event website: <http://occultations.org/Regulus2014/> and relevant Facebook updates: <https://www.facebook.com/Regulus2014>.

C. Herschel

March brings the last vestiges of winter, the first hints of spring, the Vernal Equinox, and our celebration of Women's History. In the spirit of that celebration, may we introduce Caroline Lucretia Herschel (1750-1848 CE), sister to astronomer, William Herschel. Caroline

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

• **ISSN: 0898-7548**

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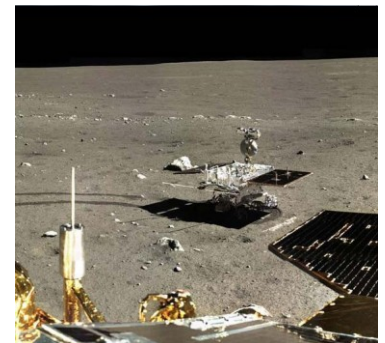


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Thank you!

Rabbit on the Moon



Courtesy CNSA/Chinanews/Ken Kremer/Marco Di Lorenzo | kenkremer.com

• Yutu (the Jade Rabbit) is China's lunar rover and
 • recently landed on the edge of Mare Imbrium.
 • There are currently some technical problems; but,
 • Yutu did arrive at his mythological origin. He is,
 • after all, the medicine hare of the Moon Goddess,
 • Chang'e. Here's an earlier image as Yutu rolls
 • away from the mothership. Off he goes; doesn't
 • he look like a winged rabbit?

Occultation Notes

- D following the time denotes a disappearance, while R indicates that the event is a reappearance.
- When a power (x; actually, zoom factor) is given in the notes, the event can probably be recorded directly with a camcorder of that power with no telescope needed.
- The times are for Greenbelt, MD, and will be good to within +/-1 min. for other locations in the Washington-Baltimore metropolitan areas unless the cusp angle (CA) is less than 30 deg., in which case, it might be as much as 5 minutes different for other locations across the region.
- Some stars in Flamsteed's catalog are in the wrong constellation, according to the official IAU constellation boundaries that were established well after Flamsteed's catalog was published. In these cases, Flamsteed's constellation is in parentheses and the actual constellation is given in the notes following a /.
- Mag is the star's magnitude.
- % is the percent of the Moon's visible disk that is sunlit, followed by a + indicating that the Moon is waxing and - showing that it is waning. So 0 is new moon, 50+ is first quarter, 100+ or - is full moon, and 50- is last quarter. The Moon is crescent if % is less than 50 and is gibbous if it is more than 50.
- Cusp Angle is described more fully at the main IOTA Web site.
- Sp. is the star's spectral type (color), O,B,blue; A,F,white; G,yellow; K,orange; M,N,S,C red.
- Also in the notes, information about double stars is often given. "Close double" with no other information usually means nearly equal components with a separation less than 0.2". "mg2" or "m2" means the magnitude of the secondary component, followed by its separation in arc seconds (") , and sometimes its PA from the primary. If there is a 3rd component (for a triple star), it might be indicated with "mg3" or "m3". Double is sometime abbreviated "dbl".
- Sometimes the Watts angle (WA) is given; it is aligned with the Moon's rotation axis and can be used to estimate where a star will reappear relative to lunar features. The selenographic latitude is WA -270. For example, WA 305 - 310 is near Mare Crisium.

