

# Star Dust

National Capital Astronomers, Inc.

June 2010

Volume 68, Issue 10

<http://capitlastronomers.org>

## Next Meeting

**When:** Sat. June 12, 2010  
**Time:** 7:30 pm  
**Where:** UM Observatory  
**Speaker:** Science Fair  
Winners

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## Directions to Dinner/Meeting

The location of our June dinner is different from usual. Members and guests are invited to join us for dinner at [Three Brothers Italian Restaurant](#) 10961 Baltimore Avenue (Route 1) Beltsville, Maryland 20705 (301) 595-8888. The meeting will still be held at the UM 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 at the observatory. Please try to let him know in advance by e-mail at [rigel1@starpower.net](mailto:rigel1@starpower.net).

## Observing after the Meeting

Following the meeting, members and guests are welcome to tour through the Observatory. Weather-permitting,

June 2010:

## Science Fair Winners

*Joe Morris*

An ongoing activity of National Capital Astronomers is the judging of astronomy-related projects in area science fairs, and our June meetings are traditionally the time when we invite the winners to present their projects to the NCA membership.

This year the June pre-meeting dinner, to which the winners and their parents are invited, will be held at Three Brothers Pizza in Beltsville, MD. The address is 10961 Baltimore Avenue (aka Route 1), just south of Powder Mill Road. We've reserved the back room; everyone is welcome (no additional reservations are required) so please plan to arrive before about 5:30.

The winning students who accepted our invitation are:

**David Zhang:** "Automatic Feature Detection and Information Retrieval from the Large Scale Database Obtained by SOHO"

**Shubham Chattopadhyay:** "Is it Possible to Measure Skyglow with a Digital Camera?"

**Ben Wing:** "Supernova Project"

**Megan Tripplett:** "Asteroid Mining: Payload Launcher"

## Amateur Telescope Making: Fun with Chemistry (Part 2)

*By Guy Brandenburg*

*In the May Star Dust Guy gave an overview of his options for stripping the gold coatings off of a batch of secondary mirrors he purchased.*

### My decisions

However, I decided that I was NOT going to do the following, because they sounded too caustic (i.e., dangerous).

- (1) No concentrated or heated chemicals in any form. Room temperature all the way.
- (2) No cyanide in any form.
- (3) No melting off the gold.
- (4) No alkalis. (I have seen the damage they can cause to mirrors.)
- (5) No naval jelly.

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several of the telescopes will also be set up for viewing.

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Thank you!

## Reminder

After the meeting, everyone is invited to join us at Plato's Diner in College Park. Plato's is 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.

Continued from Page 1

And I decided that I would try the following methods on individual flats:

- (1) Acetone to see if the gold is over-coated with something
- (2) Ferric Chloride (yes, you CAN buy it at Radio Shack – but you need to call ahead to see if the store you want to go to actually has it in stock)
- (3) Hardware-store-strength hydrochloric acid (aka muriatic acid)
- (4) Green River (a mixture of the muriatic acid and blue copper II sulfate crystals, exact proportions not important) – it's a mixture that I normally use to remove aluminum coating.
- (5) Liquid mercury, which was generously provided, in small quantities, by several local NCA and/or NOVAC members who were trying to get rid of it and finally had an excuse. *[I will refrain from naming them, lest somebody give them a hard time.]*
- (6) Some of these methods, followed by others.

So, I got some large plastic cups and put the various liquids into each one, and then I put a mirror into each one. Or vice-versa, I don't recall.

## Results:

- (1) I hadn't realized that the acetone would dissolve the plastic cup and make a mess all over everything. But it did. That method not only caused havoc, but when put into a glass container, did nothing at all to the gold coating that I could tell. I concluded that there is no overcoating on top of the gold.
- (2) Ferric chloride etchant mostly worked, but rather slowly (hours). Flakes of gold came off in patches, and either floated to the surface or went to the bottom. The nickel never came off completely, but the small patches that were left were nearly transparent. The sides of the blanks did not lose their gold.
- (3) For some reason, I forgot to try straight muriatic acid.
- (4) Green River worked a little faster than the ferric chloride, but again, not completely. However, the gold that was on the sides of the blank did disappear.
- (5) The mirrors floated on TOP of the mercury, and had to be pushed down. The liquid mercury worked extremely slowly. After a couple of hours, it had produced a handful of silvery holes in the gold coating; the mercury seemed to be forming an amalgam with some of the nickel underneath. I couldn't find any gold flakes. But the coating mostly seemed intact. *[To my surprise, week or so later, after having taken the mirror out of the mercury and having put this mirror to one side, I went to show it to someone, and I discovered that there was no gold layer visible. My conclusion is that that the remaining mercury had very slowly formed an amalgam with both the gold and the nickel. However, it was not possible to remove it with a gloved finger.]*
- (6) Dipping the mirrors into mercury that had had most of the coating removed by FeCl or HCL + CuSo4 didn't seem to make any noticeable difference. A mirror that was first put into mercury and was then put into Green River or ferric chloride worked about the same as just Green River or Ferric Chloride.

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*Photo: Partly-stripped mirror being held above a plastic container of Green River by a piece of wood. Note the gold flaking off.*

OK, so I was able to remove most of the coating with either Green River or FeCl. And if I had been willing to wait for some period of days with the mirrors immersed, they might have removed everything, but I was too impatient.

Bill Rohrer, an NCA ATMer and metalworker, volunteered to take the flakes of gold and mercury off my hands. (He collects almost anything interesting made out of metal.)

Now, I needed to figure out how flat the mirrors were.

I did have a method for testing that: some reference flats and a monochromatic light box which I built and which filters out everything except the green 546.1 nm mercury-vapor line from ordinary fluorescent or 'black-light' bulbs. One puts the transparent reference flat on top of the questioned flat, under the green light, and then looks for Newton's fringes. If the fringes are perfectly straight, the mirror is as flat as the reference surface. If they are a little curved, then one can quantify how much it deviates.

Result? Perfectly flat as far as I could tell.

Unfortunately, this method does not work for mirrors that are already coated. Or at least, not for me.

I decided to try coating the 2 mirrors that had been stripped with Green River and etchant, and a single mirror that had never been touched by me. I did the normal washing job on the 2 stripped mirrors, and left the other one alone. Then I loaded them all into the vacuum chamber, brought the vacuum down to below  $10^{-4}$  Torr (mm of mercury), and melted and evaporated the small slug of aluminum, as usual.

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## Martha H. Warren



Martha Hope Wills Warren, 67, loving wife of former NCA President, Wayne H. Warren Jr., and an NCA member herself since 1988, died on May 9, 2010 following a short battle with cancer.

Born February 16, 1943 in New Haven, Connecticut, Martha and Wayne met in 1966 when both were employed by Bell Telephone Laboratories in Murray Hill, New Jersey. Following graduate school at Indiana University, the couple moved to Maryland in 1975 when Wayne took a job at NASA's Goddard Space Flight Center. Martha was employed as a Human Resources Specialist at the University System of Maryland for 25 years.

Martha developed an interest in astronomy through her association with NCA members and her participation for many years on occultation expeditions with Wayne, and David and Joan Dunham. She was a regular attendee at NCA meetings.

Martha is survived by her husband of 43 years, Wayne H. Warren Jr., her son Kenneth of Baltimore, daughters Sandra of St. Augustine, Florida and Katherine of Greenbelt, three grandchildren, and six nieces.

A memorial service was held on Saturday, May 22, from 1:00 to 4:00 p.m., at the offices of the University System of Maryland, where Martha had been employed since 1984 December.

Donations in Martha's name may be made to the

Lung Cancer Research Foundation, 845 Third Avenue, New York NY 10022:  
(<https://www.lungcancerresearchfoundation.org/donate.htm>)

and/or to Capital Hospice, Philanthropy Office, 2900 Telestar Court, Falls Church VA 22042:  
(<http://www.capitalhospice.org/support/donation/>).

## 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 and Expeditions

Dr. David Dunham

### Asteroidal Occultations

Date	Day	EDT	Star	Mag.	Asteroid	dmag	s "	dur.	Ap.	Location
Jun 10	Thu	1:20	2UC29470232	13.1	Aguntina	1.9	7	9	DE,MD,VA,WV;DC?	
Jun 23	Wed	23:50	2UC37917435	11.1C	Artemis	0.2	18	9	NJ,MD,DC,nVA,sPA	
Jun 24	Thu	23:39	2UC31245613	12.8	Aneas	2.4	12	9	NJ,MD,PA,OH;nVA?	
Jun 30	Wed	0:10	TYC03050665	12.6	Bredichina	1.4	6	9	wPA,WV,VA,NC;MD?	
Jul 3	Sat	3:19	2UC32395626	11.8	Bianca	0.8	7	7	LI,NJ,sPA,MD,WV	
Jul 8	Thu	17:59	Yed Prior	2.7	Roma	10.8	6	1	NL,BE,wFR,wES,PT	
Jul 10	Sat	2:46	2UC22104220	12.6	Irma	1.0	6	9	MA,CT,NJ,MD,nVA	
Jul 18	Sun	21:51	2UC22032118	11.5	Ixion	8.0	45	7	TNO eN.America?	
Jul 22	Thu	1:52	2UC19774482	11.8C	Dynamene	0.7	11	9	MA,NJ,MD,VA,DC	
Jul 24	Sat	4:28	2UC41492644	12.5	Pretoria	2.2	6	9	wNC,VA,eMD,NJ,CC	
Jul 25	Sun	4:29	TYC24160555	10.2	Irmintraud	4.9	2	5	MA,sePA,MD,DC,VA	
Jul 27	Tue	2:20	2UC31935704	12.9	Rockefellia	2.0	4	9	DE,sMD,VA,TN;DC?	
Aug 4	Wed	4:18	TYC75120596	11.5	Nanette	4.4	2	8	PA,MD,VA,NC,SC	
Aug 7	Sat	23:46	PPM 240097	9.7	1999 OJ4	13.1	6	4	TNO Americas?	
Aug 19	Thu	23:43	TYC68320335	11.1	Eunomia	0.3	60	7	App.Mtns toCoast	
Aug 21	Sat	5:28	SAO 94100	8.5	Psyche	2.7	10	3	TX,TN,NC,VA,sMD	
Sep 3	Fri	5:10	SAO 96927	9.3	Gaussia	6.4	2	4	WV,wMD,sePA,NJ	
Sep 7	Tue	20:40	TYC62450119	11.9	Semiramis	1.3	4	7	w&nVA,DC,MD,NJ	
Sep 11	Sat	1:54	2UC43061589	11.4	Diana	1.7	7	7	TN,eKY,eOH,wPA	

### Lunar Grazing Occultations (\*, Dunham plans no expedition)

Date	Day	EDT	Star	Mag.	% alt	CA	Location
Jun 16	Wed	23:11	ZC 1454	7.0	27+	7	4N Winfld,Eldrsbrg& Baltimore,MD
Sep 4	Sat	5:13	SAO 79102	7.8	22-	35	0N Occoquan,VA;Clintn&Marlton,MD

### Total Lunar Occultations

DATE	Day	EDT	Ph	Star	Mag.	% alt	CA	Sp.	Notes
Jun 16	Wed	21:27	D	SAO 117942	7.7	26+	27	72S	G5 Sun alt. -9 deg.
Jun 16	Wed	23:08	D	ZC 1454	7.0	27+	7	12N	G5 Az. 274, close double?
Jun 24	Thu	21:17	D	28 Oph	6.7	98+	15	78N	B9 Sun -7, ZC2452, double?
Jun 24	Thu	21:48	D	31 Oph	6.6	98+	19	57N	A9 Sun alt. -12, ZC 2455
Jun 29	Tue	23:24	R	18 Aquarii	5.5	87-	8	47S	F0 Azimuth 113, ZC 3131
Jul 2	Fri	3:46	R	ZC 3370	6.2	71-	43	39S	G8 Maybe close double
Jul 3	Sat	0:30	R	16 Piscium	5.7	63-	7	89N	F6 Az.93,ZC3482,close dbl.
Jul 4	Sun	3:44	R	45 Piscium	6.8	53-	39	64S	K0 ZC 51, close double?
Jul 7	Wed	4:23	R	ZC 425	7.1	23-	28	76N	K0
Jul 7	Wed	4:26	R	SAO 75633	7.0	23-	29	53S	K0
Jul 14	Wed	21:10	D	RX Sex	6.7	14+	13	27S	A3 Sun -7, Az.265, ZC1528
Jul 20	Tue	22:42	D	ZC 2269	5.4	77+	23	65N	B5 Maybe close double
Jul 30	Fri	3:21	R	9 Piscium	6.3	84-	51	63S	G7 ZC 3455, spec. binary
Jul 30	Fri	3:24	R	kappa Psc	5.0	84-	51	81N	A0 ZC 3453
Aug 4	Wed	2:11	R	ZC 493	6.9	39-	19	66N	A0
Aug 5	Thu	1:34	R	SAO 76555	7.2	29-	4	62S	G5 Azimuth 63 deg.
Aug 13	Fri	20:16	D	ZC 1833	6.9	21+	16	38S	G5 Sun alt. -3 deg.
Aug 16	Mon	23:17	D	42 Librae	5.0	54+	4	50N	K3 Az. 235, ZC 2237
Aug 20	Fri	23:15	D	ZC 2822	5.6	89+	28	46S	A6
Aug 28	Sat	1:47	R	ZC 89	6.5	89-	54	89N	F5 close double?
Sep 1	Wed	1:13	R	ZC 594	6.9	55-	23	80N	B9 mg3 9.4 sep. 58",PA 241
Sep 1	Wed	5:28	R	ZC 611	7.0	53-	69	43N	K2
Sep 1	Wed	6:15	R	SAO 76483	7.2	53-	75	27N	G5 Sun alt. -5 deg.
Sep 2	Thu	0:53	R	99 Tauri	5.8	44-	10	42S	G8 Az. 67,ZC 742
Sep 2	Thu	5:40	R	103 Tauri	5.5	43-	63	21S	B2 Sun -11, ZC 767, triple
Sep 3	Fri	2:48	R	SAO 77851	7.4	33-	20	66S	A0
Sep 3	Fri	5:06	R	2 Gem	6.7	32-	45	37S	K0 ZC 923, close double?
Sep 5	Sun	7:37	R	Tegmine	5.1	12-	48	63S	G0 Sun +10,ZC 1236, triple

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

Timing equipment and even telescopes can be loaned for most expeditions that we actually undertake; we are always shortest of observers who can fit these events into their schedules, so we hope that you might be able to.

Information on timing occultations is at: <http://iota.jhuapl.edu/timg920.htm>.

Good luck with your observations.



To keep the planetarium open, Arlington Public Schools has given Friends of the Planetarium until September 2010 to raise \$161,120 and June 2011 to raise a total of \$402,800. The Planetarium has helped to educate and inspire the children of Arlington and the surrounding community for 40 years. Funds are needed to replace the projector system, dome, and seats.

**Make Checks Payable to:**

ACF - Planetarium Fund

**Mail Checks to:**

Friends of the Planetarium  
P.O. Box 7029, Arlington, VA 22207

All donations are tax deductible.

**Donate Online:**

1. Navigate to [www.arlcf.org](http://www.arlcf.org)
2. Click the "Donors and Giving" drop-down
3. Select "Donate Online"
4. Click "Network for Good" or "Live United"
5. Designate **Planetarium Fund** for donation

*Thank you!*

**E-mail:** [save.the.planetarium@gmail.com](mailto:save.the.planetarium@gmail.com)  
**Facebook:** <http://bit.ly/facebook-planetarium>  
**Website:** [www.saveplanetarium.org](http://www.saveplanetarium.org)

Funds are being raised for the Planetarium Fund, held by the Arlington Community Foundation (ACF), a 501(c)(3) non-profit organization. In the event we fail to achieve our fundraising goal and the planetarium is closed, the donations collected will be given to a fund of similar educational purpose.



**Nominating Committee Report**

*By Jeff Norman, Chair*

This is a reminder to all NCA members that we will elect officers for next year (July 2010 to June 2011) at NCA's June 12, 2010 meeting. The Nominating Committee (Walter Faust, Harold Williams and Jeff Norman) is recommending the following slate of officers; but any member may make additional nominations from the floor.

- President** - Joseph Morris
- Vice-President** - John Hornstein
- Sec/Treasurer** - Michael Brabanski
- Asst/Sec/Treas** - Jeff Norman
- Trustee** - Andy Seacord

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Results here? They all looked pretty good. In fact, the one I hadn't touched looked the best, since I think I left some paper towel residue on the others.

But once again, I had no idea how flat the mirrors were. And given my limitations with the light box, that method wouldn't work. Bob Bolster suggested I use something called the Ritchey-Common test that is described in a book by Daniel Malacara, involving a spherical mirror and bouncing a beam off the diagonals at 45 degrees. I wasn't sure I could do that test, so I asked around to see if somebody had an interferometer that they wouldn't mind using. A correspondent from Alaska, Stanley Truitt, who works at Mauna Kea, volunteered to do so. So I sent the mirrors off by mail for him to test.

There was a saga of waiting for a new red laser to arrive from the mainland, and with somebody upgrading the fringe analysis software whilst the laser was unavailable. And since he had not been trained in using the new software, the fringe pattern images are not available, or even saved. The wavelength used and referenced is 633 nm. The surface errors, normal incidence, are stated below:

Mirror	Process	Peak-to-Valley Wavelength deviation (633 nm)	Root Mean Square	Power
A	Overcoated gold, not stripped	0.246	0.044	-0.149
B	Stripped, mostly, with Green River	0.165	0.025	-0.012
C	Stripped, mostly, with Ferric Chloride	0.208	0.043	-0.084

Bottom line?

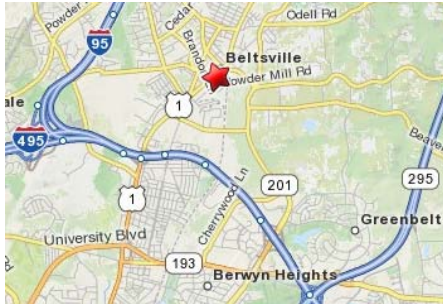
Recall that 0.246 is just about 1/4 wave, 0.165 is just about 1/6 wave, and 0.208 is about 1/5 wave.

If you are satisfied with 1/4 wave p-v error on a diagonal mirror, then putting an aluminum coating right over the gold will produce acceptable results. If you prefer 1/5 or 1/6 wave, then you should strip off the old gold coating with ferric chloride or Green River, and be prepared to wait several days for all of the coating to come off. And then you have to wash the blanks, etc, etc. In all, a very interesting experiment in applied chemistry, physics, and optics.

P.S.: Let me know if you are interested in one of the diagonal flats for your own home-built telescope. The ones that I strip first will cost a bit more, but all will go for much less than a comparable 1.5" minor-axis diagonal mirror from any commercial outfit.

## Maps and Directions for Three Brothers Restaurant in Beltsville, MD

Three Brothers is located at 10961 Baltimore Avenue (Route 1), just south of its intersection with Powder Mill road (Route 201).



## Calendar of Events

- **NCA Mirror- and Telescope-making Classes:** Tuesdays June 1, 8, 15, 22, 29 and Fridays, June 4, 11, 18, 25, 6:30 to 9:30 pm at the Chevy Chase Community Center, at the northeast corner of the intersection of McKinley Street and Connecticut Avenue, N.W. Contact instructor Guy Brandenburg at 202-635-1860 or email him at [gbrandenburg@yahoo.com](mailto:gbrandenburg@yahoo.com). In case there is snow, call 202-282-2204 to see if the CCCC is open.
- **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). There is telescope viewing afterward if the sky is clear.
- **Dinner:** Saturday, June 12 at 5:30 pm, preceding the meeting, at the [Three Brothers Italian Restaurant](#) (301) 595-8888. See map and directions on left hand column of this page. Note that the dinner is in a different place than its usual location, but we will have the meeting at the Observatory as usual.
- **Upcoming NCA Meetings** at the University of Maryland Observatory
  - Jun 12, 2010 **Science Fair Winners**
    - David Zhang: "Automatic Feature Detection and Information Retrieval from the Large Scale Database Obtained by SOHO"
    - Shubham Chattopadhyay: "Is it Possible to Measure Skyglow with a Digital Camera?"
    - Ben Wing: "Supernova Project"
    - Megan Tripplett: "Asteroid Mining: Payload Launcher"

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Would you prefer to get Star Dust by e-mail? \_\_\_\_\_

#### MEMBERSHIP CATEGORIES AND ANNUAL DUES RATES

All members receive Star Dust, the monthly newsletter announcing NCA activities. The basic dues cover an electronic copy of Star Dust; paper copies are \$10 extra. You may also choose to get Sky & Telescope magazine at the discounted rate of \$33.

Student Membership .....	\$ 5
Paper copy of Star Dust .....	\$10
Sky & Telescope .....	\$33
Total .....	_____

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Paper copy of Star Dust .....	\$10
Sky & Telescope .....	\$33
Total .....	_____

Please mail this form with your check payable to National Capital Astronomers to:  
**Mr. Michael L. Brabanski, NCA Treasurer; 10610 Bucknell Drive, Silver Spring, MD 20902-4254**

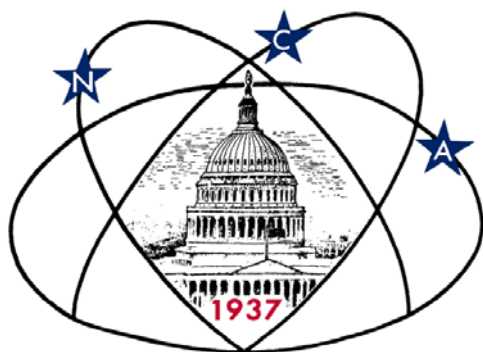
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**If undeliverable, return to**

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10610 Bucknell Dr.  
Silver Spring, MD 20902-4254

**First Class**

**Dated Material**



Next NCA Mtg:

**June 12**

**7:30 pm**

**@ UM Obs**

**Science Fair**

**Winners & Pizza!**

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