

Star Dust

Newsletter of National Capital Astronomers, Inc.

capitalastronomers.org

September 2014

Volume 73, Issue 1

Next Meeting

When: Sat. Sept. 13th, 2014
Time: 7:30 pm
Where: UMD Observatory
Speaker: Melissa Hayes-Gehrke

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Directions to Dinner/Meeting

Our time and location for dinner with the speaker before this meeting is 5:30 pm at "The Common," the restaurant in the UMD University College building located at 3501 University Blvd.

The meeting is held at the UMD Astronomy Observatory on Metzger 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 @ observatory. Please try to let him know in advance by e-mail at rigel1@starpower.net.

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.

Impactors from the Sky

Melissa N. Hayes-Gehrke, University of Maryland

Abstract: An asteroid impact is an astronomical threat that could become reality. However, past impacts of several specific asteroids on Earth and other planets have provided key information to scientists. The source of the greatest threat to Earth is unlikely to be from the millions of asteroids that exist in the main asteroid belt, but from the thousands of asteroids that orbit in the inner Solar System.

Astronomers are searching for these high-threat asteroids, but the search is far from complete. If an asteroid is discovered to be on a course to impact the Earth, scientists have explored several possible techniques for preventing the impact; and, although none has been tested yet on the necessary scale, the most plausible strategies for such an event will be discussed.



Courtesy asterisk.apod.com

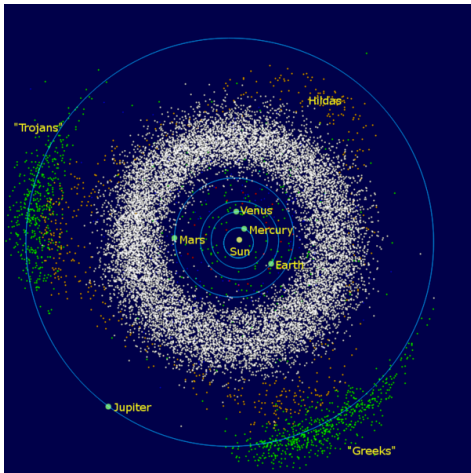
Chelyabinsk Meteor exploding over the southwest region of Russia on February 15, 2013. Its airburst was observed by an unprecedented number of people.

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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.

Asteroids in the Solar System



Courtesy Mdf-Wikipedia Commons

The Main Asteroid Belt between Mars & Jupiter as well as "Trojans," "Hildas," & "Greeks."

Brief Space Rock Primer

Composition Type C (Chondrite)

Dark, clay & silicate rocks that are most common as well as the oldest items in the Solar System

Composition Type S (Stony)

Nickel-iron & silicate rocks

Composition Type M (Metallic)

Nickel-iron rocks

Trojans

Asteroids trailing Jupiter in its orbit at Lagrangian points 4 or 5 (60° offset)

Greeks

Asteroids ahead of Jupiter in its orbit at Lagrangian points 4 or 5 (60° offset)

Hildas

(Hildian Group)

Asteroids opposite Jupiter in its orbit or at Lagrangian points 4 or 5 (60° offset)

Impactors from the Sky – continued from page 1

Biographical Sketch:

Dr. Melissa N. Hayes-Gehrke developed a love of the stars and astronomy as a child in rural Pennsylvania. She completed undergraduate degrees in Physics and Earth, Atmospheric, and Planetary Sciences at the Massachusetts Institute of Technology in 1996. She received her doctorate in Astronomy from Boston University in 2004. Since that time, she has been an instructor at the University of Maryland, specializing in teaching astronomy to non-science majors, as Senior Lecturer. She has developed two new and innovative courses for non-science majors that focus on observing asteroids and the threat of asteroid impacts.



"Veg-01" Update

It has been 4 months since the Space X Dragon delivered the Veg-01 experiment and the plant facility (called "Veggie") to the Expedition 39 crew of the International Space Station (ISS). On May 7th, NASA astronauts Steve Swanson & Rick Mastracchio installed Veggie in the Columbus module of ISS. The experiment contains 6 plant pillows of outrageous red romaine lettuce seeds (a hearty variety) on a rooting mat. Each pillow was given 100 milliliters of water before Swanson hit the Veggie lights (red, green & blue LEDs) on May 8th, initiating Veg-01.