Mid-Atlantic Occultations

David Dunham

Asteroidal and Planetary Occultations

2014	Date	Day	EDT	Star	mag.	Asteroid	dmag	dur. s	Ap. "	Location
Mar 10	Mon	3:34	SAO 183623	10.4	Admete	5.5	12	5	eOH,WV,CVA,eNC	
Mar 11	Tue	21:59	TYC13211396	10.5	Myrrha	3.9	15	6	w&nVA,DC,MD,SNJ	
Mar 16	Sun	6:32	TYC62590253	11.0	Papagena	1.8	9	7	NY,nPA,nNJ,sNE	
Mar 17	Mon	22:25	2UC44642564	12.1	Princetonia	2.1	12	8	swPA,nWV,WMD,eVA	
Mar 18	Tue	5:07	2UC17536867	11.6	Eunomia	0.4	26	7	WPA,WV,VA,eNC,DC	
Mar 20	Thu	2:06	Regulus	1.3	Erigone	11.1	14	1	se&CNY,nNJ,swCT	
Mar 22	Sat	21:18	SAO 116098	8.7	Lena	7.4	4	3	CVA,eWV,WMD,CPA	
Mar 31	Mon	23:07	TYC07541526	10.7	Menippe	4.5	3	5	nOH,PA,NJ;nMD?	
Apr 2	wed	5:28	SAO 162007	9.1	Mora	7.0	1	4	WV,VA,MD,DE;DC?	
Apr 10	Thu	23:59	TYC07921566	10.7	Feronia	3.1	7	5	sAZ,CTX,sLA,CFL	
Apr 12	Sat	2:50	4U393099867	12.4	Laetitia	0.3	17	8	e USA, e Canada	
Apr 13	Sun	23:47	SAO 81691	9.7	1999 XR13	5.9	6	4	sePA,MD,nVA;DC?	

Lunar Grazing Occultations

2014	Date	Day	EST/EDT	Star	Mag	% alt	CA	Location & Remarks
Mar 6	Thu	23:12	ZC 577	6.0	36+	9	10N	LaceySpg, Madison, Thornburg, VA
*** Dates and times above are EST, those below are EDT ***								
Mar 9	Sun	21:46	SAO 95623	8.6	64+	62	10N	Pittsburgh&NewFreedom, PA; nDE
Apr 3	Thu	23:45	delta3 Tau	4.3	20+	5	7N	Kincardine, ON; n. Virginia, MN
Apr 8	Tue	21:16	ZC 1281	6.3	66+	66	11N	WakeForest, Lamm & Wilson, NC

Interactive detailed maps at <http://www.timerson.net/IOTA/>
 *, no expedition planned from DC area

Total Lunar Occultations

2014	Date	Day	EST/EDT	Ph Star	Mag	% alt	CA	Sp.	Notes
Mar 8	Sat	19:52	D CE Tauri	4.3	54+	63	50S	M2	ZC 832
Mar 8	Sat	20:51	D 120 Tauri	5.7	55+	54	42S	B2	ZC 836
Mar 8	Sat	22:08	D SAO 94678	7.6	55+	40	70N	K5	close double??
*** Dates and times above are EST, those below are EDT ***									
Mar 9	Sun	22:57	D SAO 95703	7.5	65+	40	48N	F5	
Mar 9	Sun	22:57	D SAO 95703	7.5	65+	40	48N	F5	
Mar 10	Mon	2:21	D 20 Gem	6.9	65+	13	79S	G8	Az.283,ZC1002,double
Mar 10	Mon	2:21	D 21 Gem	6.3	65+	12	81S	F6	Az.283,ZC1993,double
Mar 10	Mon	19:31	D ZC 1091	6.5	72+	60	80S	K5	Sun -5,close double??
Mar 11	Tue	0:16	D lambda Gem	3.6	74+	44	69S	A3	ZC1106,mag2 11 10",PA33
Mar 12	wed	3:36	D ZC 1237	6.5	82+	14	88S	A7	Azimuth 277 deg.
Mar 12	wed	18:59	D 50 Cancri	5.9	87+	36	4S	A1	Sun +1,ZC1318,TrmDst 1"
Mar 13	Thu	1:02	D 60 Cancri	5.4	88+	48	81N	K5	ZC1332,close double??
Mar 24	Mon	4:25	R ZC 2685	6.8	46-	18	32N	K1	
Mar 24	Mon	4:59	R U Sgr	6.6	46-	22	86N	G1	ZC 2687, double?
Mar 24	Mon	5:10	R SAO 161576	7.4	46-	23	87N	K0	
Mar 24	Mon	5:13	R SAO 161582	7.0	46-	24	53N	G3	mag2 9.6 sep 69",PA 262
Mar 24	Mon	6:50	R ZC 2699	6.8	46-	31	49S	M3	Sun altitude -4 deg.
Apr 2	wed	20:20	D SAO 93425	7.9	12+	27	39S	K2	Sun altitude -10 deg.
Apr 3	Thu	22:23	D delta1 Tau	3.8	20+	14	38S	G8	Az.281,mag.2 9.5,0.05",
Apr 3	Thu	23:04	R = ZC 648	3.8	20+	7	-52S	G8	Az287,AA237, PA 190
Apr 3	Thu	23:35	D delta3 Tau	4.3	20+	2	39N	A2	Az.292,ZC658,mg2 8,1.8"
Apr 4	Fri	22:48	D ZC 787	7.1	28+	20	89N	B3	mg2 8.3,2.6",PA 164 deg
Apr 5	Sat	22:46	D SAO 95263	7.7	38+	29	39N	G5	
Apr 6	Mon	0:10	D ZC 934	6.4	38+	13	79N	K1	Azimuth 283 degrees
Apr 6	Sun	23:51	D SAO 96371	7.1	48+	25	81S	B9	
Apr 7	Mon	1:03	D ZC 1073	5.9	48+	11	39S	M2	Azimuth 282 degrees
Apr 8	Tue	0:34	D ZC 1183	7.3	57+	24	40S	F2	
Apr 10	Thu	2:06	D omega Leo	5.5	76+	21	85S	F9	ZC1397,mg2 6.5,sep."0.9
Apr 10	Thu	21:42	D 16 Sex	6.6	83+	57	78S	K0	ZC1489

