Star Dust

National Capital Astronomers, Inc.

October 2011

Volume 70, Issue 2

http://capitalastronomers.org

Next Meeting

When: Sat. Oct. 8, 2011

Time: 7:30 pm

Where: UM Observatory

Speaker: Xiaoli Sun, GSFC

Table of Contents

Directions to Dinner/Meeting

Members and guests are invited to join us for dinner at the Garden Restaurant located in the UMUC Inn & Conference Center, 3501 University Blvd E. The meeting is held at the UM Astronomy Observatory on Metzerott 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.

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.

October 2011: Dr. Xiaoli Sun
Senior Scientist
NASA Goddard Space Flight Center

Topographic Mapping of Planets via Space-based Lidar

Abstract: This presentation will give an overview of the history, ongoing work, and NASA's plans for using space-based lidar for measurements of the Earth and planets. A space-based lidar instrument was first used to measure planetary surface height and topography on the Apollo 15 mission to the Moon in 1971, using a flashlamp-pumped ruby laser. The Apollo 15-17 missions used lidars to make a few thousand measurements of the lunar surface. With the advent of diode pumped lasers in the late 1980s, the lifetime, efficiency, resolution and mass of lasers and space-based lidars all improved dramatically. These advances were utilized in NASA missions to map the shape and surface topography of Mars - with more than 600 million measurements, the Earth's topography, and the detailed shape of an asteroid. NASA's ICESat mission in Earth orbit completed its polar ice measurement mission with almost 2 billion measurements of the Earth's surface and atmosphere, and demonstrated measurements of Antarctica and Greenland with a height resolution of a few cm. Space missions presently in operation include those to Mercury, and a topographic mapping mission of the Moon. Orbital lidar also has been used in experiments to demonstrate laser ranging over planetary distances, including laser pulse transmission from Earth to Mars orbit. Based on the demonstrated value of the measurements, lidar is now a preferred measurement approach for many new scientific space missions, including a planetary mission to measure the shape and dynamics of Europa, the monitoring of ice sheet heights on Earth, the height of vegetation, atmospheric CO2 concentrations, and to map surface topographic heights on Earth with 5 m spatial resolution.

Biography: Xiaoli Sun is a Senior Scientist in the Solar System Exploration Division at NASA's Goddard Space Flight Center. He has participated in the development of space-based lidars ever since he joined NASA in 1993. He was the lead engineer in photodetector development and receiver performance analysis for the Mars Orbiter Laser Altimeter on the Mars Global Surveyor Mission launched in 1996, and the Geoscience Laser Altimeter System on the ICESat Mission launched in 2003. He was the instrument scientist for the Mercury Laser Altimeter on the MESSENGER mission launched in 2004 and the Lunar Orbiter Laser Altimeter on the Lunar Reconnaissance Orbiter mission launched in 2009. He is involved in many lidar developments at NASA Goddard Space Flight Center in the areas of instrument design and performance analysis for future NASA missions, such as the CO2 lidar for the ASCENDS mission and the Swath-mapping lidar for the LIST mission. He received his Ph.D. in Electrical Engineering from the Johns Hopkins University in 1989.

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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.

Come to the Annual Fall Open House at Hopewell Observatory on Saturday, October 29, 2011 (Cloudy or not!)

All members, friends, and relatives of the Northern Virginia Astronomy Club, the National Capital Astronomers, the Howard Astronomy League, the Greenbelt Astronomy Club, and any other local astronomy enthusiasts, are invited to come see the skies at a small, private, member-built and member-owned observatory in the foothills of Northern Virginia on the evening of Saturday, October 29th, 2011. If the skies are overcast or rainy, then the Open House will consist instead of a tour of our facilities.

The Hopewell Observatory is located on a small mountainous ridge called the "Bull Run Mountain", about 5 miles northwest of the intersection of I-66 and US-15 at the small town of Haymarket, VA. It is about 36 miles due west of the US Capitol building, and is probably located on the highest and darkest location anywhere that close to the Capital Beltway. It is surrounded by wooded areas, thanks to ownership of a lot of that land by the Jackson Hollow Recreation Area, the Bull Run Mountain Conservancy, and the federal government.

Our Telescopes
We currently have two telescope piers, in two separate observing rooms, under a roll-off roof, rather than a dome. One pier houses a massive, research-grade mount manufactured by Ealing, which guides a Celestron 14-inch Schmidt-Cassegrain telescope, a 6-inch f/15 refractor made by Jaegers, and a variety of guide scopes. The other pier houses an unusual 12-inch diameter Wright-Newtonian catadioptric telescope entirely made by one of our senior members, Bob Bolster – and that includes the optics.

