Star Dust

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

Volume 64, Number 10 June 2006 ISSN 0898-7548

The NCA June Meeting
Dr. Harold Williams

[from the NCA Web Site]

Next Meeting Date is Saturday, June 10, 2006 7:30 p.m. at the University of Maryland Observatory on Metzerott Road. Speakers will be Dr. Wayne Warren* and Dr. David Dunham* about recent eclipse work. We will also have the science fair winners present their projects. We will also have an informal time for some of our members to ask questions of a panel of our more experienced observers. So bring your questions as well as your answers. If you would like to understand how to do anything in astronomy, both as an amateur or as a professional, this is the meeting to come to. We have a very diverse pool of incredibly talented people. We will have pizza at the Observatory by Papa John's of College Park, since they seem to be able to find the observatory despite it having no street address and a somewhat hidden entrance. We will also have an election of officers and will discuss changing our dues structure so that we will be cheaper for students and people who get *Star Dust* only electronically. We will also point out that many recent articles in *Star Dust* have hyperlinks so this feature of the newsletter can only be used conveniently by getting the electronic version. Paper just doesn't work as well for this type of content rich article. We will only vote on officers and make the formal decision on dues later, since we do not want to bankrupt NCA, unless there is a large attendance and a ground swell of agreement. We do not want to lose any members or pull a fast one on anyone without careful thought on these things. A little deliberation among friends is a good thing.

Followed by an Observing Session around 9 p.m., if clear at the observatory.

---

*See bio on Page 2.

Elections at June 10 Meeting

The candidates for NCA offices for 2006-2007 are as follows. The names given in parentheses are those persons who have consented to be backups for each officer should he/she be unable to carry out the responsibilities of the position or temporarily need assistance:

President: Dr. Harold Alden Williams
(Dr. Walter L. Faust)
Vice-President: Dr. Walter L. Faust
(Dr. John D. Gaffey Jr.)
Secretary: Dr. Nancy Grace Roman
(Michael Brabanski)
Treasurer: Michael Brabanski
(Jeffrey B. Norman)
Trustee: Jeffrey B. Norman

Additional nominations may be made prior to or at the Annual NCA election meeting on June 10.

Submitted by the Nominating Committee Chairman, Dr. Wayne H. Warren Jr.

Review of talk by Dr. Alan N. Bunner: "Reflections on the Anthropic Principle"
Reviewed by Dr. Harold Williams

Dr. Alan N. Bunner, former Science Program Director, Structure, and Evolution of the Universe, Office of Space Science, NASA Headquarters, retired 2001, presented the talk "Reflections on the Anthropic Principle" at the April 8, 2006 meeting of the National Capital Astronomers at the University of Maryland Astronomy Observatory. He came with his wife Lia Lapiana who is program executive for the Navigator Terrestrial (Habitable) Planet-hunting Program at NASA Headquarters. We hope for a large NASA budget increase when her program is successful; and NASA will then have a destination for mankind.

Our speaker's first slide titled his talk "The Anthropic Principle or The Universe and Other Things." We all accept the Copernican revolution and the resulting Cosmological Principle which says there is nothing special about the place of the Earth in the universe, but lately maybe our existence should be taken into account as we attempt to understand the universe, without assuming that there is anything special about our place or existence. The anthropic principle's definition is, "the fact that man exists implies that the Universe evolved so as to make man possible." This is the weak anthropic principle, see http://en.wikipedia.org/wiki/Anthropic_ Principle. This is not the traditional way that physics is done. It seems like a tautology when people like John Wheeler started to talk about it around 1967, and some even suggested that maybe the great man was losing it. *The Accidental Universe* by Paul Davies published 1982 and *The Anthropic Cosmological Principle* by John D. Barrow & Frank J. Tipler published 1988 were early books on this sub-

(Continued on page 3)

NCA Events This Month

The Public is Welcome!

NCA Home Page: http://capitalastronomers.org

NCA Mirror- and Telescope-making Classes: Fridays, June 2, 9, 16, 23, 30; July 7, 14, 21, 28; August 4, 11, 18, 25 6:30 to 9:30 P.M. 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.

Open house talks and observing at the University of Maryland Observatory in College Park on the 5th and 20th of every month at 9 P.M. The talks are non-technical. There is telescope viewing afterward if the sky is clear.

Upcoming NCA Meetings—Saturdays June 10, September 9, October 14, November 11, December 9.

See Page 7 for other events this month.

Observing with the NCA C-14

Mike McNeal

Schedule is open, generally, Saturdays at 7:30 P.M. Call to set up a time.

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 301-526-2648 or email him at mcnealmi@verizon.net.

We need a new volunteer to house NCA's C-14, make it available for weekly viewing, and transport it to other sites, e.g., Exploring the Sky and star parties.

