

Star Dust

National Capital Astronomers, Inc.
April 2013 Volume 71, Issue 8
<http://capitlastronomers.org>



Celebrating 75 years 1937-2012

Next Meeting

When: Sat. April 13, 2013
Time: 7:30 pm
Where: UMD Observatory
Speaker: Joleen K. Carlberg
(CIW-DTM)

Table of Contents

Preview of April 2013 Talk.....	1
MASPG Talks.....	2
ATM Coating Machine.....	2
Exploring the Sky.....	3
Occultation Maps.....	4
Occultations.....	5
Casimir Effect.....	6
Hopewell May 4.....	6
Calendar.....	7

Directions to Dinner/Meeting

Our new location for dinner with the speaker before each meeting is at Mulligan's Grill and Pub on the UM Golf Course. Mulligan's is one intersection closer to the observatory on Route 193 than UMUC. One turns on to "Golf Course Road" and drives a few hundred feet to the golf course building, where "Mulligan's Grill and Pub" is located.

The dinner menu can be downloaded from <http://mulligans.umd.edu/>

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

April 2013: Joleen K. Carlberg
Carnegie Institution of Washington
Department of Terrestrial Magnetism
Red Giant Stars Say "Death to Planets!"

Abstract: Surveys of exoplanets have uncovered numerous star systems that have Jupiter-sized planets orbiting in the equivalent of the inner Solar System. Many of these planets are doomed to be engulfed by their host stars sometime during the stellar red giant phase of evolution. Unlike the tiny terrestrial planets in our own Solar System, gas giant planets can measurably increase their star's rotation and surface composition when they are engulfed. In this talk, I will overview the evolution of stars, the effects of stellar evolution on planetary systems, and the hunt for observational evidence of planetary engulfment.



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.

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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 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.

Continued from Page 1

Biography: I am currently a Vera Rubin Postdoctoral Fellow at the Carnegie Institution of Washington's Department of Terrestrial Magnetism. I earned my BS in Astronomy & Astrophysics from Villanova University and my PhD in Astronomy from the University of Virginia in 2011. I am primarily an optical spectroscopist studying the composition and rotation of red giant stars. I am interested in all phases of stellar evolution as well as the ever surprising field of exoplanets. Over the last few years, I have had the privilege of using the telescopes at Carnegie's Las Campanas Observatory in Chile to collect my data.

Note: Our previously scheduled April speaker planned on giving the same talk at the April MASPG meeting, but was forced to cancel both talks. Here is some preliminary information on the April and May, 2013 MASPG meetings.

APS Mid-Atlantic Senior Physicists Group

<http://www.aps.org/units/maspg/>

April & May 2013 Events

Date: Wednesday, April 24, 2013

Speaker: Harold A. Williams
Montgomery College

Topic: "Time-Space Invariance and Quantum Gravity: or how c,G,and h create the fabric of Reality!"

Date: Wednesday, May 22, 2013

Speaker: Wallace (Wally) Manheimer
Naval Research Laboratory (Retired)

Topic: How Fusion Can Become Relevant

Time and Location: 1:00 PM, with Q&A to follow, in a 1st floor conference room at the American Center for Physics (www.acp.org), 1 Physics Ellipse, College Park, MD-- off River Rd., between Kenilworth Ave. and Paint Branch Parkway.

Help Needed with Vacuum Pump on ATM Mirror Coating Machine

If you have experience operating, maintaining, or repairing vacuum diffusion pumps, Guy Brandenburg needs your assistance getting the mirror coating machine at our amateur telescope making class in Chevy Chase to work again. Please contact him at 202-635-1860 or gbranden@earthlink.net.

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Come See the Stars!

Exploring the Sky

2013 Schedule

<u>Date</u>	<u>Time</u>	<u>Things of interest in the month:</u>
4/6	8:30 PM	Winter constellations; Lyrid meteor shower
5/4	9:00 PM	Saturn rising in the east; the Beehive in Cancer
6/1	9:00 PM	Solstice 6/21; Mercury at Castor's feet
7/13	9:00 PM	Summer Triangle; 5-day-old Moon near Virgo
8/10	8:30 PM	Andromeda rising; Perseid meteor shower
9/7	8:00 PM	Andromeda Galaxy rising; equinox 9/22
10/5	7:30 PM	Astronomy Day 10/12; Orionid meteor shower
11/2	7:00 PM	Pleiades and Winter constellations appear

Exploring the Sky is an informal program that for over sixty 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.

