

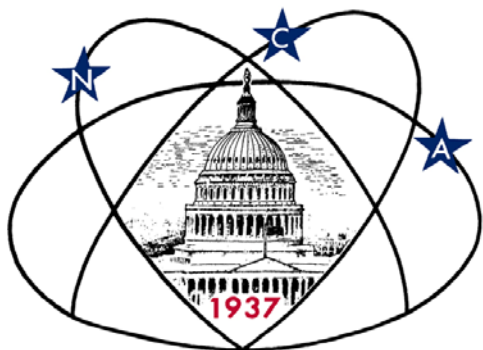
Star Dust

Newsletter of National Capital Astronomers, Inc.

capitlastronomers.org

November 2013

Volume 72, Issue 3



Next Meeting

When: Sat. Nov. 9th, 2013

Time: 7:30 pm

Where: UMD Observatory

Speaker: Kent Wood

Table of Contents

Preview of Nov. 2013 Talk.....	1
Patroclus	2
Sky Watchers.....	3
Amateur Telescope-Making Classes.....	3
Occultations.....	5
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.

An All-Sky Discovery Machine:

The Large Area Telescope on Fermi and Pan-STARRS-1 (PS1) as Contemporaneous All-Sky Monitors

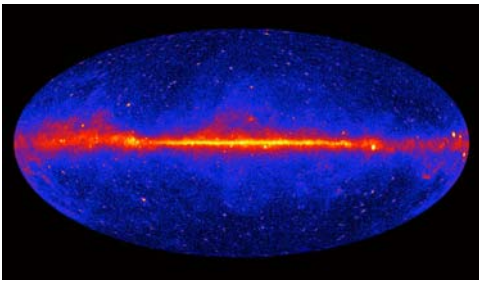
Kent S. Wood
Naval Research Laboratory

Abstract: Time-domain astronomy is increasingly important in all bands of the electromagnetic spectrum. The Large Area Telescope (LAT) onboard NASA's *Fermi* satellite is effectively an all-sky monitor in high energy gamma-rays. It is the first such monitor in that band, but is also a highly sensitive instrument that catalogs the faintest sources yet detected at those energies. Sources found by *Fermi* emit across the entire electromagnetic spectrum. Multi-wavelength observing campaigns can be pursued a new way – on an all-sky basis – provided the LAT can be correlated with other all-sky monitors with comparably powerful sky coverage and



Pan-STARRS Telescope (style: Ritchey–Chrétien Reflector)
Mt. Mauna Kea, Hawaii, elevation ≈ 4,200 meters

continued on page 2



Courtesy NASA

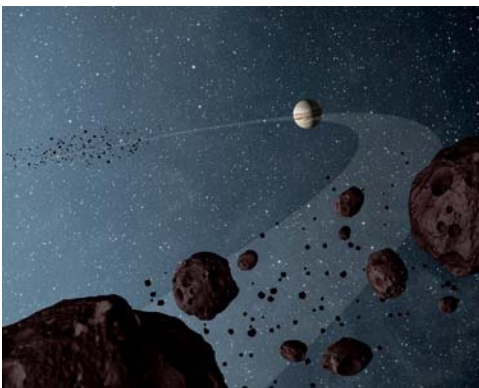
Gamma Rays in visible sky
Fermi Large Area Telescope (LAT)
<http://fermi.gsfc.nasa.gov/>

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.

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.

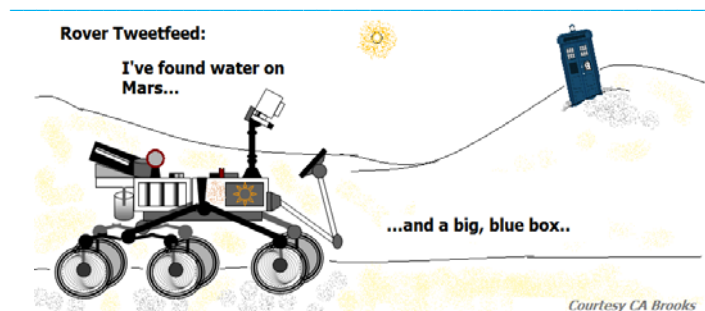


Courtesy NASA/JPL-Caltech

Jovian Trojan asteroids share Jupiter's orbit and travel in "packs." Much of the data on the behaviors of these asteroids come from NEOWISE (the asteroid aspect of the WISE survey)
<http://neo.jpl.nasa.gov/programs/neowise.html>