Some of our members own (or have built) their own telescopes, and will have them set up in the cleared, grassy area around the observatory building. If you would like to bring your own, feel free to do so. We even have outdoor electrical outlets and a small level concrete area if you need them.

Research
Recently the C-14 has been used by one of our members (Paul Hueper) to detect and confirm (or not) the existence of some extra-solar planets. He does this by using a CCD camera mounted on the telescope and taking very careful measurements of the relative brightness of "candidate" stars compared to other local stars, for many hours at a stretch. If the "candidate" star dims, remains dim, and goes back to its normal brightness again at the theoretically predicted times, then one can confirm that the theoretically proposed (but as-yet unseen) extra-solar planet has probably passed between us on Earth and its star. This is not an easy task, however: the dimming is on the order of a hundredth of a magnitude, or sometimes less.

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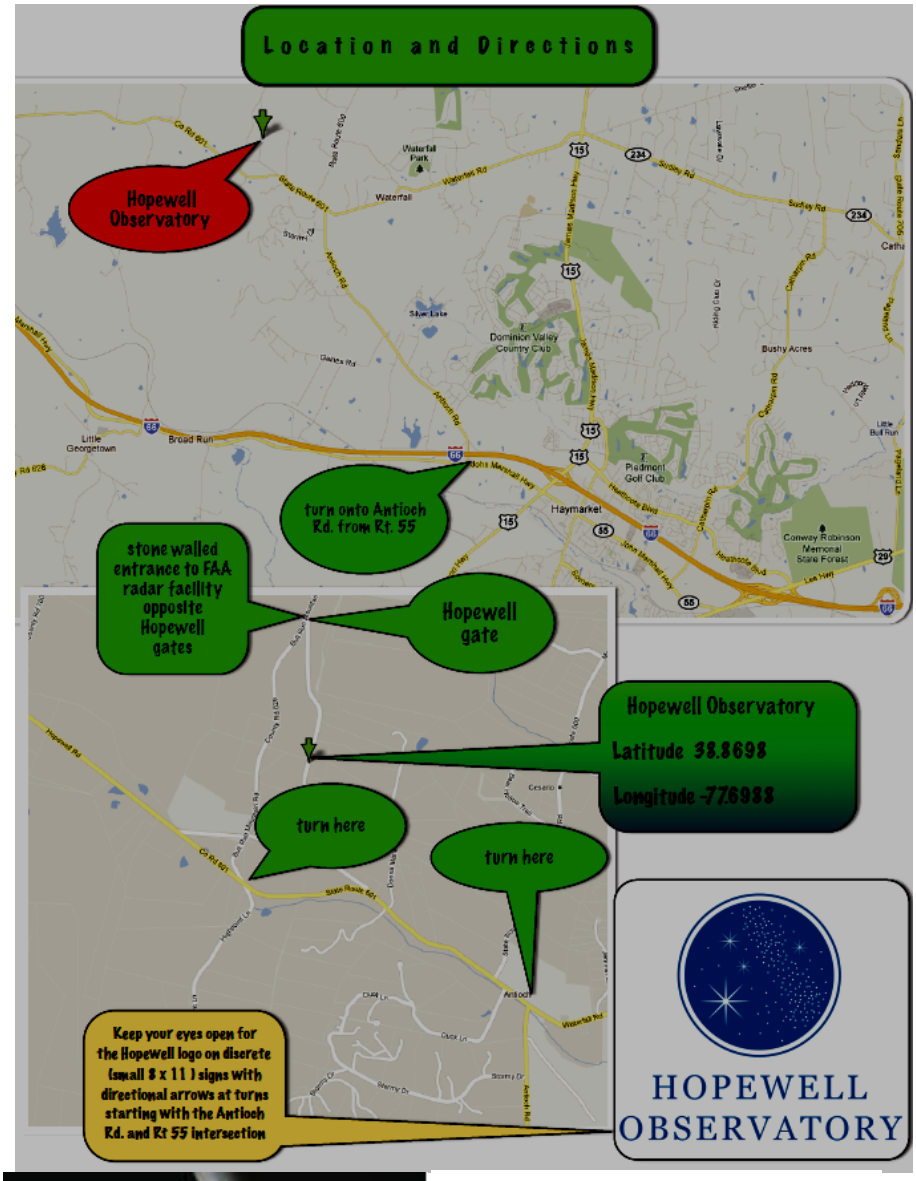


For more information, go to
http://www.cubrunbuilders.com
and click on
"HOPEWELL ASTRONOMICAL SOCIETY"

In the observatory itself, you will need to climb some stairs to look through the eyepieces.Sanitation is primitive. We have a simple composting toilet (with directions) in a red-lit outhouse behind the operations building, but we have no running water. We have some bottled drinking water and some non-potable water good enough for rinsing your hands. We also have paper towels, toilet paper, and hand sanitizers. We also have lots of bushes if you prefer roughing it.
If you get lost, you can call the observatory directly at 703-754-2317.

