Star Dust

National Capital Astronomers, Inc.

http://capitalastronomers.org

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June Talk: Dr. R. Paul Butler, "Extrasolar Planets: First Reconnaissance"

Submitted by Gary Joaquin

Dr. R. Paul Butler will present the featured talk for the June 15 meeting of National Capital Astronomers, "Extrasolar Planets: First Reconnaissance". 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

Within the last six years, planets have been discovered around 70 nearby Sun-like stars. All of these planets have been revealed by the gravitational wobble they impose on their host stars. Dr. Butler's group has found two-thirds of these planets, including all four published systems of multiple planets orbiting Sun-like stars, the only known planet observed to transit its star, and the first two sub-Saturn mass planets.

(Continued on page 2)

Election Time

Submitted by Nancy Byrd for the Nominating Committee

The nominees for officers for National Capital Astronomers for the upcoming 2002 - 2003 year are as follows:

President - Jay Miller
Vice President - Gary Joaquin
Secretary - Nancy Grace Roman
Treasurer - Jeff Norman
Trustee - Wayne Warren.

Additional nominations may be made prior to the elections at the Annual Meeting, June 15.

"New Horizons: First Mission to Pluto" A Talk by Dr. Andrew F. Cheng

Reviewed by Gary Joaquin

At the April NCA meeting, Dr. Andy Cheng, the Project Scientist for the New Horizons mission to Pluto, gave us an excellent overview of the mission. This review summarizes his presentation supplemented by information obtained from http://pluto.jhuapl.edu/index.htm and http://www.boulder.swri.edu/pkb/.

In November 2001, following an open competition among planetary scientists, NASA selected the New Horizons mission to be the first to explore Pluto and the Kuiper Belt, which is believed to be a significant source of Earth's water and the simple chemical precursors of life. John Hopkins University Applied Physics Laboratory will manage this mission, marking another first, a mission to the outer planets not managed by a NASA center. Currently, the mission is proceeding with a $30 million preliminary design study. The estimated total cost of this mission is $500 million, much less than previous missions to the outer planets.

The Kuiper Belt

The Kuiper Belt (KB) stretches from the orbit of Neptune, about 30 AU from the Sun, to about 50 AU. Most Kuiper Belt Objects (KBO) are extremely small with diameters of about 100 km. KBOs are believed to be the most primitive objects in the solar system, having been formed much farther away from the Sun, thus being colder and better preserved. The inclination of new comets suggests that the KB is not a homogenous spherical distribution, but more like a flattened disk, with a dynamic structure that is largely controlled by Neptune's gravity. The KB is believed to be the original home of short period comets.

Pluto and Charon

Pluto, the largest known KBO with a diameter of 1145 to 1200 km, was discovered in 1930 by Clyde Tombaugh at Lowell Observatory in Flagstaff, Arizona. James Christy at the U.S. Naval Observatory discovered the second KBO, Pluto's moon, Charon, in 1978. The next KBO wasn't discovered until 1992, by David Jewitt and Jane Luu. Over 500 KBOs have been identified since then.

Charon is relatively large compared to Pluto, with a diameter of 600 to 650 km . Together, Pluto and Charon, represent the only known binary planet system. Separated by only 19,636 km, Pluto and Charon have a combined center of gravity in the space between them. Over time

(Continued on page 4)

NCA Events This Month

The Public is Welcome!

NCA Home Page: http://capitalastronomers.org

Fridays, June 7, 14, 21, and 28, 6:30 to 9:30 P.M., NCA Mirror-Making Classes will probably be at the Chevy Chase Community Center. For more information, email Guy Brandenburg at gfbranden@earthlink.net or at 202-262-4274 to confirm.

Saturday, June 15, 9:30 P.M., Fridays, June 7, 21, 28; July 5, 12, 19, 9:30 P.M.
Open nights with NCA's 14-inch telescope at Ridgeview Observatory near Alexandria, Virginia. See below.

Saturday, June 15, 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.

Dr. R. Paul Butler will present the featured talk "Extrasolar Planets: First Reconnaissance".

Saturday, June 15, following the meeting, dinner with the speaker and NCA members at

Bacchus
7945 Norfolk Avenue
Bethesda, MD
301-657-1722
(Lebanese food)

See Page 6 for more National Capital Area astronomical doings.

The deadline for the September *Star Dust* is August 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.
All articles submitted may be edited to fit the space available.
Thank you.

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).

Observing with the NCA C-14

by Bob Bolster

Date, Time	Prime Objects
Friday, June 7, 9:30 p.m.	Jupiter, M44
Saturday, June 15, 9:30 p.m.	Jupiter, M44
Friday, June 21, 9:30 p.m.	5-day crescent Moon
Friday, June 28, 9:30 p.m.	M3, M5, M13
Friday, July 5, 9:30 p.m.	M3, M5, M13
Friday, July 12, 9:30 p.m.	M3, M5, M13
Friday, July 19, 9:30 p.m.	Gibbous Moon

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

"Extrasolar Planets'

(Continued from page 1)

The planets detected to date include Jupiter-mass planets in very small (4-day) orbits, and Jupiter-mass planets in non-circular, eccentric orbits. These objects have profoundly challenged the theories of planet formation. Only the systems orbiting 47 Ursae Majoris and HD 27442, with Jupiter-mass companions in circular orbits, remind us of the Solar System.