Sessions are held in Rock Creek Park once each month on a Saturday night from April through November, starting shortly after sunset. We meet in the field just south of the intersection of Military and Glover Roads NW, near the Nature Center. A parking lot is located next to the field.

Beginners (including children) and experienced stargazers are all welcome—and it's free!

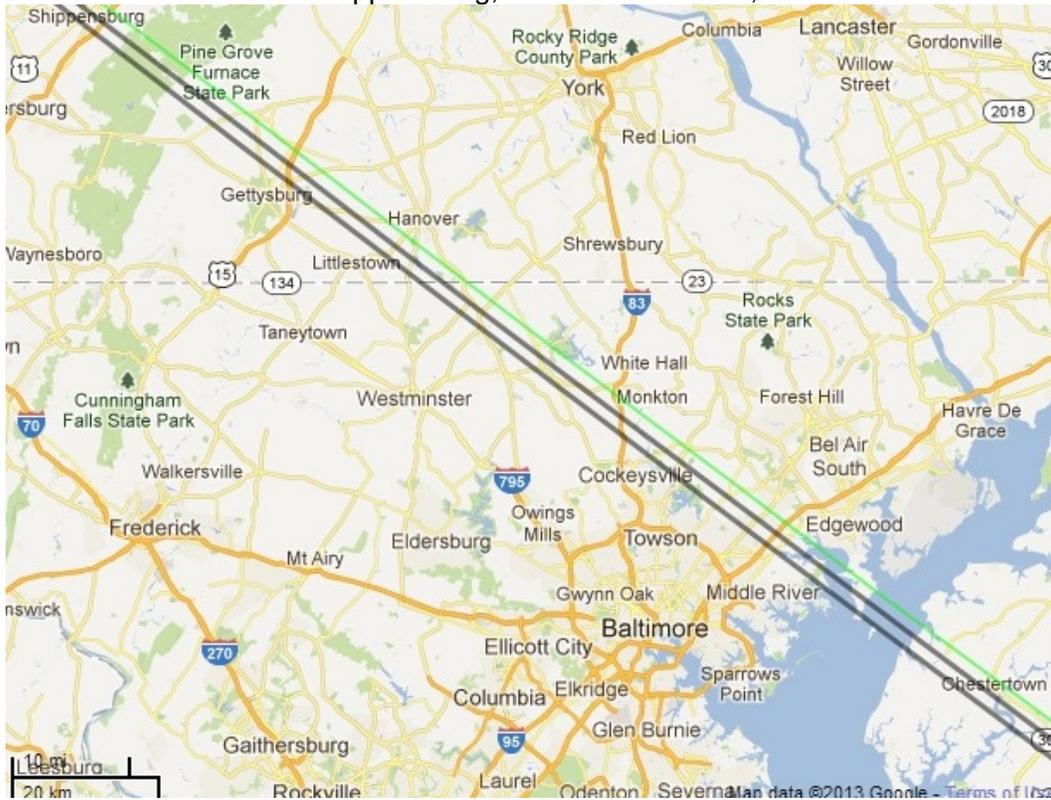
Questions? Call the Nature Center at (202) 895-6070 or check the Internet sites:

www.nps.gov/rocr/planyourvisit/expsky.htm
www.capitalastronomers.org

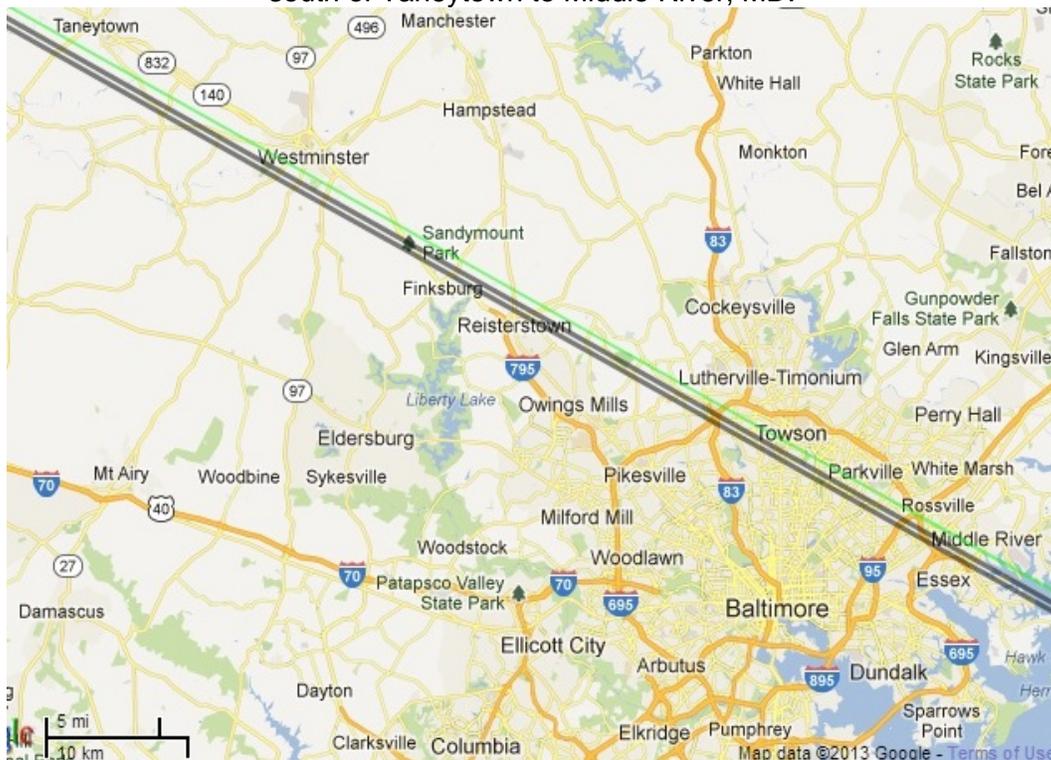
A presentation of the National Park Service and National Capital Astronomers

April 24 and May 12 Occultation Maps

The multiple events zone for the graze of chi Virginis on April 24th is shown between the two dark gray lines from Shippensburg, PA to Chestertown, MD.



The multiple events zone for the graze of SAO 846 on May 12th is shown between the two dark gray lines from south of Taneytown to Middle River, MD.



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

David Dunham

Asteroidal and Planetary Occultations

Date	Day	EDT	Star	Mag.	Asteroid	dur. dmag	Ap. s "	Location
2013								
Apr 16	Tue	22:12	2UC38759700	12.7C	Polyxo	1.1 5 9	sOH,WV,VA;MD,DC?	
Apr 19	Fri	22:16	2UC35937089	13.5	Andromache	1.4 20 10	LI,NJ,PA,nOH;MD?	
May 7	Tue	2:23	2UC23404504	12.0C	Lacadiera	0.3 15 10	NJ,DE,PA,wNY;MD?	
May 11	Sat	21:06	TYC13300781	11.5	Rhodesia	3.8 1 7	PA,MD,DE,sNJ;DC?	
May 12	Sun	2:19	TYC56933315	12.1	Hansa	1.3 5 8	MD,PA,wNY;DE,DC?	

Lunar Grazing Occultations (*, Dunham plans no expedition)

Date	Day	EDT	Star	Mag.	% alt	CA	Location
Apr 15	Mon	20:33	SAO 94948	7.7	27+ 45	10N	*sReadng,Phxv,BlaCynwd,PHL,PA
Apr 24	Wed	0:29	chi Vir	4.7	96+ 41	13N	*Shippensburg,PA;PerryHall,MD
May 12	Sun	20:56	ZC 846	8.9	8+ 17	6N	Finksbrg,sTownn,MiddlRiver,MD
May 12	Sun	21:46	SAO 94723	7.8	8+ 7	5N	Abngdn,VA;HiPt,nDun,EmrldI,NC
May 12	Sun	22:09	SAO 94739	7.6	8+ 4	4N	RichmndHgtts,OH;Shrewsbury,PA