June Speakers' Bios

David W. Dunham earned B.A. and Ph.D. degrees in Astronomy at UC, Berkeley and Yale, respectively. He has led worldwide efforts to observe both lunar grazing and asteroid occultations to learn more about the lunar orbit and topography (which contributes to the accurate reduction of eclipse data), star positions, and asteroid shapes and physical characteristics. Toward this goal, he founded the International Occultation Timing Association (IOTA) in 1975 and has been its President since that time. He has also contributed significantly in the area of astrodynamics through his work at NASA's Goddard Space Flight Center (via Computer Sciences Corporation) on the ISEE-3/ICE geotail/comet mission and at The Johns Hopkins University Applied Physics Laboratory on the NEAR (Near Earth Asteroid Rendezvous), CONTOUR (COmet Nucleus TOUR), and STEREO (Solar-TErrestrial RElations Observatory) missions.

Wayne H. Warren Jr. earned his B.A. in Physics from Fairleigh Dickinson U., and M.A. and Ph.D. degrees in Astronomy from Indiana U. He started and directed the Astronomical Data Center as a contractor employee at the National Space Science Data Center (NASA's GSFC) for 15 years. He remained at Goddard as a contractor in the Laboratory for Astronomy and Solar Physics and the Flight Dynamics Division, where he worked on star catalogs for spacecraft guidance and control. Since 2002, he has been teaching physics at Towson U. and astronomy at the University of Maryland University College. His primary interests include star catalogs, machine-readable astronomical data in general, data centers, occultations of stars by the Moon and other solar system bodies, and photoelectric stellar photometry.

In the News

Reported by Dr. Nancy Grace Roman

Ringside Seat to the Universe's First Split Second

By Christopher Wanjek
GoddardView Volume 2 Issue 6

Scientists peering back to the oldest light in the universe have evidence to support the concept of inflation, which poses that the universe expanded many trillion times its size faster than a snap of the fingers at the outset of the big bang when the universe was less than a trillionth of a trillionth of a second old. In that crucial split second, changes occurred that allowed for the creation of stars and galaxies hundreds of millions of years later.

The new finding, made with NASA's Wilkinson Microwave Anisotropy Probe (WMAP) is based on three years of continuous observations of the cosmic microwave background, the afterglow light from the first moments of the universe.

Inflation poses that the universe expanded far faster than the speed of light and grew from a subatomic size to a golf-ball size almost instantaneously. This concept, however, was a mere product of calculations done with pencil and paper around 1980. The idea stands on much firmer ground today. "We can support it with real observations," said WMAP team member Dr. Gary Hinshaw of NASA Goddard Space Flight Center in Greenbelt, Md., a lead author on one of the scientific papers submitted for publication.

The cosmic microwave background is a fossilized record of what occurred way back when. Embedded in this light are subtle patterns that point to very specific conditions about the early universe. Previous observations have focused on the temperature patterns of this light, which have provided an accurate age of the universe and insights into its geometry and composition. The temperature differences, varying by about a millionth of a degree, point to density differences—a little more matter here, a little less matter there. Over the course of millions of years, gravity exploited the density differences to create the structure of the universe—stars and galaxies separated by vast voids.

The new WMAP observations give a more detailed temperature map, and also the first full-sky map of the polarization of the microwave background. This major breakthrough enables scientists to obtain much deeper insight into what happened within the first trillionth of a second when cosmic inflation perhaps occurred. The polariza-

(Continued on page 5)

"Reflections on the Anthropic Principle"

(Continued from page 1)

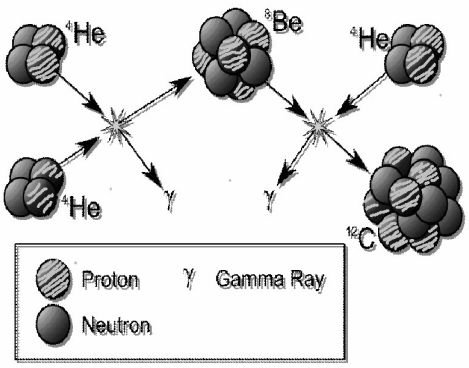
ject. The later book though asserts a "Final Anthropic Principle" (FAP) that "intelligent information-processing must come into existence in the Universe, and once it comes into existence, it will never die out." The reviewer considers this position possibly nuts, or more charitably, at least it is wishful thinking. Our speaker though, other than showing the cover of this book, did not push the FAP or discuss it, thanks heavens (whose heaven am I thanking?): *The Secret Melody: and Man Created the Universe* by Trinh Xuan Thuan published in 2005. Now there are textbooks on this topic.