• *Pan-Starrs (PS1) – continued from page 1*
• sensitivity. The Pan-STARRS 1 (PS1) optical survey is currently the
• appropriate counterpart for visible wavelengths. It has completed
• coverage of three-fourths of the sky (all Declinations north of -30 degrees)
• and continues repeated monitoring via five filters over all that sky. PS1
• observations are contemporaneous with the *Fermi* satellite. The talk will
• describe *Fermi* and Pan-STARRS and then discuss how their all-sky data
• are merged for purposes such as cross-identifying sources by correlated
• variability or establishing precise positions for optical counterparts to the
• *Fermi* sources.

• **Biographical Sketch:** Kent S. Wood completed undergraduate work in
• physics at Stanford University and obtained his Ph.D. in physics at MIT,
• with Prof. Philip Morrison. He has been at the Naval Research Laboratory
• (NRL) since 1973, where he now heads the UV/X-ray Astrophysics and
• Applications Section. Most of his work at NRL has concerned celestial
• sources of X-ray and gamma-ray radiation, including development and
• operation of space-based sensor systems. He also led scientific analysis
• on NRL's experiment on the *HEAO-1* satellite, leading to an all-sky X-ray
• source catalog that was the most complete for its era. His astrophysical
• research has emphasized compact objects such as neutron stars and
• black holes. Starting in the 1980s he led development of the USA
• Experiment on the *ARGOS* satellite, which conducted observations of
• highly variable X-ray sources and was the first systematic study of X-ray
• navigation, which is the use of celestial X-ray sources for navigation of
• satellites. He worked on the *Fermi* Gamma-ray Space Telescope since its
• conceptual inception in the 1990s and since 2005 has also been
• developing methods for using *Fermi* and the optical telescope Pan-
• STARRS jointly as tools for all-sky contemporaneous multi-wavelength
• observation.



Courtesy CA Brooks

Patroclus

David Dunham

• Early Monday morning, October 21st, the binary Trojan asteroid 617
• (Patroclus & Menoetius), occulted the 9.6-magnitude star TYC 0646-
• 00730-1 in Aries for observers across the US. The Patroclus pair are
• almost equal-sized objects, just over 100 km in diameter; their relative
• orbit is nearly circular with a diameter of 640 km. Patroclus (or "Patroclus
• primary") is the larger object is and the smaller one is Menoetius. Before
• the occultation, the position of Menoetius in the relative orbit was poorly
• known and that, combined with errors in the asteroid ephemeris and the
• star's position, meant that the occultation could occur over a wide zone
• that included the Washington, DC region.

continued on page 6

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,



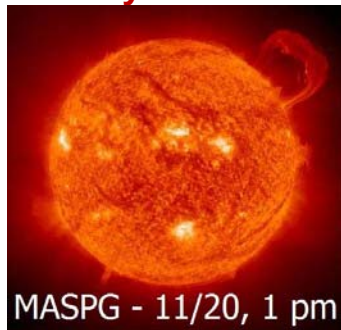
starting shortly after sunset. We meet in the field just south of the intersection of Military and Glover Roads NW, near the Nature Center. A parking lot is located next to the field. Beginners (including children) and experienced stargazers are all welcome—and it's free!