Recent Astronomy: Zoouniverse
September 2011

Nancy Grace Roman

Last month I wrote about Galaxy Zoo. This program was so successful that it spawned other similar programs. These include using a collection of solar data to search for flares, Spitzer data to search for bubble nebulae, the Lunar Reconnaissance Orbiter to search for craters, Kepler data to search for planets, Slone Digital Sky data to search for merging galaxies, and data from an automatic telescope to search for supernovae. More information about these projects can be found at: http://www.zoouniverse.org/projects.

Supermassive black holes[1]

Einstein showed that gravity affects light as well as matter. This led to the realization that material objects could become so dense that the gravitational attraction at their edge would be strong enough to keep light from escaping. The very dense bodies are called black holes. In the Milky Way galaxy, the visible matter is distributed in two primary components. a roughly spherical and slowly rotating bulge that dominates the inner part and a flat, more rapidly rotating disk that dominates at larger radii. These lie in the center of a large halo and surround a supermassive black hole that is, a mass of 4,000,000 times the mass of the Sun.

It is probable that every galaxy has a supermassive black hole in its nucleus but these are quiet most of the time. Occasionally, a hole attracts a cloud of gas, or a star that tides disintegrate into a cloud of gas, sufficiently strongly that the material spirals into the hole. As it does so, it orbits faster and faster the closer it gets to the hole.

Because temperature is defined by the random velocity of the gas, it gets hotter and hotter as it gets faster and glows brightly in the optical and ultraviolet. In addition, the electrons reach nearly the speed of light.

As they do so, because they are orbiting, they are accelerating and emit synchrotron radiation in the x-ray and radio regions. At the same time, some of the gas is accelerated to nearly the speed of light in a direction perpendicular to the orbit. It is not completely understood how these jets are formed. These narrow beams that also emit in the X-ray and radio regions extend far beyond the optical galaxy. Galaxies with active black holes are called Active Galactic Nuclei or AGNs.

Continued on Page 5

Below: One of the most detailed views of the Milky Way's core, this composite image combines near-infrared observations (red) from the Hubble Space Telescope, infrared recordings (red) from the Spitzer Space Telescope, and x-ray observations (blue and violet) from the Chandra X-ray Observatory. Credit: NASA/ESA/SSC/CXC/STScI

Continued from Page 4

Interestingly, the galactic bulges contain 1000 times as much mass as the black hole in a wide variety of galaxies. Thus the supermassive black holes and their galactic bulges must be intimately connected. Over the course of time, galaxies grow by accreting gas from the external environment or by the merger of two galaxies. In a merger, tidal fores between the two galaxies drain angular momentum from the cold gas in the disks of the galaxies allowing it to flow into the interior regions where it fuels an intense burst of star formation and supplies fresh gas to the black hole. If, as is probable, the two galaxies each contained a black hole, the holes can merge forming a more massive hole. The energy from the merger is so intense that it may blow away most or all of the remaining gas. In addition, the jets may heat the surrounding gas, preventing it from cooling and falling into the galaxy.

The Milky Way's center houses a supermassive black hole so sleepy that it probably hasn't swallowed a decent meal for years. Yet a growing body of evidence indicates that the now-dormant beast, about as massive as 4 million suns, fueled a firestorm of activity just a few million years ago, including the sustained emission of some of the highest energy radiation in the universe. A new study offers a dramatic explanation for these past fireworks: The sleeping giant woke when a smaller black hole from another galaxy smashed into it. Last year, astronomers discovered a striking new feature in the Milky Way: a pair of gamma ray-emitting gas bubbles, each the size of a small galaxy, emanating from the Milky Way's center and apparently fueled by some kind of violent event at the core of the galaxy. The core also contains an unusually high abundance of newborn stars and a lower-than-expected number of elderly stars.

