Star Dust

National Capital Astronomers, Inc. **http://capitalastronomers.org**

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NCA January Meeting to be held on January 8

The January meeting of the National Capital Astronomers will be held on Saturday, January 8 at 7:30 P.M. at the University of Maryland Astronomy Observatory on Metzerott Road in College Park, MD. Prior to the meeting there will a dinner with NCA members at the Garden Restaurant in the UMD University College Inn and Conference Center. Please see Page 2 for more information about dinner reservations. See Page 8 for directions on getting to the meeting or the dinner. Page 8 also contains information on obtaining a ride from Metro to the dinner or meeting. In addition, there is a map on Page 8 that can be a help in getting to the meeting by car. All NCA meeting and dinners are open to NCA members and the public as well. Hope to see you there!

Although NCA meetings are normally held on the first Saturday of the month, this year the January, February and March meeting will be held on the second Saturday of the month.. In April, May, and June we will return to the regularly scheduled first-of-the-month dates.

"Theory in a Virtual Observatory", A talk by Peter Teuben

Reviewed by Joan Bixby Dunham

The December 4 NCA meeting featured a talk by Dr. Peter Teuben of the University of Maryland Astronomy Department. Dr. Teuben received his Ph.D. in Gronigen, the Netherlands, with research on the dynamics of a barred galaxy. He has continued his interest in n-body dynamics, but he now works as a software engineer on a radio astronomy project. As a hobby, he participates in the development of a virtual observatory.

Dr. Teuben began his talk with a slide filled with APOD – Astronomy Picture of the Day – images. (See http://antwrp.gsfc.nasa.gov/apod). He follows the example set by Virginia Trimble, where lectures are enlivened by interesting pictures. The topics he presented in these interludes are discussed at the end of this review.

A virtual observatory (VO) is collections of astronomical data and source catalogs made available as though they were all located in one facility, while in reality they are in multiple locations. With one interface, an astronomer can locate, retrieve, and analyze data from the various archives. The addition of theory to the VO lends the astronomer support to be able to compare theoretical models and simulations with observations.

Currently, VO's are federations of observatories who have databases that can contain terabytes of data. A researcher on a project may not know the existence of relevant data. He said that typing the word "astronomy" on Google might get 5 million responses. [In fact, I found 18.3 million.] Also, once the data are located, there will likely be far too much to download via the internet to enable analysis or data mining. Astronomers realized they needed a better method of synthesizing all of this knowledge and data by providing middleware that facilitates the collection and synthesis of the data. Before the middleware can provide service though, there needs to be agreement on the format and contents of the data records.

The National Virtual Observatory (NVO) is the American program for a virtual observatory, although it is truly international in scope and in use (http://www.us-vo.org/). Its charter is to enable new science by enhancing access to data and computing resources. Each country does its own virtual observatory, with about a dozen already active.

To facilitate exchange of information, the astronomical community developed the FITS format in the 70's. The World Coordinate System (WCS) used in FITS is still in development. It is very important to have a clear and accepted data format, since otherwise it can be impossible to exchange data. The International Astronomical Union (IAU) is very involved with these discussions and sponsors the development of the VO concept. Once the agreement on the formats is reached, the middleware can be written.

The VO has the potential for new science that has never been done, and is a high-priority item for the NSF. For the astronomer, it is like having a personal library always available for research and analysis. The field is very lively, with a lot happening. The NSF 2000 Decadal report gave the Virtual Observatory the highest priority for future development and funding.

There are a number of pre-existing data centers for various astronomical data. Dr. Teuben mentioned several programs from on-line data sets: the SkyView of the As-

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NCA Events This Month

The Public is Welcome!

NCA Home Page: http://capitalastronomers.orgt

Fridays, January 14, 21, and 28, 6:30 to 9:30 P.M. NCA mirror- and telescope-making classes 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.

Saturdays January 15, 22, and 29. Observing with NCA's 14-inch telescope in Chevy Chase, MD. In Mike McNeal's backyard, 5410 Grove St, Chevy Chase, MD, (Friendship Heights Metro). Please make reservations by 10 p.m. the Friday before. Call Mike at 301-907-9449 or email him at mcnealmi@verizon.net to let him know you are coming.

