Star Dust

National Capital Astronomers, Inc.

May 2010

Volume 68, Issue 9

http://capitalastronomers.org

Next Meeting

When: Sat. May 8, 2010

Time: 7:30 pm

Where: UM Observatory

Speaker: Sean O'Neill, University of Maryland

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

May 2010: Dr. Sean O'Neill
University of Maryland

Simulations of Black Hole Mergers, Accretion Disks, Bubbles, and Jets

Abstract: Computer modeling gives astrophysicists the chance to conduct experiments without having to leave the comforts of their home planet. One way in which numerical simulations have proven especially useful is in the treatment of equations, such as those that govern the behavior of magnetized plasmas, for which general, analytic solutions are unavailable. I will discuss several applications of this approach to the modeling of astrophysical fluid flows driven by black hole gravity. These systems can feature inflows in the form of rotating accretion disks as well as outflowing jets and jet-driven structures. I will also describe the essential step of comparing the results of these simulations to astronomical observations taken across a wide range of wavelengths.

Biography: Sean O'Neill has been a postdoctoral research associate at the University of Maryland since 2007. His work focuses on analytic and numerical modeling of astrophysical fluid flows that are ultimately powered by black hole gravity. He has also devoted considerable efforts to the art and science of data visualization. Prior to moving to Maryland, he received his bachelor's degree in physics from the University of Chicago in 2000, followed by his doctorate in astrophysics from the University of Minnesota in 2007. In his spare time, Dr. O'Neill enjoys watching the films of Alfred Hitchcock and learning about the history of science.

Amateur Telescope Making: Fun with Chemistry (Part 1)

By Guy Brandenburg

What do you do with a bunch of gold-coated mirrors (diagonal flats and parabolized primary mirrors)? This problem came up when the very generous Gary Hand of Hands-On Optics gave me an envelope containing a few dozen 1.5" minor-axis diagonal flats that were all coated with gold, each in its own tiny pouch. Gary told me he had gotten the diagonals for a song from Edmund Scientific when some project or deal that they had (possibly with the US Government) fell through. The gift to me was unexpected; his explanation was that it was his way of thanking me for putting on a little show-and-tell on amateur telescope making in the pavilion outside his store at the 2009 Mid-Atlantic Astronomy Expo.

What's Wrong with Gold Coatings?

One obvious idea would be to leave the coatings alone and just put them into telescopes as is.

Continued on Page 2

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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

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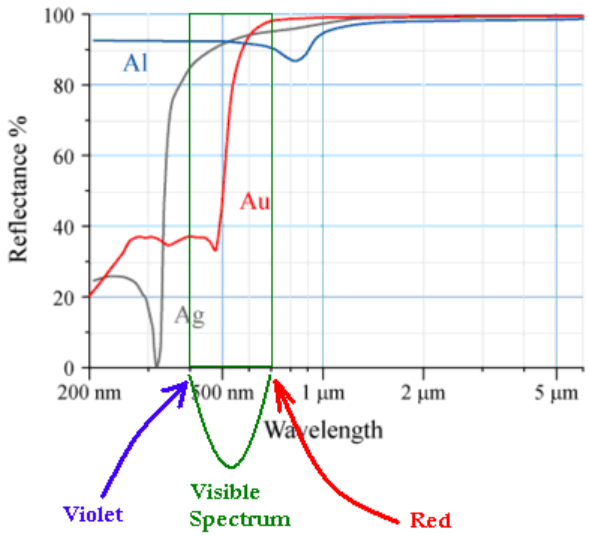
Thank you!

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

Continued from Page 1

However, this wouldn't work too well unless you only like long-wavelength light, as the graph below shows. Gold only starts reflecting 80% or more of the light when the wavelength gets to be about 550 nm (green). So if you are looking at something that is primarily blue-green, blue, indigo, or violet, then most of those photons will be lost. However, if you like to observe objects that are yellow, orange, red or infra-red, gold coatings are hard to beat. For one thing, they don't tarnish as both silver and aluminum do, and the reflectance is better than 98%. (Aluminum coatings reflect between 90 and 92% of the light everywhere in the visible spectrum, and they last a lot longer than silver coatings.)



Reflectivity Curves for Gold (Au), Silver (Ag), and Aluminum (Al)

So, if I wanted to let other amateur telescope-makers use these mirrors, I had to coat them with aluminum in the vacuum chamber we have at the NCA amateur telescope making workshop in the basement of the Chevy Chase Community Center at McKinley Street and Connecticut Avenue, in northwest DC. Now, among his other little gifts to me and the NCA workshop, Gary had also given me a gold-coated 6" mirror with a spherical figure (not parabolized). I reasoned that if I started parabolizing this mirror using an ordinary pitch lap, the friction and pitch and polishing compound used in the re-figuring process would immediately strip off the gold layer. And, somebody who wanted an already-finished mirror for a scope could use it later. Plus, I would get a little bit of experience that would be helpful with the flats.