Courtesy NASA/Koichi Wakata
Swanson turning on Veggie

A control group of lettuce seeds was activated simultaneously on Earth for comparison with the space lettuce clippings that will be frozen and shipped home for study and verification that the ISS plants are safe to eat. This is a timely experiment in light of future goals for human travel

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Exploring the Sky!

“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



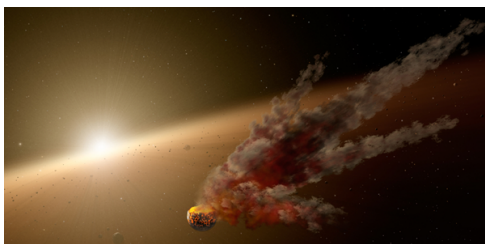
the District of Columbia. Presented by the National Park Service and National Capital Astronomers, sessions are held in Rock Creek Park once each month on a Saturday night from April through November, Beginners (including children) and experienced stargazers are all welcome—and it’s free!

For more information, check:

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

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

Planet-Building



Courtesy NASA/JPL-Caltech


Clouds of dust near NGC 2547-ID8 (in Constellation Vela) were detected with infrared sensors by the Spitzer telescope a year ago. The hypothesis, recently reported in *Science*, is that two asteroids collided in 2547’s terrestrial zone where planets like Earth might be made in a similar manner.

Source: Large impacts around a solar-analog star in the era of terrestrial planet formation. *Science* (29 August 2014), 345 (6200), 1032-1035, DOI: 10.1126/science.1255153


Sky Watchers

Autumn Schedule

September

8	8:38 pm – Full Moon , Global. Other Moon Names: <i>Harvest Moon, Full Corn Moon</i> (corn, squash, beans & rice are ready for harvest)
10	10:00 pm – Planets , N. Hemisphere. Moon 1.1° north of Uranus
8-30	Morning – Comet (C/2012 K1 – PANSTARRS, +6 mag), N. Hemisphere. (Constellation Hydra, near Alphard)
20	8:00 pm - Exploring the Sky , Local. Features: <i>Andromeda Galaxy Rising</i>
22	10:29 pm – Autumnal Equinox , N. Hemisphere 
24	2:14 am – New Moon , Global.
26	6:00 am – Planets , N. Hemisphere. Mercury 6° south of Moon
27	5:00 pm – Planets , N. Hemisphere. Mars 3° north of Antares Midnight – Planets , N. Hemisphere. Saturn 0.7° south of Moon
All month	Double Cluster , N. Hemisphere. NGC 869 & 884 (Constellation Pegasus, viewable with binoculars) Globular Cluster , N. Hemisphere. M15 (Constellation Pegasus, viewable with medium-sized telescope) Double Star , N. Hemisphere. Albireo (Constellation Cygnus, viewable with binoculars or small telescope)

October

4	 Astronomy Day! Local & National.
8	5:15 – 8:34 am – Lunar Eclipse , N. Hemisphere.

Times EDT

Veg-01 Update – continued from page 2

into deeper space:

“The farther and longer humans go away from Earth, the greater the need to be able to grow plants for food, atmosphere recycling and psychological benefits...I think plant systems will become important components of any long-duration exploration scenario.”

(Gioia D. Massa, Kennedy Space Center & principal investigator of Veg-01)

Profusion zinnia seed pillows were also sent to ISS for the pleasure of Expedition 39 while they wait for the go-ahead to eat the Veg-01 lettuce.

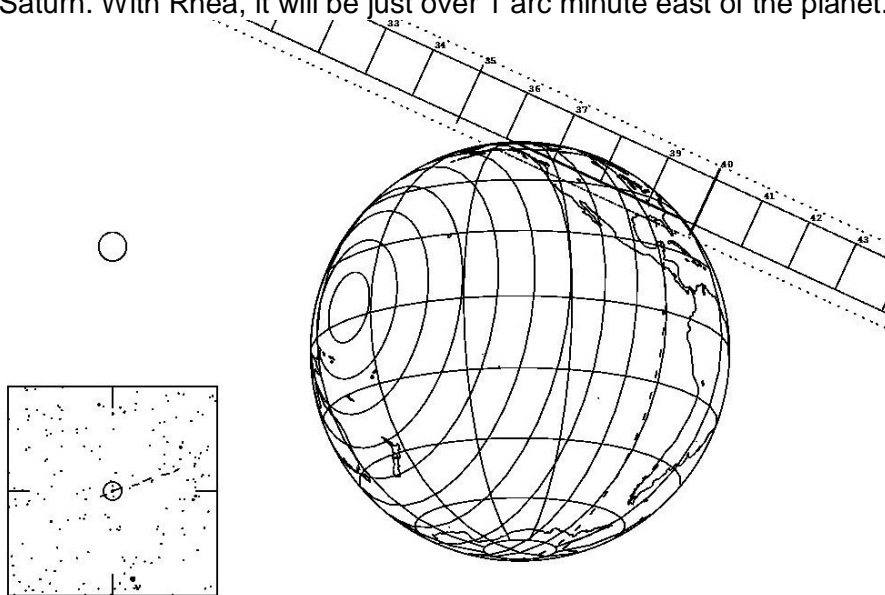
Gerard Newsham, a Veggie payload support specialist, made an optimistic statement about growing plants in space that is a familiar sentiment in regard to space exploration in general, “This is just the beginning.”