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

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

“Exploring the Sky” is a presentation of the National Park Service and National Capital Astronomers

“Our Dynamic Sun”



Courtesy NASA/JPL-Caltech

Sky Watchers

Autumn Schedule

November

2	Sunset (6:06 pm) – Open House & Star Party , Hopewell Obs. Features: <i>Jupiter, Venus, Mars & deep sky objects</i>
2	7:00 pm – Exploring the Sky , Rock Creek Park. Features: <i>Pleiades & Winter Constellations</i> www.nps.gov/rocr/planyourvisit/expsky.htm
12	10:08 – 10:14 pm – Double Shadow , Northern Hemisphere. Features: <i>Shadows of Io & Europa on Jupiter</i> astronomy.starrynight.com/article/monthly-sky-events-november-2013
16-17 (peak)	Midnight – Early am – Leonid Meteor Shower , Northern Hemisphere. (<i>Full Moon – 11/17</i>) solarsystem.nasa.gov/planets/leonids.cfm
25	Pre-dawn – ISON & Planets , Northern Hemisphere Features: <i>Mercury, Saturn & C/2012 S1 (ISON)</i> astronomy.starrynight.com/article/monthly-sky-events-november-2013
28	ISON Perihelion , Everywhere.

Amateur Telescope-Making Classes at the Chevy Chase Community Center

Guy Brandenburg, Principal Instructor

Amateur telescope makers (ATMs) will (we hope) continue to make a variety of telescopes this November at the Chevy Chase Community Center, continuing an NCA tradition that began in the 1930s. Normally, classes are on Tuesday and Friday evenings from 6:30 to 9:45. The number for the CCC is (202) 282-2204 and the address is 5601 Connecticut Ave NW, Washington, DC 20015.

If you didn't know, we have blanks, tools, abrasives, and so on for making mirrors that range from 4.25" up to 12.5" in diameter from start to finish. We also have a number of nearly complete telescope mirrors that need a few more sessions of figuring. We also have a vacuum chamber that is capable of putting the final aluminum coating on your finished mirror; or we can strip and re-aluminize a mirror that has gotten tarnished over the years. In addition, we have a fair selection of metal- and wood-working tools (lathes, mills, drills, etc) with which you could build the rest of your telescope.

You do not need prior expertise; all you need is the ability to finish a project that you begin, and to avoid dropping the mirror onto a hard concrete floor.

continued on page 4

Telescope-making – continued from page 3



Here are two recently-finished telescopes that are beautifully made, functional, and have very well-figured mirrors: JC Nebel's project (above) and David Collins' project (below). JC made the entire thing at our workshop, but David did most of the woodworking at a different facility (David describes the process in considerable detail at <http://telescopemaking.wordpress.com/>).



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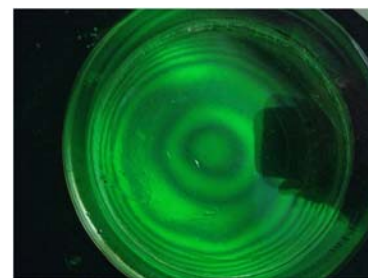
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 • postage in the production of Star Dust (the
 • NCA's single largest expense), save some
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 • embedded links in the document. If you can
 • switch from paper to digital, please contact
 • Henry Bofinger, the NCA Secretary-
 • Treasurer, at hbofinger@earthlink.net

Thank you!



• "...slightly off-center interferogram in
 • monochromatic green light of a partly-
 • completed complementary pair of
 • convex/concave mirrors for something called
 • a Stevick-Paul telescope, which is a variety
 • of Schiefspiegler, being made by Oscar
 • Olmedo. He will need 99% reflectivity, which
 • unprotected aluminum coatings cannot
 • provide (92% when new), so some other
 • place will have to do his coatings."

• -- Guy: Telescope-making

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

2013						dur. Ap.			
Date	Day	EST	Star	mag.	Asteroid	dmag	s	"	Location
Nov 12	Tue	2:18	TYC28960986	10.9	Claytonsmith	4.6	4	6	DE,MD,nVA,WV;DC?
Nov 17	Sun	19:17	TYC22660214	10.3	Chaka	3.5	2	5	wPA,wMD,eWV,eVA
Nov 20	Wed	18:30	2UC40460269	14.8	2002 TC302	5.6	49	12	TNO, e. USA
Nov 26	Tue	4:08	TYC28671816	9.8	Sophrosyne	2.0	11	4	cTX,NM,nAZ,nCA
Dec 11	Wed	4:45	TYC23901137	10.4	Vindobona	3.6	5	5	VA,WV,s&wOH,nIN

