September Talk: Dr. David DeVorkin, “Building the Universe (Gallery)”
Submitted by Gary Joaquin

My talk will be a behind-the-scenes tour of how we built the Explore the Universe gallery at the National Air and Space Museum, which opened in September 2001 for an indefinite run. Learn how we brought into one room many of the most significant telescopes in all of human history, from an original Huygens aerial telescope lens and William Herschel’s original 20-foot telescope tube and mirror, to the actual Newtonian Mirror Cage from the

(Continued on page 6)

“Gamma-Ray Bursts, Galaxies, and Supernovae”
A Talk by Dr. Jerry T. Bonnell
Reviewed by Dr. Wayne H. Warren Jr.

An NCA First
Gamma-ray (hereinafter γ-ray) bursts (GRBs) are exciting, and nerve-wracking as well — so NCA members and guests learned during a lecture by Dr. Jerry Bonnell of USRA at Goddard’s Laboratory for High-Energy Astrophysics. Dr. Bonnell’s talk, given at the Bethesda-Chevy Chase Regional Services Center of Montgomery County on May 4, 2002, was an NCA first in the sense that it was given at the same meeting as his son, James M. Bonnell, was awarded an NCA science fair certificate for his Prince George’s County Regional Science Fair project (see the May 2002 issue of Star Dust).

What are γ-ray Bursts?
γ-ray bursts are the most energetic events in the Universe. They are observed over (now generally accepted) cosmological distances and are not yet explained; i.e., we do not know as yet what physical phenomena (there may be several) cause these tremendous releases of high-frequency electromagnetic radiation.

About γ rays
Dr. Bonnell began by displaying a diagram of the electromagnetic spectrum from γ rays, which have a size scale comparable to the atomic nucleus, to radio waves, whose wavelengths are about human-body to buildings in size. Recalling that wavelength, \( \lambda \), is inversely related to frequency, \( \nu \), by the relation \( \nu = c/\lambda \), where \( c \) is the velocity of light, and that the energy is related to frequency by \( E = h \nu \), γ rays are, with the exception of cosmic rays, the highest energy radiation.

(Continued on page 3)

“Extrasolar Planets: First Reconnaissance”
A Talk by Dr. R. Paul Butler
Reviewed by Dr. Nancy Grace Roman

Dr. R. Paul Butler presented the featured talk at the June 15 meeting of National Capital Astronomers, “Extrasolar Planets: First Reconnaissance”.

Dr. Butler’s colleagues in the search for extrasolar planets are Geoff Marcy, Steve Vogt, Debra Fischer, and Chris McCarthy. Debra Fischer is doing all of the observing at Lick; Gregory Laughlin is responsible for the dynamics studies.

Late-breaking News
The introduction to this talk was a slide reminding the audience that 15 new planets had been announced during the week. As we learned later, two of these were in a system with three planets. As earlier announced, 55 Cnc also has three planets. Several systems have two. More information on these and other extraterrestrial planets can be found on the Web site: www.exoplanets.org. No extrasolar planets

(Continued on page 4)
ETX-60 for Sale

MEADE ETX-60 AT ASTRO-TELESCOPE

with Autostar Hand Controller

$450 or best offer
Phil Barringer 202-244-3492
or pbarringer@aol.com

NCA Telescope/ Mirror-making Workshop
Guy Brandenburg

The NCA telescope- and mirror-making workshop has a new location, the wood shop in the basement of the Chevy Chase Community Center at the northeast corner of the intersection of McKinley Street and Connecticut Avenue, NW. There is parking in the back of the building. We meet every Friday evening from 6:30 to 9:30 p.m. We have glass, abrasives, polishing agents, and measuring instruments such as Foucault and Ronchi testers, and even an aluminizing chamber. We have access to some woodworking equipment and a metal-working lathe, so that much of the rest of your telescope can be manufactured here as well. "Classes" are very informal, and you can start and finish your project at any time. If you are merely curious, you can also come to see what telescope-making is all about. If you have an already-completed homemade or commercial mirror that you would like tested, we can do that as well. Prices for materials available upon request, but a full kit for a 6-inch diameter mirror, with instruction, is currently about $70. During the month of September, we will meet on the 6th, 13th, 20th, and 27th. For more information, call Guy Brandenburg at 202-262-4274 or e-mail him at gfbranden@earthlink.net

"More National Capital Area Astronomical Doings"

will not appear this month because of the space required to print reviews of two monthly NCA meetings.