Now that planets have been detected, we would like to know what fraction of stars have planets, what fraction of planetary systems are similar to the Solar System, and how many other types of planetary systems exist. Toward this goal our group is surveying the 1000 nearest and brightest Sun-like stars in the northern hemisphere using the Lick 3-m (California) and Keck 10-m (Hawaii) Telescopes. In addition, we are surveying the 200 brightest southern hemisphere stars from the 3.9-m Anglo-Australian Telescope. Next year we will begin surveying the remaining nearby southern hemisphere stars from the 6.5-m Magellan Telescope in Chile.

These surveys are the only active programs capable of detecting Solar System-like planets. By 2010, these surveys will provide a first planetary census of nearby stars, allowing us to estimate the ubiquity of planetary systems and of Solar System analogs.

Biography

Dr. R. Paul Butler is a Staff Scientist at the Department of Terrestrial Magnetism of the Carnegie Institution of Washington. Previously, he has served as a Staff Astronomer at the Anglo-Australian Observatory in Sydney Australia and as a Research Fellow at UC Berkeley.

Butler's work has focused on improving the measurement precision of stellar Doppler velocities. He designed and built the Iodine absorption cell system at Lick Observatory which resulted in the discovery of six of the first eight known extrasolar planets. This instrument has become the de facto standard for precision Doppler studies, having been adopted by teams at the University of Texas, Harvard, the VLT, Subaru, and the Italian Galileo project. In addition, Butler built the Iodine systems at the Keck and Anglo-Australian Observatories. The original Iodine cell (still in use at Lick) has been requested by the Smithsonian Institution upon its retirement.

(Continued on page 3)

Support the IDA

Join the International Dark-Sky Association

3225 N. First Avenue Tucson, AZ 85719-2103

www.darksky.org

Come See the Stars!

by Joe Morris

Exploring the Sky 2002 Schedule

Date	Time	Notes
July 13	9:00 P.M.	3-1/2 day old Moon
August 3	8:30 P.M.	Perseid meteor shower August 12-13
September 7	8:00 P.M.	Fall equinox September 23
October 5	7:30 P.M.	New Moon at perigee October 6
November 2	7:00 P.M.	Leonid meteor shower November 17 and 19

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.

"Extrasolar Planets"

(Continued from page 2)

With his long time collaborator Geoff Marcy (UC Berkeley), Butler has discovered two-thirds of the known extrasolar planets, including all four published multiple planet systems (Upsilon Andromedae, 47 Ursae Majoris, GL 876, and HD 168443), the only known planet to transit its host star (HD 209458), and the first two sub-saturn mass planets (79 Ceti and HD 46375). This work has been featured on several front page articles in the New York Times and Washington Post, as well as a TIME magazine cover story.

Dr. Butler has received numerous awards for his work. ABC News recognized him as "Person of the Week", San Francisco State University named him their "Alumnus of the Year", and NEWSWEEK named him as one of the "100 Americans for the Next Century". He has received the Bioastronomy Medal from the International Astronomical Union, and the Henry Draper Medal from the National Academy of Sciences. He is currently serving as a "Centennial Lecturer" for the American Astronomical Society. Butler received his Ph.D. from the University Maryland under the supervision of Dr. Roger Bell. He received his BS. in chemistry and M.S. in physics from San Francisco State University.

Meteor Showers
July Radiants

Full Moon: July 24

Moderate Activity

Radiant	Duration	Maximum
Southern Delta Aquarids (SDA)	July 14-August 18	July 28/29

Minor Activity

Radiant	Duration	Maximum
Alpha Lyrids	July 9-20	July 14/15
July Phoenicids (PHE)	July 9-17	July 14/15
Alpha Pisces Australids	July 16-August 13	July 30/31
Sigma Capricornids	June 18-July 30	July 10-20
Tau Capricornids	June 2?-July 29	July 12/13
Omicron Draconids	July 6-28	July 17/18
Daylight Activity - None		

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

"New Horizons: First Mission to Pluto"

(Continued from page 1)
their orbits have circularized and become tidally relaxed, i.e. the orbital period of Charon is the same as the rotational period of Pluto; thus Pluto and Charon always show the same face to each other.

The Pluto-Charon system moves about the Sun slowly, taking 248 Earth years to complete one revolution. Its orbit is highly inclined, 17 degrees from the plane of the ecliptic, which is typical for KBOs. Its orbit is also highly elliptical, ranging from its closet approach of less than 30 AU in 1989 to 50 AU in 2123. This vast area traversed by Pluto is called the trans-Neptune region and the enormous number of icy bodies populating this region comprises the KB.