Some questions relevant to the Man-Universe Relationship are 1) Are we alone? Is intelligent life common or rare? 2) Does our existence tell us anything about the Universe? While some of these questions are old, the tools that we are turning to them are new; like the SETI search using radio telescopes, like SETI@home using the Arecibo radio telescope and your computer at home to analyze the data. The multispectral and multidisciplinary approach is exemplified by http://www.seti.org. The famous Drake equation parameterizes this first question so we can think about it clearly. Unfortunately, we can not turn the Drake equation around to say anything about the universe because we have no second example of intelligent life at the moment and the denominator of something like this has an N-1; so when N=1 we can say nothing, since then the denominator, N-1=0, is zero. Remember the standard deviation s is defined as

$$s = \sqrt{\frac{1}{N-1}\sum_{i=1}^{N}(x_i - \overline{x})^2}$$

given a sample x_i of a large population, but only N samples.

One thing we can consider is "How accidental is our Universe?" This is the yellow brick road from the Big Bang until the current moment with you and me at the NCA meeting. To see the latest values of the thirty or so dimensionless constants, see Max Tegmark et. al on Physical Review D, 73, page 23,505. One of the criticisms of the anthropic principle is that none of this is testable. Brandon Carter first coined the anthropic principle in 1974 IAU, International Astronomical Union, publication. (Wikipedia article on Brandon Carter is at http://en.wikipedia.org/wiki/Brandon_Carter, and his home page is at http://luth2.obspm.fr/~luthier/carter/). Some of these accidents are: First, the universe had 3 dimensions in space that we can move around in. Second, Dirac's large number hypothesis (in the Wilkipedia this is http://en.wikipedia.org/wiki/Dirac_large_numbers_hypothesis). Third, the ratio of the mass of the proton to the mass of the electron =1836. Fourth, $1/\alpha \approx 137$ where α is the dimensionless electromagnetic fine structure constant. Fifth, Carbon 12, ^{12}C, resonance level =7.65MeV, so Beryllium 8, Be-8, ^{8}Be +He-4, ^{4}He, at 7.37 MeV. Sixth, Oxygen 16, ^{16}O =7.12 MeV so $^{12}C + {}^{4}He = 7.16$MeV. These last two facts tie into the lifetime of ^{8}Be nucleus and the occurrence of ^{12}C which is useful for us Carbon life forms. This Triple-alpha process is explained in the Wikipedia article at http://en.wikipedia.org/wiki/Triple_alpha_process. This spooky use of the anthropic principle by Fred Hoyle occurred in the spring of 1953 at Cal Tech where Willy Fowler made the measurements with Fred Hoyle telling him where the resonances had to exist or we could not be. Fowler said no resonances were then known to exist at those energies, but he would check, and he did, and they were of course exactly where Fred Hoyle said they had to be so we could be made from Carbon. This is the first instance where the anthropic principle, though not yet named that, when applied, yielded some useful science, that has come to light so far.



There are no stable planet orbits, or energy levels of electrons around nuclei in quantum mechanics, or propagation of radiation in anything other than 3 space dimensions. Long chain molecules seem to need a mass of proton to electron of around 2,000 and that is what is observed. Mass we do not understand in the current standard model of particle physics and the mass ratios seem to be fine tuned for our existence. For protons to last longer than stars, the fine structure constant α must be $85 < 1/\alpha$; and for unification of the electro-weak forces to occur at high energy $1/\alpha < 185$.

Cosmic coincidences continued: Seventh is the strength of the strong nuclear force. Eighth is the strange significance of water. Ninth is the stability of the Earth's climate. Tenth is the stability of the Earth's atmosphere. Eleventh is the development of the DNA based genetic code. Twelfth is the invention of photosynthesis. Thirteenth is the origin of mitochondria. Fourteenth is the evolution of the human brain. Fifteenth is the escape from extinction. Emergence of Homo Sapiens necking down to as little as seven individuals based upon mitochondrial DNA analysis.

What if the moon didn't exist? Maybe we wouldn't exist if Jupiter wasn't in our solar system to sweep up comets. Multiverse science in the Wikipedia. Many World interpretations of quantum mechanics in the Wikipedia at URL http://en.wikipedia.org/wiki/Many-worlds_interpretation.

Dr. Bunner's speculative anthropic hypothesis: "Civilization, the existence of an intelligent species, maybe even life itself, could be a unique phenomenon in the universe, the result of a series of highly improbable accidents and lucky events." Or as Snoopy the dog on the roof of his doghouse looking at the starry sky says one night, "I am always impressed by the constancy of the stars." "It gives me a feeling of security to look up and know that the stars I see will always be there and will…" Then one of them moves rapidly through the sky and Snoopy has a sick look on his face.

This talk produced lots of comments and questions and seemed to be enjoyed by everyone present. With the expansion of the universe in space and time there seems to be an open system with a channel for dumping entropy so order and complexity can be created out of disorder and simplicity.

For future exploration one might explore Martin Reese's book *Just Six Numbers: The Deep Forces That Shape the Universe* published in 1999.

