Star Dust

National Capital Astronomers, Inc.

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Sten Odenwald, "Why Nothing is Important"

Submitted by Gary Joaquin

Sten Odenwald will present the featured talk for the February 2 meeting of National Capital Astronomers, "Why Nothing is Important". The meeting will be held in the Bethesda-Chevy Chase Regional Services Center of Montgomery County, 4805 Edgemoor Lane (Second Floor), Bethesda, MD at 3:00 P.M.

Synopsis

As we enter the 21st Century, we have succeeded in blotting out the Milky Way from our skies as our backyard security lights and city lights blaze forth. In the desperate race for Perfect Security, we have lost our sense of The Infinite which only the night sky can give us. Astronomers have uncovered dark energies and matter lurking in the cosmic Void which are collectively driving our cosmos to a bleak eternal future in which only our own Milky Way will remain as a candle shining in the intergalactic blackness. At the other extreme, physicists have discovered that space and time are not what we normally think they are. In the end, the destiny of our own universe is written within the fabric of that dark emptiness that you see each night. In this talk, I want to reacquaint you with the primal mystery of darkness and space, and show you why it is that space and darkness, what the Ancients called "the Void", is much more than Nothing.

Biography

Sten Odenwald an award-winning astronomer with Raytheon ITSS, is currently the education and public outreach manager for the NASA IMAGE satellite program. The author of *The Astronomy Cafe* and *The 23rd Cycle*, Sten Odenwald hosts an award-winning website called the Astronomy Cafe (www.theastronomycafe.net) where he has answered over 45,000 questions since 1995. He has written articles for *The Washington Post*, *Sky and Telescope* and *Astronomy* magazines on cosmology. His research work involves the discovery and investigation of the Cosmic Infrared Background and the "first light" from infant galaxies. He is the recipient of the 1999 Goddard Space Flight Center Excellence in Outreach Award and the Popular Writing Award from the American Astronomical Society, Solar Physics Division. His current book, due out this June, is *Patterns in the Void: Why nothing is Important*. Sten Odenwald started out as an amateur astronomer in Oakland California at age 10 when his Papa showed him the stars in Orion's Belt.

"Cosmic Train Wrecks: Hot Galaxy Collisions" A Talk by Dr. Kirk Borne

Reviewed by Gary L. Joaquin

At our January NCA meeting, Dr. Kirk Borne gave us a presentation about colliding galaxies, a research topic that he has pursued with passion for over twenty years. His work focused primarily upon the study of colliding spinning, spiral galaxies, the dynamics of how they join to form non-spinning elliptical galaxies and the implications that these collisions have upon the structure and evolution of the Universe. Dr. Borne has explored these dynamics with extensive computer modeling of collisions in an attempt to develop models that match observations of real galactic structures.

Dr. Borne's work explores two of the themes supported by NASA, namely the astronomical search for origins and the study of the structure and evolution of the Universe. Much of the data for his work have come from three of NASA's four great observatories: the Hubble Space Telescope (HST) launched in 1990, the Compton Gamma Ray Observatory launched in 1991, and the Advanced X-Ray Astronomy Facility (now called the Chandra X-Ray Observatory) launched in 1999. The fourth great observatory, the Space Infrared Telescope Facility, has yet to be launched. When it is launched, great results are expected because of its much higher resolution at infrared wavelengths, where a lot of the action is taking place in colliding galaxies.

Dr. Borne began studying colliding galaxies at the California Institute of Technology which gave him the opportunity to expand the scope and scale of his earlier work on the gravitational tidal interactions in cataclysmic variable binary stars. Unfortunately, in the late 1970s, the astronomical scientific community was not very supportive of serious research involving elliptical galaxies which were considered static and even boring compared to spiral galaxies.

(Continued on page 2)

NCA Events This Month

The Public is Welcome!

NCA Home Page: http://capitalastronomers.org

Fridays, **February 1, 8, 15, and 22, 7:00 to 10:00 P.M.,** NCA Mirror-Making Classes. Note change to ***Fridays***.