Rhea & SAO159034

David Dunham

Saturn's satellite, Rhea (V), will occult the 7.8-magnitude star SAO 159034 (HIP 74007) on Friday evening, Sept. 12 around 8:39 pm EDT (that's 0:39 UT of Sept. 13 UT) (see *Asteroidal & Planetary Occultations* on page 5). The star will be the brightest object near Saturn. With Rhea, it will be just over 1 arc minute east of the planet.



The figure above shows the region of visibility of the event. In the Washington DC region, the altitude will be 13° in the southwest (azimuth 237°). Therefore, to observe this event, you will need to find

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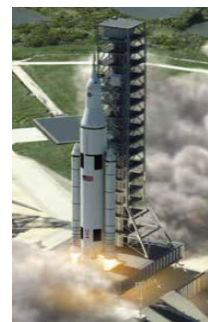


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Thank you!

...the next "big" thing...



<http://www.nasa.gov/sls/>

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	Satellite/ Asteroid	dmag	dur.	Ap.	Location		
Sep 12	Fri	20:39	SAO 159034	7.8	Rhea (V)	3.2	58	2	ne USA		
Sep 18	Thu	20:34	4UC444130878	14.5	Chiron	4.2	12	12	Cuba; e. USA?		
Sep 30	Tue	1:40	2UC42900457	12.5	Terpsichore	0.9	9	8	w&nVA, DC, MD, ePA		
Sep 30	Tue	2:32	TYC01420016	11.2	Spiridonia	4.6	4	7	OH, MD, NJ; DC, nVA?		
Oct 1	Wed	23:00	TYC62662813	10.8	Laetitia	0.4	12	9	All MidAt, not SC		
Oct 2	Thu	22:53	2UC23239021	12.2	Hera	0.9	5	8	VA, DC, eMD, DE, sNJ		

Lunar Grazing Occultations

2014											
Date	Day	EDT	Star	Mag	% alt	CA	Location & Remarks				
Oct 1	Wed	21:21	SAO 161825	8.3	52+	25	8S	*Hamletn, VA; MtAiry&Finksbrg, MD			
Oct 1	Wed	21:59	SAO 161847	8.4	53+	20	8S	*ClearSpg, MD; Midltn, Bangr, PA			
Oct 12	Sun	1:04	SAO 93927	7.5	83-	44	8N	ChrI tsv, Qantco, VA; Brndywn, MD			
Oct 14	Tue	6:42	ZC 975	6.8	63-	66	3S	ScotI and, Loganville, PA; Sun -7			

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

Total Lunar Occultations

2014											
Date	Day	EDT	Ph Star	Mag	% alt	CA	Sp.	Notes			
Sep 11	Thu	5:58	R zeta PscA	5.2	93-	39	37N A7	AA325, ZC180, close dbl?			
Sep 11	Thu	5:59	R zeta PscB	6.3	93-	39	37N F7	Sun-10, AA 326, ZC 181			
Sep 13	Sat	1:16	R ZC 437	7.3	78-	39	15S G5				
Sep 13	Sat	4:56	R ZC 449	7.9	77-	66	52N K0				
Sep 15	Mon	2:20	R SAO 94132	8.1	58-	34	58N F2	mag2 10, sep. 9", PA318			
Sep 17	Wed	1:30	R SAO 95771	7.3	38-	6	49S K0	Az. 73, mg2 11, 24", PA 6			
Sep 17	Wed	1:50	R 21 Gem	6.3	38-	10	38N F6	Az 75, ZC1003, dbl, prime			
Sep 17	Wed	1:50	R 20 Gem	6.9	38-	10	40N G8	21Gem+24s, ZC1002, 2ndary			
Sep 17	Wed	1:53	R SAO 95791	7.9	38-	10	73N K0	Az. 76			
Sep 17	Wed	3:52	R ZC 1011	7.3	37-	33	74N K0				
Sep 18	Thu	5:57	R ZC 1136	8.1	28-	46	79S A2	Sun alt. -11 degrees			
Sep 19	Fri	6:21	R SAO 97727	7.9	20-	41	54N G0	Sun alt. -7 deg.			
Sep 21	Sun	5:08	R SAO 117942	7.7	7-	7	57S G5	Az. 85, close double?			
Sep 30	Tue	22:33	D ZC 2573	7.2	42+	7	81N A0	Azimuth 238 degrees			