Star Parties
Dr. Harold Williams

The first, "Almost Heaven Star Party," AHSP, August 24 through August 28, 2006 at "The Mountain Institute," TMI, in Spruce Knob, West Virginia for several nights under the darkest skies east of the Mississippi. No on-site reservation, you must register in advance.

Registration fee gives you access to camping with hot showers, indoor rest rooms, (limited) Internet access (actually I could receive wi-fi all the way in the area I camped and observed from), entertaining daytime programs and presentations, solar observing, and for an additional fee someone else will cook three meals a day for you.

Last year the NCA web master, Harold Williams, went and was a daytime presenter as well as a night time observer. This year I am going without any responsibilities except to have a good time. This was wonderful; I will be going back again next year when they hold it at the Mountain Institute in Spruce Knob, West Virginia. I collected fossils, the mountains are beautiful, too, and next year I will go in the "Sinks of Gandy" in the daytime.

Last year, "Greenbank Star Quest II" was July 6 through July 10, 2005. I went, it was fun, but Greenbank is not quite as dark as "TMI. Greenbank Star Quest III," June 21 through June 24, 2006. SARA, Society of Amateur Radio Astronomy, meeting at NRAO, Greenbank, West Virginia is June 18 through June 21, 2006, right before the "Greenbank Star Quest III," which is optical.

You could easily go to both. Jeff Gerber took real data of the galaxy with a radio telescope that is now used in education, near the 21 centimeter line last year. I could tell he was quite excited about it. It excited me, too. It is real neat to do, maybe you would like to go and do it at either SARA or "Star Quest III."

While they are run by different groups with somewhat different wavelength interests, they do have an overlap and some of the organizers are involved in both and come all the way from Atlanta, Georgia to participate and help with these two star parties.

For the best list of regional star parties the "NOVAC Star Party" site is generally the best, although they do not mention SARA at NRAO at the moment. Maybe they are visible light chauvinists, and the Blackwater, West Virginia Star Party site has not been updated yet, but I think it is going to be September 22 through September 24, 2006.

New Dues Proposal for NCA
Jeffrey Norman

In light of the fact that we are now running a surplus, I would like to propose the following new dues rates: Standard for those receiving paper copies of Star Dust - $20; Student - $15. Standard for those receiving electronic copies of Star Dust - $10, Student - $ 5. Sky & Telescope subscriptions:- add $33.

Explanation: Almost 60% of our expenses involve the printing and mailing of *Star Dust*. If our members would agree to receive *Star Dust* electronically, we could reduce the *Star Dust* expenses to almost nothing. The remaining $10 should be able to cover our other expenses: the Astronomical League dues ($700), speakers' dinners ($400), Secretary's expenses ($400) and miscellaneous ($200).

Anyone who still wanted a paper copy of *Star Dust* could print it on their own printers. Electronic newsletters are becoming more common nowadays (I subscribe to three of them myself.) Given the cost savings and the fact that all of our members have access to email, I don't think it is unreasonable to ask our members to switch. I think that most of our members read each issue of *Star Dust* only once and then throw it away. Why not help the environment by saving a few trees (from which paper is made) and by reducing the amount of trash that has to be disposed of at great cost to local governments; and switch to electronic format. One of the officers of the other major astronomy club in this region, the Northern Virginia Astronomy Club (NOVAC), told me that his club is trying to switch all of its members to an electronic format-only newsletter; and most of them have now switched.

I am making this proposal to decrease the dues because I think that our dues should cover our costs and no more, not because the dues are too high or hurting membership. There is no evidence that our current dues have anything to do with our falling membership. Our dues of $27 have not changed since 1997, which means that, if inflation were taken into account, they have actually decreased over 40% in real terms since 1997. Furthermore, the dues now charged by NOVAC are $30; and NOVAC seems to have no problem maintaining 1000 members (8 times as many as NCA) even though its dues are higher than NCA's. Both clubs cover the same metropolitan area. Currently NOVAC, despite its name, has as many members in Maryland and DC as it does in Northern Virginia. So the comparison is completely relevant.

Some members have raised the issue of how we plan to use our $12,000 in reserves. The late Bob McCracken gave us some money, which now amounts to about $5000 with interest, as seed money to fund upfront costs for future NCA trips such as the Comet Halley trips in 1986 and the more recent eclipse trips to Curacao and Turkey. All of those trips were very successful; they were both educational and enjoyable. We should certainly save at least that $5000 for future astronomy-related trips, which as a side benefit may attract more members to NCA. I think that the rest of the money should be reserved for equally worthwhile special projects rather than just drawing it down to pay routine expenses. What is our long term plan? - to use up all of our reserves to fund the status quo for several years and then go out of business. If you want NCA to be revived and do better in the future, then you should not support any proposals that simply use up our money to fund the same things that have resulted in a continually declining membership for several years.

Please note that this article expresses my opinions as one member of NCA. I hope that it will be used to start our discussion on NCA dues.