University of Maryland Observatory, in College Park on the 5th and 20th of every month at 9 P.M. The talks are non-technical.

Saturday, January 8 at 7:30 P.M. NCA meeting at the University of Maryland Astronomy Observatory on Metzerott Road in College Park, MD.

Saturday, January 8 at 5:30 P.M., preceding the meeting, dinner with NCA members at the Garden Restaurant in the UMD University College Inn and Conference Center. See map and directions on Page 8.

If you are planning to come to the dinner before the meeting, please tell Benson J. Simon, telephone: 301-776-6721, e-mail st88@ioip.com, so that we can make reservations for the right number of people.

Upcoming NCA Meetings
2005: January 8, February 12, March 12, April 2, May 7, and June 4

The deadline for the February Star Dust is January 15. Please send your material to Elliott Fein by that date to ensure inclusion.

Send submissions to Elliott Fein at elliott.fein@erols.com.

Text must be in ASCII, MS Word (97 or earlier), or WordPerfect.

All articles submitted may be edited to fit the space available.

"Theory in a Virtual Observatory"

(Continued from page 1)
tronomical Data Center, SIMBAD of the CDC (Strasbourg), and the Abstract Data Service (ADS) of the Harvard-Smithsonian. The ADS can be used by anyone to see abstracts. Those with IP addresses from observatories, or, in other words, those with IP addresses associated with paid journal subscriptions, can see the articles as well as the abstracts. This service is very useful to professional astronomers. No longer is it necessary to have physical hard-copy printout of the journals.

The problem is that all the data are there in these databases and services, but they are not synthesized. The VO model is that data stays at each of the centers, but software in the VO will find and collect the data the users' request. The big question is whose computer will do this work? And who will authenticate the users making the requests?

NVO applications, DataScope, OASIS, Spectrum Services, OpenSkyQuery, and YourSky (atlas) were examples of what might be done with a virtual observatory. These were designed to show to other astronomers the utility of a virtual observatory. DataScope service (http://heasarc.gsfc.nasa.gov/cgi-bin/vo/datascope/init.pi) is useful for amateurs as well as professionals. Given a galaxy name or coordinate or object name, DataScope goes through about 500 catalogs that have registered for this service and produces the results that can be downloaded for use.

Adding theory to the VO gives researchers a powerful tool for evaluating models and theories. One use of the theories is to fit models to the observation. Another is to take a model and simulate data to match it. This can be useful, for example, in seeing what types of data a new type of telescope might produce with specific objects. This is known as SOS – simulate observations of simulations. Dr. Teuben showed an example of observations and simulated observations of a barred galaxy with the distribution of carbon monoxide as observed by a millimeter array. The simulated data from a given model can be directly compared with the actual observations.

Astronomers follow the concept of open source, where data and programs are freely available. One suggestion Dr. Teuben has when simulating observations is to save the code rather than the simulated data do reduce the amount that needs to be kept.

NEMO and STARLAB are programming environments for n-body simulations that Dr. Teuben used to study interacting galaxies. Anyone can download and use these tools. (http://www.manybody.org/). Analysis of galaxies and clusters has found that, in galaxies, individual stars rarely have direct interactions with other stars while in globular clusters they do. Stars in galaxies will never see spikes in the force field, while those in globular clusters will see multiple spikes during their lifetimes. The equations are the same, but the types of physics that come from the two are quite different. One of the uses that Dr. Teuben made of these simulations was to compute the speed with which a bar in a barred spiral rotates, and how the rotation rate changes as the model is changed. This can be directly compared with the observed rotation. It is not possible to model a galaxy as millions of individual stars, so ways are sought to make realistic simulations of galaxies that are doable with current computer technology. His barred galaxy simulation used 10,000 stars with a trick called n-body softening to simulate the gravity forces a star would really see. The bar rotation rate with different softening models was compared with the observed rates to see which theory was better.