Continued on Page 6

Mid-Atlantic Occultations and Expeditions

David Dunham

Asteroidal Occultations

Date	Day	EDT	Star	Mag.	Asteroid	dmag	s	dur. "	Ap.	Location
Oct 11	Tue	3:57	SAO 97705	7.7	Saimaa	8.9	1	2		cenOH,sPA,cenNJ
Oct 12	Wed	21:27	SAO 148086	7.8	1996 EB	9.0	0.6	2		VA; rank 2
Oct 14	Fri	4:07	SAO 129368	9.6	2000 TW55	8.5	0.5	2		VA;MD? rank 1
Oct 14	Fri	20:41	s09d-1141073	11.8	Arethusa	1.9	11	8		VA;rest of eUSA?
Oct 17	Mon	3:46	2UC31833811	11.9	Idomeneus	5.6	5	7		sON,NY,PA,NJ;MD?
Oct 18	Tue	3:48	2UC38612959	11.6	Xanthe	3.5	3	7		nVA,MD,DC,sPA,NJ
Oct 19	Wed	4:52	2UC41833875	12.4	1996 TQ66	10.	6	9		TNO; N.America?
Oct 21	Fri	20:45	SAO 161949	9.1	Thia	4.6	5	4		sGA,sSC,seNC
Oct 27	Thu	5:07	2UC36290077	11.9	Asterope	1.8	7	7		nOH,sPA,MD,DE,NJ
Oct 29	Sat	4:03	2UC35396788	11.1C	Astraea	0.3	4	9		sOH,MD,sPA,nVA
Oct 29	Sat	20:38	PPM 719445	9.9	Pia	6.8	1	4		WV,MD,sPA;DC,VA?
Nov 2	Wed	5:24	n40b-0383700	11.3	Zerbinetta	3.5	10	6		NC,VA,MD,ePA;DC?
Nov 5	Sat	0:02	PPM 721134	10.3	Interamnia	1.7	15	4		sCA,AZ,NM,nTX,OK
*** Dates and times above are EDT, those below are EST ***										
Nov 9	Wed	4:54	TYC13630286	9.5	Petrovic	6.1	2	4		PA,nMD,Delmarva
Nov 10	Thu	2:03	SAO 76864	8.9	Bulgaria	7.4	2	3		cenNJ,sPA,cenOH
Nov 11	Fri	18:24	2UC22095884	12.2C	Hertha	0.5	3	10		nwSC,wNC,VA,sMD

Lunar Grazing Occultations (*, Dunham plans no expedition)

Date	Day	EDT	Star	Mag.	% alt CA	Location
Oct 21	Fri	6:10	Acubens	4.3	37- 52 10S	Lagrange & Olamon, ME
Oct 23	Sun	4:46	SAO 118450	8.2	17- 13 7S	Winfeld&Nazarth,PA;Brnrdsv,NJ
Oct 23	Sun	5:24	SAO 118468	8.5	16- 20 8S	Norlina,RoanokeRapds,&Olds,NC
Oct 23	Sun	8:48	ZC 1582	6.4	15- 23 10S	Antioch&Manteca,CA;nLsVegs,NV
Oct 24	Mon	6:04	X 34491	9.8	8- 14 11S	Gamber, Towson &WhiteMarsh,MD

Total Lunar Occultations

DATE	Day	EDT	Ph	Star	Mag.	%	alt	CA	Sp.	Notes
Oct 5	Wed	22:55	D	ZC 2986	6.4	70+	27	84S	G8	
Oct 14	Fri	21:19	R	ZC 489	6.8	92-	16	87N	K5	
Oct 15	Sat	7:04	R	ZC 525	6.5	90-	38	57N	A*	Sun alt. -3 deg.
Oct 15	Sat	22:54	R	51 Tauri	5.6	86-	26	77S	F0	ZC 631, close double
Oct 15	Sat	23:35	R	56 Tauri	5.3	85-	34	75N	A0	
Oct 16	Sun	3:07	R	67 Tauri	5.3	85-	70	38N	A7	ZC 657
Oct 17	Mon	1:17	R	108 Tauri	6.3	77-	44	85N	A2	ZC 784
Oct 17	Mon	3:08	R	109 Tauri	5.0	77-	63	15S	G8	ZC 792
Oct 18	Tue	0:23	R	SAO 78006	7.3	69-	23	19S	F0	mg2 11,sep. 3",PA 33dg.
Oct 18	Tue	2:31	R	SAO 78074	7.4	68-	47	88N	B1	
Oct 19	Wed	4:55	R	ZC 1084	7.3	58-	62	85N	K5	
Oct 20	Thu	2:15	R	ZC 1198	6.1	48-	22	38S	K0	maybe close double?
Oct 20	Thu	2:39	R	SAO 97439	7.5	48-	27	61N	F8	mg2 13,sep. 6",PA 83
Oct 20	Thu	4:00	R	5 Cancri	6.0	47-	42	65S	B9	ZC1210, spec. binary
Oct 28	Fri	14:20	D	del Sco =	2.3	6+	28	87N	B0	Sun 34, mag2 5.0,
Oct 28	Fri	15:39	R	ZC 2290	2.3	6+	27	-80S	B0	Sun 25, sep .08",PA 200
Oct 31	Mon	19:15	D	SAO 187837	7.8	32+	27	64S	F3	
Oct 31	Mon	21:09	D	ZC 2810	7.7	33+	14	17N	A5	Az. 229
Nov 1	Tue	18:48	D	ZC 2933	7.9	42+	34	89N	F3	Sun alt. -8 deg.
Nov 2	Wed	19:10	D	SAO 164025	7.5	53+	38	66S	G0	
Nov 2	Wed	20:15	D	8 Aquarii	6.6	53+	37	86N	A3	ZC 3070
Nov 2	Wed	22:34	D	SAO 164080	7.1	54+	22	34N	K4	maybe close double
Nov 3	Thu	17:57	D	46 Cap	5.1	62+	34	76N	G8	Sun +1, ZC 3185
Nov 3	Thu	17:59	D	ZC 3184	7.0	62+	34	64N	K0	Sun 0, close double?
Nov 3	Thu	23:29	D	ZC 3201	7.9	64+	24	16N	F8	
*** Dates and times above are EDT, those below are EST ***										
Nov 10	Thu	3:03	D	27 Arietis	6.2100+	49	51N	G5	ZC 371,Term.Dist. 4"	
Nov 12	Sat	6:28	R	51 Tauri	5.6	98-	20	79S	F0	Sun-4,WA260,ZC631,dbl.

Explanations & more information is at http://iota.jhuapl.edu/exped.htm. David Dunham, 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/timng920.htm.

Continued from Page 5

These conditions could result from the same event: the dregs of a small satellite galaxy, housing an intermediate-mass black hole about as heavy as 10,000 suns, smacking into the Milky Way's center about 10 million years ago. The Milky Way's gravity would have slowly stripped the satellite galaxy of most of its mass since the body first began falling toward the Milky Way about a billion years after the big bang but would still be hefty enough to make a stir, the team's simulations show.

1. Much of this article is based on a paper by T. M. Heckmann and G. Kauffmann. The item on Activity in the Milky Way is based on a NASA press release.

NCA Returns to Annual Fiscal Year Membership Renewal Cycle

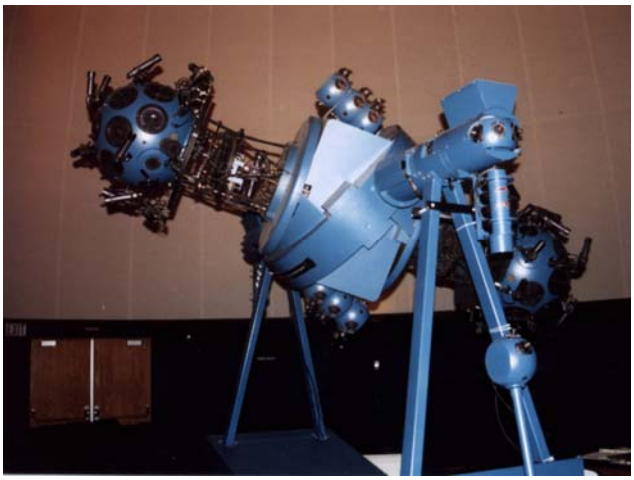
Benson Simon

As most members know by now, NCA is returning to annual membership renewals at the beginning of each NCA fiscal year on September 1. This will save a great deal of work for the NCA Treasurer and Secretary, which was the original intent of the annualized process, as provided in NCA's constitution. Long-time members will largely be unaffected because their renewal date anniversaries will have remained in the August-September time frame. Members who joined or renewed after March 1, 2011 will be considered paid up through August 31, 2012.

National Capital Area Skeptics

On Saturday, October 15 at 1:30 pm at the Bethesda Regional Library, Douglas W. Gage, Ph.D. will present "Humans to Mars: How and Why." Now that the space shuttle program has ended, what should be the next step for human space flight? There appears to be broad agreement that Mars should be our ultimate goal, but some say that first we should go back to the Moon or to an asteroid.