Jeff Norman

In the News

(Continued from page 2)

tion signal is at least 100 times fainter than the temperature signal.

WMAP also finds that the first stars—the forebears of all subsequent generations of stars and of life itself—were fully formed remarkably early, only about 400 million years after inflation. This is called the era of reionization, the point when the light from the first stars ionized hydrogen atoms, liberating electrons from the protons.

Polarization is affected by the environment through which the light passes, such as the polarized glare of sunlight produced when it reflects off of a shiny object. Scientists are hunting for two kinds of polarization signals in the microwave background. One, called the E-mode, points to the era of reionization. This is the polarization caused by the microwave background scattering off of the ionized hydrogen. The other is called B-mode, which points directly to inflation.

WMAP detected E-mode polarization but not B-mode yet. B-mode detection could provide smoking-gun evidence for inflation. But with the temperature map plus the E-mode polarization map, the WMAP team can say several things about inflation. For example, scientists now have an upper limit on the energy of inflation. Also, WMAP data support basic predictions of inflation about the size and strength of spacetime fluctuations and how they get weaker on smaller length scales.

"It blows my mind that we can now distinguish between different versions of what happened within the first trillionth of a second of the universe," said Dr. Charles Bennett of the Johns Hopkins University in Baltimore, WMAP principal investigator. And it's only going to get better as WMAP continues to soak up light. The polarization detection will grow stronger. "The longer WMAP observes, the more it reveals about how our universe grew from microscopic quantum fluctuations to the vast expanses of stars and galaxies we see today," Bennett said.

CASSINI FINDS ENCELADUS TIGER STRIPES ARE REALLY CUBS

NASA, August 2005

The Cassini spacecraft discovered that long, cracked features dubbed "tiger stripes" on Saturn's icy moon Enceladus are very young. They are between 10 and 1,000 years old. The south pole had episodes of geologic activity as recently as 10 years ago. These cracked features are approximately 80 miles long, spaced about 25 miles apart and run roughly parallel to each another. The cracks act like vents. They spew vapor and fine ice water particles that have become ice crystals. This crystallization process can help scientists pin down the age of the features.

"There appears to be a continual supply of fresh, crystalline ice at the tiger stripes, which could have been very recently resurfaced," said Dr. Bonnie Buratti, a team member of the Cassini visual and infrared mapping spectrometer at NASA's Jet Propulsion Laboratory (JPL), Pasadena, Calif. This finding is especially exciting because ground-based observers have seen tiny Enceladus brighten as its south pole was visible from Earth. Cassini allows scientists to see that the brightening is caused by geologic activity. Cassini's visual and infrared mapping spectrometer shows water ice exists in two forms on Enceladus. The ice exists in pristine, crystalline ice and radiation-damaged amorphous ice.

When ice comes out of the "hot" cracks, or "tiger stripes," at the south pole, it forms as fresh, crystalline ice. As the ice near the poles remains cold and undisturbed, it ages and converts to amorphous ice. Since this process is believed to take place over decades or less, the tiger stripes must be very young.

"One of the most fascinating aspects of Enceladus is that it is so very small as icy moons go, but so very geophysically active. It's hard for a body as small as Enceladus to hold onto the heat necessary to drive such large-scale geophysical phenomena, but it has done just that," said Dr. Bob Brown, a team leader for the visual and infrared mapping spectrometer at the University of Arizona, Tucson.

Cassini's cameras provided detailed images of the south polar cap, in which the tiger stripe fractures were found to be among the hottest features. The timing of the craft's ion and neutral mass spectrometer and the cosmic dust analyzer observations seems to indicate the vapor and fine material are originating from the "hot" polar cap region. These data also indicate the production of water vapor and ejection of fine material are connected, as they are in a comet. This suggests that vapor and dust-sized icy material are coming from the tiger stripes.

Shining Light on Dark Matter

Credit: JPL/NASA via /Science/NOW Daily News

(Continued on page 7)

Exploring the Sky
by Joe Morris

2006 Schedule

Date	Time	Things of interest
6/17	9:00 P.M.	The Big Dipper and the Summer Triangle
7/22	9:00 P.M.	Mars disappearing but Jupiter still good
8/26	8:30 P.M.	Pegasus and Andromeda rising; Hercules
9/30	8:00 P.M.	Rock Creek Park day
10/21	7:30 P.M.	Orionid meteor shower peak
11/4	7:00 P.M.	Moon (in Aries) near full; Pleiades

Exploring the Sky is an informal program that for nearly fifty 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 immediately 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: http://www.nps.gov/rocr/planetarium or http://www.capitalastronomers.org

A presentation of the National Park Service and National Capital Astronomers.