Lunar Grazing Occultations

2013									
Date	Day	EST	Star	Mag	% alt	CA	Location	&	Remarks
Nov 25	Mon	2:50	SAO 117977	8.2	54- 39	2S	*s.Laurel,Fairlnd,Deerwood,MD		
Nov 26	Tue	6:16	36 Sex	6.3	43- 56	4S	*SouthHill,VA;RoanokeRapds,NC		
Nov 29	Fri	6:49	56 Vir	7.0	15- 34	4S	Warrenton, VA; Nanjemoy, MD		
Dec 6	Fri	17:08	SAO 163780	8.1	21+ 33	2S	*Martinsburg,WV;Gettysburg,PA		

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

Total Lunar Occultations

2013									
Date	Day	EST	Ph Star	Mag	% alt	CA	Sp.	Notes	
Nov 13	Wed	1:08	D ZC 3507	6.5	80+ 17	64N	F5	Spectroscopic binary	
Nov 16	Sat	19:20	D ZC 450	6.4100+	32	85N	K3	Terminator Dist. 6"	
Nov 17	Sun	23:04	R ZC 593	5.9100-	64	71N	F4 AA 312,	SpecBinary,TmD5"	
Nov 18	Mon	5:25	R ZC 617	6.6	99- 24	60N	F6 AA 320,	Term. Dist. 8"	
Nov 18	Mon	19:18	R ZC 718	6.0	98- 15	79S	K4 Az. 78	deg, AA 272 deg	
Nov 18	Mon	21:58	R 97 Tauri	5.1	98- 45	54S	A7 AA 246,	ZC 730, double?	
Nov 19	Tue	21:58	R 127 Tauri	6.7	94- 36	70S	B9 AA 259,	ZC 863	
Nov 21	Thu	22:17	R SAO 96848	7.1	82- 20	78N	K0		
Nov 22	Fri	22:17	R ZC 1237	6.5	74- 10	18S	A7	Azimuth 80 degrees	
Nov 23	Sat	5:04	R ZC 1256	7.3	72- 63	81S	A2		
Nov 24	Sun	1:25	R SAO 98338	7.6	64- 35	55S	K2		
Nov 24	Sun	3:46	R kappa Cnc	5.2	63- 57	78S	B8 ZC 1359,	close double	
Nov 26	Tue	6:35	R 36 Sex	6.3	43- 54	39S	K4 Sun -5,	ZC1566, double?	
Nov 27	Wed	3:09	R SAO 138220	7.1	34- 22	90S	A0		
Nov 27	Wed	3:39	R SAO 138233	7.0	34- 27	45N	K4		
Nov 29	Fri	3:56	R ZC 1887	6.3	16- 8	79S	K0	Azimuth 109 degrees	
Nov 29	Fri	6:59	R 56 Vir	7.0	15- 35	21S	K5 Sun -2,	ZC1900, graze	
Nov 29	Fri	12:43	D Spica =	1.0	14- 17	-88N	B1 Sun +29,	AA 84, ZC1925	
Nov 29	Fri	13:50	R alpha Vir	1.0	14- 6	84S	B1 Sun +24,	Azimuth 251	
Dec 6	Fri	17:33	D ZC 3021	7.3	21+ 32	69N	K0 Sun -9,	close double?	
Dec 7	Sat	19:13	D ZC 3172	7.7	32+ 30	77N	G5		
Dec 7	Sat	21:33	D ZC 3184	7.0	32+ 8	13S	K0 Az. 252,	double?	
Dec 8	Sun	18:19	D SAO 146159	7.9	42+ 45	89N	K0		
Dec 8	Sun	21:03	D Situla	5.0	43+ 25	58N	K2 ZC3320,	kappaAqr, double?	
Dec 10	Tue	17:48	D ZC 30	7.1	64+ 51	43N	A0 Sun alt. -12	deg.	
Dec 10	Tue	20:54	D ZC 41	7.7	65+ 48	58N	G5		
Dec 11	Wed	17:45	D ZC 162	6.9	74+ 48	62N	F0 Sun alt. -11		
Dec 11	Wed	22:39	D SAO 109738	7.8	75+ 43	75S	G5		
Dec 12	Thu	19:26	D ZC 290	6.1	83+ 59	60N	A6		
Dec 12	Thu	21:55	D SAO 92761	6.9	83+ 59	39N	K0		
Dec 13	Fri	20:03	D sigma Ari	5.5	90+ 60	51S	B7 ZC 422		
Dec 14	Sat	19:50	D ZC 532	7.1	95+ 52	58S	G0	Maybe close double	
Dec 16	Mon	3:55	D ZC 718	6.0	99+ 27	30S	K4	Terminator Dist. 5"	

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

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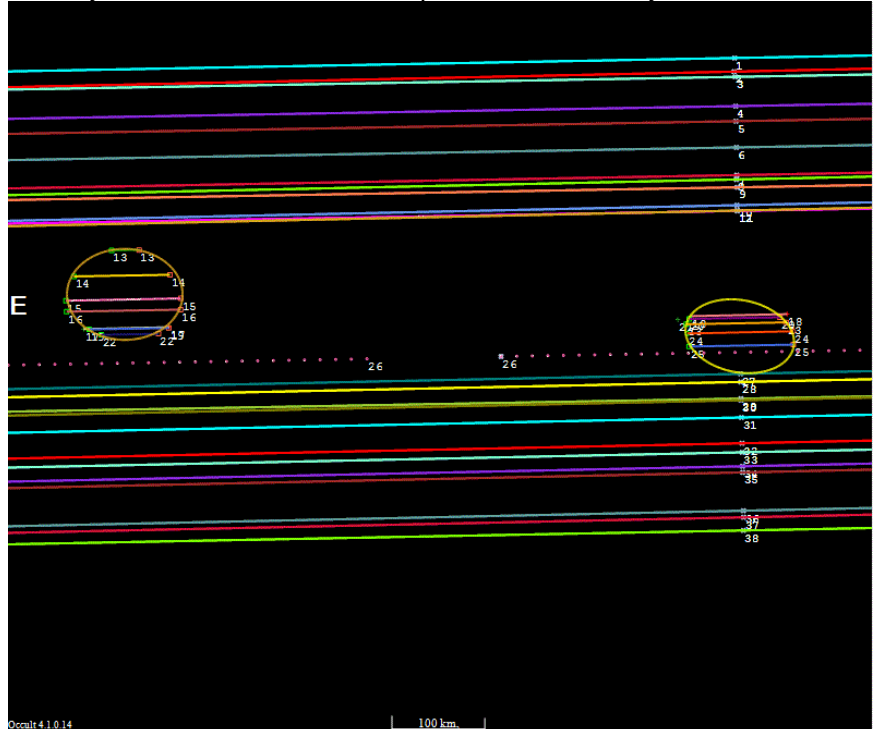
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• *Patroclus – continued from page 2*

- The International Occultation Timing Association (IOTA) coordinated a
- large effort to obtain observations over the 700-km-wide uncertainty zone
- with fixed-site and numerous mobile stations 30 km or less apart.
- Fortunately, it was clear in our area and most other areas across the
- USA; so, the campaign was quite successful. Observers from the
- Washington, DC area covered much of the northern part of the
- uncertainty zone with 4 observers spread across Maryland.



- Figure: Sky Plane Plot of observer lines for the Oct. 21st occultation by the Patroclus
- system. The colored lines represent multiple observations & lines extending across the
- whole figure were miss (no occultation) observations (the observation at Greenbelt, just
- north of Washington, is line #5 from the top). The short lines are chords across the
- Patroclus components when they occulted the star for some observer. My observation at
- Hanover Courthouse, VA, is the top one (#13) on the left object, which is Patroclus
- primary. The Menoetius secondary object is farther south on the right; the motion was
- from left to right, so Menoetius occulted the star first. North is at the top.

- I pre-pointed a telescope in our Greenbelt, MD backyard to the
- occultation altitude and azimuth & my wife agreed to turn on the video
- camera 10 minutes before the occultation (which took place at 2:43 am
- EDT). In the meantime, I drove south into Virginia to set up a line of
- remote telescope-video systems; Wayne Warren helped with the
- deployment. Not only were the Patroclus components nearly aligned with
- the motion, but the center-of-mass path prediction was less than 20 km in
- error (much smaller than usual). This allowed some observers in
- southernmost Virginia, and farther west along that path, to see
- occultations by both components about 40 seconds apart (the maximum
- occultation length was about 7 seconds). Consequently, all of the stations
- in Maryland and those that we set up near Dahlgren and Bowling Green,
- VA had no occultation; but, at my southernmost station, in the parking lot
- of a memorial park south of Hanover Courthouse, VA, a two-second
- occultation occurred, near the northern edge of the path of the occultation

continued on page 7

Patroclus – continued from page 6

by the Patroclus primary. Besides obtaining good measurements of the sizes and shapes of the objects of this interesting asteroidal system, the video-recorded disappearances and reappearances were all gradual. The star's magnitudes indicate that it is likely a distant red giant and we will be able to measure its diameter from careful analysis of the occultation event light curves.



Clear Skies!

Calendar of Events

- **NCA Mirror- and Telescope-making Classes:** Tuesdays Nov. 5, 12, 19, 26 and Fridays, Nov. 1, 8, 15, 22 (No class on Nov. 29) from 6:30 to 9:45 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.
- **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:** "Bright & Shiny Moon" Fri. Nov. 8 at 7:30 pm; \$5/adult; \$3/students/senior/ teachers/military; children under 3 free. Doors open 7:00 for pre-show activities. www1.pgcps.org/howardbowens
- **NCA Pre-meeting Dinner:** Saturday, Nov. 9 at 5:30 pm, preceding the meeting, at [Mulligan's Grill and Pub](#) at the [University of Maryland Golf Course](#).
- **Mid-Atlantic Senior Physicists Group:** "Our Dynamic Sun," with Holly Gilbert (GSFC), Wed. Nov. 20 at 1 pm at the American Center for Physics (1st floor conference room). <http://www.aps.org/units/maspg/>
- **Upcoming NCA Meetings** at the University of Maryland Observatory:
 - **9 Nov:** Kent Wood (NRL), *An All-Sky Discovery Machine: A Gamma-Ray Telescope and an Optical Survey Telescope*
 - **14 Dec:** Gordon Bjoraker (GSFC), *Water Vapor and Hydrocarbons on the Outer Planets*

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.?

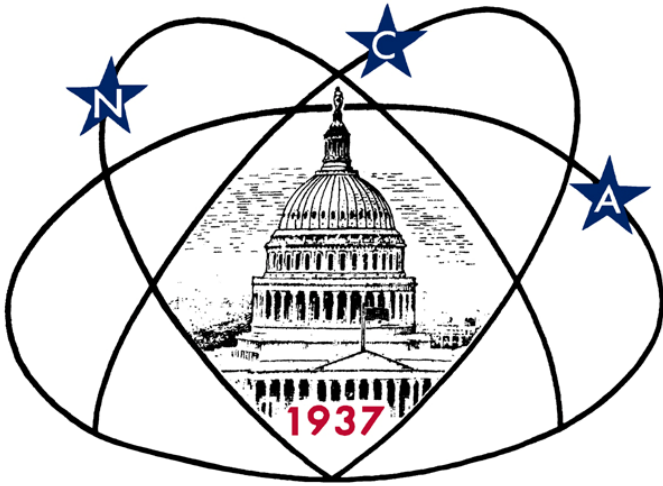
Are you interested in volunteering for: Telescope making, Exploring the Sky, Star Dust, NCA Officer, etc.?

Please mail this form with check payable to **National Capital Astronomers** to:
Henry Bofinger, NCA Treasurer; 727 Massachusetts Ave. NE, Washington, DC 20002-6007

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Alexandria, VA 22314

First Class
Dated Material



Next NCA Meeting:

2013 November 9th

7:30 pm

@ UMD Observatory

Dr. Kent S. Wood

Inside This Issue

Preview of Nov. 2013 Talk.....	1
Patroclus.....	2
Sky Watchers.....	3
Amateur Telescope-Making	
Classes.....	3
Occultations.....	5
Calendar.....	7