Continued on Page 7



The Howard B. Owens Science Center Planetarium 2011 Fall Schedule of Programs

9601 Greenbelt Road
Lanham-Seabrook, MD 20706
http://www1.pgcps.org/howardbowens/

All Programs held the second Friday of the month unless otherwise indicated.
Doors open by 7:15 p.m.
Program begins at 7:30 p.m.
Call 301-918-8750 during school hours to confirm program topic.
Cost is $5.00 for adults; $3.00 for students/teachers/seniors. Children 3 and under are free.

October 14, 2011:
Spooky Skies

How do you pronounce *Celtic*? How do you pronounce *Samhain* (Gaelic for "summer's end")? What do the Seven Sisters have to do with Halloween? Why do we carve pumpkins? You will explore these matters and more in this fun and informative star program. Legends and lore of the Seven Sisters from different world cultures will be presented in a family friendly way. Then you'll discover the connections among the Seven Sisters, Samhain and Halloween. Along the way you'll learn to identify stars, constellations and planets visible at this season. ***Boo!***

November 18, 2011*:
Treasure of the Stars
NOTE: This is the 3rd Friday of the month

"X" marks the spot… or does it?! On this evening, your quest begins OUTSIDE the planetarium, beginning at 7:00 p.m. Help us find the clues that we need to take into the planetarium in order to find the Treasure of the Stars! Constellation identification is interwoven into the activities, as well as a lot of fun!

December 9, 2011:
Terrible Teddy

In this timeless tale, Santa has made a Teddy Bear too big to fit in the sleigh. But Teddy doesn't want to be in a department store. Come learn how Teddy uses the stars to find his way back to Santa! A tour of the current night sky follows the presentation. Special: bring a teddy bear to donate to Toys for Tots, and receive $1 off your admission fee!

Continued from Page 6

Meanwhile, real challenges lie in developing the technologies, systems, and operational processes that will keep explorers safe, secure, productive, and happy on the surface of Mars. We need to provide shelter, energy, air, water, food, health care, communications, IT support, ground transportation, and much more. The initial development of these technologies is much less expensive than designing and building rockets, and most can be used or adapted for use on Earth.

Douglas Gage is an independent technology consultant based in Arlington, Virginia. In the early 2000s, he served as a Program Manager at DARPA, managing programs in robotic software. He served as a reviewer for the NASA's Mars Technology Program for several years, and in 2005 he served as External Cochair for NASA's Capabilities Roadmapping Team for Autonomous Systems and Robotics.

Calendar of Events

NCA Mirror- and Telescope-making Classes: Tuesdays Oct. 4, 11, 18, 25 and Fridays, Oct. 7, 14, 21, 28, 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.

Exploring the Sky at Rock Creek Park Oct. 22 7:30PM. Pleiades and Jupiter rising in the East. http://www.nps.gov/rocr/planyourvisit/expsky.htm. Questions? Call the Nature center at (202) 895-6070.

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, Oct. 8 at 5:30 pm, preceding the meeting, at the *Garden Restaurant* in the University of Maryland University College Inn and Conference Center.

Montgomery College Planetarium: Saturday, 22 Oct. 2011 at 7 pm. 7621 Fenton Street, Takoma Park, MD (240) 567-1463. "When was Creation?" http://www.mc.cc.md.us/Departments/planet/

Upcoming NCA Meetings at the University of Maryland Observatory

Oct. 8, 2011 **Xiaoli Sun** (GSFC) - *Topographic Mapping of Planets via Space-based Lidar*

Nov. 12, 2011 **Dan Wik** (GSFC) - *Merging Galaxies and Clusters of Galaxies*

Dec. 10, 2011 **Justin Finke** (NRL) - *Gamma Rays from Radio Galaxies*

National Capital Astronomers Membership Form

Name: _____ **Date:** ___/___/___

Address: _____ **ZIP Code:** _____

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Present or Former Occupation (Or, If Student, Field of Study): _____

Academic Degrees: _____ **Field(s) of Specialization:** _____

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Standard Individual or Family Membership: …… $10

Optional additional contribution to NCA: …… $__

Total Payment (circle applicable membership category above): …… $___

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Michael L. Brabanski, NCA Treasurer; 10610 Bucknell Drive; Silver Spring, MD 20902

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Next NCA Mtg:

Oct. 8

7:30 pm

@ UM Obs

Dr. Xiaoli Sun

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