Mid-Atlantic Occultations and Expeditions

by Dr. David Dunham

Asteroidal Occultations

Date	Day	EDT	Star	Mag	Asteroid	dmag	dur. s	Ap. in.	Location
Jun 29	Thu	1:10	TYC58080098	11.4	2000 OJ67	10.8	17	7	TNO; Americas
Jul 24	Mon	21:25	TYC02670292	9.7	Huenna	5.9	3	4	e. Virginia
Jul 25	Tue	22:54	SAO 163453	8.4	Carmen	4.8	5	2	n&wNY,nOhio
Aug 21	Mon	4:42	TYC13101942	10.1	Vibilia	2.7	5	4	nOhio,w&nNY
Sep 5	Thu	3:11	TYC57940845	10.4	Prudentia	2.4	7	5	cNC,eVA,DE
Sep 9	Sat	3:32	TYC22541227	10.9	Phocaea	0.5	9	6	NJ,MD,DC,VA,NC

Grazing Occultations

DATE	Day	EDT	Star	Mag	% alt	CA	Location
Jul 20	Thu	3:47	Alcyone	2.9	23- 20	15N	near Lafayette, IN
Jul 20	Thu	4:42	ZC 562	6.6	23- 34	16N	Easton,MD;Richmond,VA;Sun-13
Jul 20	Thu	5:16	SAO 76259	7.5	23- 40	16N	Waldorf&Annapolis,MD;Sun-8
Aug 19	Sat	4:33	ZC 996	6.8	18- 24	13N	Hazelton,WV; s.Somerset, PA
Aug 20	Sun	5:34	SAO 79422	8.9	11- 26	13N	Damascus & Carrs Mill,MD
Sep 13	Wed	3:56	SAO 76514	7.2	63- 62	11N	Bethesda & Columbia, MD

Total Lunar Occultations

DATE	Day	EDT	Ph	Star	Mag	%	alt	CA	Sp.	Notes
Jun 10	Sat	22:48	D	ZC 2397	6.5	99+	19	53S	K1	terminator distance 8"
Jun 14	Wed	3:21	R	omega Sgr	4.7	92-	25	77S	G3	ZC 2910
Jun 14	Wed	4:57	R	60 Sgr	4.8	91-	22	41S	G8	ZC2914;spec.bin.;Sun-8
Jun 17	Sat	4:34	R	70 Aquarii	6.2	64-	35	45S	A9	ZC 3347; Sun alt. -11
Jun 22	Thu	5:36	R	ZC 459	6.4	12-	28	15S	K2	Sun -2; close double?
Jul 1	Sat	23:16	D	ZC 1676	6.5	35+	10	86S	K5	Azimuth 265 deg.
Jul 3	Mon	23:10	D	ZC 1859	6.9	54+	18	44S	B9	
Jul 15	Sat	1:55	R	ZC 3432	6.2	78-	29	76N	K0	Close double?
Jul 16	Sun	4:59	R	ZC 35	6.2	66-	51	7S	K0	Sun alt. -10 deg.
Jul 16	Sun	5:05	R	ZC 32	7.0	66-	52	85S	M5	Sun alt. -9 deg.
Jul 17	Mon	2:05	R	epsilonPsc	4.3	56-	23	56N	K0	ZC 146; close double
Jul 17	Mon	4:18	R	ZC 162	6.9	55-	47	84S	F0	
Jul 19	Wed	2:04	R	ZC 411	7.0	34-	11	69N	G0	
Jul 20	Thu	2:50	D	Merope	4.1	23-	13	-41N	B6	ZC 545; Az. 69 deg.
Jul 20	Thu	3:26	D	Alcyone	2.9	23-	19	-28N	B7	ZC 552 = eta Tauri
Jul 20	Thu	3:34	R	Merope	4.1	23-	21	66N	B6	23 Tauri = ZC 545
Jul 20	Thu	3:48	R	SAO 76189	7.0	23-	23	47S	F8	
Jul 20	Thu	3:52	D	Atlas	3.6	23-	24	-77N	B8	ZC560; spect. binary
Jul 20	Thu	3:56	R	ZC 550	7.0	23-	25	62S	A1	
Jul 20	Thu	3:58	R	24 Tauri	6.3	23-	25	47N	A0	
Jul 20	Thu	4:04	R	Alcyone	2.9	23-	26	55N	B7	ZC 552;close double?
Jul 20	Thu	4:30	R	ZC 559	6.5	23-	31	36S	F0	very close double
Jul 20	Thu	4:52	R	Atlas	3.6	23-	35	73S	B8	spec.bin.;ZC560;Sun-12
Jul 20	Thu	4:56	R	Pleione	5.1	23-	36	89S	B7	spec.bin.;ZC561;Sun-11
Aug 3	Thu	20:58	D	1 Scorpii	4.6	67+	24	84N	B1	ZC2263;Sun-8;spec.bin.
Aug 7	Mon	21:19	D	60 Sgr	4.8	97+	27	58S	G8	ZC 2914
Aug 11	Fri	4:38	R	83 Aquarii	5.5	95-	38	40S	F2	ZC3388;WA221;closeDbl.
Aug 14	Mon	0:35	R	pi Piscium	5.5	70-	23	87S	F0	ZC 240
Aug 14	Mon	0:43	R	ZC 241	6.8	70-	25	59S	G5	
Aug 15	Tue	0:21	R	27 Arietis	6.2	59-	14	39S	G5	ZC 371; Azimuth 78 deg.
Aug 16	Wed	1:34	R	66 Arietis	6.2	48-	21	86S	K0	ZC 501;mg2 10 .8",PA 65
Aug 19	Sat	4:45	R	ZC 996	6.9	18-	28	38N	A2	Close double
Sep 2	Sat	22:09	D	ZC 2677	6.9	72+	19	81N	F5	
Sep 2	Sat	23:47	D	ZC 2688	7.0	72+	11	82S	G6	
Sep 8	Fri	21:41	R	ZC 35	6.2	97-	18	43S	K0	WA 222 deg.