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

The Pleiades Error

- Some Europeans and Americans have a disagreement over the distance of the "Seven Sisters" (Pleiades) appearing in the Taurus Constellation. According to an August study, the Americans calculated the Pleiades distance ≈ 430 ly vs. the European calculation ≈ 390 ly. Both camps reported a small error rate. The American camp coordinated radio telescopes across the Earth into one planet-sized telescope and used a modified parallax approach in its distance calculations. The European Space Agency (ESA) used its Hipparcos satellite in its parallax method, but the satellite's cameras weren't sensitive enough to identify background galaxies as reference points. Therefore, a 100,000+ star catalog was compared to Hipparcos' surveyed stars.
- Neither side yielded. However, according to *Nature*, Pleiades is supposed to be made of young stars and a number of measurements are based on the characteristics of these stars. So, if the ESA distance is correct, scientists don't understand young stars after all. Astronomer Carl Metis of UC-San Diego was quoted as saying, "If we don't understand young stars, we're kind of hosed."
- Allegedly, the matter is settled with a recalculation of 443 ly (error = 1%).

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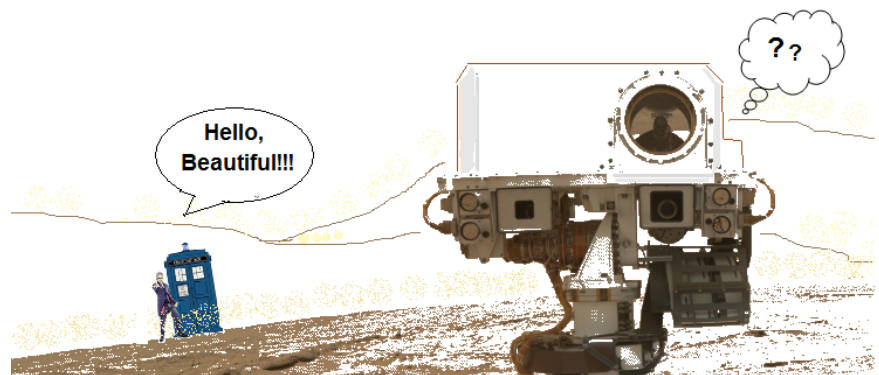
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Rhea & SAO 159034 – continued from page 4

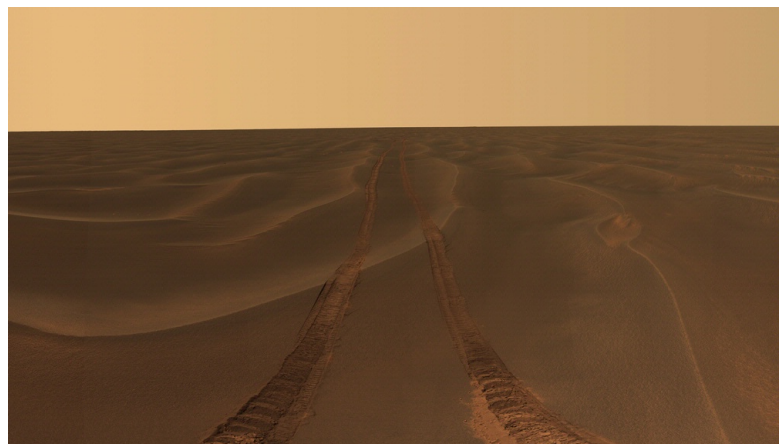
• a location with a horizon low enough in that direction. Since the central
 • line passes north of the Earth's surface, the actual duration of the
 • occultation will likely be much less than the 58-seconds central duration.
 • Although Washington, DC is in the path of the predicted occultation, it is
 • only a short distance north of the predicted southern limit. So, with the
 • prediction uncertainties, we don't know if an occultation will occur here or
 • not; and, if it does occur, how long it will last. The duration could be more
 • than 30 seconds. Within one standard deviation, the southern limit could
 • be anywhere from central Florida to New Orleans, or as far north as
 • central New England.