Doing realistic simulations of large numbers of stars is very time consuming, even with super computers. Dr. Teuben showed

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Astronomical Tidbits
Nancy Grace Roman

Not so Cosmic Microwaves
from *Science Now* – Nov 30

In the past two years, astrophysicists and cosmologists have nailed down the age and composition of the universe by studying the all-pervading radiation left over from the Big Bang. But subtleties in that cosmic microwave background (CMB) suggest that our own solar system may be producing or absorbing some of the microwaves, a team of astrophysicists reports. If the finding holds up, researchers may have to rethink their theory of how the universe ballooned into existence.

But the intriguing correlations that appear to relate some aspects of the CMB to the plane of the solar system may still be a product of chance, says Charles Bennett, a cosmologist at NASA's Goddard Space Flight Center in Greenbelt, Maryland, and leader of the WMAP team. "Improbable things happen all the time."

Miniplanets may hop from one star to another!

China, India Set Sights on the Moon
From *Science Now* – Nov. 30

Udaipur, India--The new kids on the space block are having their own race to the Moon. Last week, Chinese scientists presented details of the country's planned lunar orbiter mission, named Chang'e, to be launched sometime in 2007. Not to be outdone, Indian space officials revealed at the same time that they have added a probe to the suite of instruments aboard Chandrayaan-1, which is headed to the Moon the same year.

Both countries unveiled their plans here at the International Conference on Exploration and Utilization of the Moon. "It has all the makings of a new race," says German high-energy physicist Horst Uwe Keller of the Max Planck Institute for Solar System Research in Katlenburg-Lindau, which hopes to build a payload for the Indian spacecraft. "And that's good. Healthy competition has never killed anybody."

The Chinese mission, the country's first outside Earth's orbit, hopes to put a 2-ton satellite into a 200-kilometer, circular polar orbit for a year's worth of exploration. Its 150-kg scientific payload will include a camera to map the terrain of the Moon in stereo for the first time. It will also carry a gamma and x-ray spectrometer to study its elemental and mineral composition, as well as instruments to measure solar winds and spot high-energy particles from deep space. The Chang'e mission will also carry a microwave radiometer to analyze the density, depth, and composition of the lunar soil, the first time such an instrument has been trained on the moon.

Neither country has plans for human lunar exploration.

Alien Worlds Invade the Kuiper Belt
from *Science Now*

Like fleas jumping from dog to dog, frozen miniplanets may hop from one star to another, astronomers have proposed. Computer simulations show that some of the icy objects in the outermost reaches of our solar system may actually be alien invaders that originally orbited another star. The exchange would have occurred when the other star had a close encounter with our newborn Sun.

Beyond the orbit of Neptune, tens of thousands of icy bodies, with diameters between 100 and 1500 kilometers, constitute the so-called Kuiper belt. These Kuiper belt objects are thought to be leftovers from the formation of our solar system. However, the remote and extremely elongated orbits of some of these objects are hard to explain. Take Sedna, for example. The mysterious mini-planet, whose discovery was announced earlier this year, takes 11,000 years to complete one orbit and never gets closer to the Sun than 10.5 billion kilometers--almost twice the average distance of Pluto.

Now, at least two groups of scientists suggest that Sedna-like objects may have crossed over from another star to our Sun during a close encounter. This likely took place when both stars were only a few tens of millions of years old and still resided in a densely populated cluster.

Astronomers Discover Planet Building is Big Mess
NASA Press Release

New observations from NASA's Spitzer Space Telescope reveal surprisingly large dust clouds around several stars. These clouds most likely flared up when rocky, embryonic planets smashed together. The Earth's own Moon may have formed from such a catastrophe. When embryonic planets, the rocky cores of planets like Earth and Mars, crash together, they are believed to either merge into a bigger planet or splinter into pieces. The dust generated by these events is warmed by the host star and glows in the infrared, where Spitzer can see it.

Do You Want to Get *Star Dust* Electronically?

Any member wishing to receive *Star Dust,* the newsletter of the National Capital Astronomers, via e-mail as a PDF file attachment, instead of hard-copy via U.S. Mail, should contact Nancy Grace Roman, the NCA Secretary, at nancy.roman6@verizon.net or 301-656-6092 (home).

