

**Celebrating 80 Years  
of Astronomy  
1937-2017**

## Next Meeting

**When:** Sat. May 13th, 2017

**Time:** 7:30 pm

**Where:** UMD Observatory

**Speakers:** Alycia Weinberger

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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](mailto:rigel1@starpower.net).

# Star Dust

*Newsletter of National Capital Astronomers, Inc.*

[capitalastronomers.org](http://capitalastronomers.org)

May 2017

Volume 75, Issue 9

## Snapshots of Planet Formation

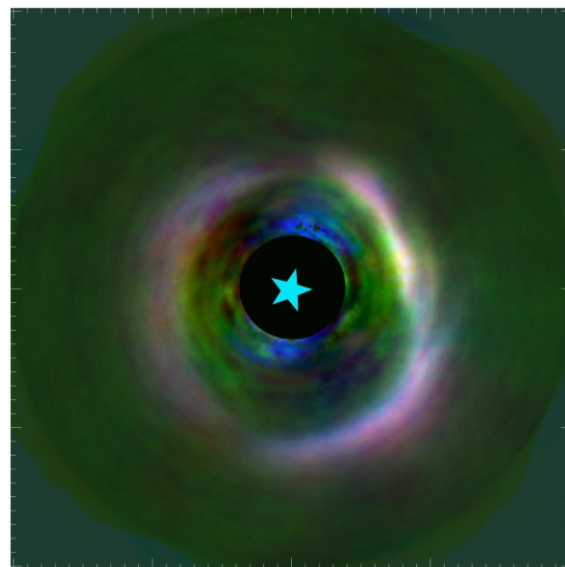
*Alycia J. Weinberger*

*Department of Terrestrial Magnetism  
Carnegie Institution for Science*

**Abstract:** In the first days of our Solar System, dust and gas that surrounded our young Sun in a disk slowly accumulated into planetesimals that grew into protoplanets and eventually planets. Much is still not known about how volatile molecules, such as water and organics, survived the heat and collisions of the planetary formation process. Obviously, they somehow found a way to Earth, which supports life. This talk will focus on how the initially ubiquitous disks of gas and dust around young stars form the diversity of observed mature planetary systems.

This talk will also reveal how advanced instrumentation and data processing techniques on the ground and in space enable ultra-high spatial-resolution images of disks. This allows probing of disk dynamics and compositions, including where and how ices and organics exist throughout disk evolution.

In addition, the talk will also address how the Large Binocular Telescope Interferometer can search for faint remnant disks that reveal the presence of planetary systems like our own and highlight stars that will be fertile hunting grounds for habitable planets. Finally, the talk will demonstrate how Atacama Large Millimeter Array data, in conjunction with optical/infrared data, show where comets and asteroids populate disks and how they may reveal the locations of planets that sculpt their orbits.



*Courtesy A. Weinberger  
Infrared image of a disk around HD 142527.*

*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.

### Beethoven, Chuck Berry & billions of miles ...



Courtesy NASA/JPL

One of the Voyager spacecraft

**“In all likelihood, Voyager will outlive humanity.”**

The quote is from *“The Farthest,”* a new documentary about Voyager’s interstellar flight, the visions of the builders and the golden record (which, of course, contains information on who humans are, including Chuck Berry & Beethoven).

Voyagers 1 & 2 were launched in 1977 on top of a Titan-Centaur rocket. Voyager 1 will be within 4 lightyears of Sirius in about 290,000 years.

See the movie trailer below:

[https://youtu.be/znTdk\\_de\\_K8](https://youtu.be/znTdk_de_K8)

### The Great North American Eclipse



**Aug 21<sup>st</sup> 2017**

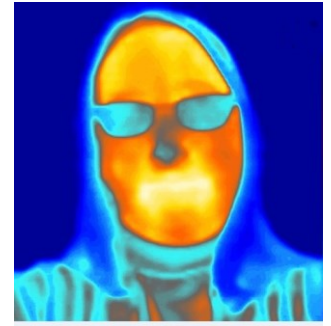
<http://www.greatamericaneclipse.com/>

• Planet Formation – continued from page 1

#### • Biographical Sketch:

• Alycia Weinberger is a staff member at the Department of Terrestrial Magnetism of the Carnegie Institution for Science in Washington, DC, where she observes young Milky Way stars and their disks. She also looks for and studies extrasolar planetary systems.