Planetary Destinations



Courtesy CA Brooks

• Humans have their eyes set on the next giant leap: *Mars*. Projected
 • launches are for the 2030s using gravity-assist maneuvers & cycloer
 • trajectories. In the meantime, don't miss the National Air & Space
 • Museum exhibit, "***Spirit & Opportunity: 10 Years Roving across Mars.***"
 • The rover images are amazing and the last day of the exhibit is Sept. 14th.



Courtesy NASA/JPL-Caltech/Cornell University

• *While in Purgatory... Opportunity was stuck in the sand (a dune called*
 • *"Purgatory") on the Meridiani Plains for over a month, plenty of time to take this*
 • *picture called "Rub Al Khali" (named after the Arabian Desert's "empty quarter")*

Visiting Asteroids



Surface of the asteroid, Vesta
 Courtesy NASA/JPL
<http://dawn.jpl.nasa.gov/>

Ion-propelled Dawn, launched in 2007, is the first spacecraft to orbit an asteroid in the main belt. Investigating how planets in our System formed, Dawn arrived at Vesta in 2011 and is scheduled to arrive at Ceres in 2015.

The submission deadline for the October issue of Star Dust is Sept. 27th.

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
- **Phoebe Waterman Haas Public Observatory** at the National Air & Space Museum, Solar viewing, Wed. - Sun., 12 - 3 pm (weather permitting).
- **Museum Exhibit:** "Spirit & Opportunity: 10 Years Roving across Mars" at the National Air & Space Museum through Sept. 14.
- **Mid-Atlantic Senior Physicists Group:** "Collisions in Space: The Threat of Asteroid Impacts" with Melissa Hayes-Gehrke (UMD), Wed. Sept. 17, at 1 pm at the American Center for Physics (1st floor conference room). <http://www.aps.org/units/maspg/>
- **NASA Goddard Visitors Center:** Monthly Model Rocket Launch, Sun. Oct. 5, at 12:45 pm, ICESat Road, Greenbelt, MD.
- **Owens Science Center Planetarium:** "Heroes of the Sky," Fri. Oct. 10, at 7:30 pm; \$5/adult; \$3/students/senior/teachers/military; children under 3 free. Doors open 7:15 for pre-show activities. www1.pgcps.org/howardbowens
- **Upcoming NCA Meetings** at the University of Maryland Observatory: **11 Oct:** Marc Kuchner (GSFC), "Citizen Science: Disk Detectives Search for Forming Exoplanetary Systems."

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.?

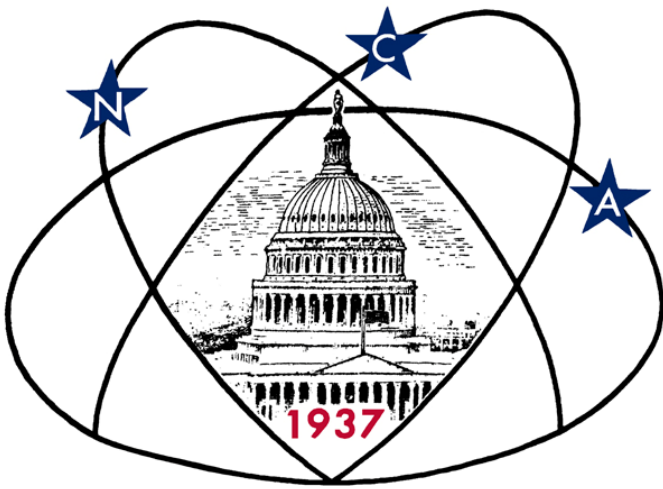
Are you interested in volunteering for: Telescope making, Exploring the Sky, Star Dust, NCA Officer, etc.?

Please mail this form with check payable to **National Capital Astronomers** to:
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Next NCA Meeting:
2014 September 13th
7:30 pm
@ UMD Observatory

**Dr. Melissa N.
Hayes-Gehrke**

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