Mid-Atlantic Occultations and Expeditions

by David Dunham

Asteroidal Occultations

Date	Day	EST	Star	Mag	Asteroid	dmag	s	in.	Location
Jan 3	Mon	18:45	TYC12150509	11.3	Pales	1.2	21	7	Penn., n.NJ
Jan 4	Tue	1:34	TYC24360724	11.1	Ausonia	0.8	8	7	s. New York
Jan 6	Thu	21:42	SAO 115046	9.5	Croatia	4.2	7	4	n. New York
Jan 7	Fri	3:06	SAO 58721	9.4	Lumen	2.3	13	3	s.w.VA, n.NC
Jan 10	Mon	4:56	TYC13710524	10.6	Flammario	1.5	8	6	w.VA, cen. NC
Jan 13	Thu	6:39	TYC19502225	11.2	Theobalda	2.2	7	8	n.WV,n.VA,DC?
Jan 14	Fri	2:46	PPM 714543	9.6	Ingeborg	4.4	2	4	n. Penn., s.NY
Jan 20	Thu	22:30	TYC17610660	12.2	Massinga	1.9	7	9	Penn.,Delaware
Jan 21	Fri	4:58	SAO 96450	8.7	Tamariwa	6.5	2	2	cen. NC, w. VA
Jan 26	Wed	0:07	TYC07180482	11.0	Bathseba	2.7	7	7	w. N. Carolina
Jan 28	Fri	2:41	2UC45823720	12.3	Patroclus	3.5	8	10	Maryland, DC
Feb 2	Wed	19:02	TYC18680563	11.7	Baillauda	4.0	8	8	NY, w. Penn.

Grazing Occultations

DATE	Day	EST	Star	Mag	% alt	CA	Location
Jan 6	Thu	4:50	SAO 183194	8.5	23- 15	17S	Ladysmith & Townsend, VA
Jan 7	Fri	6:58	SAO 184198	8.1	13- 19	20S	n. Lexington, VA; Sun -7 deg.
Jan 8	Sat	6:37	SAO 185197	8.5	6- 7	22S	Millville, NJ; Sun -8 deg.
Jan 12	Wed	17:46	SAO 164834	8.7	8+ 18	20S	HebronMD(Sun-9); Chester,VA
Jan 13	Thu	19:01	SAO 165429	8.7	16+ 21	17S	Barnesville & Eldersburg,MD
Jan 14	Fri	19:25	X 53895	10.1	26+ 31	15S	Hughesville, MD
Jan 15	Sat	21:34	SAO 109408	7.9	37+ 20	9S	Carlisle & Mechanicsburg,PA

Total Lunar Occultations

DATE	Day	EST	Ph	Star	Mag	%	alt	CA	Sp.	Notes
Jan 3	Mon	1:42	R	SAO 138836	7.3	54- 21		87N	G0	
Jan 6	Thu	6:40	R	SAO 183232	7.2	22- 27		64S	F6	Sun alt. -9 deg.
Jan 7	Fri	5:40	R	ZC 2311	6.3	13- 10		64N	B8	Az. 133 WA 294
Jan 7	Fri	6:38	R	ZC 2317	6.6	13- 17		37N	A0	Sun alt. -9; WA 321
Jan 7	Fri	11:46	D	sigma Sco	2.9	12- 29	-85	N	B1	Sun +29 deg.
Jan 8	Sat	6:16	R	ZC 2474	6.7	6- 4		59S	F2	Azimuth 131 deg.
Jan 12	Wed	17:40	D	SAO 164829	7.1	9+ 20		25N	A0	Sun-7;2nd*4",D 6s later
Jan 14	Fri	19:14	D	X 53895	10.1	26+ 31		34S	K2	Graze, Hughesville, MD
Jan 15	Sat	22:21	D	SAO 109427	7.7	37+ 12		64S	M	Az. 265 deg.; CI Psc
Jan 17	Mon	17:52	D	ZC 325	7.1	57+ 64		19N	K0	Sun alt. -8 deg.
Jan 18	Tue	23:20	D	ZC 460	6.9	68+ 36		59S	A0	
Jan 19	Wed	0:34	D	Botein	4.4	68+ 22		74N	K2	delta Arietis = ZC 465
Jan 19	Wed	21:32	D	33 Tauri	6.1	76+ 66		81N	B9	ZC 584; spect. binary
Jan 20	Thu	0:08	D	ZC 594	6.9	77+ 37		50S	B9	triple star
Jan 21	Fri	3:33	D	ZC 745	7.3	85+ 11		58S	K0	azimuth 295 deg.
Jan 22	Sat	2:00	D	SAO 77604	7.0	91+ 37		60N	K0	
Jan 22	Sat	2:31	D	SAO 77619	7.1	91+ 32		65N	F2	
Jan 23	Sun	4:50	D	ZC 1042	6.7	96+ 16		86N	A2	
Jan 24	Mon	5:49	D	76 Gem	5.3	99+ 13		48N	K5	ZC 1169; term.12" away
Jan 27	Thu	3:00	R	ZC 1479	6.4	97- 62		86N	F2	
Jan 30	Sun	2:08	R	Zaniah	3.9	79- 44		84S	A2	eta Vir=ZC 1772;double?
Jan 31	Mon	5:58	R	ZC 1890	7.3	69- 39		75S	K0	
Feb 3	Thu	4:13	R	SAO 183712	7.9	38- 17		59S	F3	
Feb 4	Fri	5:00	R	ZC 2404	6.7	27- 13		82S	G2	Azimuth 141 deg.
Feb 4	Fri	5:37	R	ZC 2409	7.0	27- 17		27N	B9	

David Dunham, e-mail dunham@starpower.net, more info. http://iota.jhuapl.edu
Phone home 301-474-4722; office 240-228-5609; car 301-526-5590

NATIONAL CAPITAL ASTRONOMERS
MEMBER INTEREST SURVEY

Name: _____ Date: ___/___/___
Address: _____ ZIP Code: _____
Home Phone: ____-____-_____ E-mail: _____
Present or Former Occupation (Or, If Student, Field of Study): _____
Academic Degrees: _____ Field(s) of Specialization: _____
Employer or Educational Institution: _____

We Need To Know What You Would Like NCA To Do **FOR YOU**

Please rate each of the activities below where:

1. *means "**Very** important **TO ME**, and **I** will participate regularly";*
2. *means "**Somewhat** important **TO ME**, and **I** will sometimes participate"; and*
3. *means "**Not** important **TO ME**".*

___ Provide a monthly talk by a professional astronomer about the latest developments in astronomy

___ Show me interesting objects through the telescopes after the monthly talk

___ Provide opportunities to socialize with other astronomers, as at the pre-meeting dinners

___ Teach me how to set up and use my own telescope

___ Teach me how to select a telescope for purchase

___ Teach me how to build a telescope

___ Teach me how to photograph the stars

___ Organize drives/rides to distant, darker sites for an evening of observing

___ Organize occultation timing expeditions

We Need To Know What **YOU** Can Do For Your Fellow Member of NCA

NCA needs you! *For more than ½ century, amateur and professional astronomers have given generously of their time to build NCA and to support its members' interests. But **every year** new people **must** assume support and leadership roles to maintain services to our members and to the community.* ***Please put check marks alongside the activities to which you can contribute.***

___ Help with NCA management:

- ___ General operations management
- ___ Financial management
- ___ Program organization and planning
- ___ Scheduling speakers
- ___ Administrative management
- ___ Program publicity
- ___ Website and list-serve management

___ Newsletter preparation and production

___ Help with the post-meeting observing sessions

___ Teach telescope setup and use and astrophotography

___ Help with telescope-making classes

___ Help maintain NCA's 14-inch telescope

Please return this to Benson J. Simon, former NCA president, at the next NCA meeting, or mail it to the NCA Treasurer, Jeffrey Norman. No envelope is needed, just fold this page in half, this side inside, tape the ends together, affix a 37-cent postage stamp, and drop it into a mailbox. Many thanks to the many members who already completed this survey at the December 4, 2004 meeting.

Tape here.
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FIRST CLASS
DATED MATERIAL

Mr. Jeffrey Norman
5410 Connecticut Avenue, NW #717
Washington, D.C. 20015

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"Theory in a Virtual Observatory"

(Continued from page 2)

a special computer chip developed to compute the Newtonian force model efficiently. The GRAPE-6 and Baby-GRAPE compute the forces for 100,000 and 60,000 stars efficiently. This design has been awarded the Gordon Bell prize three times at annual super computing conferences. Their most recent was for achieving a computation rate of 32 Tflops, 32 thousand billion floating point operations per second. The bottleneck for computations with these chips then becomes communicating the positions of the particles to the chip. Dr. Teuben showed us a picture of one set-up with four computers attached to the chip. The GRAPE developers are now working on the GRAPE-8.

The Hayden Planetarium projection system is available to astronomers (and others) after hours for use of its projectors. The n-body analysts used it to "fly" through their simulated galaxy and watch it evolve. Dr. Teuben and his colleagues had a problem in seven dimensions of time and space, six for position and velocity and the seventh that of time. Their simulation included simulating the evolution of the stars as they orbit in the galaxy. They found that visualization of the problem was helped by illuminating one stellar orbit, with markers for time, with all the other stars moving, as well as evolving. Stellar evolution has an influence on the dynamics of the cluster, as stars enlarge or become supernovae. They were studying the impact of stellar evolution on the dynamics of globular clusters.

Simulations and projections in a planetarium are often supported by the Virtual Director (VirDir) a piece of software written by NCSA, which works in a CAVE as well as a planetarium. It is used, for example, in making IMAX movies. The NCSA does not make VirDir available to others but Partiview is a version of the Virtual Director that is available as open source software. The database of objects can be logged into Partiview and the analyst can fly through it. Partiview is now publicly available in both Macintosh and Windows versions, thanks to the Hayden Planetarium (see http://www.manybody.org/).

The VO and theory in a VO is a hobby for Dr. Teuben. He is a software engineer for CARMA, the Combined Array for Research in Millimeter-wave Astronomy. This is being formed by combining three existing microwave programs into one. The Berkley Illinois Maryland Array (BIMA) of ten 6-meter dishes and the Owens Valley Radio Observatory (OVRO) an array of 6 10-meter antennas planned to merge to become CARMA, with first light planned for 2005 (http://www.mmarray.org/). The University of Chicago then also suggested their Sunyaev-Zeldovich Array (SZA), six smaller dishes of 3 meters, also combine, so that CARMA = OVRO + BIMA + SZA. The arrays are being moved to a location in the Inyo Mountains at a higher elevation than their current sites in the Owens Valley of California. Nine of the 10 BIMA dishes have been moved to the new site (The 10th will not be moved.) and the antennas from OVRO will move. The SZA array will join the rest of CARMA in three years after its current observing program completes.

Astronomy is one science where amateurs can still make real contributions. For example, one can download data for SETI and participate in the search for signals in the data. The VO is a tool amateurs can use as well as professionals to search through data to discover how we have to put the data into the VO and how to use it.

The pictures Dr. Teuben showed included the following (all available on APOD):

- The International Space Station crossing the Sun during the transit of Venus.
- Supernova, Cas A, an image com-

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Getting to the NCA Monthly Meeting and the Dinner Before the Meeting

Jeff Guerber

NCA meetings are now held at 7:30 p.m. at the University of Maryland Observatory, in College Park on Metzerott Rd. between University Blvd. (MD-193) and Adelphi Rd. To get there from the Capital Beltway (I-495), either take US Rt. 1 south about a mile, turning right onto MD-193 West, then at the first light turn right onto Metzerott; or, take New Hampshire Ave. (MD-650) south, turn left at the second light onto Adelphi Rd., two more lights, turn left onto Metzerott, and proceed about a mile to the observatory. The observatory is on the south side of Metzerott Rd., directly opposite the UM System Administration building; you can park there if the observatory lot is full, but be careful crossing Metzerott Rd.

At 5:30 p.m. before the meeting, please join us for dinner at the Garden Restaurant in the UMD University College Inn and Conference Center, 3501 University Blvd. East at Adelphi Rd. From the Beltway, either take New Hampshire Ave. south, turn left onto Adelphi, and at the third light (passing Metzerott) turn left onto University then immediately right into the garage; or, take US-1 south, turn right onto University Blvd. west, and take it to the intersection with Adelphi Rd. Park either in the garage (costs), or in Lot 1 nearby (free). To get to the Observatory, exit to the right onto University Blvd. (MD-193) east, and at the second light turn left onto Metzerott Rd.

