

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

Star Dust

Newsletter of National Capital Astronomers, Inc.

capitlastronomers.org

October 2017

Volume 76, Issue 2

Next Meeting

When: Sat. October 14th, 2017

Time: 7:30 pm

Where: UMD Observatory

Speaker: Dr. Erika R. Nesvold

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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 Alamo Mexican Restaurant. The restaurant is located at 5508 Kenilworth Avenue, Riverdale, MD 20737.

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

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.

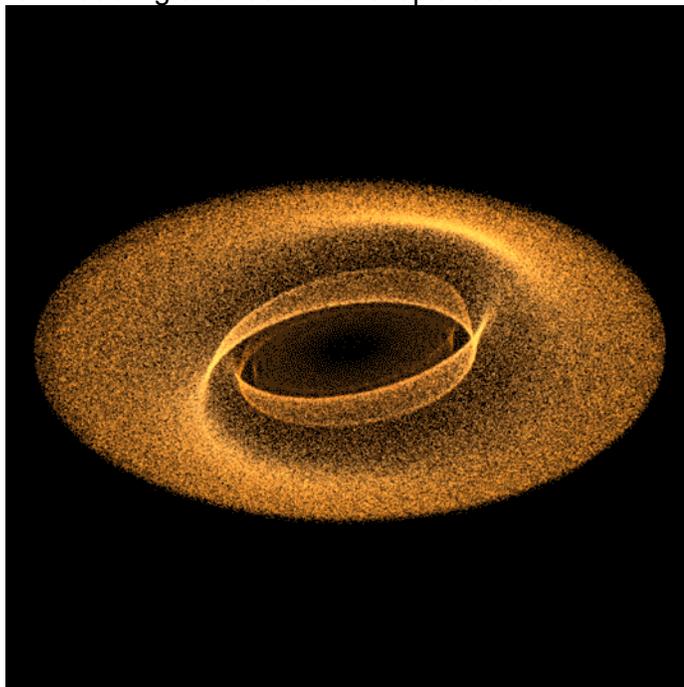
Debris Disks: What Astronomical Leftovers Can Tell Us About Planets

Erika R. Nesvold

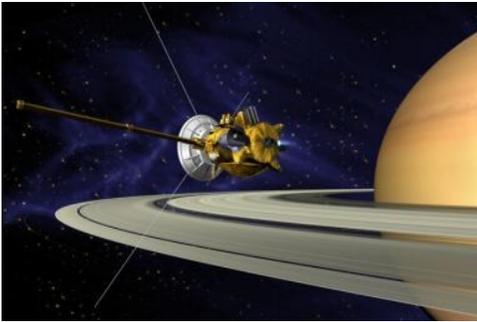
Carnegie Institution for Science

Department of Terrestrial Magnetism

Abstract: Debris disks are made up of the rocky and icy material left over from planet formation. Observations of debris disks around other stars with optical and infrared telescopes have revealed that many of these disks are lumpy and asymmetric, indicating that unseen exoplanets may be nearby, shaping the disks via gravity. By modeling this gravitational interaction between a planet and disk, we can predict the presence of an undetected exoplanet and even estimate its mass and orbit. I will present my research on debris disk models and provide some examples of the power of disk modeling to understand exoplanets.



Debris disks come in a variety of shapes and sizes. By modeling the effects of a planet's gravity on a disk, we can use the disk's observed shape to learn about the planet's mass and orbit. This simulated image of the beta Pictoris debris disk shows the complex spiral structure created by the unseen planet beta Pictoris b. (Credit: NASA Goddard Scientific Visualization Studio/E. Nesvold)



Artist's Conception of Cassini-Huygens Saturn Orbit Insertion – Image Credit: NASA/JPL

Farewell, Cassini

After 20 years in space, 13 in orbit of Saturn, the Cassini spacecraft plunged into the Saturnian atmosphere on Sept. 15th to keep it from potentially crashing into one of the planet's moons and contaminating it with any hitchhiking microbes from Earth.

In this space it would be impossible to list all of the discoveries Cassini-Huygens made. Closeups of Saturn's rings, images of the hexagon storm at Saturn's South Pole and the images of the surface of Titan sent back by the Huygens probe are just a few.

So, while the mission has ended, the science continues, and you can view thousands of incredible images at:

images.nasa.gov/#/search-results?q=cassini-huygens&keywords=&page=5&media=image,video,audio&yearStart=1920&yearEnd=2017

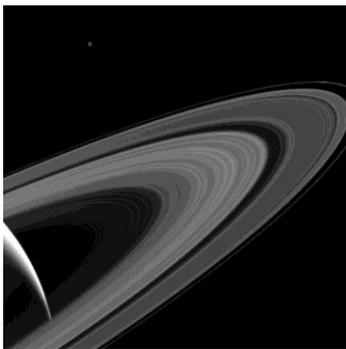


Image Credit: NASA/JPL-Caltech/Space Science Institute

Debris Disks – continued from page 1



Erika Nesvold talking about the results of her research.

Biographical Sketch:

Erika Nesvold completed a Bachelor's degree in Mathematics and a Ph.D. in Physics at the University of Maryland, Baltimore County. She performed her graduate research at the NASA Goddard Space Flight Center with Dr. Marc Kuchner, on the modeling of circumstellar debris disks. She is now a Carnegie Postdoctoral Fellow at the Carnegie Institution's Department of Terrestrial Magnetism.

Star Designations and Names

If you are not an astronomer, you may have wondered, in reading the caption for the picture on Page 1, if 'beta Pictoris' was a typo. Actually that is the correct way of writing a star designation. Designations are primarily used in astronomical research. The second half of a star designation (e.g. Pictoris) indicates the constellation within which the star resides, in this case the southern constellation of Pictor. The first part of the designation (e.g. beta) usually indicates where it is in the order of brightness of stars within that constellation - alpha being the brightest, beta the second and so on. Also this part of the designation is lower case because the lower-case Greek letters are used to give the designation (e.g. beta Pictoris is also β Pictoris). Scientists also often abbreviate star designations, with beta Pictoris being bet Pic or even β Pic.

Names, unlike designations, often have historical origins and are capitalized. For instance, the name Betelgeuse, star designation - alpha Orionis, is of Arabic origin, said to mean 'the hand of Orion'. Sometimes designations become so popular that they then are considered names, such as Alpha Centauri, and are therefore often capitalized.

By the way, despite its 'alpha' designation, Betelgeuse currently isn't the brightest star in Orion. Rigel is. So why that designation? Betelgeuse is a variable star and apparently at the time its designation was given, it was the brighter of the two. Just one of many examples of astronomers trying to organize things, and the Universe throwing them a curve.

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

21 October (7:30 pm) – Summer Triangle

18 November (7:00 pm) – Pleiades & Winter Constellations

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

An Astronomical Treat

Nature will be celebrating this Halloween with a waxing gibbous moon rising in the Eastern sky, lighting the way for all of those trick-or-treaters. So if it’s not too cloudy, and you have a pair of binoculars or a telescope that you don’t mind ghosts, goblins, superheroes and fairy princesses getting near, it might be the perfect time to turn them into astronomers as well by showing them some lunar craters. And if there are a few clouds crossing the sky, all the better for that horror-movie feeling. Clear, or somewhat clear, skies! Hopefully.

Sky Watchers

Fall

October/November

Saturn remains visible in the early evening sky throughout October and into November. Venus and Mars remain visible in the early morning sky with Jupiter joining them late in October.	
10/19	New Moon and the opposition of Uranus.
10/21 -10/22	Peak of the Orionids meteor shower – approximately 20 meteors per hour the morning of the 22 nd .
11/4	Full Moon. Beaver Moon 12:23 a.m. (also known as the Corn Moon and Flower Moon)
11/4 – 11/5	Peak of the Taurids meteor shower – 5-10 meteors per hour. Unfortunately, the full moon will make for less than ideal viewing conditions.
11/13	Conjunction – Venus 0.3° north of Jupiter. 1:10 a.m.

Times EDT through 11/4 – EST after 11/5

Tales of the Eclipse

Along with millions of others, NCA members took part in viewing the Great North American Eclipse of 2017. The following pages contain pictures and stories of wonders, triumphs and near misses – all part of the eclipse experience.



A classic Diamond Ring.

Picture taken by Bernie Kaufman – Glendo State Park, Wyoming

Tales of the Eclipse – continued from page 3

Prasad Agrahar – Penn Wynne, PA (Partial Eclipse)

My granddaughter suggested we could hold an eclipse viewing at her elementary school. I distributed about 200 eclipse-viewing glasses among people, but the crowd size grew to an estimated 600 to 700. I set up two telescopes - one was an iOptron cube with an 80 mm f/5 achromat with a solar filter and a CCD camera, with a live view on a 42 inch large screen television. The second scope was my NCA-made 8-inch Dobsonian with an 8-inch Thousand Oaks Solar filter for viewing the eclipse. We distributed free drinking water to people. Attendees arrived in huge numbers with lawn chairs. The event also was attended by school and local officials and has appeared on the Lower Merion School District www.lmsd.org/penn-wynne/about/newsroom/article/~post/penn-wynne-community-gathers-to-view-solar-eclipse-20170831. Hearing those hundreds of oohs and aahs was the most memorable and exhilarating experience I ever had. (A story about Prasad's NCA-made telescope is at [StarDust 2015 10.pdf](#))

John Z. Wetmore – Orin, WY (Total Eclipse)

I had a Celestron-8 (with a solar filter for the partial phases). My brother had a 60 mm refractor. My sister had my 7x50 binoculars. There were a couple of very nice sunspot groups, which added to the interest when our neighbors came over to take a look through the C-8, and were nice landmarks to track the progress of the eclipse. The light grows eerie in the minutes leading up to totality. The air starts to cool down. Then you can see the darkness approaching from the west.

I didn't bother to try photographing this eclipse. It was my 7th, and I decided it was time to just watch it and enjoy myself. I spent most of the time looking through the telescope at the structure of the inner corona, the prominences, and the chromosphere. I stepped away from the eyepiece long enough to look at the outer corona, the planet Venus, and the 360-degree sunset.

Was it one of Einstein's theories that two and a half minutes never goes by as fast as it does during an eclipse?

Mike Laugherty – Smith Rock State Park, OR (Total Eclipse)

As coverage of the Sun approached 70%, I could definitely tell a difference in sunlight. It had a strange softness about it and looked as though it had been filtered somehow. Closer to totality the light became otherworldly, as though we inhabited a planet with either a much smaller sun or one that was much farther away. The temperature dropped and birds down in the canyon began to fly to trees. All around the canyon, people began to howl at the Moon covering the Sun and our friends' dog joined in.

I told our party to look west and watch the shadow approach us. We could see the horizon get darker and darker as the shadow made its way toward us. As day slowly became almost night, I saw a bat fly around near to us and then it happened. Turning east, the diamond ring flashed brilliantly and then...totality. Never in my life have I seen anything like this. The Sun's corona was amazingly visible; Venus shone bright and obvious. We stood there in awe. 2024 can't come soon enough.

continued on page 6

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Thank you!

Recent Astronomy Highlights

• Just a pair of highlights this month, and
 • appropriately enough, binaries are sort
 • of a theme. The Universe does seem to
 • favor them.

Binary Asteroid Acts Like a Comet

• For the first time, astronomers have
 • found a pair of orbiting asteroids that
 • display features of a comet.
 • www.sciencedaily.com/releases/2017/09/170920144724.htm

Supermassive Black Hole Binary

• Scientists have confirmed that
 • supermassive black holes can form
 • binaries when their galaxies merge.
 • P. Kharb, D. V. Lal, D. Merritt. **A
 • candidate sub-parsec binary black
 • hole in the Seyfert galaxy NGC 7674.**
 • *Nature Astronomy*, 2017; DOI:
 • [10.1038/s41550-017-0256-4](https://doi.org/10.1038/s41550-017-0256-4)

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 Occultations

Date	Day	EDT/EST	Star	mag.	Asteroid	dmag	dur. s	Ap. "	Location, Notes
Oct 15	Sun	4:47	SAO 38480	7.6	Hartley	8.0	4 2	s-nwNC,wVA,eKY	
Oct 17	Tue	20:01	4U371141955	13.7	Leucus	5.1	2 12	OH,PA,MA;MD,VA?	
Oct 24	Tue	21:18	SAO 186802	9.5	Geometria	4.4	1.1 4	OH,nwPA,w&nNY	
Oct 25	wed	5:41	TYC07800625	9.7	Leona	5.7	3 4	wNY,n&ePA,cNJ	
Oct 29	Sun	5:43	SAO 115561	8.5	Gotha	7.0	1 3	neKY,wVA,n&eNC	
Nov 2	Thu	22:21	4U 553-5344	12.8	Milnstefank	4.1	2.4 9	ePA,MD,DC,VA	
*** Dates and times above are EDT, those below are EST ***									
Nov 5	Sun	4:43	TYC19290183	11.9	Adeona	1.0	13 7	wNC,VA,sMD,nDE	
Nov 7	Tue	0:37	SAO 110109	7.2	Floirac	6.8	2 2	seVA,cenNC,nwSC	

Lunar Grazing Occultations

Date	Day	EDT/EST	Star	Mag	% alt	CA	Location & Remarks
Oct 15	Sun	5:05	Regulus	1.4	20- 24	7N	Baker,MT;Bismrk,ND;Bemidji,MN
Oct 27	Fri	19:20	pi Cap	5.1	50+ 32	0N	*Harrisburg & Allentown, PA
*** Dates and times above are EDT, those below are EST ***							
Nov 8	wed	4:30	SAO 96312	7.4	77- 69	4N	*Gamber,OwingsMills,Towson,MD
Nov 10	Fri	2:21	SAO98223**	8.3	56- 41	8N	Barboursvil,KingGeorge,VA;SMD

* No expedition planned from the Washington, DC region
 ** observations valuable since the star is in the Kepler2 program
 Interactive detailed maps at www.iota.timerson.net

Total Lunar Occultations

Date	Day	EDT/EST	Ph Star	Mag	% alt	CA	Sp. Notes
Oct 15	Sun	5:37	D Regulus	1.4	19- 30	-57N	B7 AA 56,ZC1487=alpha Leo
Oct 15	Sun	6:41	R =alpha Leo	1.4	19- 42	67N	B7 Sun -8,mg2 12 sep .05"
Oct 17	Tue	5:47	R SAO119072*	9.2	6- 9	85S	G0
Oct 23	Mon	20:28	D SAO160296*	8.1	16+ 6	51S	K2 Az240, close double?
Oct 24	Tue	21:03	D SAO186042*	8.2	24+ 7	68N	B8
Oct 25	wed	20:08	D ZC 2729	6.9	32+ 21	47N	B9 spectroscopic binary
Oct 25	wed	21:06	D 29 Sgr	5.2	32+ 14	76N	K2 Azimuth 229, ZC 2734
Oct 25	wed	21:53	D BB Sgr	6.8	32+ 7	81N	G0 Az.237,SAO187349,SpBin
Oct 25	wed	21:56	D SAO 187358	7.5	32+ 6	83N	B8 Az.238,Spectr. Binary
Oct 27	Fri	19:07	D pi Cap	5.1	50+ 33	15N	B4 Sun-11,ZC2981,PAgraze
Oct 28	Sat	19:21	D ZC 3118	6.9	60+ 34	65S	K0
Oct 29	Sun	18:48	D ZC 3245*	6.9	69+ 32	30S	F5 Sun altitude -8 deg.
Nov 4	Sat	19:56	R 5 Tauri	4.1	99- 11	33S	K0 Az82,AA239,ZC508,TD6"
*** Dates and times above are EDT, those below are EST ***							
Nov 5	Sun	19:58	D Aldebaran	0.9	95- 13	-85N	K5 Az. 79, AA 95, ZC 692
Nov 5	Sun	20:52	R =alpha Tau	0.9	95- 24	58S	K5 AxisAngle 248, ZC 692
Nov 6	Mon	22:51	R 127 Tauri	6.7	87- 36	60N	B9 ZC 863
Nov 6	Mon	23:50	R ZC 871	6.7	87- 47	34S	G8
Nov 7	Tue	0:16	R SAO 94839	7.5	87- 52	48S	B9 close double?
Nov 8	wed	3:20	R SAO 96253	8.0	77- 70	73N	B8
Nov 8	wed	4:39	R SAO 96312	7.4	77- 69	17N	A5
Nov 8	wed	5:34	R ZC 1060	7.3	76- 61	37S	K2 maybe close double?
Nov 8	wed	22:35	R 81 Gem	4.9	68- 10	76S	K5 Az 75,ZC1175,SpecBin
Nov 8	wed	23:23	R SAO 97260	7.0	68- 19	35S	K0 Mag2 8.6 sep 6" PA 275
Nov 9	Thu	6:09	R ZC 1203	7.1	66- 64	74S	G5 Sun -7, close double?
Nov 10	Fri	2:08	R SAO 98194	7.8	56- 38	76S	G5
Nov 10	Fri	3:23	R SAO 98229*	8.1	55- 52	64S	A0 close double??
Nov 10	Fri	4:46	R SAO 98249	7.9	55- 64	85N	K0
Nov 11	Sat	1:27	R SAO 98773	7.5	45- 19	78N	K0
Nov 11	Sat	3:09	R 23 Leonis	6.5	44- 38	49S	M0 ZC 1449
Nov 13	Mon	4:25	R ZC 1686	8.4	23- 28	49S	K0
Nov 13	Mon	4:38	R X17445*	9.7	23- 30	49S	K0

*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 iota.jhuapl.edu/exped.htm
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• *Tales of the Eclipse – continued from page 4*

• **Michael Chesnes – Grand Chain, IL (Total Eclipse)**

• For the 2017 total solar eclipse I was interested in contributing to the Baily's beads timing effort which NCA members David and Joan Dunham were organizing through the International Occultation and Timing Association (IOTA). IOTA has timed Baily's beads over a number of solar eclipses to monitor the Sun for subtle changes in its diameter. My contributions were very nearly successful, but ultimately were negated by last-moment human error on my part. Nevertheless, it was emotionally moving to see my first total eclipse, and it was an experience I heartily recommend.

• Since some of my future in-laws live in Grand Chain, IL, in the path of the eclipse and south of its centerline, the eclipse provided an opportunity for my fiancée Jane's extended family to get together.

• My main telescope was a 6-inch f8 Criterion reflector, which projected into a Sun Funnel (see picture below) with a 30 mm Kellner eyepiece. We used a GoPro Hero4 on a separate tripod to record the image in a Sun Funnel. Unfortunately, about three minutes before totality I bumped my telescope and because the Sun was a dim crescent by then I was not able to return it to the Sun Funnel's field of view until after totality. Once it was clear that I could not get my telescope repositioned in time, I was determined to enjoy totality by naked eye, and was astonished to see blue and red tints in the solar chromosphere that I thought were only visible in heavily processed digital images.

• Overall, planning for a solar eclipse and then observing it was thrilling but a little bittersweet. Already I have ideas for how to improve my equipment setup for 2024.



• Michael with his setup, including the Sun Funnel showing a partially eclipsed Sun. Picture taken by Jane Ulrich.

• **Joan and David Dunham – Bowling Green, KY (Total Eclipse)**

• We went to Columbia, Missouri and stayed with Joan's brother and sister-in-law, who live within the path of totality. We wanted to observe the eclipse from near the edge of the eclipse path in Missouri if it was predicted to be clear, or elsewhere if not. Before the eclipse, we visited prospective observation locations, asking for permission to observe there, distributing solar eclipse glasses, and seeking volunteers to observe. But, as eclipse day approached, the forecast was poor, so we left for clearer skies in Kentucky. The site we chose was the Sugar Maple Square, a small, nearly defunct mall, in Bowling Green. We were very close to the northern limit, with about 24 seconds of totality predicted for our location.

• *continued on page 7*

Tales of the Eclipse – continued from page 6

The photo below is from the images taken for the Eclipse Megamovie. The camera was a Sony Alpha 6000, with a 500mm telephoto. The image was at f/8, exposure 1/125 sec, ISO 200.



Picture taken by Joan Dunham

The submission deadline for November's Star Dust, is October 23.

Clear Skies!

Calendar of Events

- **NCA Mirror- or Telescope-making Classes:** Currently, meeting times are 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.) **Please note that meeting times may change in the near future due to proposed center hour changes.** Contact instructor Guy Brandenburg at [202-635-1860](tel:202-635-1860) or email him at gfbrandenburg@yahoo.com to confirm times for upcoming meetings.
- **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
- **Mid-Atlantic Senior Physicists Group:** "Peregrinus versus the Pole Model: The Physics and History of Magnetism" with Dr. Jonathan Keohane, Hampden-Sydney College. Wed. Oct. 18, at 1 pm at the American Center for Physics (1st floor conference room) with Q&A to follow. 1 Physics Ellipse, College Park, MD-- off River Rd., between Kenilworth Ave. and Paint Branch Parkway. www.aps.org/units/maspg/
- **Upcoming NCA Meeting** at the University of Maryland Observatory: **11 November:** Alexander van der Horst (George Washington U), *Transient Relativistic Jets*

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.?

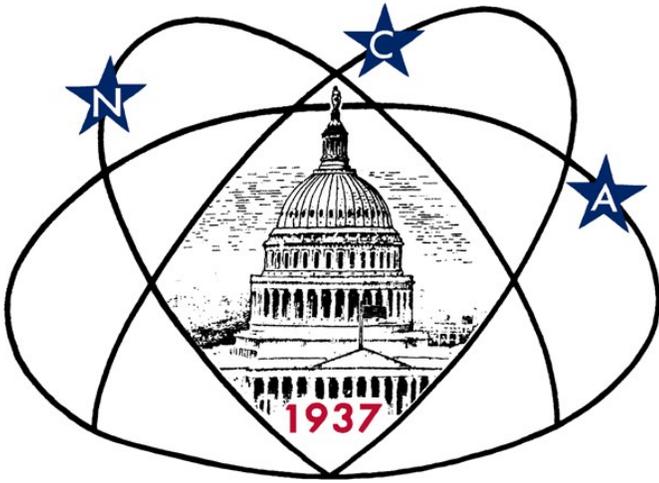
Are you interested in volunteering for: Telescope making, Exploring the Sky, Star Dust, NCA Officer, etc.?

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*Celebrating 80 Years of Astronomy
1937-2017*

Next NCA Meeting:

2017 October 14th

7:30 pm

@ UMD Observatory

Dr. Erika R. Nesvold

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