Explanations & more information is at <http://iota.jhuapl.edu/exped.htm>.
 David Dunham, dunham@starpower.net, phone 301-526-5590

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C. Herschel – continued from page 4

• was also an astronomer in her own right,
 • considered one of the first women to get
 • paid for such a duty. Her best tool was a
 • large, 5-ft focal length Newtonian telescope.

• As a child, Caroline contracted infectious
 • diseases which, reportedly, made her
 • unattractive for marriage (scarring from
 • smallpox at 3 yrs old and stunted growth
 • from typhus at 10 years old). Caroline's
 • mother decided that she should spend her
 • life as free house help whereas her father
 • thought she should be educated (sneaking
 • in knowledge without that of the mother's).

• William left Hanover, Germany during the
 • time of the Seven Years War (1772) for
 • Bath, England, became a musician, and asked Caroline to join him



Silhouette of Caroline Herschel.
 Courtesy of the Museum of the
 History of Science, Oxford University

continued on page 7

Science Fair Volunteers Needed

Jay Miller

• Science fair season is upon us. Here is a list of the science fairs in the
 • area. Please consider judging one of them. You know all you need to
 • know to judge high and junior high astronomy projects. NCA gives a year
 • membership in NCA and a year subscription to S&T magazine to the
 • winners. I've registered for the Montgomery County fair. Contact the
 • schools listed to find out how to register for the others. Normally you have
 • to preregister. Contact me (info in the left margin) and I will fill you in on
 • judging procedures. Please consider PG and the nearby VA fairs only. I
 • don't have info on DC fairs.

Date	City	Fair
March 8 (Sat)	Glen Burnie, MD	Anne Arundel County (North County HS)
March 15 (Sat)	Silver Spring, MD	Montgomery County (FDA- White Oak)
March 15 (Sat)	Fairfax, VA	Fairfax County Regional (Robinson Secondary School)
March 15 (Sat)	Manassas, VA	Prince William County (Kelly Leadership Center)
March 20 (Thurs)	Leesburg, VA	Loudoun County (Tuscarora HS)
March 22 (Sat)	Walkersville, MD	Frederick County (Walkersville HS)
April 5 (Sat)	Largo, MD	Prince Georges Area (PG Community College)

C. Herschel – continued from page 6

and try a singing career. She arrived to find her brother immersed in “amateur astronomy,” making telescopes and, ultimately, getting her to help.

William discovered Uranus, built his sister a telescope & encouraged Caroline to also explore the universe...she did.

Among other discoveries, she is credited with M48, cluster IC 4645, NGC 2360 and several comets (the first of which was Herschel-Rigollet).

Caroline received numerous medals & awards in science and the lunar crater, C. Herschel, is named in her honor.

The submission deadline for the April issue of Star Dust is March 30th

Clear Skies!

Calendar of Events

- **NCA Mirror- or Telescope-making Classes:** Tuesdays and Fridays, from 6:30 to 9:45 pm at the Chevy Chase Community Center (intersection of McKinley Street and Connecticut Avenue, N.W.) Contact instructor Guy Brandenburg at 202-635-1860 or email him at gfbrandenburg@yahoo.com.
- **Open house talks and observing at the University of Maryland Observatory** in College Park on the 5th and 20th of every month at 8:00 pm (Nov.-Apr.) or 9:00 pm (May-Oct.). Details: www.astro.umd.edu/openhouse
- **Owens Science Center Planetarium:** “Universe in the Radio,” Fri. Mar. 14, 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
- **Owens Science Center Planetarium:** “Fancy Nancy, Stellar Stargazer,” Sat. Mar. 15, at 11:30 am, 1:30 pm; \$5/adult; \$3/students/senior/teachers/military; children under 3 free. www1.pgcps.org/howardbowens
- **Mid-Atlantic Senior Physicists Group:** “The Environmental Dynamics of Human Evolution,” with Rick Potts (Smithsonian), Thur. Mar. 20, at 1 pm at the American Center for Physics (1st floor conference room). <http://www.aps.org/units/maspg/>
- **Upcoming NCA Meetings at the University of Maryland Observatory:**
- **12 Apr:** Suvi Gezari (UMD), *Stars Shredded by Black Holes*
- **10 May:** Craig Markwardt (GSFC), *What NuSTAR Has Found So Far*
- **14 June:** Election; Science Fair Winners

National Capital Astronomers Membership Form

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

Address: _____ **ZIP Code:** _____

Home Phone: ___-___-___ **E-mail:** _____ **Print / E-mail Star Dust (circle one)**

Membership (circle one): Student..... \$ 5; Individual / Family.....\$10; Optional Contribution.....\$__

Please indicate which activities interest you:

- Attending monthly scientific lectures on some aspect of astronomy _____
- Making scientific astronomical observations _____
- Observing astronomical objects for personal pleasure at relatively dark sites _____
- Attending large regional star parties _____
- Doing outreach events to educate the public, such as Exploring the Sky _____
- Building or modifying telescopes _____
- Participating in travel/expeditions to view eclipses or occultations _____
- Combating light pollution _____

Do you have any special skills, such as videography, graphic arts, science education, electronics, machining, etc.?

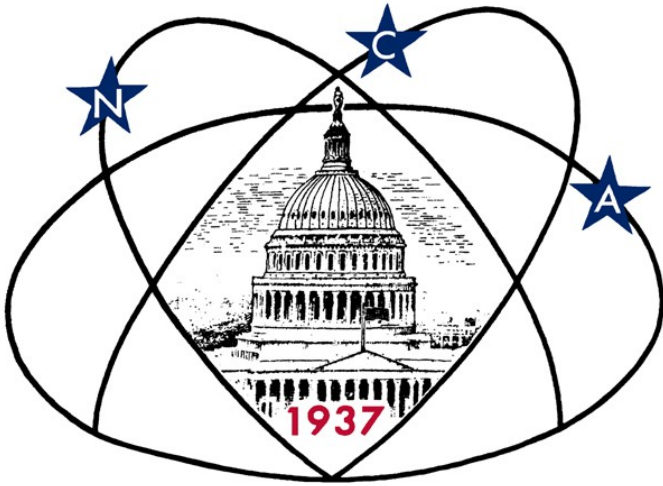
Are you interested in volunteering for: Telescope making, Exploring the Sky, Star Dust, NCA Officer, etc.?

Please mail this form with check payable to **National Capital Astronomers** to:
Henry Bofinger, NCA Treasurer; 727 Massachusetts Ave. NE, Washington, DC 20002-6007

National Capital Astronomers, Inc.

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First Class
Dated Material



Next NCA Meeting:

2014 March 8th

7:30 pm

@ UMD Observatory

Dr. Elizabeth Hays

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