A Sticky Surprise

I was in for quite a surprise, however. Although the thin gold layer came off almost immediately by abrasion with the pitch and polishing compound, I discovered that the layer of nickel that was underneath was extremely stubborn and hard to remove. In fact, it was so stubborn that it stuck to the lap – or should I say, some of the pitch in the lap came off and stuck to the mirror! This had never, ever happened to me before while polishing (or watching others polish) many scores of mirrors. The gobs of pitch that had attached themselves to the glass and its nickel coating had to be removed with turpentine. Eventually, I found that by changing the polishing compound from cerium oxide to rouge (or vice versa, I don't remember now), I mostly (but not completely) solved the sticking problem. But the amount of friction that this process required proved to me that this method of removing the gold coating on the flats would be utterly out of the question. Why? Because pushing hard like that for many minutes (if not hours) would remove the flatness that the flats were supposed to have; they would become utterly useless except as tiny paperweights.

Continued on Page 6

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Come See the Stars!

Exploring the Sky

2010 Schedule

Date	Time	Things of interest
5/15	9:00 PM	Young Moon; Saturn's rings almost edge-on
6/19	9:00 PM	Solstice 6/21; Summer Triangle; Mars in Leo
7/10	9:00 PM	Saturn, Mars, Venus, Regulus in a line
8/14	8:30 PM	Perseid meteors (maybe); Andromeda rising
9/04	8:00 PM	Jupiter and Uranus in conjunction
10/16	7:30 PM	Moon past first quarter; Pleiades rising
11/06	7:00 PM	New moon; winter constellations appearing

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

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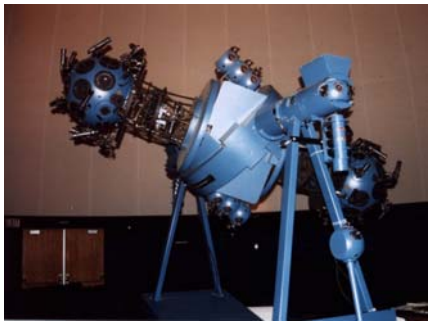

The Howard B. Owens Science Center Planetarium

Public Program

Doors open at 7:15 p.m. Program begins at 7:30 p.m.
Cost is $4.00 for adults; $2.00 for students/seniors. Children under 3 are free.

CHANGE!
May 14, 2010:
More than Meets the Eye

More than Meets the Eye is an interactive planetarium program designed to provide the audience with the opportunity to compare celestial objects such as planets, globular clusters, and galaxies as seen by the unaided eye, through binoculars or telescopes, and through multiple wavelength imagery. As a natural extension of these observations, you will learn to recognize patterns of stars in the sky, and how they appear to change with the seasons.

Note: Previously advertised "Skywatchers of Africa" will be shown Fall 2010

9601 Greenbelt Road
Lanham-Seabrook, MD 20706
http://www1.pgcps.org/howardbowens/
or call 301.918.8750 during school hours

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	dur. s	Ap. "	Location
May 7	Fri	0:18	SAO 141506	8.3	Haneda	9.3	1	3	VA,WV,OH;MD,nNC?
May 7	Fri	0:56	SAO 120122	7.3	1999 JK80	10.4	1	2	NJ,DE,MD;PA,VA?
May 8	Sat	23:36	TYC19451456	9.9	Zeuxo	5.2	3	4	nNY,MA,CT,RI;LI?
May 14	Fri	2:49	TYC68501897	11.0	Admete	4.6	5	7	S.Car.; N.Car.?
May 18	Tue	21:18	HIP 35495	10.1	Bettina	3.2	2	5	PA,MD,DE;DC,NJ?
May 25	Tue	4:37	2UC22749985	10.8C	Euterpe	0.3	12	8	OH,n&wPA; Sun-10
Jun 1	Tue	22:57	2UC27493783	11.6	Polyxo	1.0	15	7	CT,sNY,nNJ,nPA
Jun 2	Wed	0:02	SAO 118587	9.7	Dorothea	5.5	3	4	OH,sPA,MD,DE,VA?
Jun 8	Tue	1:25	TYC63241847	10.5	Bohemia	2.3	10	6	sNJ,neMD,PA,sON
Jun 9	Wed	2:16	PPM 718909	9.9	Amneris	4.4	2	4	n.N.Car.,n.Tenn.
Jun 13	Sun	22:48	2UC21799280	11.7	Urania	0.5	9	7	SC,wNC,nGA,Tenn.