"More National Capital Area Astronomical Doings" will reappear in the October Star Dust.
Imaging γ rays

A comparison of whole-sky images of our galaxy in visible and γ-ray radiation is enlightening. A visible-light image, in this case a famous painting supervised by the Swedish astronomer Knut Lundmark, ca. 1950, shows a wide swath of stars, gas, and dust. The γ-ray image, compiled from data taken by the EGRET instrument aboard the Compton Gamma-Ray Observatory (CGRO), shows a very narrow band along the galactic plane — no stars are visible at all, only a glow from γ rays emitted by cosmic-ray interactions with galactic gas and dust. Away from the plane, we see only individual galactic sources identified as pulsars and other galaxies.

Mapping γ rays

A map of γ-ray burst events, as measured by the Burst and Transient Source Experiment (BATSE), also on CGRO, shows a random (isotropic) distribution of sources over the whole sky, an early indication of the cosmological distribution of the burst events.

History of γ rays Bursts

History credits the first γ-ray detection to the Cold War and the treaty banning nuclear weapons tests in the atmosphere. To monitor compliance with the treaty, the U.S. launched a series of so-called Vela satellites that could presumably detect γ rays given off by hydrogen bomb explosions. However, in 1967, a Vela 4 satellite pair detected an event that was eventually interpreted as cosmic in origin. The Vela satellites eventually recorded 73 events. No further events were observed until the Compton Gamma-Ray Observatory was launched in 1991 April, after which BATSE observed an average of one event per day. Thus, it was found that γ-ray bursts are not the rare phenomena that they were once thought to be, but rather common. Of course, this is because they are seen over distance scales comparable to the size of the known Universe.

Origin of the Bursts

Unfortunately, BATSE did not have the resolution to pinpoint the burst sources; it was not until other observations were made of burst afterglows, initially by an x-ray satellite, later by optical observations, that the bursts were found to originate in distant galaxies. Numerous optical transients observed with HST show conclusively that very distant galaxies are the sources of all γ-ray bursts observed to date.

Finding to Date

Dr. Bonnell showed a sample of BATSE time profiles of specific bursts. Amazingly, no two events are alike, leading to the expression quoted by Dr. Bonnell: “If you’ve seen one γ-ray burst, you’ve seen one γ-ray burst.” The one common factor for all bursts is that they are composed of pulses and, it turns out that the pulses range from narrow symmetric to broad trailing shapes only. It was also discovered that the pulses have measurable lags that can be correlated with the burst luminosities (as determined only for bursts identified with galaxies whose red shifts have been measured). The lag-luminosity relation shows that the shorter the lag, the lower the luminosity.

A Close One

One GRB was seen to fall way below the line in luminosity. This event was GRB 980425 and was determined to have occurred in a relatively nearby galaxy; it appears to have been associated with the supernova explosion SN1998vw. The host galaxy, rather than being billions of light years (ly) away, is only about 100 million ly distant and the GRB is underluminous by orders of magnitude.

There’s a Plot

A plot of GRBs using supergalactic coordinates (a system defined by the distribution of matter within about 100 Mpc of the Milky Way) shows a concentration of sources toward the plane, thus lending some evidence for a supernova origin.

GRB models include merging neutron stars and hypernovae, which are merely supernovae involving massive stars that implode to form black holes.

Dr. Bonnell then briefly discussed SN1987A, concentrating on the evolution of the central clump over the 15 years since the event. Although many detailed studies have been made of SN1987A and we do know that a strong burst of neutrinos was emitted during the initial stages of the core collapse, there is no way to determine if a γ-ray burst accompanied the explosion because the event occurred during a period when no GRB detectors were operating.

In the Future

Although the mechanisms that produce GRB events are still poorly understood, the future holds some promise for understanding these important phenomena through observations that will be provided by SWIFT. SWIFT is a Goddard-managed mid-sized explorer mission (MIDEX) specifically designed to detect and analyze GRBs for purposes of surveying the sky and analyzing data on individual bursts. The mission is tentatively scheduled for launch in 2003 September. Additional information may be obtained at the official SWIFT website (http://swift.gsfc.nasa.gov).