Saturday, February 2, 8:30 P.M., Fridays, February 8 & 15, 8:30 P.M. Wednesday, February 20, 7:00 P.M. Open nights with NCA's 14-inch telescope at Ridgeview Observatory near Alexandria, Virginia. See below.

Saturday, February 2, 3:00 P.M. - NCA meeting in the Bethesda-Chevy Chase Regional Services Center of Montgomery County, 4805 Edgemoor Lane, (Second Floor), Bethesda, MD.

See map and directions on Page 8.

Sten Odenwald will present the featured talk "Why Nothing is Important".

Saturday, February 2, following the meeting, dinner with the speaker and NCA members at

Il Forno Pizzeria
4926 Cordell Avenue
Bethesda, MD
301 652-7757

See Page 4 for more National Capital Area astronomical doings.

To join NCA, use the membership application on Page 7.

The deadline for the March *Star Dust* is February 15. Your cooperation in adhering to the deadline would be appreciated.

Please send submissions to Elliott Fein at elliott.fein@erols.com.
Text must be in ASCII, MS Word, or WordPerfect.
Thank you.

An Evening at NCA's C-16

by Elliott Fein

A couple of weeks ago Adele and I went down to NCA's C-16 at Bob Bolster's house. We brought along our son and two grand-daughters, aged eight and eleven.

We all had a very enjoyable evening. I think the eleven-year old got a tremendous amount out of it. It was hard to pull her away form th eyepice to get her to let otheres take a look. Bob started us off with some deep sky objects, then we moved onto the planets and got a gorgeous view of Saturn and its rings. Cassini's division was easy for all of us to see.

Mirror Making Classes

by Guy Brandenburg

Fridays, February 1, 8, 15, and 22. The NCA Mirror-Making class will be held on **Fridays** in February of 2002, from 7:00 to 10:00 PM at the American University's McKinley Hall, rooms 9 and 13, just off Ward Circle in Northwest Washington, DC. Classes are very informal, and you can start or finish a mirror at any time. We have all the necessary abrasives, glass, pitch, and testing equipment on hand, and you will find that in learning how to make a fine primary mirror, you will learn a lot about optics and astronomy that will be very helpful in observing the sky later on. Plus, you can then brag about how you made your own mirror and how you tested it to be accurate to a small fraction of a wavelength of light! Prices for entire packages (instruction, blank, tool, grit, pitch, other abrasives, rouge, testing, and so on) run about $70 for a 6-inch mirror, and more for larger ones. Our prices are actually lower than ordering an entire kit from Willmann-Bell or Newport Glass. We can also test optics that you purchased or found elsewhere, and can aluminize mirrors up to 12.5 inches for an additional fee. For more information, email Guy Brandenburg at gfbranden@earthlink.net or phone him in the evenings or weekends at 202-635-1860.

Dr. Kirk Borne

(Continued from page 1)

At that time, the idea of the "island universe" permeated astronomy suggesting that galaxies evolved in splendid isolation although there was much evidence to suggest otherwise. Galaxies are observed in pairs and other groupings including galaxy clusters, some of which include thousands of galaxies. Then there were those apparently interacting galaxies where gravitational tides appeared to be tearing them apart. Nonetheless, studying elliptical galaxies at this time was considered to be taboo, especially when trying to obtain observational time on the 200-inch telescope at Mount Palomar.

Fortunately, there was an earlier precedent for studying colliding galaxies. The Messier objects include a collection of the very brightest galaxies, which offered the Toomre brothers, Alar and Juri, the opportunity to do some original work. In 1972 they collaborated to create a computer model of the Whirlpool Galaxy,

(Continued on page 3)

Observing with the NCA C-14

by Bob Bolster

Date, Time	**Prime Objects**
Saturday, Feb. 2, 8:30 p.m.	M31, M42, Double Cluster, Saturn, Jupiter
Friday, Feb. 8, 15, 8:30 p.m.	M31, M42, Double Cluster, Saturn, Jupiter
Wednesday., Feb. 20, 7:00 p.m.	Occultation of Saturn by the Moon: Disappearance 7:15, Reappearance 8:35 Also Jupiter, and M31, M42, Double Cluster, Saturn, Jupiter, 9-day old Moon.

At Ridgeview Observatory in Bob Bolster's backyard, 6007 Ridge View Drive, Franconia, Virginia (off Franconia Road between Telegraph Road and Rose Hill Drive). Call Bob at 703-960-9126 before 6:00 p.m., to let him know you are coming.

Dr. Kirk Borne

(Continued from page 2)
M51, that explained the interaction between the larger and the smaller galaxies that comprise this Messier object. They also created models of Arp 295, NGC 4676, and NGC 4038/9. From this early work, Alar Toomre extracted a unique insight: perhaps Edwin Hubble's famous tuning fork diagram summarizing galactic structures was actually backwards! On the left-hand side Hubble depicted elliptical galaxies and on the right were spiral and barred spiral galaxies. Alar Toomre hypothesized that the diagram should be read from right to left as a galactic merger sequence. Starting from primordial gas and dust particles, the galaxies condensed and flattened into spinning spirals that eventually collided with each other to form non-spinning elliptical galaxies.

Despite this remarkable precedent, Dr. Borne had a difficult time convincing the faculty at Caltech to permit him to pursue a thesis on colliding galaxies. A visiting senior research faculty member, who had done significant work with computational models, declared that all of the work to be done in this field was complete and that any further work was a waste of time. Undaunted, Dr. Borne prepared a thesis proposal which was ultimately approved.

Dr. Borne's thesis focused upon models of colliding galaxies. This was followed by a study of NGC7252, affectionately known as the "Atoms for Peace" galaxy because its structure resembled the old Atomic Energy Commission's symbol from the 1960s. NGC7252 was believed to have been formed from the collision of two large spiral galaxies. Optical images including several very long exposures revealed very faint tidal tails and loop structures. Earlier work by Francois Schweizer had confirmed that the stellar properties and abundances found in NGC7252 matched those observed in spiral galaxies, identifying it as a galaxy near the end of the Toomre and Toomre galactic merger sequence. In the early 1980s, at the University of Michigan, Dr. Borne collaborated with Doug Richstone to create a model of NGC7252 which, when projected 1 billion years into the future, resulted in an elliptical galaxy.

Despite these encouraging results the astronomical community then believed that collisions were possible but still quite rare. In fact, one very famous astronomer suggested that colliding galaxies were so uninteresting that it was like a car wreck: "When you crash a Chevy into a Ford, you don't get a new car, you get a mess!"

The Infrared Astronomy Satellite (IRAS) changed this attitude by discovering a whole new class of galaxies that were neither elliptical nor spiral, but were the brightest objects at infrared wavelengths and were subsequently called ultraluminous infrared galaxies (ULIRG). More importantly, in almost every single case, ULIRGs were found to be involved with galactic collisions. Thus began the period of "Merger Madness" where many astronomers immediately became interested in studying these phenomena.

At a workshop hosted by the Space Telescope Science Institute, where Dr. Borne worked for ten years, twenty-six astronomers presented their own estimates of the rate at which galaxies collide, as determined from a wide variety of methods. Using the units of merger per galaxy per Hubble time, where Hubble time equals the age of the Universe, estimated at about 12 billion years, the participants estimated an average of 0.38 +/- 0.34 collisions/galaxy/Hubble time with estimates ranging from 0.03 up to 1.5, the latter being Dr. Borne's estimate. Although the standard deviation was quite large, there was finally a public consensus that galactic collisions were frequent enough to play a significant role in the evolution of the Universe.

Subsequent HST observations proposed and conducted by Dr. Borne and colleagues over a three-year period made two observations each of 123 ULIRGs. With its high spatial resolution, the HST was able to provide evidence proving that virtually all of these ULIRGs were colliding galaxies. From this observational run, a 1999 NASA press release reported that over two dozen of these ULIRGs are indeed "nests" of galaxies, "apparently engaged in multiple collisions that lead to fiery pile-ups of three, four or even five galaxies smashing together."

Dr. Borne presented a computer model of one dramatic galaxy collision, the Cartwheel Galaxy, demonstrating how a nearby smaller galaxy penetrated its center like a bullet, creating both the rim and the spokes of a great wheel. Significantly, the boundary of the Cartwheel is a very strong collision shock wave where gas and dust have been rapidly compressed to form many bright knots, extremely active regions of star formation now believed to be the early stages of globular star clusters. These regions, seen in the Cartwheel and in the ULIRGs, are considered to be super star clusters, and these galaxies are considered to be super starbursts because their rate of star formation is about 1000 times greater than that of our own Milky Way galaxy. They are truly ultraluminous star bursts. The Milky Way is estimated to give birth to an average of one star per year, given that it contains approximately 10 billion stars and that the age of the Universe is about 10 billion years old.

ULIRGs appear to be the missing link in a key evolutionary process of our Universe, particularly in the formation of quasars or quasi-stellar objects, objects that appear to be local stars, but spectrographically prove to be extremely distant and ancient objects. Recent HST images of quasars have shown them to be embedded in galaxies, suggesting that quasars are born in galactic collisions and may represent the transitional phase between the young interrelated galaxies of the past and older isolated galaxies that we see today.

Dr. Borne closed by speculating about the results of a collision between the Andromeda Galaxy and our own Milky Way. Redshifts indicate that the Andromeda galaxy is getting closer, although its proper motion (motion perpendicular to our line-of-sight) needs to be determined in order to predict a collision with certainty. Nonetheless, if a collision is inevitable and if we are around in four billion years to witness it, then we would see the formation of tidal tails and ultraluminous star bursts, distortion on a galactic scale resulting in a new ULIRG, the merging of two black holes releasing a massive burst of energy and the formation of jets of hot gases like M87 in the Virgo cluster. Eventually, to the casual observer, the merger product of the Andromeda and Milky Way collision will ultimately look like yet another boring elliptical galaxy, but to think that would be to ignore the wonder of this incredible process.

NCA extends its appreciation to Dr. Borne for his time, his expertise, and his gift in being able to communicate the wonder of the Universe to our members.

Other National Capital Area Meetings

University of Maryland Observatory on Metzerott Road. Open house on the 5th and 20th of each month. The talk begins at 8:00 P.M. And is followed by observing if the weather permits.
February 5 Dr. Sylvan Veilleux, "Monsters in the Sky: Quasars and Supermassive Black Holes.
February 20 Dr. David Neufeld on TBA
March 4 Dr. Dereck Richardson on "How to Make Asteroid Families and Satellites
Info: (301) 405-3001 Source: http://www.astro.umd.edu/openhouse/

NASA/GSFC LEP Seminar Laboratory for Extraterrestrial Physics Brown Bag Seminar.
The Laboratory for Extraterrestrial Physics (LEP) at NASA's Goddard Space Flight Center conducts weekly science seminars Fridays at Noon in Room 8 in Building 2 at Goddard.
February 1 Dr. Vladimir Osherovich, NASA Goddard Space Flight Center, "Resonances as a Diagnostic Tool All the Way From the Earth's Ionosphere to Neutron Stars and Black Holes".
February 8 Dr. Dana Crider, NASA Goddard Space Flight Center, "Solar Wind Interaction with Mars' Ionosphere"
February 15 Dr. John Keller, NASA Goddard Space Flight Center, "Progress Report on the Turbotrap Development"
February 22 Dr. Keith Ogilvie, NASA Goddard Space Flight Center, TBD
Source: http://lep694.gsfc.nasa.gov/seminar/

Goddard Scientific Colloquia
The Scientific Colloquia will be held at 3:30 p.m. on Fridays in the Building 3 auditorium, except as noted.
For the time being, access to Goddard Space Flight Center is limited to those holding Goddard badges or official visitors. You can become an official visitor by finding a badged Goddard employee to escort you. The Scientific Colloquium Committee cannot promise to provide escorts. We regret the inconvenience to our regular guests. Coffee and tea will be served at 3:00 p.m., courtesy of GEWA.
If you plan to attend and do not have a NASA badge, please contact Carol Krueger, at (301) 286-6878, at least 24 hours beforehand. To be added to our mailing list, call the same number.
February 1 Gregory Chaitin, IBM Research Division, "Paradoxes of Randomness"
February 8 Luann Becker, University of California, Santa Barbara "Evidence for Impact-Generated Extinctions"
Building 8 Auditorium.
If you plan to attend and do not have a NASA badge, please contact Carol Krueger, at (301) 286-6878, at least 24 hours beforehand.
Source: lheawww.gsfc.nasa.gov/users/djt/colloq/

University of Maryland at College Park Astronomy Colloquia
All Astronomy Colloquia are held in Room CSS 2400 on Wednesdays at 4:00-5:00 p.m. unless otherwise noted. Coming from off-campus? Please note parking information at the bottom of this announcement. All Astronomy Colloquium are held in room CSS 2400 at 16:00-17:00 (4:00-5:00 p.m.) unless otherwise noted.
February 6 Dr. Philip Armitage, University of Colorado, Boulder, "Population Synthesis of Extra-solar Planets and Brown Dwarfs"
February 13 Dr. Nicholas White, NASA Goddard Space Flight Center, "TBD"
February 20 Dr. Nicholas White, NASA Goddard Space Flight Center, "TBD"
February 27 Dr. Namir Kassim, NRL, "Emerging from the Confusion: A Quiet Renaissance in Low-freq Radio Astronomy"
March 6 Prof. Vera Rubin, DTM, "TBD"
Special accommodations for individuals with disabilities can be made by calling (301) 405-3001. It would be appreciated if we are notified at least one week in advance. Parking: Please note that most parking meters in Parking Garage 2 have been removed. Parking for visitors is available in the Cashier-Attended Parking Lot at the intersection of Paint Branch & Technology Drive. It is a 5-10 minute walk from the parking lot to the Computer & Space Sciences building.
Source:http://www.astro.umd.edu/colloquia/colloquium.html

Star Dust Is Now Available 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 hardcopy via U.S. Mail, should contact Nancy Grace Roman, the NCA Secretary, at ngroman@erols.com, or via telephone at 301-656-6092 (home).

Meteor Showers

Full Moon: February 27
Major Activity: None

Minor Activity

Radiant	Duration	Maximum
Aurigids	January 31-February 23	Feb. 5-10
Alpha Centaurids (ACE)	February 2-25	Feb. 8/9
Beta Centaurids	February 2-25	Feb. 8/9
Delta Leonids (DLE)	February 5-March 19	Feb. 22/23
Sigma Leonids	February 9-March 13	Feb. 25/26

Daylight Activity

Radiant	Duration	Maximum
Capricornids-Sagittariids	January 13-February 28	January 30-February 3
Chi Capricornids	January 29-February 28	February 13/14

Source: http://comets.amsmeteors.org/meteors

Mid-Atlantic Occultations and Expeditions

by David Dunham

Asteroidal Occultations

DATE	Day	EST	Star	Mag	Asteroid	dmag	Dur s	Ap. in.	Location
Feb 3	Sun	3:30	TYC14070880	10.5	Katja	2.6	4	7	Maine
Feb 5	Tue	23:52	TYC17970844	11.9	Cohnia	2.7	5	8	Maryland, DC
Feb 10	Sun	22:21	TYC24240187	11.2	Virtus	3.0	18	8	n. Florida
Feb 21	Thu	1:22	TYC19351084	10.9	Montague	2.5	11	7	Georgia
Feb 26	Tue	3:03	TYC48890715	11.7	Jovita	4.1	4	8	Virginia
Feb 28	Thu	5:06	SAO 207513	10.1	Hispania	3.2	7	6	Texas

Lunar Grazing Occultations

DATE	Day	EST	Star	Mag	% alt	CA	Location
Feb 1	Fri	0:49	X17976	9.2	84- 41	12S	Manassas, VA; sp K5
Feb 3	Sun	4:18	ZC 1994	6.6	64- 45	16S	Fayetteville, NC
Feb 5	Tue	2:55	ZC 2232	7.2	42- 13	14S	n.e. of Monmouth, NJ
Feb 5	Tue	3:49	X39821	8.9	41- 20	15S	Fredericksburg, VA
Feb 7	Thu	4:49	51 Oph	4.8	22- 9	15S	Fire Island, NY; ZC 2523
Feb 7	Thu	5:54	SAO 185501	8.6	21- 17	15S	Odenton, MD
Feb 15	Fri	20:07	X32604	9.6	12+ 8	10S	n. VA; DC; Bowie, MD
Feb 16	Sat	18:15	SAO 109751	9.5	18+ 38	15S	Sun -7, Easton, MD; s. NJ
Feb 19	Tue	22:35	ZC 0527	6.2	45+ 24	1S	Damascus, Fulton, Laurel, MD

Total Lunar Occultations

DATE	Day	EST		Star	Mag	%	alt	CA	Sp.	Notes
Feb 2	Sat	0:43	R	ZC 1856	6.6	75-	27	63N	F5	mags.7.2,7.6,sep 1.0",PA105
Feb 2	Sat	23:59	R	ZC 1976	7.0	64-	7	89N	A3	
Feb 3	Sun	0:27	R	ZC 1978	6.6	64-	12	88S	K0	close double star
Feb 3	Sun	4:40	R	ZC 1994	6.2	63-	43	53S	F8	mags.6.5,7.7,sep 3.6",PA103
Feb 4	Mon	1:03	R	ZC 2097	6.8	53-	6	66N	K0	
Feb 4	Mon	3:56	R	ZC 2110	6.3	52-	31	8N	K0	
Feb 7	Thu	4:39	R	SAO 185466	7.4	21-	7	43S	F2	
Feb 8	Fri	6:12	R	SAO 186864	7.4	13-	12	71S	G2	close double; Sun -11
Feb 15	Fri	20:03	D	X32604	9.6	12+	9	16S		Graze, DC and Bowie, MD
Feb 15	Fri	20:10	R	X32604	9.6	12+	8	4S		
Feb 16	Sat	19:21	D	ZC 0188	7.6	18+	28	75S	F0	
Feb 16	Sat	21:20	D	SAO 109805	7.5	19+	6	61N	K0	Az. 270
Feb 17	Sun	20:14	D	ZC 0298	7.1	26+	29	74N	F2	Possible close double
Feb 17	Sun	21:34	D	SAO 110316	7.2	27+	14	74N	F5	
Feb 18	Mon	19:31	D	SAO 093098	7.5	35+	47	84S	A0	
Feb 19	Tue	19:59	D	SAO 093504	7.7	45+	53	74S	G0	
Feb 20	Wed	19:17	D	Saturn	0.0	55+	69	65N		Disk duration 52 sec.
Feb 20	Wed	19:23	D	Titan	8.3	55+	68	66N		Duration 2 sec.
Feb 20	Wed	19:27	D	SAO 093941	7.5	55+	67	54S	A0	
Feb 20	Wed	20:40	R	Saturn	0.0	55+	56	-80N		Disk duration 49 sec.
Feb 21	Thu	22:51	D	SAO 077191	7.2	66+	44	83S	K0	
Feb 24	Sun	3:56	D	ZC 1161	5.9	87+	10	58S	K5	
Feb 25	Mon	2:01	D	UV Cancri	7.0	93+	41	41S	M4	SAO 80312; var. 7.0-8.5
Mar 1	Fri	22:22	R	ZC 1923	6.8	88-	14	65N	K0	

Total occultations are calculated for Greenbelt, MD, but in most cases, the times will be within 2 minutes for locations within 70 miles of there.

Phone the IOTA occultation line, 301-474-4945, for weather go/cancel decisions, and other updates and details, or check IOTA's Web site at http://www.lunar-occultations.com/iota

David Dunham, e-mail dunham@erols.com
Phone home 301-474-4722; office 240-228-5609; car 301-526-5590.

Getting to the NCA Monthly Meeting

Saturday, February 2

3:00 P.M. - NCA Meeting in the Bethesda-Chevy Chase Regional Services Center of Montgomery County, 4805 Edgemoor Lane **(2nd Floor)**, Bethesda, MD.

Sten Odenwald will present the featured talk for the February 2 meeting of National Capital Astronomers, "Why Nothing is Important".

Following the meeting, dinner with the speaker and NCA members at
Il Forno Pizzeria
4926 Cordell Avenue
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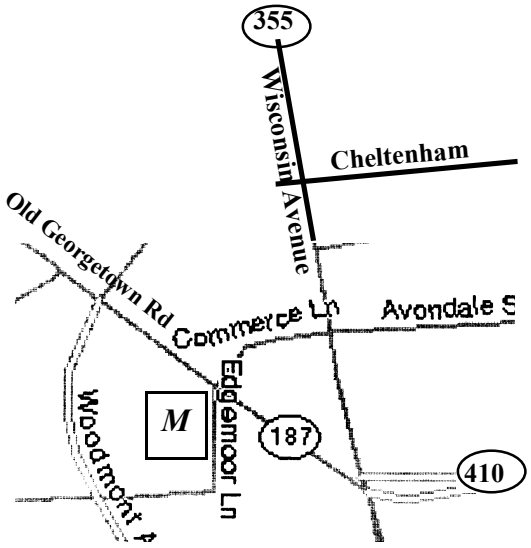
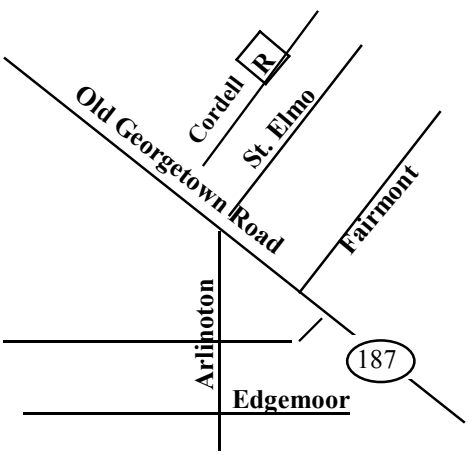
301 652-7757





Directions to the New Meeting Place

From North of Bethesda

1. Take Rockville Pike/MD-355 South.
2. Rockville Pike/MD-355 S becomes MD-355/Wisconsin Ave.
3. Shortly after Cheltenham Dr. (and one block before reaching Rt. 410), turn right onto Commerce Lane.
4. Commerce Lane becomes Edgemoor Lane.
5. After crossing Old Georgetown Rd., 4805 is the second entrance on the right. (See ***M*** on map.*)*
6. To get to public parking, continue on Edgemoor Lane which will make a sharp right turn. The parking garage is then on your right. See note below.

From South of Bethesda

1. Take MD-355/Wisconsin Ave. North.
2. Turn slight left onto MD-187/Old Georgetown Rd.
3. Turn next left onto Edgemoor Ln. 4805 is the second entrance on the right. (See ***M*** on map.*)*
4. To get to public parking, continue on Edgemoor Lane which will make a sharp right turn. The parking garage is then on your right.

Note: there are two parking lots. The one on Woodmont is for the apartments and may have a fee. The one on Edgemoor is marked "Public" and does not charge on weekends.

Directions to the Restaurant

1. Following the meeting, turn right out of the parking garage.
2. Continue on Edgemoor Lane and cross Woodmont Ave.
3. Turn right onto Arlington Blvd.
4. Turn left onto MD-187/Old Georgetown Rd.

Turn right at Cordell Ave. The restaurant, Il Forno Pizzeria, will be on your right between the Betawi Grill (blue canopy with orange lettering) and Nam's (red canopy).

Have change available for meters (still in operation at that time) or use the public parking garage near the restaurant.

Star Dust is published ten times yearly, September through June, by the National Capital Astronomers, Inc. (NCA).
Editor: Elliott Fein, Co-editor: Adele Fein, Editorial Advisor: Nancy Byrd.

National Capital Astronomers, Inc.

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. Contact: Sue Bassett wb3enm@amsat.org

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".

Yes! I'd like to join the NATIONAL CAPITAL ASTRONOMERS **Date:**

Name(s): _____

Address: _____

_____

Telephone: _____ E-mail: _____

Other family members who should receive a membership card: _____

Dues:

___ $57 With *Star Dust* and a discount subscription to *Sky & Telescope*.
___ $27 With *Star Dust* ONLY.
___ $45 Junior membership with *Star Dust* and a discount subscription to *Sky & Telescope*.
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