Lunar Grazing Occultations (*, Dunham plans no expedition)

Date	Day	EDT	Star	Mag.	%	alt	CA	Location
Apr 22	Thu	23:22	SAO 98583	8.8	65+	43	15N	New Freedom, PA; Edgewood, MD
May 16	Sun	20:44	SAO 78122	7.9	10+	26	15N	Carmel Church, VA; Sun -6
May 16	Sun	20:47	SAO 78121	7.5	10+	27	15N	*Raleigh, NC; Sun alt. -7
May 16	Sun	21:49	ZC 956	6.2	11+	13	12N	Metuchen,NJ;Elmira,NY;Toronto
May 17	Mon	22:57	SAO 79289	8.5	19+	11	10N	Shrewsbury, PA; Aberdeen, MD
May 18	Tue	21:50	SAO 97680	7.7	28+	30	12N	Runnemede,NJ;Douglsv&Phily,PA
May 22	Sat	22:23	SAO 138431	8.1	73+	46	15N	*Roanoke,VA;New Hope&Micro,NC
May 24	Mon	20:21	ZC 1944	5.5	90+	30	15N	*Skippers,VA; CapeHatteras,NC

Total Lunar Occultations

DATE	Day	EDT	Ph	Star	Mag.	%	alt	CA	Sp.	Notes
May 9	Sun	4:47	R	SAO 128208	8.0	21-	16	83N	G5	
May 16	Sun	21:41	D	PX Gem	6.2	10+	15	39N	B3	Azimuth 288, ZC 956
May 16	Sun	22:23	D	10 Gem	6.6	11+	8	49N	G5	Azimuth 294, ZC 960
May 16	Sun	22:26	D	LU Gem	6.9	11+	8	79N	B0	Azimuth 294, ZC 962
May 16	Sun	22:31	D	12 Gem	7.0	11+	7	61S	A0	Azimuth 295, ZC 964
May 17	Mon	21:48	D	SAO 79250	7.8	19+	24	42N	K2	
May 17	Mon	23:49	D	56 Gem	5.1	19+	1	19S	M0	Azimuth 295, ZC1113
May 18	Tue	20:47	D	ZC 1241	6.5	28+	43	60N	A0	Sun alt. -6 deg.
May 18	Tue	21:42	D	SAO 97680	7.7	28+	33	33N	K0	
May 20	Thu	0:57	D	ZC 1381	6.4	41+	3	52S	A2	Azimuth 283
May 20	Thu	20:45	D	SAO 118084	8.4	50+	53	87N	F8	Sun alt. -6 deg.
May 20	Thu	22:29	D	SAO 118110	8.2	51+	37	49N	K2	
May 21	Fri	0:08	D	16 Sex	6.6	52+	18	61S	K0	ZC 1489
May 22	Sat	0:40	D	SAO 118620	7.3	63+	17	5S	A2	
May 22	Sat	1:22	D	62 Leonis	6.0	64+	10	81S	K3	Azimuth 262, ZC 1605
May 22	Sat	22:52	D	ZC 1713	5.6	73+	38	88N	K0	probably close double
May 24	Mon	1:34	D	ZC 1833	6.9	84+	17	19S	G5	
May 25	Tue	0:52	D	ZC 1960	6.7	91+	26	62N	K3	maybe close double
May 29	Sat	0:48	R	ZC 2514	6.4	98-	23	42S	B9	WA 230, term.dist. 15"
May 29	Sat	23:45	R	ZC 2659	6.2	95-	12	53S	M3	Azimuth 136, WA 234deg.
May 31	Mon	3:22	R	ZC 2822	5.6	89-	28	74S	A6	
Jun 1	Tue	2:23	R	ZC 2940	7.4	82-	24	41S	G0	
Jun 4	Fri	2:49	R	ZC 3299	7.9	56-	20	88S	G5	
Jun 4	Fri	2:51	R	SAO 146105	8.2	56-	20	78S	G5	Maybe close double
Jun 7	Mon	3:26	R	ZC 89	6.5	27-	14	74N	F5	Az. 89; close double?

Explanations & more information are 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.

Good luck with your observations.

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Science News

Thank you Nancy Grace Roman for finding this article.

Milky Way Grew by Swallowing other Galaxies

From Phil Berardelli
ScienceNow Daily News
25 November 2009

The motto "E Pluribus Unum" ("out of many, one") could be applied to the Milky Way. Astronomers have obtained new evidence that our home galaxy contains pieces of many former galaxies. The findings strengthen the idea that large galaxies don't emerge whole from single, gigantic clouds of dust and gas. Rather, they grow by swallowing their neighbors.