David Dunham, e-mail dunham@starpower.net, more info. http://iota.jhuapl.edu

In the News

(Continued from page 5)

Astronomers have known for decades that the visible stars in a galaxy don't have enough gravity to hold it together. Large amounts of dark matter must make up the balance. But scientists have been stumped in their efforts to locate or describe it. The most popular theory suggests that dark matter consists of massive exotic particles that do not interact with normal matter except through gravity. It also holds that the particles are slow and cool. While this model fits most galaxies, it also predicts many more small galaxies than are known.

For the past 3 years, a team led by Gerry Gilmore of the Institute of Astronomy has been using giant telescopes to map the positions and velocities of thousands of stars in 10 minigalaxies around the Milky Way. On February 3, he appeared with others at a press conference in London where he announced that his team had found the same volume of dark matter in each galaxy. The dark matter was about 1000 light-years across and had an even density equivalent to four hydrogen atoms per cubic centimeter.

The new results suggest that dark matter at the center of small galaxies is more spread out and warmer than was thought. The particles appear to have a velocity of 9 kilometers per second, and Gilmore believes that they interact with one another via some unknown force to spread out evenly. The nature of dark matter particles themselves remains one of the biggest mysteries of physics.

Scientists are reacting cautiously until they learn more about Gilmore's find, but the claim alone "will generate a lot of excitement," says cosmologist Robert Nichol of the University of Portsmouth, U.K. Mario Mateo of the University of Michigan, Ann Arbor, who also studies dwarf galaxies, was surprised by the density of dark matter Gilmore found. Still, he says, it's "pretty amazing" that although scientists can't see it or measure it, "we can start talking about constraining the nature of dark matter."

NASA'S CHANDRA FINDS BLACK HOLES STIRRING UP GALAXIES

From: NASA News

The Chandra data revealed an unsuspected turmoil in elliptical galaxies that belies their calm appearance in optical light. Astronomers believe massive clouds of hot gas in these galaxies have been stirred up by intermittent explosive activity from centrally located super-massive black holes.

"This is another example of how valuable it is to observe the universe at different wavelengths besides just the traditional optical wavelengths," said NASA's Chandra Program Scientist Wilt Sanders. "Without these X-ray and radio observations, we wouldn't know these apparently static galaxies in reality are still evolving due to the interaction with their central black holes." Contrary to expectations, the distribution of the multimillion-degree gas in these galaxies differed markedly from

(Continued on page 8)

Other National Capital Area Meetings

Northern Virginia Astronomy Club

Sunday, June 11 7:00 p.m.

Dr. Sten Odenwald <http://www.astronomycafe.net/vita.html>, author of the Astronomy Cafe <http://www.astronomycafe.net/> will be speaking about the potential of a future Solar Super Storm <http://www.msnbc.msn.com/id/12595708/>.

General membership meetings are open to the public, and are held at Enterprise Hall, room 80, on the campus of George Mason University in Fairfax, Virginia. The meeting hall is in the basement floor of the building. It is best to park in parking lot B and walk up the hill to the rear of Enterprise Hall (see note above). Meetings start at 7:00 P.M., on the second Sunday of every month. If you come earlier, you can do a little socializing. The first part of the meeting is club business, during which the officers make reports about their activities and areas of responsibility. The next part of the meeting usually includes:

* Show and Tell, where members share gadgets, books, techniques, etc.

* The Observing Report, describing the astronomical events for the next month.

* Q&A, where beginning astronomers are encouraged to ask questions to be answered by more experienced members.

* The Sky Tour, describing what's where in the sky for the next month.

The final part of the meeting is a program, usually by one of the members, but sometimes by "outside experts". We've had presenters from all aspects of Astronomy.

Please Join Us for Dinner!

