Star Dust

National Capital Astronomers, Inc.

September 2012 *Volume 71, Issue 1*

http://capitalastronomers.org

Celebrating 75 years 1937-2012

Next Meeting

When:	Sat. Sept. 8, 2012
Time:	7:30 pm
Where:	UMD Observatory
Speaker:	James Braatz (NRAO)

Table of Contents

Preview of Sept. 2012 Talk 1

Treasurer's Report 2

Exploring the Sky 2

Fall Owens Planetarium 3

ATM Crayford Focuser 4

Occultations 5

Comsic Gamma Rays 5

ω^2 Tauri Occultation 6

African Cosmos 7

Calendar 7

Directions to Dinner/Meeting

Members and guests are invited to join us for dinner at the Oracle Restaurant located in the UMUC Inn & Conference Center, 3501 University Blvd E. The Garden Restaurant is undergoing renovation. The meeting is held at the UMD 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.

September 2012: James Braatz
National Radio Astronomy Observatory

Megamasers

Abstract: In the gaseous and dusty accretion disks that surround the supermassive black holes in the nuclei of nearby galaxies, water molecules emit maser radiation at a wavelength of 1.3 cm. Applying the technique of Very Long Baseline Interferometry, we can map the distribution of individual masering clouds in these disks, and can determine their positions with an accuracy better than 0.01 milliarcseconds, and their line-of-sight velocities with an accuracy better than 1 km/s. The masers thus provide a powerful tool for tracing the dynamics of the disk.

We use these data to measure the precise masses of the central supermassive black holes. These measurements constitute the "gold standard" measurements of the masses, and can be used to calibrate other methods of measuring masses. Accurate values for the masses of the central supermassive black holes has important applications in understanding how galaxies evolve.

We also use the maser data to directly measure the geometric distances to the host galaxies. By measuring galaxy distances in this manner, we aim to determine the expansion rate of the universe to within a few percent. This measurement will place a significant constraint on models of dark energy.

Biography: Jim Braatz is an astronomer at the National Radio Astronomy Observatory (NRAO) in Charlottesville, VA. He received a B.A. in Physics from the Johns Hopkins University, and a Ph.D. in Astronomy from the University of Maryland. Subsequently he held postdoctoral positions at the Harvard-Smithsonian Center for Astrophysics and at the NRAO in Green Bank, WV before taking his current position in Charlottesville.

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.

Star Dust is published ten times yearly September through June, by the National Capital Astronomers, Inc. (NCA).
ISSN: 0898-7548

Editor: Michael Chesnes

Editorial Advisors:
Elizabeth Warner
Jeffrey Norman
Wayne Warren
Harold Williams
John D. Gaffey, Jr.
Marjorie Weissberg

PDF Distributor: Jay Miller

Please Get Star Dust Electronically

NCA members able to receive Star Dust, the newsletter of the NCA, via e-mail as a PDF file attachment, instead of hardcopy via U.S. Mail, can save NCA a considerable amount of money on the printing and postage in the production of Star Dust (the NCA's single largest expense) and also save some trees. If you can switch from paper to digital, please contact Manjunath Rao, the NCA Secretary, at kurchi@hotmail.com.

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

Jim works with the North American ALMA Science Center of the NRAO, supporting the use and development of the Atacama Large Millimeter / Submillimeter Array (ALMA). He also supports the development and operations of the Green Bank Telescope in West Virginia.

Jim's research is centered on observations of radio emission from active galaxies. He is the Principal Investigator of the Megamaser Cosmology Project, a multi-year effort that is using observations of maser emission from water molecules that are circling black holes in distant galaxies to measure the distances to those galaxies. The measurements give a direct measure of the expansion rate of the universe, helping to reveal the nature of the still-mysterious dark energy.

NCA Treasurer's Report

1 JULY 2011 - 30 August 2012

INCOME	
Dues	850.00
Gifts	230.00
TOTAL INCOME	1080.00
EXPENSES	
Astronomical League	660.00
Liability Insurance	640.00 (FY2012 & FY2013)
Star Dust	645.61
Speaker's Dinner	378.51
Telescope Making Class	151.15
DC Corporation Fee	130.00
IDA	100.00
Admin	14.89
TOTAL EXPENSES	2720.16
BALANCE - 1 July 2011	10479.34
NET CHANGE	-1640.16
BALANCE - 30 Aug 2012	8839.18

Exploring the Sky

9/15	8:00 PM	Cassiopeia level with Polaris; equinox next week
10/20	7:30 PM	Astronomy Day; Orionid meteor shower
11/03	7:00 PM	Pleiades and Winter constellations appear

Questions? Call the Nature Center at (202) 895-6070 or check:
http://www.nps.gov/rocr/planyourvisit/expsky.htm
http://www.capitalastronomers.org

A presentation of the National Park Service and National Capital Astronomers

2012-2013 Officers

President:
Joseph C. Morris
j.c.morris@verizon.net
703-620-0996 (h)
703-983-5672 (w)

Vice-President:
John Hornstein
jshgwave@yahoo.com
301-593-1095 (h)

Secretary:
Manjunath Rao
kurchi@hotmail.com
571-272-0939

Treasurer:
Henry Bofinger
hbofinger@earthlink.net
202-675-1075

Asst. Secretary-Treasurer:
Jeffrey B. Norman
jeffreynorman@comcast.net

Trustees:
- Benson Simon (2013)
- Andrew Seacord (2014)
- Wayne Warren (2015)
- Harold Williams (2016)

Appointed Officers and Committee Heads:

Exploring the Sky
Joseph C. Morris
j.c.morris@verizon.net

Telescope Making
Guy Brandenburg
gfbrandenburg@yahoo.com
202-635-1860

NCA Webmaster
Harold Williams
Harold.Williams@montgomerycollege.edu
240-567-1463 (w)
301-565-3709 (h)

Meeting Facilities
Jay H. Miller
rigel1@starpower.net
240-401-8693

Star Dust Editor
Michael Chesnes
m.chesnes@verizon.net
301-313-0588

Howard B. Owens Science Center Planetarium
Fall 2012 Schedule of Programs

Doors open by 7:15 PM; programs begin at 7:30 PM.
Cost: $5/adult;
$3 for students/seniors/teachers/military

September 14, 2012: Our Invisible Universe

This is a musical journey through the invisible universe, showcasing the talent of musician and artist, Stephen C. Dubois. Images and brief narratives will accompany the music, introducing the audience to the wonders of the universe from a perspective beyond what our eyes can see. Following the presentation will be a tour of the VISIBLE universe, the current night sky!

October 12, 2012: How the World Will Really End

The doomsday predictions about the world ending according to the Mayan calendar are phony. Come discover some true cosmic disasters that could do us all in. Earth struck by a giant asteroid? Earth swallowed by our own expanding Sun? The Milky Way galaxy collides with the Andromeda galaxy? These events will happen, but when? What will they be like? This is scary fun!

November 16, 2012: Journey to the Stars: Return to Tiwanaku

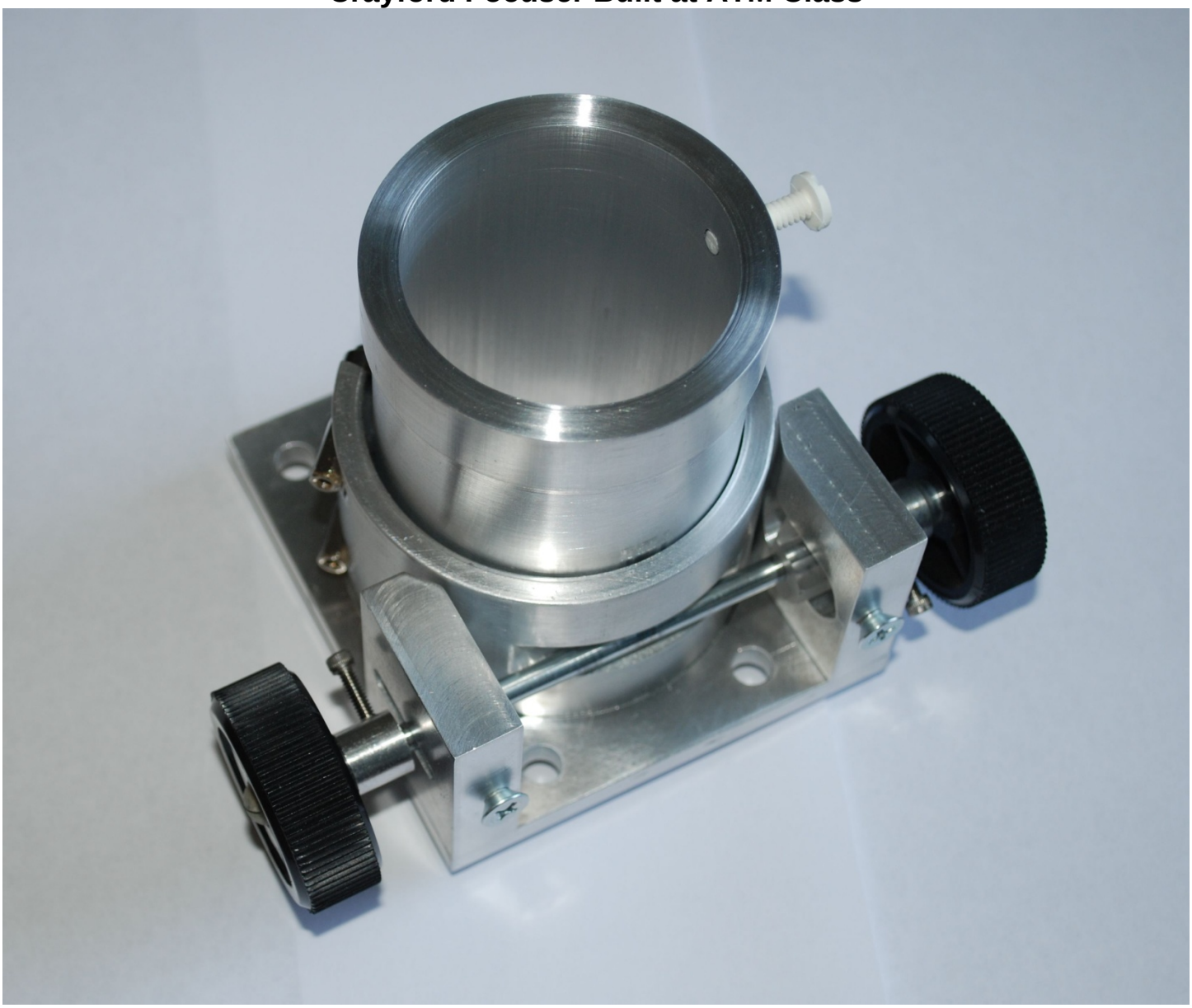
Years ago, our planetarium staff took you on a fictional journey to the ruins of Tiwanaku, Bolivia, only to have the entire audience transported unexpectedly to different worlds through the Sun Gate. Now we return to Tiwanaku to see if we can recreate the magical experience. Come prepared to help us solve the challenges of the sky to navigate through the different worlds!

December 14, 2012: Rudolf Flu

Our time-tested classic returns to the planetarium this month! We head to the North Pole to discover that all of Santa's reindeer have come down with the flu and will be out of commission through Christmas! How will Santa get the presents delivered in time? Join Santa's dog Sirius in determining a solution! A tour of the current night sky follows the presentation.

9601 Greenbelt Road Lanham-Seabrook, MD 20706; 301.918.8750
http://www1.pgcps.org/howardbowens

Crayford Focuser Built at ATM Class



Prasad Agrahar, a student at the NCA Amateur Telescope Making class, built this beautiful 2-inch diameter Crayford focuser for his truss-tube Dobsonian telescope using the class's machine tools. The focuser is partly made from scrap metal he found at the class, and ball bearings from computer muffin fans. Prasad has drawings available if anyone is interested, and he is building the rest of the telescope to a similar level of craftsmanship.

Thank you Nancy Grace Roman for finding this article.

Very High Energy Cosmic Gamma Rays

Based on article in "Science News" from *Scientific American*

Observations from the Fermi satellite and the ground-based Veritas observatory of more than 136 sources are providing information on very high energy gamma rays with energies near 10^{12} electron volts. The most abundant extragalactic sources of these gamma rays are blazars, objects in which we are looking directly down the jets from black holes. They blaze with the intensity of a thousand Milky Way galaxies and can vary in brightness by a factor of five within an hour—a puzzlingly rapid time, too fast even for light to cross from one side of the black hole to the other.

These TeV gammas from blazars play a role in heating intergalactic gas, possibly preventing the gas from settling into galaxies. This may solve one of the most perplexing puzzles in modern cosmology: the fact that dark matter should nucleate lots of miniature galaxies yet doesn't seem to do so. Radiation from many other blazars blends together to form part of a very high energy background. Only about a sixth of the background comes from blazars. The rest must come from pulsars, collisions of cosmic rays produced by supernovae, and maybe the decay or annihilation of dark-matter particles.

Pulsars should be denuded of very-high-energy gammas. Although the stars might well produce such gamma rays near their surface, the surrounding magnetosphere should snuff them out. When the MAGIC observatory saw hints of high-energy pulses from the pulsar at the heart of the Crab Nebula, few paid any attention. Fermi and the VERITAS observatory confirmed the detection of photons with energies up to 0.4 TeV. A new idea is that streams of electrons and positrons are carrying energy into the outer magnetosphere and converting into gammas there.

There are TeV gamma sources that astronomers have yet to see any other way; they do not seem to correspond to any star, nebula, or other discernible object. They are tantalizingly marked "UNID" in the database.

Mid-Atlantic Occultations and Expeditions

David Dunham

Asteroidal and Planetary Occultations

Date	Day	EDT	Star	Mag.	Asteroid	dmag	dur. s	Ap. "	Location
Sep 9	Sun	20:43	SAO 187062	9.9	Utra	6.2	3	4	seSC,eNC,seVA
Sep 10	Mon	20:57	2UC32969917	11.6	2007 OC10	9.6	12	7	TNO;S.Amr.;eUSA?
Sep 19	Wed	21:56	SAO 187032	9.4	1993 NB	6.7	1	4	PA,NJ;MD,DC,DE?
Sep 20	Thu	3:15	SAO 164891	8.0	2000 PD30	15.8	6	2	TNO;S.Amer.;USA?
Oct 8	Mon	6:42	2UC40000398	10.9	Metis	0.5	12	6	MD,DC,nVA;Sun -6

Lunar Grazing Occultations (*, Dunham plans no expedition)

Date	Day	EDT	Star	Mag.	% alt	CA	Location
Sep 9	Sun	5:44	SAO 77515	8.2	42- 60	1S	*Skiprs,Sufolk,&Chesapeak,VA
Sep 13	Thu	6:15	ZC 1372	7.8	8- 23	8S	*Chrltsvil&Ladysmith,VA Sun-8
Sep 19	Wed	20:03	ZC 2156	7.7	19+ 11	10S	*Barborsv,Occoqn,VA;Waldrf,MD
Oct 6	Sat	1:20	SAO 77118	7.7	69- 34	4N	*Winchester,VA&Westminster,MD
Oct 9	Tue	4:50	SAO 97442	8.0	39- 43	3S	*Rockville,Laurel,SevernaP,MD
Oct 10	Wed	3:49	ZC 1320	6.7	30- 21	0N	*Pittsburgh &central PA; n.NJ
Oct 12	Fri	6:05	SAO 118363	9.1	12- 23	8S	*Falmouth, VA; Nanjemoy, MD

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

Total Lunar Occultations

DATE	Day	EDT	Ph	Star	Mag.	% alt	CA	Sp.	Notes
Sep 7	Fri	5:16	R	ZC 595	6.8	61- 69	35N	K1	close double?
Sep 9	Sun	1:28	R	SAO 77323	7.7	43- 12	56N	G4	Azimuth 73 degrees
Sep 9	Sun	4:22	R	SAO 77433	7.9	42- 45	70S	A0	
Sep 9	Sun	6:35	R	Y Tauri	6.9	41- 67	85S	M5	Sun -2,SAO 77516,min. 9
Sep 10	Mon	3:10	R	SAO 95790	7.9	33- 22	68N	G5	
Sep 10	Mon	4:26	R	22 Gem	7.1	33- 36	42S	A0	ZC 1006, spec. binary
Sep 11	Tue	2:43	R	ZC 1116	7.2	24- 6	27S	B9	Azimuth 73 deg.
Sep 13	Thu	6:27	R	ZC 1372	7.8	8- 25	27S	K0	Sun alt. -5 deg.
Sep 19	Wed	19:57	D	ZC 2156	7.7	19+ 12	19S	K0	Sun alt.-10, Az. 232
Sep 20	Thu	19:47	D	SAO 184141	8.0	29+ 20	50S	G3	Sun -9, close double
Sep 20	Thu	19:49	D	SAO 184137	7.9	29+ 20	8N	G5	Sun altitude -9 degrees
Sep 21	Fri	21:44	D	ZC 2472	7.0	41+ 12	9N	F2	Azimuth 229 degrees
Sep 22	Sat	21:33	D	mu Sgr	3.8	52+ 22	61N	B2	ZC 2633; close double??
Sep 23	Sun	19:03	D	ZC 2791	5.6	63+ 30	35N	B2	Sun -1, spect. binary
Sep 24	Mon	0:19	D	43 Sgr	4.9	64+ 8	60S	K0	Az237,ZC2814,close dbl?
Sep 25	Tue	21:12	D	SAO 164080	7.1	83+ 38	83N	K4	maybe a close double
Sep 26	Wed	2:13	D	nu Aquarii	4.5	84+ 12	46N	G8	Az. 245, ZC 3093
Sep 29	Sat	1:27	D	16 Piscium	5.7	99+ 49	16N	F6	ZC3482,dbl,Term Dist 1"
Oct 1	Mon	1:40	R	ZC 173	6.5	99- 62	77S	G5	AA 246
Oct 5	Fri	7:45	R	HU Tauri	5.9	76- 48	32N	B8	Sun+6, ZC 700,spec.bin.
Oct 6	Sat	4:52	R	ZC 808	6.8	68- 70	67S	B0	
Oct 7	Sun	1:53	R	68 Orionis	5.8	60- 31	49S	B9	ZC 940, close double?
Oct 8	Mon	5:26	R	SAO 96538	7.4	49- 60	69N	K0	
Oct 9	Tue	2:02	R	ZC 1190	7.2	40- 12	47N	A2	Azimuth 79; see note
Oct 9	Tue	3:50	R	1 Cancri	5.8	40- 33	80N	K3	ZC 1197
Oct 10	Wed	4:02	R	FX Cancri	6.7	30- 24	25N	M3	ZC 1320
Oct 10	Wed	5:02	R	SAO 98146	7.7	29- 35	76S	F5	maybe close double
Oct 10	Wed	6:27	R	SAO 98178	7.8	29- 50	56S	K0	Sun -9, close double?
Oct 11	Thu	4:50	R	SAO 117836	7.2	20- 21	59N	G5	
Oct 13	Sat	6:50	R	ZC 1662	6.4	6- 19	25N	K2	Sun -6,mg2 8, sep. 0.2"

Oct. 9, ZC 1190, the star has an 11th-mag. companion 16" away in PA 20, but the primary star may also be a close double.

Explanations & more information is at http://iota.jhuapl.edu/exped.htm .
David Dunham, dunham@starpower.net ,
phone 301-526-5590 or +7-916-0929487

Small Cusp-Angle Graze of 4.9-mag. ω^2 Tauri Video-recorded with 80mm Remote Systems in Minnesota August 11

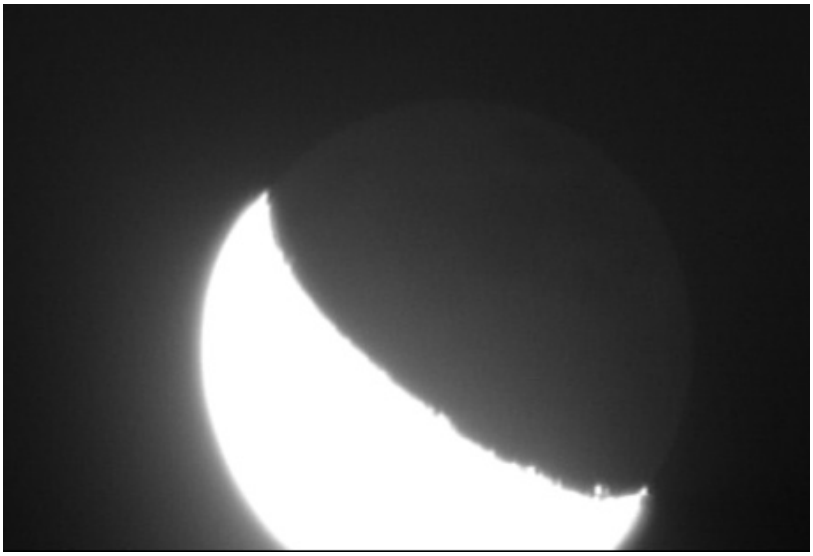
David Dunham

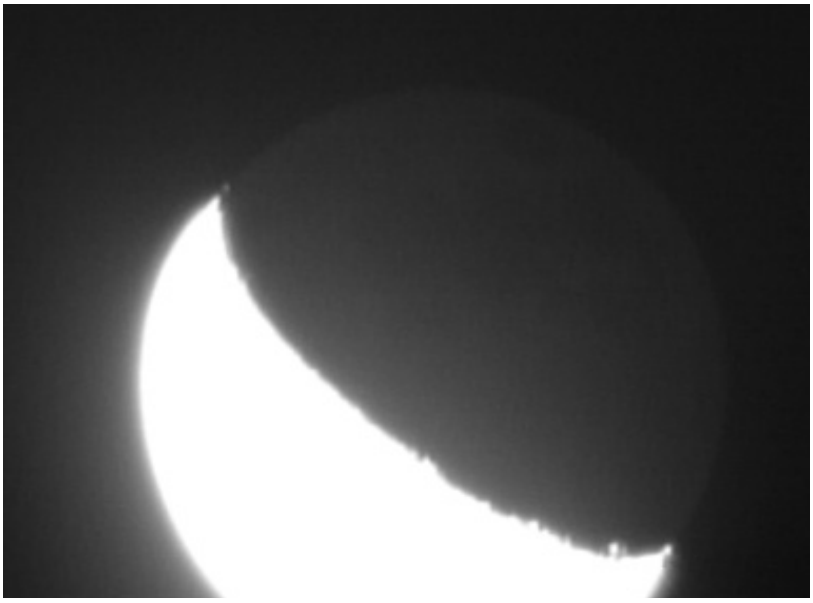
I attended an astrodynamics conference in Minneapolis Aug. 12-16. I went there early because I noticed that this rather bright graze occurred there early the weekend before the conference. With the small cusp angle, I thought that there would be too much glare to record with my 80mm short-tube refractor "midi" video systems, but I took 2 of them, to try, and 2 10cm SCT's for more magnification at attended stations that Joan and I ran.

But as in Arizona for the eta Gem graze in April 2011 (see http://iota.jhuapl.edu/etagm619.doc), the machines triumphed; it was machines, 2; humans, 0. Maybe a few events were lost while the star was at the northern cusp at the start of the graze, but the star was easily recorded during most of the graze with the "midi" systems in spite of the 2° north central graze cusp angle.

The Moon was 35% sunlit and 22° above the horizon. At the northern remote station, 6 disappearances and 6 reappearances were recorded, while at the southernmost station, only 4 events were recorded, 3 of them very close to the cusp. The observations indicated a south shift of about 150m relative to the Kaguya lunar profile. The star is ZC 628.

Captions for Right Column:
Top: The narrow graze path across the Minneapolis/St. Paul region is shown between the two gray lines that cross the map. Our sites were near Grant, underlined, northeast of St. Paul.
Center: This view was captured from the video recording at the northern remote station while ZC 628 was behind a lunar mountain. The station was about 150m south of the southern attended station.
Bottom: This view was about two seconds after the other view, showing the star visible close to the northern cusp just after one of the 6 reappearances that were recorded.





African Cosmos: Stellar Arts

Michael Chesnes

The National Museum of African Art (950 Independence Ave. SW) is running an exhibit on astronomical influences in African art through December 9, 2012. http://africa.si.edu/exhibits/cosmos/intro.html

African Cosmos: Stellar Arts features traditional works such as masks, stools, and figurines, as well as contemporary works incorporating multimedia. Some of the cultures represented include the Dogon and Edo peoples of west Africa and the Tabwa people of central Africa. One section of the exhibit is dedicated to ancient Egypt.

The museum is not easy to find since it is mostly underground, beneath a garden just south of the Smithsonian Castle. Once in the museum, you will need to descend two floors to tour the exhibit.

Calendar of Events

NCA Mirror- and Telescope-making Classes: Tuesdays Sept. 4, 11, 18, 25, and Fridays, Sept. 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.

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, Sept. 8 at 5:30 pm, preceding the meeting, at the Oracle Lounge in the University of Maryland University College Inn and Conference Center.

Montgomery College Planetarium:
7621 Fenton Street, Takoma Park, MD (240) 567-1463.
Saturday, 22 Sept. 2012 at 7:00 pm. "Mayan Calendars". In the Planetarium.
http://www.mc.cc.md.us/Departments/planet/planet/MayanAstronomy.html

Mid-Atlantic Senior Physicists Group: Wednesday, September 19 at 1:00 pm, 1st floor conference room of American Center for Physics, 1 Physics Ellipse, College Park, MD. Stephan Schlamminger, U. of Washington/NIST. "The Planck Constant and the Redefinition of the SI".

Upcoming NCA Meetings at the University of Maryland Observatory

Sept. 8, 2012	**James Braatz** (NRAO) – Megamasers
Oct. 13, 2012	**Dennis Bodewitz** (UMD) – Ultra-Violet Observations of Asteroids
Nov. 10 2012	**Michael Lowenstein** (UMD / GSFC) – What X-Rays Tell Us about Dark Matter and Clusters of Galaxies

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:

Sept. 8
7:30 pm
@ UMD Obs

James Braatz
(NRAO)

Inside This Issue

Preview of Sept. 2012 Talk 1
Treasurer's Report 2
Exploring the Sky 2
Fall Owens Planetarium 3
ATM Crayford Focuser 4
Occultations 5
Cosmic Gamma Rays 5
ω^2 Tauri Occultation 6
African Cosmos 7
Calendar 7