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

Total Lunar Occultations

DATE	Day	EST	Ph	Star	Mag.	% alt	CA	Sp.	Notes
Apr 13	Sat	21:56	D	SAO 93825	8.1	12+ 11	51S	F0	Azimuth 286 degrees
Apr 14	Sun	22:16	D	ZC 760	6.6	19+ 17	56N	A5	mg2 7.5 sep 1.0",PA 297
Apr 15	Mon	20:19	D	SAO 94948	7.7	27+ 48	33N	K0	Sun alt. -7;Penn. graze
Apr 15	Mon	21:43	D	SAO 94988	8.2	27+ 32	47N	K0	
Apr 15	Mon	22:10	D	SAO 95001	8.1	27+ 27	86S	B9	maybe close double?
Apr 15	Mon	22:48	D	SAO 95031	7.9	27+ 19	61S	B9	
Apr 16	Tue	20:52	D	SAO 96038	7.8	36+ 49	15S	B9	
Apr 16	Tue	22:50	D	ZC 1040	6.4	36+ 27	78N	A2	close double
Apr 16	Tue	22:57	D	SAO 96110	7.3	36+ 26	42N	A2	close double?
Apr 17	Wed	0:07	D	SAO 96160	7.6	37+ 13	89N	F0	Azimuth 283 degrees
Apr 17	Wed	20:13	D	SAO 97002	7.7	45+ 62	60S	M*	Sun alt. -6 deg.
Apr 18	Thu	20:03	D	ZC 1256	7.3	55+ 64	60S	A2	Sun alt. -4 deg.
Apr 19	Fri	0:58	D	SAO 97850	7.9	56+ 18	49N	G5	
Apr 20	Sat	20:15	D	ZC 1469	7.6	74+ 55	79S	F5	Sun -6,mg2 10,24",PA 21
Apr 21	Sun	1:04	D	14 Sex	6.2	75+ 29	45N	K1	ZC 1482, close double??
Apr 22	Mon	1:15	D	55 Leonis	5.9	84+ 32	17S	F2	ZC 1587, close double?
Apr 24	Wed	0:21	D	chi Vir	4.7	96+ 42	26N	K2	ZC1815,t.d.14",MD graze
Apr 27	Sat	3:20	R	41 Librae	5.5	97- 30	73N	G8	AA 285,ZC2233,mg2 9, ".3
Apr 27	Sat	4:59	R	kappa Lib	4.8	97- 22	45S	K5	AA 223,ZC2241,spec.bin.
Apr 29	Mon	4:14	R	ZC 2556	7.2	83- 30	89S	A3	
Apr 30	Tue	2:07	R	ZC 2724	6.3	74- 16	76S	M2	
May 1	Wed	2:49	R	ZC 2889	6.9	63- 16	71S	M2	
May 1	Wed	3:04	R	SAO 162989	7.2	63- 18	68S	F5	
May 1	Wed	5:41	R	ZC 2903	7.7	62- 33	44S	K3	Sun -6, close double?
May 3	Fri	4:50	R	ZC 3172	7.7	40- 24	78N	G5	
May 3	Fri	6:36	R	46 Cap	5.1	39- 38	5S	G8	Sun alt. +5, ZC 3185
May 4	Sat	5:00	R	SAO 146159	7.9	29- 21	7S	K0	
May 6	Mon	4:52	R	SAO 109052	7.4	13- 9	67S	G5	Azimuth 91 deg.
May 9	Thu	9:31	R	Mars	1.3	0- 42	57N		Sun +39 only 5 deg. away
May 9	Thu	15:56	D	Mercury	-2.1	0- 45	-84S		Sun +47 only 3 deg. away
May 9	Thu	17:28	R	Mercury	-2.1	0- 27	55N		Sun +30 only 2 deg. away
May 12	Sun	20:50	D	ZC 846	8.9	8+ 18	18N	A0	Sun -8; MD graze
May 12	Sun	22:03	D	SAO 94739	7.6	8+ 5	19N	B9	Az. 291; sPA graze

Explanations & more information are at <http://iota.jhuapl.edu/exped.htm> .

David Dunham, dunham@starpower.net ,

Phone 301-526-5590

*Thank you Nancy Grace Roman
for locating this article.*

Vacuum Can Yield Flashes of Light

By Charles Q. Quoi
Proceedings of the National
Academy of Sciences
February 11, 2013

A vacuum might seem like empty space, but scientists have discovered a new way to seemingly get something such as light from that nothingness. And the finding could ultimately help scientists build incredibly powerful quantum computers or shed light on the earliest moments in the Universe's history.

Quantum physics explains that there are limits to how precisely one can know the properties of the most basic units of matter. For instance, one can never absolutely know a particle's position and momentum at the same time. One bizarre consequence of this uncertainty is that a vacuum is never completely empty, but instead buzzes with so-called virtual particles that constantly wink into and out of existence. These virtual particles often appear in pairs that near-instantaneously cancel themselves out. Still, before they vanish, they can have very real effects on their surroundings. For instance, photons can pop in and out of a vacuum.

When two mirrors are placed facing each other in a vacuum, more virtual photons can exist around the outside of the mirrors than between them, generating a seemingly mysterious force that pushes the mirrors together. This phenomenon, predicted in 1948 by the Dutch physicist Hendrick Casimir and known as the Casimir effect, was first seen with mirrors held still. Researchers also predicted a dynamical Casimir effect that can result when mirrors are moved or objects otherwise undergo change.

Continued on next column

Now quantum physicist Pasi Lähteenmäki at Aalto University in Finland and his colleagues reveal that by varying the speed at which light can travel, they can make light appear from nothing. The speed of light in a vacuum is constant, according to Einstein's theory of relativity, but its speed passing through any given material depends on a property of that substance known as its index of refraction. By varying a material's index of refraction, researchers can influence the speed at which both real and virtual photons travel within it. Lähteenmäki says one can think of this system as being much like a mirror, and if its thickness changes fast enough, virtual photons reflecting off it can receive enough energy from the bounce to turn into real photons. "Imagine you stay in a very dark room and suddenly the index of refraction of light [of the room] changes," Lähteenmäki says, "The room will start to glow."

The researchers began with an array of 250 superconducting quantum-interference devices, or SQUIDS, circuits that are extraordinarily sensitive to magnetic fields. They inserted the array inside a refrigerator. By carefully exerting magnetic fields on this array, they could vary the speed at which microwave photons traveled through it by a few percent. The researchers then cooled this array to 50 thousandths of a degree Celsius above absolute zero. Because this environment is supercold, it should not emit any radiation, essentially behaving as a vacuum. "We were simply studying these circuits for the purpose of developing an amplifier, which we did," says researcher Sorin Paroanu, a theoretical physicist at Aalto University. "But then we asked ourselves, 'what if there is no signal to amplify? What happens if the vacuum is the signal?'"

The researchers detected photons that matched predictions from the dynamical Casimir effect. For instance, such photons should display the strange property of quantum entanglement that is, by measuring the details of one, scientists could in principle know exactly what its counterpart is like, no matter where it is in the universe, a phenomenon Einstein referred to as, "spooky action at a distance."

Open House at Hopewell Observatory: Saturday, May 4-5, 2013

NCA members, families and guests are invited to view the spring sky at Hopewell Observatory in the Bull Run Mountains. See Jupiter, Saturn, the Milky Way, and numerous deep-sky objects, as well as recent improvements to our facilities. The Sun sets at about 8:06 pm, and the Moon won't rise until about 3:35 am. Come around sunset. We have four main telescopes: a 12" Wright catadioptric made by one of our members, a 14" Celestron Schmidt-Cassegrain, a 6" f/15 Jaegers refractor, and a 16" Newtonian truss-tube alt-az scope made by Alan Bromborsky.

Directions: (1) From the Beltway (I-495) go west on I-66 25 miles to Exit 40 at Haymarket onto U.S. 15. (2) Turn left on U.S. 15 at the traffic light at the end of the exit ramp. (3) Go 0.3 mile to traffic light, turn right onto Va. 55. (4) Go 0.8 mile to Antioch Road (Rt. 681) and turn right. (5) Go 3.2 miles to the end of Antioch Rd. and turn left onto Waterfall Road (601). (6) Go one mile and bear right onto Bull Run Mountain Rd. (Rt. 629). (7) Go 0.9 mile on 629 to narrow paved road at right with an orange pipe gate (Directly across from an entrance gate with stone facing). (8) Turn right through pipe gates, go 0.3 mile to top of ridge, and around the concrete building and towers, and park there. (9) Continue on foot via a dirt road through the white gate and woods a few hundred feet south to the observatory itself.

If it is raining or hopelessly cloudy the event will be canceled. For further information call 202-635-1860 (Guy Brandenburg) or email him at gfbranden@earthlink.net. The direct line to the observatory is 703-754-2317.

Free Family Science Night

WHEN: Fri, May 3, 2013 6:00-8:30 PM
WHERE: Howard B. Owens Science Center

Changes

Changes in science are happening all the time. From Animal Adaptations and Mutations to Climate, Weather and Environmental Changes. Come and participate in activities that bring some of these changes to light.

NO COST!

Bring your family and friends of all ages down to try and "adapt" some science, math and engineering ideas through fun, hands-on activities.

Calendar of Events

NCA Mirror- and Telescope-making Classes: Tuesdays Apr. 2, 9, 16, 23, 30 and Fridays, Mar. 5, 12, 19, 26, 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 gfbrandenburg@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.). Details: www.astro.umd.edu/openhouse

Dinner: Saturday, Apr. 13 at 5:30 pm, preceding the NCA meeting, at *Mulligan's Grill and Pub* at the [University of Maryland Golf Course](http://www.umdgolfcourse.com).

Owens Science Center Planetarium: "Breaking Crystal" (Tycho Brahe) Fri. Apr. 12 at 7:30 pm; \$5/adult; \$3/students/senior/ teachers/military; children under 3 free. Doors open 7:00 for pre-show activities. <http://www1.pgcps.org/howardbowens>

Montgomery College Planetarium: 7621 Fenton Street, Takoma Park, MD (240) 567-1463. Sat. Apr. 20 at 7:00 pm. "Fabric of Reality" in the Planetarium. <http://www.montgomerycollege.edu/Departments/planet/>

Mid Atlantic Senior Physicists Group : Harold A. Williams, Montgomery College. "Time Space Invariance and Quantum Gravity: or how c,G,and h create the fabric of Reality!" Wed. Apr. 24 at 1:00pm. American Center for Physics, College Park, MD. See page 3.

Upcoming NCA Meetings at the University of Maryland Observatory

- Apr. 13 **Joleen K. Carlberg** (CIW-DTM), Red Giant Stars Say "Death to Planets!"
- May 11 **Nancy Chabot** (APL), MESSENGER's Surprising Images of Mercury
- Jun. 8 **Science Fair Winners**

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

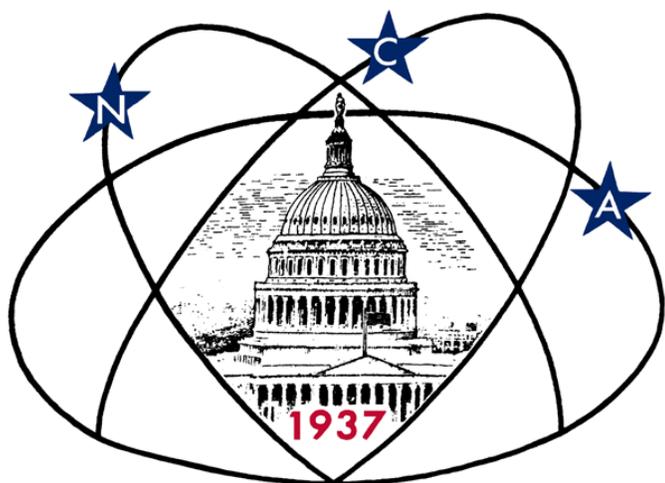
NCA c/o Elizabeth Warner

400 Madison St #2208

Alexandria, VA 22314

First Class

Dated Material



Next NCA Mtg:

April 13

7:30 pm

@ UMD Obs

**Joleen K. Carlberg
(CIW-DTM)**

Inside This Issue

Preview of Apr. 2013 Talk.....	1
MASPG Talks.....	2
ATM Coating Machine.....	2
Exploring the Sky.....	3
Occultation Maps.....	4
Occultations.....	5
Casimir Effect.....	6
Hopewell May 4.....	6
Calendar.....	7