Since February 1995, a number of NOVAC members have been congregating on the night of our regular meetings for dinner. Hopefully this assists in getting to know one another, at a more relaxed location than at the meeting itself. It's also nice to see who it is you're talking to for a change and be able to connect faces with names — unlike the usual observing situation. All are welcome to attend, whether NOVAC members or prospective members, guests or whoever — just be prepared to discuss a little astronomy or any other topic that pops up! If you'd like to join us, stop by the Red, Hot and Blue restaurant at 5:30 P M. See you there!

Source: http://novac.com/

Congratulations to Science Fair Award Winners!

We are pleased to announce that Julie E. Walker and James M. Bonnell are the winners (to date) of the NCA Astroscience Awards in the 2006 science fairs. The Prince Georges County Science Fair was held at Prince Georges Community College, Largo, Maryland. The NCA judges were Dr. Wayne H. Warren Jr. and Dr. Andrew W. Seacord II.

Julie E. Walker lives in Hollywood MD and attends Leonardtown Regional High School. Her project: *The Dust Devils Did It: Wind Erosion on Mars.*

James M. Bonnell lives in Greenbelt MD and attends Eleanor Roosevelt High School. His project: *Infrared Photometry of a GRB Afterglow.*

These award winners will be honored at the June NCA meeting. They will bring their projects to the meeting, where each will give a three to five-minute summary of his or her project. Each student will be presented with a certificate, a one-year membership in NCA, and a one-year subscription to Sky and Telescope.

Getting to the NCA 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.

Do You Need a Ride?

Please contact Jay Miller, 240-401-8693, if you need a ride from the metro to the meeting at the observatory. (Please try to let him know in advance by email at rigel1@starpower.net.)

In the News

(Continued from page 7)

that of the stars.

High angular resolution imaging observations by Chandra indicate violent activity still occurs in elliptical galaxies. "The distribution of hot gas has no correlation with the optical shape," Diehl said. "Something is definitely making a mess there, and pumping energy equivalent to a supernova every century into the gas."

Although supernovae are a possible energy source, a more probable cause was identified. The scientists detected a correlation between the shape of the hot gas clouds and the power produced at radio wavelengths by high-energy electrons. This power output can be traced back to the centers of the galaxies, where supermassive black holes are located. Repetitive explosive activity fueled by the in-fall of gas into central black holes is known to occur in giant elliptical galaxies located in galaxy clusters, as well as in isolated elliptical galaxies.

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.

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 hardcopy via U.S. Mail, should contact Nancy Grace Roman, the NCA Secretary, at nancy.roman6 @verizon.net or 301-656-6092 (home).

The deadline for the September Star Dust is August 23. Please send your material to Elliott Fein by that date to ensure inclusion. Send submissions to Elliott Fein at elliott.fein@verizon.net.

Articles submitted may be edited to fit the space available.

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. Consultant: Jeffrey Norman

National Capital Astronomers, Inc.

http://capitalastronomers.org

Dr. Harold Williams, NCA President, Harold.Williams@montgomerycollege.edu, 301-650-1463 (planetarium), 301-565-3709 (home).
Dr. Walter L. Faust, NCA Vice-president, wlfaust1370@direcway.com, 301-217-0771.
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, Gary Joaquin, Benson Simon, Dr. Wayne H. Warren,
NCA Webmaster, Dr. Harold Williams, Harold.Williams@montgomerycollege.edu, 301-650-1463 (planetarium), 301-565-3709 (home).
Elliott Fein, NCA *Star Dust* Editor, elliott.fein@verizon.net, 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. NCA is an IRS Section 501(c)(3) tax-deductible organization. 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.

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).

Classes: Some NCA members are available for educational programs for schools and other organizations. The instruction settings include star parties, classroom instruction, and school-teacher 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."

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

Name: _____ Date: ____/____/_____
Street address: _____
City/State/ZIP: _____
Telephone: ____-____-_____ E-mail: _____
Other family members who should receive a membership card: _____
Would you prefer to get *Star Dust* by e-mail? ____

MEMBERSHIP CATEGORIES AND ANNUAL DUES RATES

All members receive Star Dust*, the monthly newsletter announcing NCA activities. As an added optional benefit to extend your knowledge of astronomy you may also choose* Sky and Telescope *magazine at the discounted rate of $33.*

Student Membership: ……..… $15 ……..with *Sky and Telescope*....$48
Standard Individual or Family Membership: ……..… $27 ……...…..with *Sky and Telescope*....$60

You are welcome to make contributions in any amount in addition to the dues shown above.
Contribution amount:_____

Please mail this form with your check payable to National Capital Astronomers, to:
Mr. Jeffrey Norman, NCA Treasurer; 5410 Connecticut Avenue, NW #717; Washington, D.C. 20015

National Capital Astronomers, Inc.
If undeliverable, return to
NCA c/o Nancy Roman
4620 N. Park Ave., #306W
Chevy Chase, MD 20815-4551

FIRST CLASS
DATED MATERIAL

NCA Will Meet on June 10 !

Inside this issue: