

Star Dust

Newsletter of National Capital Astronomers, Inc.

capitalastronomers.org

March 2016

Volume 74, Issue 7

Next Meeting

When: Sat. Mar 12th, 2016

Time: 7:30 pm

Where: UMD Observatory

Speakers: Eleonora Troja

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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 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 @ observatory. Please try to let him know in advance by e-mail at rigel1@starpower.net.

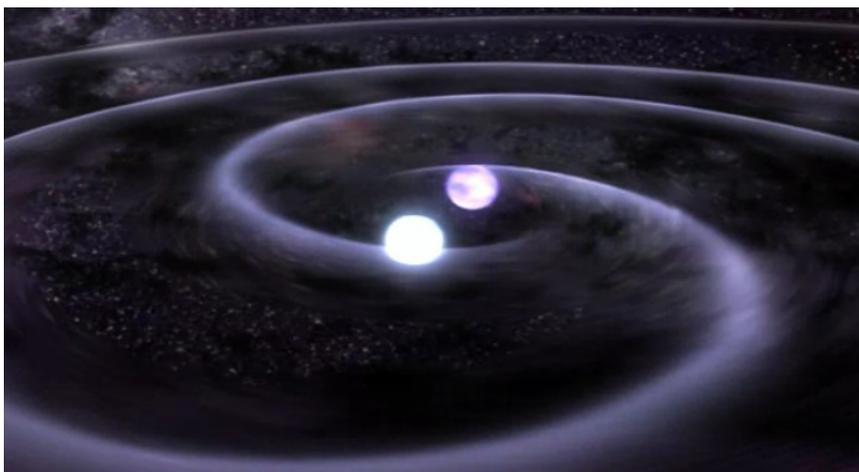
Observing after the Meeting

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.

Cosmic Crashes: The Many Faces of Neutron Star Collisions

*Eleonora Troja,
University of Maryland – College Park*

- Abstract:** Colliding neutron stars (NSs) are strong sources of gravitational radiation and are one of the most promising candidates for direct detection by ground-based gravitational wave detectors such as advanced LIGO and Virgo. Growing observational evidence shows that collisions between neutron stars also produce bright, electromagnetic signals: gamma-ray bursts and macronovae. Gamma ray bursts are brief flashes of gamma-ray radiation; macronovae are short-lived infrared transients powered by the radioactive decay of heavy nuclei. The simultaneous detection of both electromagnetic and gravitational radiation arising from the same collision between neutron stars would lead to revolutionary advances to our understanding. This exciting prospect makes these systems prime targets in the era of multi-messenger astronomy.
- Information in this talk will include ongoing observational efforts to characterize the electromagnetic signatures of NS collisions and outline future initiatives aimed at exploring the gravitational wave sky.



Courtesy NASA/GSFC

Visualization of gravitational waves produced by merging neutron stars.

continued on page 2

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.

A Quick Look at Neutron Stars

After a supernova, the core of the star can continue to collapse, its gravity transforming the atomic structure and compressing the star into a densely-packed, 12-mile diameter ball, predominantly made of neutrons. The

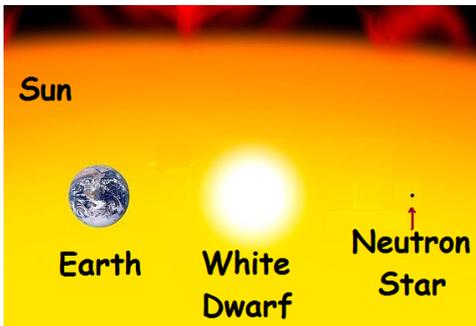


Image: Courtesy Pics-about-Space.com & VisualPhotos.com

The relative size of a neutron star compared to celestial bodies (above) and Manhattan Island, USA (below).



Image: Courtesy NASA/GSFC

star is so dense that a teaspoon of matter would weigh 1 billion tons; and, its space-bending gravity would have a pull 2 billion times that of Earth's.

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Neutron Stars – continued from page 1

Biographical Sketch:



Courtesy E. Troja

Dr. Eleonora Troja is an Assistant Research Scientist at University of Maryland - College Park, and leads the Swift Guest Observer program at NASA's Goddard Space Flight Center. Her research focuses on the study of short duration gamma-ray bursts, their connection to neutron star mergers, and their use to localize gravitational wave sources. Dr. Troja earned her PhD at the University of Palermo (Italy), with a thesis focused on Swift observations of gamma-ray bursts. She then became a NASA postdoctoral fellow at NASA/GSFC, working primarily on Swift and Fermi observations of transient phenomena.



Courtesy NASA

An illustration of a gamma-ray burst from a neutron star merger.

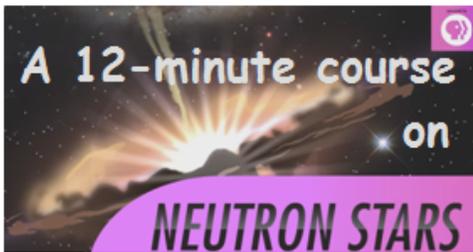
Watch a simulation of neutron stars merging:

<https://svs.gsfc.nasa.gov/cgi-bin/details.cgi?aid=10543>

The simulation features two equal-mass neutron stars orbiting each other 60,000 times per minute. After a billion years or so, the stars merge in a few milliseconds, resulting in gravitational waves and a brief, intense gamma-ray burst.

A Quick Look – continued from page 2

Criteria for the development of a neutron star involves the solar mass (the Sun = 1 solar mass). Whereas the Chandrasekhar limit (solar mass = 1.4) helps define the outcome of a white dwarf, the Tolman–Oppenheimer–Volkoff limit is used to define a neutron star. A white dwarf core will have a mass less than 1.4 and a neutron star will have 1.5 – 3 solar masses. Quark stars are hypothesized to have 3 – 5 solar masses and black holes will have solar masses above 5.



Courtesy PBS Digital Studios

with Phil “Bad Astronomer” Plait:

<https://youtu.be/RrMvUL8HFIM>

A neutron star’s rotational speed can be extreme! Star PSR J1748-2446ad (≈ 2 solar masses), located in the Sagittarius constellation, has a spin rate of 716 times per second (43,000 times per minute). Incidentally, this is too fast for making a smoothie; a quick calculation reveals that my NutriBullet® generates about 167 revolutions per second. Food experts say that you don’t need to blend a smoothie much faster than that!

The Great North American Eclipse



Aug 21st 2017

www.greatamericaneclipse.com/

Sky Watchers

Spring Schedule

March

20	1:00 am – Vernal Equinox (N. Hemisphere). Autumnal Equinox (S. Hemisphere).
21	12 am – Planets , N. Hemisphere. Jupiter 2° north of Moon.
30-31	Evening – Globe at Night , Global. Features: <i>Constellations Leo</i> (N. Hemisphere) and <i>Crux</i> (S. Hemisphere).

Times EDT

April

1-8	Evening – Globe at Night , Global. Features: <i>Constellations Leo</i> (N. Hemisphere) and <i>Crux</i> (S. Hemisphere).
2	8:30 pm – Exploring the Sky , Features: <i>Jupiter & Winter Constellations</i> .
8	7 am – Planets , N. Hemisphere. Venus 5° north of Moon.

Times EDT

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!

2016 Observation Dates for Spring

- 2 April (8:30 pm) - Winter constellations; Jupiter high
- 7 May (9:00 pm) - Mars and Saturn rising close to Antares; Big Dipper high

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

The North American Eclipse Path

On Monday, August 21, 2017, a total solar eclipse will be visible, coast-to-coast, across the middle of the US. It will begin in Oregon at approximately 10:17 am PDT, where Lincoln City and Newport will be in the path of totality and end at approximately 2:46 pm EDT with the cities of Charleston and Georgetown in South Carolina.



Courtesy NASA Scientific Visualization Studio

Eclipse path: umbra (black oval), penumbra (concentric circles) & path of totality (red line) near or through specified cities approaching the east coast.



There are many other cities from which the eclipse can be viewed. Many resources are available online, including the [Great American Eclipse website](#) (the link is on page 3 of this newsletter). Updates, videos and images are also available via the [Great American Eclipse Facebook page](#).

 **@NatCapAstro**

John Hornstein

Liz Dervy suggested that the NCA have a Twitter® account as an additional channel for communication between members. She also

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• **Star Dust** is published ten times yearly
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• Treasurer, at hbofinger@earthlink.net

Thank you!

ALCon 2016 Washington DC



August 10 – 13, 2016

*The Annual Astronomical League
Convention includes space exploration
& astronomy talks, special tours, an
awards banquet, "Star-B-Que" and
more!*

**Hosted by NOVAC and the
Astronomical League**

<https://Alcon2016.astroleague.org>

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	dmag	dur.	Ap.	Location, Notes
2016									
Mar 16	Wed	5: 48	SAO 58673	9. 4	2000 AG227	11. 0	5	5	PA, MD, VA; DC, NJ?
Mar 21	Mon	6: 42	TYC57371569	10. 8	El pi s	2. 8	7	6	nVA, DC, MD Sun -6
Mar 23	Wed	0: 13	SAO 137911	9. 8	Modestia	4. 4	3	4	nVA, OH; s&wMD, DC?
Mar 25	Fri	0: 17	TYC13411471	11. 3	Isergi na	4. 6	4	7	OH, nVA, DC, s&wMD
Mar 26	Sat	22: 24	1U702233877	10. 5	P/2016 BA14	3. 8	1	5	eVA, MD, sePA; DC?
Apr 1	Fri	0: 24	4U580029244	13. 1	Ri ta	3. 5	7	11	PA, MD, NJ; DC, nVA?
Apr 2	Sat	23: 08	SAO 115049	9. 9	Zappal a	6. 0	2	4	nTN, sKY, sVA; nNC?
Apr 5	Tue	4: 49	TYC61840983	10. 9	Kl eopatra	2. 0	12	6	neFL, GA, nAL, TN
Apr 6	Wed	20: 54	2UC16576199	11. 3	Aethra	0. 9	5	7	wl 95-VA, MD; DC?

Lunar Grazing Occultations

Date	Day	EDT	Star	Mag	% alt	CA	Location & Remarks
2016							
Mar 13	Sun	19: 31	ZC 592	7. 7	31+ 46	1N	sCharlottesvi l l , RutherGl en, VA
Mar 15	Tue	23: 25	SAO 95146	8. 8	54+ 36	6N	StphnC, Paris, Burk, VA; nWl df, MD
Mar 15	Tue	23: 45	SAO 95158	8. 1	54+ 32	6N	Chantilly, Fairfax, VA; Baden, MD
Mar 16	Wed	22: 04	ZC 1057	6. 8	64+ 59	5N	nUrbna, Gl enl g, nCol mbi a, BWl , MD
Mar 31	Thu	3: 36	U Sgr	6. 6	53- 15	8S	Louisa, Doswell l , &Cheriton, VA
Apr 10	Sun	19: 22	Aldebaran	0. 9	16+ 29	-1N	Good Enough Big Pond, Labrador

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

Total Lunar Occultations

Date	Day	EDT	Ph Star	Mag	% alt	CA	Sp.	Notes
2016								
Mar 13	Sun	20: 45	D SAO 93732*	9. 6	31+ 44	66S	G0	
Mar 13	Sun	20: 56	D SAO 93735*	8. 7	31+ 41	47S	G0	
Mar 13	Sun	20: 57	D SAO 93746	8. 0	32+ 30	18S	G5	close double?
Mar 13	Sun	22: 38	D SAO 93757*	8. 2	32+ 23	52N	G0	close double?
Mar 13	Sun	23: 23	D ZC 608	6. 0	32+ 14	42S	F3	Az. 278, mag2 9 sep. 4"
Mar 15	Tue	23: 15	D SAO 95157	7. 9	54+ 38	68S	K0	
Mar 16	Wed	20: 29	D SAO 96261	7. 7	64+ 69	57N	K2	
Mar 16	Wed	21: 57	D ZC 1057	6. 8	64+ 61	15N	K0	Good central MD graze
Mar 17	Thu	23: 33	D ZC 1190	7. 2	74+ 53	86N	A2	
Mar 18	Fri	1: 23	D l Cancr	5. 8	75+ 33	85S	K3	ZC1197
Mar 18	Fri	21: 18	D SAO 98068*	7. 9	82+ 63	90S	G5	
Mar 19	Sat	20: 18	D xi Leoni s	5. 0	89+ 47	48S	K0	ZC1409, spec. bi nary
Mar 20	Sun	1: 09	D ZC 1423	6. 7	90+ 49	76S	A3	
Mar 20	Sun	4: 06	D ZC 1433	7. 0	91+ 17	57N	F8	
Mar 21	Mon	3: 31	D ZC 1539	7. 3	95+ 29	63S	G5	close double??
Mar 27	Sun	4: 46	R HI Li brae	7. 5	87- 36	45S	A*	SAO 159050
Mar 28	Mon	4: 12	R ZC 2280	6. 5	80- 35	64N	M1	double?
Mar 28	Mon	6: 34	R 49 Li brae	5. 5	80- 29	36S	F7	Sun -5, ZC2291, spec. bi n.
Mar 31	Thu	3: 08	R ZC 2680	5. 6	53- 11	54N	K0	Az. 125, close double??
Mar 31	Thu	3: 50	R U Sgr	6. 6	53- 16	28S	G	ZC2687, doubl e?, VAgaze
Mar 31	Thu	3: 52	R ZC 2685	6. 8	53- 17	90S	K1	
Mar 31	Thu	4: 04	R SAO 161576	7. 4	53- 18	32S	K0	VA graze
Mar 31	Thu	4: 34	R SAO 161582	7. 0	53- 22	80S	G3	Mag2 10 sep 69" PA 262
Apr 1	Fri	6: 16	R SAO 162685*	7. 7	42- 28	32S	F*	Sun alti tude -8 degrees
Apr 3	Sun	5: 51	R SAO 164315	7. 2	22- 15	70S	B8	Sun-12, Az. 122, mg2 9 .2"
Apr 8	Fri	20: 45	D ZC 393	6. 7	4+ 5	38S	K0	Az. 280, close doubl e??
Apr 9	Sat	21: 04	D SAO 93544*	9. 6	9+ 15	79S		Az. 277
Apr 10	Sun	14: 36	D theta1 Tau	3. 8	16+ 58	43S	G7	Sun +54, mg2 8 ". 1, PA212
Apr 10	Sun	15: 19	R = ZC 669	3. 8	16+ 64	-23S	G7	Sun +48, AA 209
Apr 10	Sun	18: 43	D Aldebaran	0. 9	17+ 53	84N	K5	Sun +10, ZC 692 Lab.
Apr 10	Sun	19: 55	R alpha Tau	0. 9	17+ 39	-86N	K5	Sun -4, AA 279 graze

* 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/exped.htm>
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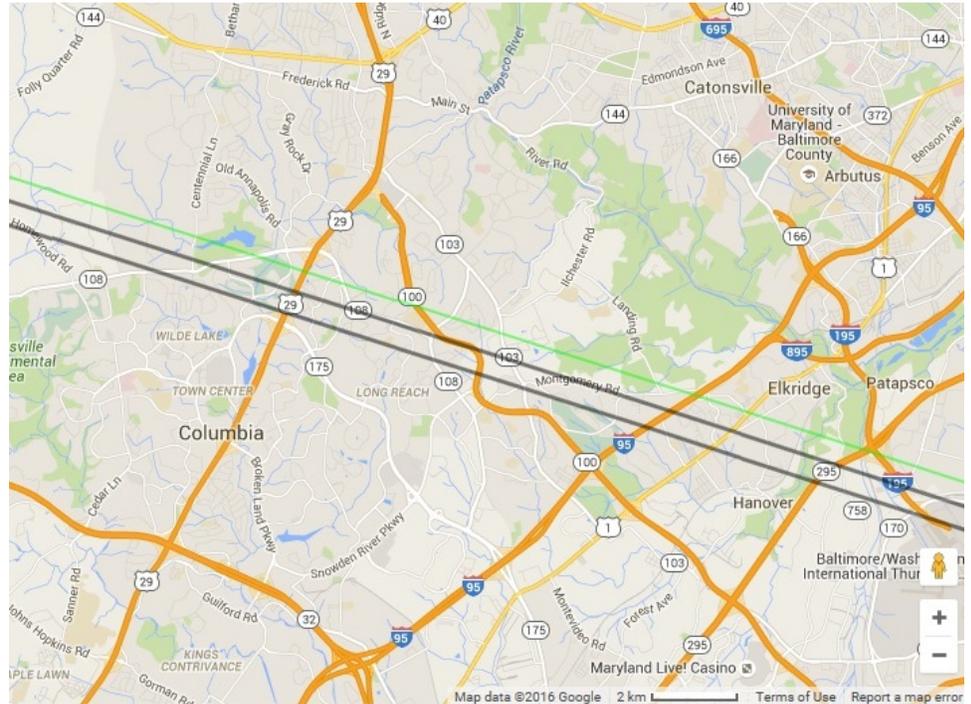
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Star ZC 1057

David Dunham

A good grazing occultation of 6.8-magnitude ZC 1057 will be visible the evening of March 16th from the narrow zone between the two dark gray lines on the map of central Maryland (below). A short total occultation will be visible from locations south of the zone, while the star will not be occulted for locations north of it.



@NatCapAstro – continued from page 4

very generously offered to maintain the account, if one were set up.

A request for member opinions quickly showed that a large majority of respondents thought it was a good idea. That included a substantial number of members who said that, although they personally would probably not use Twitter, many young people found Twitter to be a particularly natural way to communicate, and therefore NCA should include it.

Elizabeth Warner set up the account, with the Twitter address @NatCapAstro, a very apt address that she had suggested. Follow us on Twitter!

Our thanks to Liz Dervey for her suggestion and for volunteering to maintain the account, and to Elizabeth Warner for suggesting the apt Twitter handle and setting up the account.

Twitter can be accessed from any computers or mobile devices that can connect to the internet.

You might like to give it a spin.

April 2016



Global Astronomy Month

<http://astronomerswithoutborders.org/global-astronomy-month-2016.html>

The submission deadline for the April issue of Star Dust is March 25th.

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 (Family Night):** "Hello, Earth: Greetings from Endeavour," Fri. Mar. 11, 7:30 pm; \$5/adult; \$3/students/senior/teachers/military; children under 3 free. www1.pgcps.org/howardbowens
- **NOVAC's Annual Messier Marathon:** Sat. Mar. 12, starting at 6 pm at CM Crockett Park, Midland, VA (observing site: 38.38'.2"N -77.43'.15"W). <http://www.novac.com/wp/observing/messier-marathon/>
- **Mid-Atlantic Senior Physicists Group:** "The Permian Extinction (250 Mya)" with Douglas Erwin (Smithsonian Institution), Wed. Mar. 16, at 1 pm at the American Center for Physics (1st floor conference room). <http://www.aps.org/units/maspg/>
- **Owens Science Center Planetarium (Family Night):** "Songs from the Sky," Fri. Apr. 8, 7:30 pm; \$5/adult; \$3/students/senior/teachers/military; children under 3 free. www1.pgcps.org/howardbowens
- **Upcoming NCA Meetings** at the University of Maryland Observatory:
 - **9 April:** Richard Walker (UMD), "The Origin of the Moon."

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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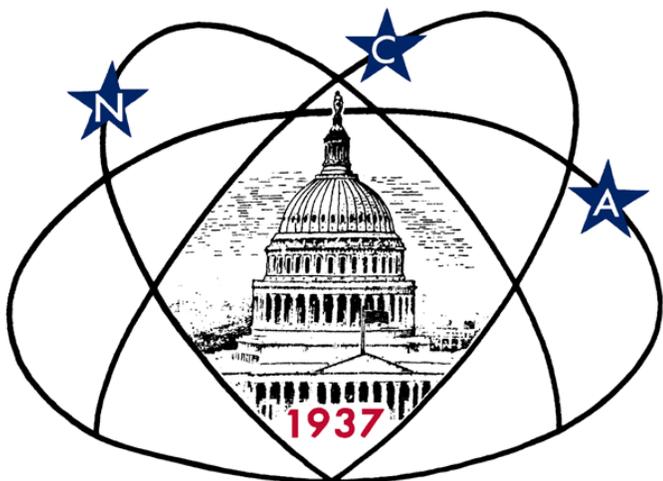
NCA c/o Elizabeth Warner

400 Madison St #2208

Alexandria, VA 22314

First Class

Dated Material



Next NCA Meeting:

2016 March 12th

7:30 pm

@ UMD Observatory

Eleonora Troja

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