The NCA thanks Dr. Bonnell for presenting this highly exciting talk about highly excited objects. The reviewer thanks Dick Byrd for operating his camcorder to produce a useful record of the lecture that was used to prepare this review.

Review of “Gamma-Ray Bursts, Galaxies, and Supernovae” (Continued from page 1)

Meteor Showers

September Radiants

Full Moon: September 21

Major Activity – None

<table>
<thead>
<tr>
<th>Radiant</th>
<th>Duration</th>
<th>Maximum</th>
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</thead>
<tbody>
<tr>
<td>Gamma Aquarids</td>
<td>September 1-14</td>
<td>September 7/8</td>
</tr>
<tr>
<td>Alpha Triangulids</td>
<td>September 5-15</td>
<td>September 11/12</td>
</tr>
<tr>
<td>Alpha Aurigids (AUR)</td>
<td>August 25-September 6</td>
<td>September 1/2</td>
</tr>
<tr>
<td>Eta Draconids</td>
<td>August 28-September 23</td>
<td>September 12/13</td>
</tr>
<tr>
<td>Gamma Piscids</td>
<td>August 26-October 22</td>
<td>September 23/24</td>
</tr>
<tr>
<td>Southern Piscids (SPI)</td>
<td>August 12-October 7</td>
<td>September 11-20</td>
</tr>
</tbody>
</table>

Source: http://comets.amsmeteors.org/meteors
were known 10 years ago. We now know of at least 75 or 80.

Up Close
In our solar system, the only known life is on the Earth. Mars did have water and still may, but it has not been observed directly. Jupiter has about 300 times the mass of the Earth. Its large Galilean satellites are interesting because they may have water. Europa is the most enticing. The surface looks very much like cracked ice with water having risen through fissures and frozen. Subsurface water can be heated by the tides raised by Jupiter. Titan, the large satellite of Saturn, has an atmosphere with organics. It might have oceans of methane. Methane could serve the same role as a solvent for chemical reactions that water could. 

ellite of Saturn, has an atmosphere with organics. It might have oceans of methane. It uses a grating for the resolution and then sends the beam through prisms that separate the various orders from the grating. In the Lick program, they are currently observing 350 stars of all ages brighter than 7.5, of types F, G, and K. Only the youngest, chromospherically active, and rapidly rotating stars are omitted. Eventually, they plan to observe all 2000 stars in this range. They are observing 650 stars with the Keck telescope, which they first used in 1996. They began using the Anglo-Australian telescope in June 1998. The first observations with the Magellan telescope (in Chile) will be in late November this year.

Practice of Doppler Detection
The first attempt to detect extrasolar planets by Doppler was at the Dominion Astrophysical Observatory in Victoria. Campbell and Walker realized that a comparison source that traversed the spectrograph in the same way as the starlight was needed. They used an absorption tube with LiF gas with the 3.5-m Canadian, French, Hawaii telescope. LiF is very poisonous, has a weak absorption, and is useful only in the far red where the stars have little light. Butler spent a year experimenting with various chemicals (his undergraduate degree was in chemistry) and finally settled on iodine vapor. Iodine has very strong weakness, and is useful only in the far red where the stars have little light. Butler spent a year experimenting with various chemicals (his undergraduate degree was in chemistry) and finally settled on iodine vapor. Iodine has very strong weakness, and is useful only in the far red where the stars have little light.

An Example
16 Cyg is a double star with components separated by about 1000 AU. The B component is nearly identical to the Sun; A is slightly brighter. B shows a perturbation with a 2.2-year period. Far from being sinusoidal, the velocity drops from maximum positive to maximum negative in only 60 days! At first, it was thought that this was a result of the companion but we now know that the orbits of most planets are eccentric; only about 10% are circular. The minimum mass of the planet is 1.7 times that of Jupiter.

Mass Distribution of Planets
The mass distribution shows that there are few planets heavier than 8 times the mass of Jupiter although these should be easiest to detect. By contrast, there are many whose mass is less than that of Jupiter, although these are the hardest to detect. Thus, there must be many small planets even though we have not detected them. The shortest period is 2.98 days but there are many periods near 3 days. It is hard to explain this cut-off.

Upsilon Andromedae (υ And )
υ And is the first system found to have more than a single planet. The motions can be decomposed into a 4.6-day period for a 1-Jupiter mass planet, a 0.7-year period for a 2-Jupiter mass planet, and a 3.5-year period for a 4-Jupiter mass planet. The orbit for the 4.6-day object is nearly circular. (Close orbits are nearly always circular; more distant orbits are eccentric.)

A Planet around an M-type Star
The only planet found around an M-type star is around Gliese 876. (Most M-type stars are too faint to observe at the high dispersion needed.) The system has two planets: P = 61 day, M = 1.9 Jupiter, e = 0 and P = 30 day, M = 0.56 Jupiter, e = 0.27.

(Continued on page 5)
A Planet about a G8-type Star

55 Cnc is a G8 star with about 95% the mass of the Sun. A planet with a period of 14.6 days had been announced previously. A planet whose nearly circular orbit has a period of about 14 years with approximately the mass of Jupiter has now been announced. The system also contains a planet with a 44.3-day period, similar to that of Mercury, with about the mass of Saturn. The system may contain another planet. The middle and near planet periods are in 3:1 resonance. A planet in an orbit like the Earth’s would be stable; a close planet with a large eccentricity would not be. Most large planets have radii very close to Jupiter’s because the cores are degenerate.

Proto-planets about Star Disks

In the solar system, the planet orbits are nearly in the plane of the Sun’s rotation. Most planet rotation axes are perpendicular to this plane. This led early to the suggestion that the planets formed from a disk around the Sun. In the 1980s, we first observed such a disk in another system. We now have found that about half of the young stars have disks. In our portion of the disk, protoplanets are driven in toward the star by viscous forces in the disk, which is much more massive than the planets. It is moving and pushes the planets with it. The problem is how to keep the protoplanets from falling into the Sun. That might result from stabilization by planetary resonance. Also, planets can change their relative distances from the Sun; some can even be ejected from the system. Any force must push the planet out of a circular orbit.

An Interesting System

HD209458 was the sixth system discovered with a planet in a 51 Peg-like orbit. It has a 4-day period. In such a short period orbit, there is about a 10% chance that the planet will transit the star as this planet does. From the transit, the physical size of the planet can be determined, as we know the approximate radius of the star and, now, the portion of its light blocked by the planet. In this case, the planet blocks about 1.4% of the area of the star indicating that the planet diameter is about 40% larger than that of Jupiter. This is close to the theoretical prediction. Since the fact that the planet transits indicates that the inclination is near zero, we can determine that the density is about 1/2 that of Saturn and, hence, that the planet is composed mainly of H and He as is Saturn. Large surveys are looking for other transits but none have been detected.

Looking for Earth-like Planets

We are anxious to find Earth-like planets. The Terrestrial Planet Finder (TPF) is designed for this. It may use four large telescopes in space as a nulling interferometer to cancel the light from the star but other designs are also being studied. The TPF could provide spectra of an Earth-like planet if it found one. The presence of oxygen would probably indicate the presence of life. Also, a chronograph system might be used with a very large telescope.

SETI Help

Finally, SETI (Search for Interstellar Intelligence) might receive a picture of a planet sent by another civilization. Observations are taken with both Arecibo and the Parks telescope in Australia. SETI@home, which scans the signals received, is the largest computer project in the world. A crater on the back of the moon would be an ideal site for an Arecibo type telescope as it is shielded from terrestrial radiation. The Allen telescope at Hat Creek near Mt. Lassen will be an array of satellite dishes covering a square hectare to detect extraterrestrial signals. It is the prototype for a square kilometer array that might be placed in western Australia.

The author thanks Dr. Butler for a careful editing of this review.

Come See the Stars! by Joe Morris

Exploring the Sky 2002 Schedule

<table>
<thead>
<tr>
<th>Date</th>
<th>Time</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>October 5</td>
<td>7:30 P.M.</td>
<td>New Moon at perigee October 6</td>
</tr>
<tr>
<td>November 2</td>
<td>7:00 P.M.</td>
<td>Leonid meteor shower November 17 and 19</td>
</tr>
</tbody>
</table>

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) 426-6829 or check the Internet sites: http://www.nps.gov/rocr/planetarium and http://www.capitalastronomers.org

A presentation of the National Park Service and National Capital Astronomers.
NCA TREASURER’S REPORT
Jeffrey Norman

July 1, 2001 to June 30, 2002

INCOME
Dues $7081.00
Gifts 632.00
Interest 215.47
Telescope-making Classes 290.00
Total Income $8218.47

EXPENSES
IDA Dues $100.00
Miscellaneous 158.10
Purchase of New Projector 1775.46
Secretary 249.18
Sky & Telescope Subscriptions 3534.10
Speakers’ Dinners 402.00
Star Dust 4478.42
Total Expenses $10697.26

Balance - July 1, 2001 $13803.79
Excess Expenses over Income 2478.79
Balance - June 30, 2002 $11325.00 *

Total number of paying members joining or renewing from 7-1-00 to 6-30-01 162 **
Total number of paying members joining or renewing 7-1-01 to 6-30-02 154 **
Decrease in Membership (4.9%) 8

MEMBERSHIP REVIEW
Total paying memberships as of 6-30 of each fiscal year

* The Balance includes $4643.25 from the NCA Travel account
** This does not include life members or science fair winners because they receive free memberships.

NCA BUDGET - FISCAL 2003

Income
Dues 7100
Gifts 600
Interest 200
Telescope-making Classes 300
Total Income 8200

Expenses
Int. Dark-Sky Assn. Dues 100
Miscellaneous 50
Secretary 250
Sky & Telescope Subscriptions 3500
Speakers’ Dinners 400
Star Dust 4500
Total Expenses 8800

Deficit 600

September Talk
(Continued from page 1)
100-inch Mount Wilson reflector that Edwin Hubble used in the 1920s to discover that galaxies exist and that they are all moving away from one another, to the pristine back-up mirror to the Hubble Space Telescope, among many other objects of recent astronomical history.

Bio
David DeVorkin is Curator, History of Astronomy and the Space Sciences at the National Air and Space Museum. His major research interests are in the origins and development of modern astrophysics during the 20th Century and the origins of the space sciences in the V-2 and early Aerobee eras through the IGY. He is the author/editor/compiler of nine books and over ninety scholarly and popular articles, most recently Beyond Earth: Mapping the Universe (2002), Henry Norris Russell: Dean of American Astronomers (2000) and The American Astronomical Society’s First Century (1999). Dr. DeVorkin holds the Ph.D. in the History of Astronomy from the University of Leicester (1978) and the Master of Philosophy in Astronomy from Yale (1970). He has curated “Stars” (1983-1997); “V-2: The World’s First Ballistic Missile System” (1990-); and most recently “Explore the Universe” (2001-)

For Your Information
Submitted by Nancy Grace Roman

Jim Dwyer wrote: Christina is spending the summer doing asteroidal research as a Caltech student at JPL. (Maureen hopes to become a planetary scientist.) Thanks to you for her [Christina’s] scholarship award last year at the science fair! It was much appreciated.

(Jim Dwyer is the father of Christina Dwyer who was a Science winner last year.)

Bruce Becker wrote: San Diego is switching street lighting to higher level unshielded lighting. Mount Palomar observatory, north of us might not have a future. We are lucky to see 3 1/2 magnitude stars from our location — otherwise, must travel for to the desert for viewing.

(Bruce Becker is a long-time member.)
### Mid-Atlantic Occultations and Expeditions

**by David Dunham**

#### Asteroidal Occultations through early October 2002

<table>
<thead>
<tr>
<th>DATE</th>
<th>Day</th>
<th>EST</th>
<th>Star</th>
<th>Mag</th>
<th>Asteroid</th>
<th>dmag</th>
<th>s in.</th>
<th>Location</th>
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<tr>
<td>Sep 16</td>
<td>Mon</td>
<td>5:38</td>
<td>TYC07322818</td>
<td>10.5</td>
<td>Hidrun</td>
<td>5.2</td>
<td>3 36</td>
<td>Carolinas</td>
</tr>
<tr>
<td>Sep 25</td>
<td>Wed</td>
<td>22:01</td>
<td>TAC-12 7192</td>
<td>11.8</td>
<td>Comacina</td>
<td>2.5</td>
<td>9 8</td>
<td>Mexico</td>
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<tr>
<td>Sep 28</td>
<td>Sat</td>
<td>0:46</td>
<td>PPM 144222</td>
<td>9.3</td>
<td>Clarissa</td>
<td>4.3</td>
<td>4 3</td>
<td>DC area</td>
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#### Grazing Occultations through early October 2002

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<th>Day</th>
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<th>CA</th>
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<tr>
<td>Sep 24</td>
<td>Tue</td>
<td>23:18</td>
<td>SAO 093029</td>
<td>7.6</td>
<td>89-29</td>
<td>17N</td>
<td>Brandywine &amp; Annapolis, MD</td>
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<tr>
<td>Sep 26</td>
<td>Thu</td>
<td>5:20</td>
<td>X04557</td>
<td>8.8</td>
<td>81-65</td>
<td>14N</td>
<td>Falls Church, VA; DC; Lanham, MD</td>
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<tr>
<td>Sep 28</td>
<td>Sat</td>
<td>0:46</td>
<td>SAO 077053</td>
<td>8.8</td>
<td>63-74</td>
<td>12N</td>
<td>Clinton to Kent Is., MD</td>
</tr>
<tr>
<td>Oct 3</td>
<td>Thu</td>
<td>5:08</td>
<td>eta Leonis</td>
<td>3.5</td>
<td>13-25</td>
<td>8N</td>
<td>Indian River, MI</td>
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#### Total Lunar Occultations

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<tr>
<td>Sep 12</td>
<td>Thu</td>
<td>21:40</td>
<td>D ZC 2388</td>
<td>7.5</td>
<td>42+12</td>
<td>79S</td>
<td>F3</td>
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<tr>
<td>Sep 15</td>
<td>Sun</td>
<td>20:29</td>
<td>D ZC 2852</td>
<td>7.3</td>
<td>73+25</td>
<td>86N</td>
<td>K0</td>
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<td>Sep 18</td>
<td>Wed</td>
<td>0:06</td>
<td>D 33 Cap</td>
<td>5.4</td>
<td>89+27</td>
<td>53S</td>
<td>K0 ZC 3130</td>
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<tr>
<td>Sep 23</td>
<td>Mon</td>
<td>0:19</td>
<td>R 33 Ceti</td>
<td>6.0</td>
<td>98-46</td>
<td>81S</td>
<td>K4 ZC 170</td>
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<tr>
<td>Sep 23</td>
<td>Mon</td>
<td>6:21</td>
<td>R 89 Piscium</td>
<td>5.1</td>
<td>97-24</td>
<td>58S</td>
<td>A3 ZC 192</td>
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<tr>
<td>Sep 26</td>
<td>Thu</td>
<td>5:54</td>
<td>R ZC 517</td>
<td>6.1</td>
<td>80-51</td>
<td>38N</td>
<td>K1 ZC 517; graze in OH &amp; PA</td>
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<tr>
<td>Sep 26</td>
<td>Thu</td>
<td>21:53</td>
<td>R 43 Tauri</td>
<td>5.5</td>
<td>75-1</td>
<td>1</td>
<td>87S K2 ZC 614; Azimuth 65 deg.</td>
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<tr>
<td>Sep 27</td>
<td>Fri</td>
<td>1:19</td>
<td>D omega Tau</td>
<td>4.9</td>
<td>73-39</td>
<td>27N</td>
<td>A3 ZC 628</td>
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<td>Sep 27</td>
<td>Fri</td>
<td>2:09</td>
<td>D omega Tau</td>
<td>4.9</td>
<td>73-49</td>
<td>60N</td>
<td>A3 possible close double</td>
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<tr>
<td>Sep 27</td>
<td>Fri</td>
<td>5:15</td>
<td>R ZC 642</td>
<td>6.8</td>
<td>72-72</td>
<td>63N</td>
<td>F5 close double</td>
</tr>
<tr>
<td>Sep 27</td>
<td>Fri</td>
<td>5:39</td>
<td>R ZC 646</td>
<td>5.9</td>
<td>72-70</td>
<td>50S</td>
<td>M0 close double</td>
</tr>
<tr>
<td>Sep 27</td>
<td>Fri</td>
<td>6:39</td>
<td>R ZC 651</td>
<td>6.0</td>
<td>72-63</td>
<td>65S</td>
<td>B8 close double?; Sun -5</td>
</tr>
<tr>
<td>Sep 30</td>
<td>Mon</td>
<td>4:01</td>
<td>R SAO 079054</td>
<td>6.9</td>
<td>43-42</td>
<td>165</td>
<td>K8 wide double</td>
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<tr>
<td>Oct 1</td>
<td>Tue</td>
<td>2:16</td>
<td>R ZC 1208</td>
<td>6.3</td>
<td>33-12</td>
<td>12S</td>
<td>K1 close double</td>
</tr>
<tr>
<td>Oct 1</td>
<td>Tue</td>
<td>2:43</td>
<td>R SAO 079868</td>
<td>7.3</td>
<td>33-17</td>
<td>83N</td>
<td>K0</td>
</tr>
<tr>
<td>Oct 3</td>
<td>Thu</td>
<td>6:33</td>
<td>R eta Leonis</td>
<td>3.5</td>
<td>13-35</td>
<td>64N</td>
<td>A0 ZC 1484; Sun alt. -7</td>
</tr>
</tbody>
</table>

Phone the IOTA occultation line, 301-474-4945, for updates, or check IOTA’s Web site at http://www.lunar-occultations.com/iota

David Dunham, e-mail dunham@erols.com, phone 301-474-4722

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### 2002 VAAS Convention

**Submitted by Nancy Byrd**

From: "Terry Barker" <teebark@netzero.com>

To: "Nancy Byrd" <nancy@pangean.com>,

Subject: VAAS 2002

Date: Wed, 14 Aug 2002 21:18:31 -0400

Announcing the 2002 VAAS Convention!

The event this year will take place in Ashland, VA (10 miles north of Richmond), at Randolph-Macon College, and will be hosted by RAS (Richmond Astronomical Society). It’s on Sat., Oct. 5, and we have put together an exciting program! You can get the lowdown on our web page, http://www.richastro.org/vaas.htm.

Some quick highlights:
- We have three GREAT morning speakers.
- Workshops on telescope making, Herschel objects, CCD photography, a Charles Messier re-enactment, a renaissance navigator, and much more.
- Door prizes
- A picnic that afternoon
- Star gazing into the morning hours

You can respond to this email, but I’d rather you send a response to my real home, tbarker@i2020.net (I’m temporarily working away from home.)
Getting to the NCA Monthly Meeting

Saturday, September 14
3:00 P.M. - NCA Meeting in the Bethesda-Chevy Chase Regional Services Center of Montgomery County, 4805 Edgemoor Lane (2nd Floor), Bethesda, MD.

Dr. David DeVorkin will present the featured talk for the September meeting of National Capital Astronomers, “Building the Universe (Gallery)”.

Following the meeting, dinner with the speaker and NCA members at

Heritage India
4931 Cordell Ave
Bethesda, MD
301-656-3373
(Indian food)

Directions to the 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
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 Road.
4. Turn left onto MD-187/Old Georgetown Rd.
5. Turn right at Cordell Ave. The restaurant, Heritage India, will be on your left, #4931, across the street from Il Forno and the public parking garage.

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

Jay H. Miller, NCA President, jhmiller@os2bbs.com, 301-530-7942 (home).
Gary Joaquin, NCA Vice-president, glj1@erols.com, 703-750-1636 (home).
Dr. Nancy Grace Roman, NCA Secretary, ngroman@erols.com, 301-656-6092 (home).
Jeffrey Norman, NCA Treasurer, jfmiller@ferc.gov, 5410 Connecticut Avenue, NW, Apt. #717, Washington, DC 20015-2837.
Trustees: Jeff Guter, Dr. Andrew W. Seacd, II, Dr. Wayne H. Warren, Dr. Harold Willams
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@erols.com, 301-762-6261 (home), 5 Carter Ct. Rockville, MD 20852-1005.

Appointed Officers and Committee Heads: Exploring the Sky - Joseph C. Morris; Meeting Facilities - Jay H. Miller; Observing - Robert N. Bolster; Telescope Making - Guy Brandenburg; Travel Director - Sue Bassett; 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. Contact: Sue Bassett wb3enn@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

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.
___ $15 Junior membership with Star Dust ONLY.
___ $100 Contributing member (with Sky & Telescope) ($43 tax-deductible).
___ $150 Sustaining member (with Sky & Telescope) ($93 tax-deductible).

Junior members only: Date of Birth: _____________ Only members under the age of 18 may join as juniors.

Tax deductible contribution: __________ Thank You.

_____ I prefer to receive Star Dust by e-mail.

Please send this form, with your check payable to National Capital Astronomers, Inc., to:
Mr. Jeffrey Norman, NCA Treasurer, 5410 Connecticut Ave NW #717, Washington DC 20015-2837
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