The clues come from globular clusters--spherical concentrations of up to millions of stars, orbiting the galactic center as self-contained neighborhoods. Aside from our galaxy's huge spiral arms globular clusters constitute some of its most striking features. Astronomers have long thought they formed from concentrated clouds of gas and dust in the early Milky Way. But two recent papers in *Nature* paint an entirely different portrait.

Both show that the stars in the globular clusters contain a significant quantity of elements formed in supernovae but globular clusters do not contain enough mass to prevent supernova remnants from escaping. Therefore, the authors argue that the clusters are the remains of much larger structures – small galaxies.

Star Dust Speaker Reviews

By Michael Chesnes

I warmly encourage NCA members to write reviews for the talks at our meetings, so that they can be published in Star Dust. We have an excellent lineup of speakers every year, and our reviews are both a valuable historical record of our activities and a way to recognize our speakers.

Continued from Page 2

[Apparently, it is not possible to vacuum-deposit a layer of gold directly on glass; one first has to deposit a layer of nickel, followed immediately by the gold.]

I still didn't know whether I could just vacuum-deposit a thin layer of aluminum directly over the gold these HOO-Edmunds flats, or whether I needed to strip off the existing gold coating by chemical means. And if the latter, then what chemicals would work best?

Not knowing which approach was best, I naturally decided to use Google to research the question. I didn't get much help, though I did get some ideas on dissolving gold – none of which sounded very safe. Then I wrote requests for suggestions to several list-serves that deal with amateur telescope making and vacuum chambers, and also to the NCA and NOVAC local list-serves as well.

Suggestions are worth every penny

Naturally, I got lots and lots of suggestions. I don't recall anybody suggesting that coating aluminum right over the gold would be a good idea (though I could be in error on this). Most writers had various suggestions on how to strip the gold and nickel layers. Here is a summary of the some of the suggestions I received:

a) Immerse the flats in mercury, because it will form an amalgam both with the gold and the nickel.

b) Under no circumstances should I ever use mercury, because if I spill a single drop, it will kill me and everybody who ever uses the building, which will have to be torn down.

c) Mercury is perfectly safe as long as you don't drink it.

d) Use hot cyanide solutions – they use them to dissolve and concentrate gold when mining the stuff.

e) Cyanide is very, very poisonous and can kill you very, very quickly. Don't use it.

f) Use various concentrated, hot, fuming acids, alone or in combination. Including, but not limited to, aqua regia (nitric and sulfuric acids) because this will dissolve the gold.

g) Only use concentrated or hot acids if I am a certified chemist, have a venting hood and lots of other typical hazardous-chemical safety equipment and training.

h) Use ferric chloride printed-circuit board etchant, which can be purchased at Radio Shack.

i) Heat up the ferric chloride to speed up the reactions.

j) You can't buy ferric chloride any more at Radio Shack. It's been discontinued.

k) Use strong alkali solutions.

l) Don't use alkali solutions on glass, because they damage the surface.

m) Heat the flats up to the melting temperature for gold and nickel, and it will come off, leaving the glass unharmed.

n) Melting the metal off is not a good idea because gold melts at 1004 C, nickel melts at 1455 C, and Pyrex softens at a much lower temperature, about 820 C. You don't want to soften these flats, because they would have to be re-annealed, then re-polished, then re-figured.

o) Use naval jelly.

Do you notice that the advice from various people mostly contradicted each other? Nobody said that they had actually tried any of these methods to do what I needed to do; they all seemed to be speaking theoretically, or were given advice from their friends who were chemists. So I didn't feel terribly enlightened.

To be continued in June Star Dust.

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Nominating Committee Report

By Jeff Norman, Chair

NCA members 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

Calendar of Events

NCA Mirror- and Telescope-making Classes: Tuesdays May 4, 11, 18, 25 and Fridays, May 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). There is telescope viewing afterward if the sky is clear.

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

More than Meets the Eye: Friday, May 14 at 7:30 pm; planetarium presentation at Owens Science Center, 9601 Greenbelt Road, Lanham-Seabrook, MD.

Exploring the Sky: Saturday, May 15 at 9:00 pm, Rock Creek Park at the corner of Military and Glover Roads, NW Washington. Young Moon; Saturn's rings almost edge-on.

Upcoming NCA Meetings at the University of Maryland Observatory

May 8, 2010 **Sean O'Neill** (U.Md.) - *Simulations of Black Hole Mergers, Accretion Disks, Bubbles, and Jets*

Jun 12, 2010 **Science Fair Winners + Pizza**

Yes, I'd like to join NATIONAL CAPITAL ASTRONOMERS!

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Telephone: _____-_____-_____ E-mail: .....

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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	_____

Individual/Family Membership	$10
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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Next NCA Mtg:

May 8

7:30 pm

@ UM Obs

Dr. Sean O'Neill

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