Are You Coming to Dinner?

If you are planning to come to the dinner before the meeting, please tell Benson J. Simon, telephone: 301-776-6721, e-mail st88@ioip.com, so that we can make reservations for the right number of people.

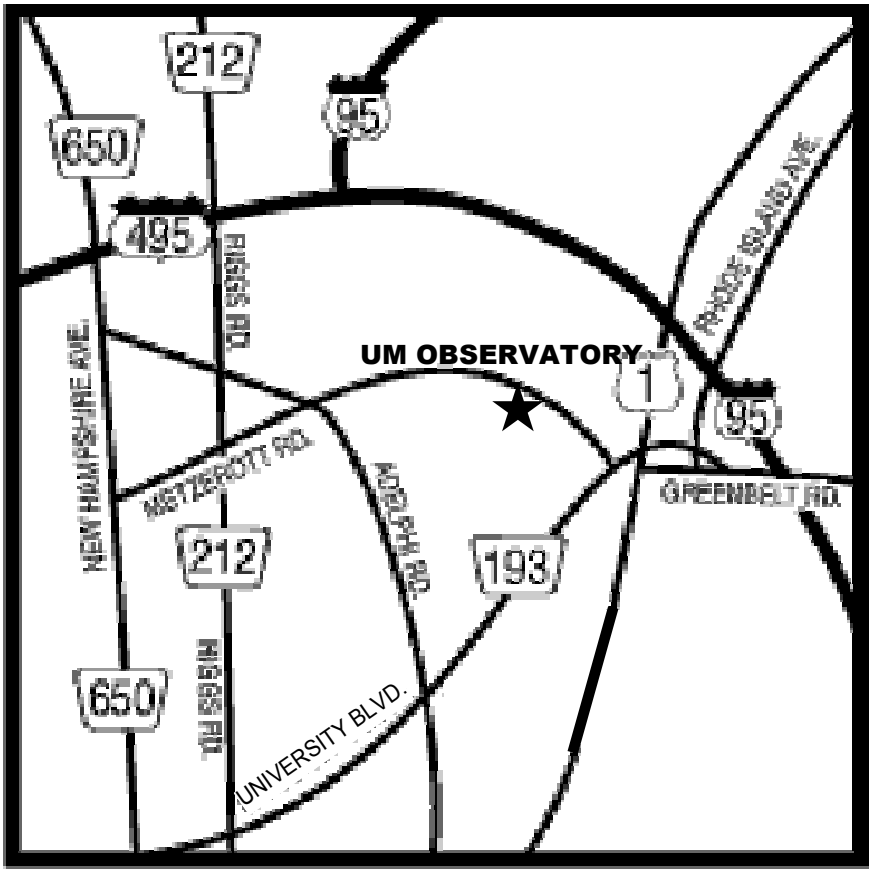
Do You Need a Ride?

Please contact Jay Miller, 301-530-7942, 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 email at rigel1@starpower.net.)

Observing after the Meeting

Elizabeth Warner

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.



Getting to the NCA Meeting

"Theory in a Virtual Observatory"

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posed of pictures in different wavelengths.

- Recently discovered galaxy hidden behind our galaxy.
- Edge on galaxy with a peanut shaped bulge. The theory is that this type of a galaxy is a barred galaxy.
- The Moon, at apogee and perigee, and a series through a lunation, showing the librations.
- Picture of a sonic boom
- Picture of a plane passing in front of the Sun as observed with an h-alpha filter.
- Gamma ray observatory, composed of many computer-controlled elements.
- Eagle nebula
- Whirlpool galaxy, M51.

The URLs are:

http://www.mmarray.org/ - CARMA

http://antwrp.gsfc.nasa.gov/apod/ - Astronomy Picture of the Day

http://www.us-vo.org/ - US National Virtual Observatory

http://www.ivoa.net/ - International Virtual Observatory Association

http://bima.astro.umd.edu/nemo/tvo/ - Theory in a Virtual Observatory

http://heasarc.gsfc.nasa.gov/cgi-bin/vo/datascope/init.pi - Datascope

http://irsa.ipac.caltech.edu/applications/Oasis/ - On-line Archive Science Information Services (OASIS)

http://www.manybody.org/ - Manybody (NEMO, Starlab, Partiview, MODEST,

http://www.astro.umd.edu/~teuben/nca.html

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Editor: Elliott Fein, Co-editor: Adele Fein, Editorial Advisor: Nancy Byrd. Consultant: Jeffrey Norman

National Capital Astronomers, Inc.

http://capitalastronomers.org

Jay H. Miller, NCA President, rigel1@starpower.net, 301-530-7942 (home).
Jeff Guerber, NCA Vice-president, jeff.guerber@gsfc.nasa.gov, 703-281-4980 (home).
Dr. Nancy Grace Roman, NCA Secretary, nancy.roman6@verizon.net, 301-656-6092 (home).
Jeffrey Norman, NCA Treasurer, jefffrey.norman@att.net, 5410 Connecticut Avenue, NW, Apt. #717, Washington, DC 20015-2837, 202-966-0739
Trustees: Guy Brandenburg, Gladys Fuller, Gary Joaquin, Dr. Wayne H. Warren,
NCA Webmaster, Dr. Harold Williams, hwilliam@mc.cc.md.us, 301-650-1463 (planetarium), 301-565-3709 (home).
Elliott Fein, NCA *Star Dust* Editor, elliott.fein@erols.com, 301-762-6261 (home), 5 Carter Ct. Rockville, MD 20852-1005.
NCA Web Page: http://capitalastronomers.org/.
Appointed Officers and Committee Heads: Exploring the Sky - Joseph C. Morris; Meeting Facilities - Jay H. Miller; Observing - Michael McNeal, mcnealmi@verizon.net; Telescope Making - Guy Brandenburg; *Star Dust* Editor - Elliott Fein

SERVING SCIENCE & SOCIETY SINCE 1937

NCA is a nonprofit, membership-supported, volunteer-run, public-service corporation dedicated to advancing astronomy, space technology, and related sciences through information, participation, and inspiration, via research, lectures, presentations, publications, expeditions, tours, public interpretation, and education. NCA is the astronomy affiliate of the Washington Academy of Sciences. All are welcome to join NCA.

SERVICES & ACTIVITIES:

Monthly Meetings feature presentations of current work by researchers at the horizons of their fields. All are welcome; there is no charge. *See* monthly *Star Dust* for time and location.

NCA Volunteers serve in a number of capacities. Many members serve as teachers, clinicians, and science fair judges. Some members observe total or graze occultations of stars occulted by the Moon or asteroids. Most of these NCA members are also members of the International Occultation Timing Association (IOTA).

Publications received by members include the monthly newsletter of NCA, *Star Dust*, and an optional discount subscription to *Sky & Telescope* magazine.

Consumer Clinics: Some members serve as clinicians and provide advice for the selection, use, and care of binoculars and telescopes and their accessories. One such clinic is the semiannual event held at the Smithsonian Institution National Air and Space Museum.

Fighting Light Pollution: NCA is concerned about light pollution and is interested in the technology for reducing or eliminating it. To that purpose, NCA is an Organization Member of the International Dark Sky Association (IDA). Some NCA members are also individual members of IDA.

Classes: Some NCA members are available for educational programs for schools and other organizations. The instruction settings include star parties, classroom instruction, and schoolteacher training programs that provide techniques for teaching astronomy. NCA sponsors a telescope-making class, which is described in the *Star Dust* "Calendar of Monthly Events."

Tours: On several occasions, NCA has sponsored tours of astronomical interest, mainly to observatories (such as the National Radio Astronomy Observatory) and to the solar eclipses of 1998 and 1999.

Discounts are available to members on many publications, products, and services, including *Sky & Telescope* magazine.

Public Sky Viewing Programs are offered jointly with the National Park Service, and others. Contact: Joe Morris, joemorris@erols.com or (703) 620-0996.

Members-Only Viewing Programs periodically, at a dark-sky site.

NCA Juniors Program fosters children's and young adults' interest in astronomy, space technology, and related sciences through discounted memberships, mentoring from dedicated members, and NCA's annual Science Fair Awards.

Fine Quality Telescope, 14-inch aperture, see "Calendar of Monthly Events."

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