• Weinberger received her B.A. in physics from the University of Pennsylvania and her Ph.D. in physics from Caltech. Before joining the Carnegie scientific staff in 2001, she was a NICMOS postdoctoral researcher and astrobiology postdoctoral fellow at UCLA. She is an active user of ground and space telescopes, including being the principal investigator of current programs with the Hubble Space Telescope, Stratospheric Observatory for Infrared Astronomy, the Atacama Large Millimeter Array, and Carnegie’s telescopes at Las Campanas Observatory. Her awards include the Annie Jump Cannon Prize of the American Astronomical Society, the Vainu Bappu Gold Medal of the Astronomical Society of India as well as lectureships as the Beatrice Tinsley Visiting Fellow at University of Texas at Austin and a Distinguished Visitor at Haverford College.



Courtesy A. Weinberger  
Alycia in infrared

## March for Science Guest Appearance



(Image capture) Courtesy CA Brooks

The crowd applauds NCA Member Nancy Grace Roman at the March for Science Main Stage, Washington DC, April 22, 2017

## 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!

### 2017 Observation Dates

- 2 April (8:30 pm)** – Winter Constellations & Jupiter
- 7 May (9:00 pm)** – Mars, Saturn, Antares & the Big Dipper
- 4 June (9:00 pm)** – Vega & 3 planets
- 9 July (9:00 pm)** – Summer Triangle, Moon & Jupiter
- 6 August (8:30 pm)** – Andromeda & Mercury
- 3 September (8:00 pm)** – Mars, Saturn, Antares & Vega
- 1 October (7:30 pm)** – Summer Triangle
- 5 November (7:00 pm)** – Pleiades & Winter Constellations

Hosted by: [National Capital Astronomers, Inc](#) and [Rock Creek Park](#)

## Sky Watchers

## Spring Schedule

### May

10	5:42 pm – <b>Full Moon</b> , Global. Other Moon Names: Full Flower Moon (abundance of flowers), Full Corn-planting Moon, Full Milk Moon.
14	3:51 pm – <b>Moon</b> , Global. (apogee at 252,407 miles).
17	7 pm – <b>Planets</b> , N. Hemisphere. <i>Mercury</i> (at greatest western elongation, 26°).
17 -26	Evening – <b>Globe at Night</b> , Global. Features: <i>Constellations Leo</i> (N. Hemisphere) & <i>Crux</i> (S. Hemisphere).
20	2 am – <b>Planets</b> , N. Hemisphere. <i>Neptune</i> 0.5° north of Moon.
23	1 am – <b>Planets</b> , N. Hemisphere. <i>Uranus</i> 4° north of Moon. 9 pm – <b>Planets</b> , N. Hemisphere. <i>Mercury</i> 1.6° north of Moon.
25	9:21 pm – <b>Moon</b> , Global. (perigee at 221,958 miles).
26	10 pm – <b>Planets</b> , N. Hemisphere. <i>Mars</i> 5° north of Moon.

Times EDT

## (599) Luisa

*David Dunham*

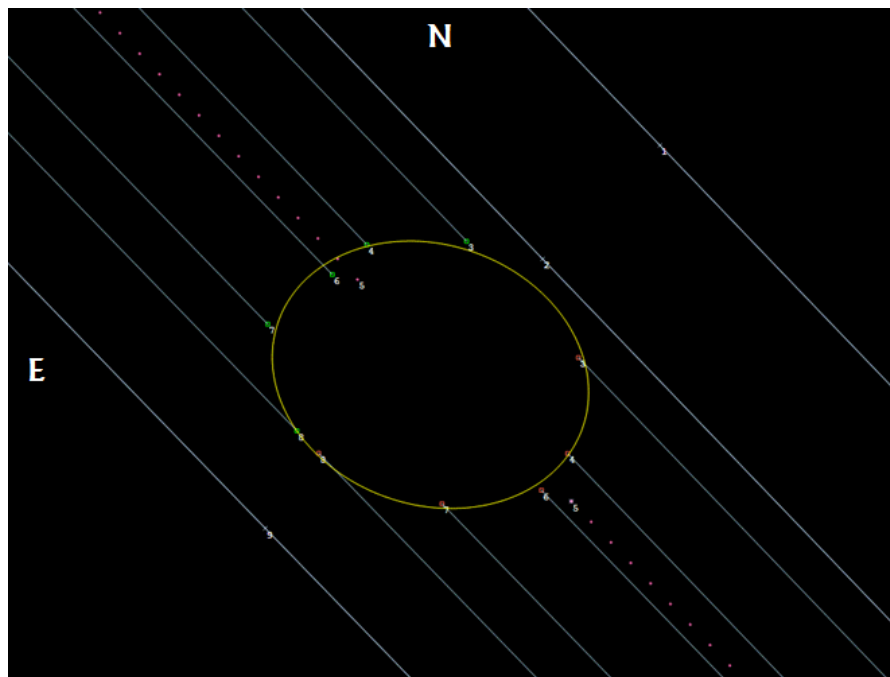
The star SAO 184216 (Smithsonian Astrophysical Observatory catalog), also designated as HIP 79392, was occulted by asteroid (599) Luisa. At magnitude 8.5, SAO 184216 was the brightest star occulted by a sizable asteroid in the east coast area during the last 9 months. It occurred on Sunday night/Monday morning, the night after the April NCA meeting. Our original plan was to try it in North Carolina, to reach the whole path, but Roger Venable (from southern Georgia) covered the southern half of the path in Florida. That allowed us to make a shorter drive to cover just the north half of the path on the Delmarva Peninsula. Our southernmost station was at Chincoteague, VA, the closest we could get, within 5 km, of the predicted central line. As can be seen from the plot, the strategy

*continued on page 4*



(599) Luisa – continued from page 3

worked well, with all of the observations being fit well by an ellipse with the dimensions 63 x 78 kilometers.



Courtesy David Dunham

Sky-plane Plot of the Observations of the Occultation of SAO 184216 by (599) Luisa on April 10, 2017

## Hopewell Observatory Open House

Michael Chesnes

Come to the Annual Spring Open House at Hopewell Observatory on Saturday, May 27, 2017 (Cloudy or not)!

All astronomy members, friends, and relatives, are invited to come see the skies at a small, private, member-built and member-owned observatory in the foothills of Northern Virginia. If the skies are overcast or rainy, then the Open House will consist instead of a tour of our facilities. The Hopewell Observatory is located on a small mountainous ridge called the "Bull Run Mountain," about 5 miles northwest of the intersection of I-66 and US-15 at the small town of Haymarket, VA. It is about 36 miles due west of the US Capitol building, and probably located on the highest (1,178 feet) and darkest area anywhere close to the Capital Beltway. It is surrounded by woods, thanks to ownership of much of that land by the Jackson Hollow Recreation Area, the Bull Run Mountain Conservancy, and the Federal government.



HOPEWELL  
OBSERVATORY

continued on page 6

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

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• Editor: CA Brooks

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- Elizabeth Warner
- Wayne Warren
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### Please Get Star Dust Electronically

• NCA members able to receive Star Dust,  
• the newsletter of the NCA, via e-mail as a  
• PDF file attachment, instead of hardcopy via  
• U.S. Mail, can save NCA a considerable  
• amount of money on the printing and  
• postage in the production of Star Dust (the  
• NCA's single largest expense), save some  
• trees and have one-click access to all the  
• embedded links in the document. If you can  
• switch from paper to digital, please contact  
• Henry Bofinger, the NCA Secretary-  
• Treasurer, at [hbofinger@earthlink.net](mailto:hbofinger@earthlink.net)

**Thank you!**

### The "Grand Finale"



Courtesy NASA/JPL-Caltech

• From April & September, Cassini will  
• make 22 weekly dives between Saturn  
• & its rings. The spacecraft's final entry  
• into Saturn's atmosphere will be on  
• September 15<sup>th</sup>, 2017, at 10:44 am UT.  
• Earth will also receive Cassini's last  
• signal that day at 12:08 pm UT.

• Learn more: <http://tinyurl.com/llwr5x5>

## 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

Date	Day	EDT	Star	Mag	Asteroid	dur.	Ap.	Location, Notes
May 18	Thu	1:02	SAO 183793	8.1	Hildegard	4.9	2 2	se-ncNC, cVA, cWV
May 23	Tue	3:31	4UC34479116	12.1	2004 HE79	11.4	4 9	TNO; VA; any eUSA
Jun 2	Fri	23:20	4U348170229	15.6	2014 MU69	12	4 16	Chile, Argentina
Jun 3	Sat	22:28	4UC39169045	12.3	Isko	2.7	3 10	SMD, nVA, nWV; DC?
Jun 12	Mon	3:19	2UC26797390	12.1	Pauly	1.1	9 8	SDE, MD, DC, SWPA

### Lunar Grazing Occultations

Date	Day	EDT	Star	Mag	% alt	CA	Location & Remarks
Jun 2	Fri	20:50	SAO 119212	7.5	65+ 58	6N	*Raeford, TarHeel, Wilmingtn, NC

\* No expedition planned from the Washington, DC region

\*\*\* Interactive detailed maps at <http://www.iota.timerson.net/> \*\*\*

### Total Lunar Occultations

Date	Day	EDT	Ph Star	Mag	% alt	CA	Sp.	Notes
May 14	Sun	5:46	R ZC 2611	7.1	89- 25	30N	B9	Sun altitude -2 deg.
May 15	Mon	3:10	R X 44912*	8.3	83- 28	78N	B8	
May 15	Mon	3:47	R SAO 161947	7.0	83- 31	26N	K2	
May 14	Sun	5:46	R ZC 2611	7.1	89- 25	30N	B9	Sun altitude -2 deg.
May 15	Mon	3:10	R X 44912*	8.3	83- 28	78N	B8	
May 15	Mon	3:47	R SAO 161947	7.0	83- 31	26N	K2	
May 18	Thu	3:23	R ZC 3136	8.0	57- 18	44S	K1	
May 19	Fri	3:20	R ZC 3267	7.3	47- 12	33N	G8	Az. 116, close double??
May 19	Fri	4:33	R SAO164999*	8.6	46- 23	25S	F5	
May 19	Fri	4:44	R SAO164994*	7.9	46- 25	51N	K0	Sun-12, 2nd mg14? 1.9"
May 20	Sat	4:55	R ZC 3404	7.3	36- 23	86N	G0	Sun altitude -10 deg.
May 28	Sun	21:25	D SAO 97072	7.7	15+ 21	60N	A2	Sun altitude -11 deg.
May 28	Sun	22:54	D 74 Gem	5.0	15+ 5	37S	M0	Az. 289, ZC1158, dbl??
May 29	Mon	21:25	D SAO 97956*	8.0	24+ 31	53N	F8	Sun alt. -11 deg.
May 29	Mon	22:59	D SAO 98007*	7.6	24+ 13	37N	K2	Az. 280, close double?
May 31	wed	0:04	D ZC 1422	6.7	35+ 9	66S	G8	Azimuth 279 deg.
May 31	wed	21:55	D CX Leonis	6.0	45+ 41	72N	A0	ZC1531, close double
May 31	wed	22:42	D SAO 118325	8.4	45+ 32	84N	G5	
Jun 1	Thu	0:45	D rho Leonis	3.8	46+ 9	56N	B1	Az275, ZC1547, close dbl
Jun 4	Sun	1:09	D ZC 1864	6.7	76+ 22	48N	K2	
Jun 4	Sun	2:28	D 46 Vir	6.2	76+ 7	69S	K2	Az260, ZC1869, close dbl
Jun 11	Sun	4:06	R ZC 2710	6.7	97- 27	50N	A8	Axis Angle 302 deg.
Jun 13	Tue	0:27	R ZC 2959	7.4	88- 14	90N	A3	Azimuth 129 degrees
Jun 13	Tue	1:03	R SAO 163426	7.7	88- 20	55N	A2	
Jun 13	Tue	3:10	R SAO 163479	7.3	88- 32	88S	K3	maybe close double?

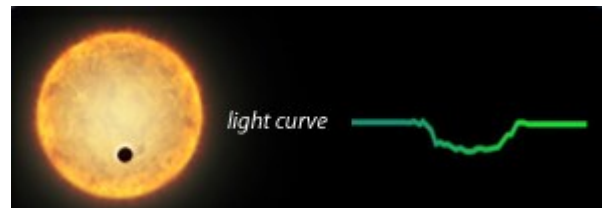
\* The star is in the Kepler 2 exoplanet search program so lightcurves of the occultation are desired to check for close stellar duplicity.

Further explanations & more information is at <http://iota.jhuapl.edu>

David Dunham, [dunham@starpower.net](mailto:dunham@starpower.net)

### How does Kepler find Planets?

<https://kepler.nasa.gov/>



## 2016-2017 Officers

### President:

Joseph Morris  
[j.c.morris@verizon.net](mailto:j.c.morris@verizon.net)  
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### Vice-President:

John Hornstein  
[jshgwave@yahoo.com](mailto:jshgwave@yahoo.com)  
 301-593-1095 (h)

### Secretary-Treasurer:

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[hbofinger@earthlink.net](mailto:hbofinger@earthlink.net)  
 202-675-1075

### Asst. Secretary-Treasurer:

Jeffrey B. Norman  
[jeffreynorman@comcast.net](mailto:jeffreynorman@comcast.net)

### Trustees:

- Benson Simon (2017)
- Andrew Seacord (2018)
- Wayne Warren (2019)
- Harold Williams (2020)

### Appointed Officers and Committee Heads:

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 Jay Miller  
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### Social Media

Liz Dervy  
 Twitter: [@NatCapAstro](https://twitter.com/NatCapAstro)

## June Election Information

*John Hornstein,  
 Reporting for the Nominating Committee, May 2017*

Following is the slate of 2017-2018 officers and other board positions for consideration before the June meeting.

### Executive Officers

Position	Current	Candidate(s)
President	Joseph Morris	Harold Williams
Vice President	John Hornstein	John Hornstein
Secretary-Treasurer	Henry Bofinger	Henry Bofinger
Assistant Secretary-Treasurer	Jeff Norman	Jeff Norman

### Trustees

Current	Candidate(s)*
Andrew Seacord (to June 2018)	N/A
Wayne Warren (to June 2019)	N/A
Harold Williams (to June 2020)	Joseph Morris
Benson Simon (to June 2021)	N/A

\* Note: Only one Trusteeship opening occurs each year.

### Appointed Officers and Committee Heads

Committee	Officer/Head	Contact Information
Exploring the Sky	Jay Miller	<a href="mailto:jhmillier@me.com">jhmillier@me.com</a>
Telescope Making	Guy Brandenburg	<a href="mailto:gbrandenburg@yahoo.com">gbrandenburg@yahoo.com</a> 202-635-1860
NCA Webmaster	Elizabeth Warner	<a href="mailto:warnerem@astro.umd.edu">warnerem@astro.umd.edu</a>
Star Dust Editor	Todd Supple	<a href="mailto:NCAStardust@gmail.com">NCAStardust@gmail.com</a>

### Open House – continued from page 4

We currently have two telescope piers in separate observing rooms under a roll-off roof (you will need to climb some stairs inside the observatory to look through the eyepieces). One pier houses a massive, research-grade mount manufactured by Ealing, which guides a Celestron 14-inch Schmidt-Cassegrain telescope, a 6-inch f/15 refractor made by Jaegers, and a variety of guide scopes. The other pier houses an unusual 12-inch diameter Wright-Newtonian catadioptric telescope entirely made by one of our senior members, Bob Bolster – and that includes the optics. Other member-owned telescopes will be located on the grassy area outside the observatory.

We have hot chocolate, a simple composting toilet (with directions) in a red-lit outhouse behind the operations building, but we have no running water. We have some bottled drinking non-potable water as well as towels, toilet paper, sanitary gel, etc.

*continued on page 7*

Open House – continued from page 6

The observatory is located at:  
(38.8698, -77.6988).

For directions, see *Guy’s Math & Astro Blog*:

<http://tinyurl.com/kou9wjp>

If you get lost in transit, you can call the observatory directly at 703-754-2317.

Also, if you would like a detailed astronomical weather forecast for the location, do a Google search for “Hopewell Observatory Clear Sky Chart” or go directly to:

<http://tinyurl.com/HAS2009>

**The submission deadline for June’s Star Dust, the last issue of this series, is May 28<sup>th</sup>.**

**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](mailto: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](http://www.astro.umd.edu/openhouse)
- **Owens Science Center Planetarium:** “Time & Space Warp,” Fri. May 12, 7:30 pm; \$5/adult; \$3/students/senior/teachers/military; children under 3 free. [www1.pgcps.org/howardbowens](http://www1.pgcps.org/howardbowens)
- **Mid-Atlantic Senior Physicists Group:** “The Wide-Field InfraRed Survey Telescope (WFIRST)” with Jeffrey W. Kruk (NASA/GSFC), Thur. May 18\*, at 1 pm at the American Center for Physics (1<sup>st</sup> floor conference room). *\*This is the 3<sup>rd</sup> Thursday of the Month.* [www.aps.org/units/maspg/](http://www.aps.org/units/maspg/)
- **Towel Day,** annual tribute to author Douglas Adams (“*Hitchhiker’s Guide to the Galaxy*”) by all of the “hoopy froods,” Thur. May 25, on Earth & in space. [www.towelday.org/](http://www.towelday.org/)
- **Astronomy Festival on the National Mall:** Fri. June 2, 6 - 11 pm, north of the Washington Monument. Hosted by [Hofstra University](http://Hofstra University). *NCA will also be participating with an info table & guided telescope use for the public.*
- **Upcoming NCA Meetings** at the University of Maryland Observatory:  
10 June: Science Fair Winners! Elections! Astro-photos!

## 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.?

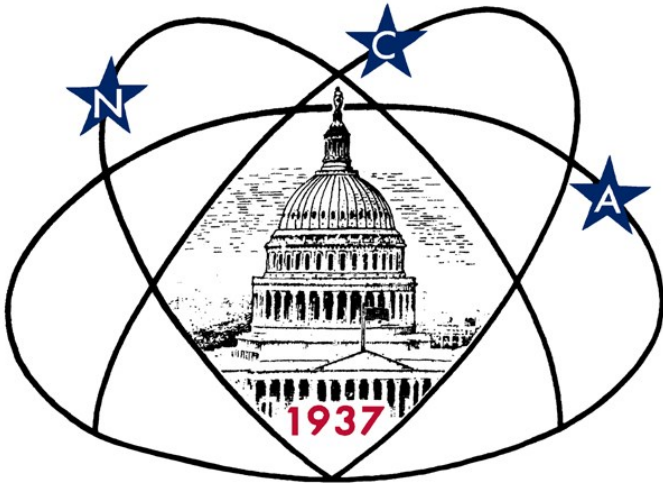
Are you interested in volunteering for: Telescope making, Exploring the Sky, Star Dust, NCA Officer, etc.?

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.

If undeliverable, return to  
NCA c/o Elizabeth Warner  
400 Madison St #2208  
Alexandria, VA 22314

First Class  
Dated Material



*Celebrating 80 Years of Astronomy  
1937-2017*

*Next NCA Meeting:*

**2017 May 13<sup>th</sup>**

**7:30 pm**

**@ UMD Observatory**

**Dr. Alycia J.  
Weinberger**

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