Pluto's closest approach to the Sun actually takes it inside of Neptune's orbit. The orbits of Pluto and Neptune are in resonance: for every two complete orbits that Pluto makes, Neptune completes three. Most KBOs are trapped in this 3:2 resonance. Dr. Cheng suggested that there may have been many more KBOs than what we now see and that perhaps many KBOs collided with each other and were expelled from the Solar System.

In 1988, occultations revealed that Pluto has an atmosphere. As Pluto recedes from the Sun much of its thin nitrogen atmosphere condenses as frost on its surface. This periodic re-deposition of fresh frost taking place every year on Pluto (every 248 Earth years) makes Pluto one of the most reflective surfaces in the Solar System. Infrared spectra of Pluto also reveal traces of methane and carbon monoxide. So far ,the only chemical species detected on Charon is water ice. Both Pluto and Charon are about twice as dense as water, implying that they are composed of about 2/3 rock and 1/3 water ice.

Fraternal Twins?
Voyager images of Neptune's moon, Triton, suggest that it may be a captured KBO just like Pluto. Triton is about the same size, has a very irregular orbit, has the same general color and surface ice composition, and an atmosphere. It also has dark smudges on its surface, suggesting an organic surface like tar on a driveway. Hubble Space Telescope imaging of Pluto reveals a planet of sharp contrasts going from almost pure white to pure black. Could these surface features have similar origins?

The Spacecraft
The New Horizons spacecraft will be about 2.5 m long, weigh about 400 kg and borrow from technology used by the CONTOUR (Comet Nuclear Tour) spacecraft due to be launched in July. One significant departure in the spacecraft's design is that it will be powered by a radioisotope thermal generator, since it will be too far away from the Sun for solar power to be effective.

Instruments on the spacecraft will include PERSI, the Pluto Express Remote Sensing Investigation package, named after Percival Lowell. PERSI includes a CCD imager, a near-infrared imaging spectrometer (LEISA) essential for measuring the composition and physical state of surface ices, and an ultraviolet imaging spectrometer (ALICE). Also on

(Continued on page 5)

Meteor Showers

June Radiants

Full Moon: June 24

Moderate Activity

Radiant	Duration	Maximum
June Lyrids	June 10-21	June 15/16

Minor Activity

Radiant	Duration	Maximum
June Aquilids	June 2-July 2	June 16/17
June Bootids	June 27-July 5	June 28/29
Corvids	June 25-July 3	June 27/28
Tau Herculids	May 19-June 19	June 9/10
Ophiuchids	May 19-July 2	June 20/21
Theta Ophiuchids	May 21-June 16	June 10/11
Sagittariids	June 10-16	June 10/11
Phi Sagittariids	June 1-July 15	June 18/19
Chi Scorpiids	May 6-July 2	May 28-June 5
Omega Scorpiids	May 19-July 11	June 3-6
June Scutids	June 2-July 29	June 27/28

Daylight Activity

Radiant	Duration	Maximum
Arietids	May 22-July 2	June 7/8
Zeta Perseids	May 20-July 5	June 13/14
Beta Taurids	June 5-July 18	June 29/30

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

"New Horizons: First Mission to Pluto"

(Continued from page 4)
board will be REX, a radio/radiometry experiment, PAM, a suite of plasma and high-energy-particle spectrometers, and LORRI, a long-focal-length imager.

The Flight Plan
The New Horizon spacecraft is scheduled for launch January 2006 along a trajectory that swings close to Jupiter for a gravity assist in March 2007. The estimated flyby of Pluto will be in 2015 or 2016. This date will be finalized when competing requirements among the spacecraft's onboard experiments and data gathering objectives are resolved.

The spacecraft will begin taking pictures of Pluto and Charon, one year prior to flyby, At first they will appear as unresolved bright dots. About three months prior to the spacecraft's closest approach, on-board cameras will start to record the first maps. If Pluto's atmosphere does condense into frost, then this will be a great chance to watch the seasons change. During the 75 days leading up to the closest encounter, the spacecraft will take pictures of higher quality than those taken by the Hubble Space Telescope.

Pluto and Charon each complete one full revolution in about six Earth days. Thus for the last two Pluto days (about 12 Earth days), the spacecraft will compile maps and gather spectra measurements of Pluto and Charon every Earth half day.

The busiest part of the mission will last one full Earth day, starting one half day prior to closest approach. On the way, the spacecraft will record ultraviolet emissions from Pluto's atmosphere and take spectral maps in the near infrared, telling the science team about surface composition. Looking back at the mostly dark side of Pluto, the spacecraft will try to identify haze in the atmosphere, planetary rings and measure the roughness or smoothness of the surface. As the spacecraft passes through the shadows cast by the Sun shining on Pluto and Charon, the spacecraft will be detecting radio wave transmissions from Earth and observing the Sun and Earth rise and set behind Pluto and Charon in an effort to take atmospheric measurements. After the Pluto-Charon flyby, the spacecraft will be retargeted to encounter as many as three more Kuiper Belt Objects.

An Impassioned Plea
Dr. Cheng emphasized how fragile the status of this mission is. Congress may choose to cut its funding at any time. He encouraged us to contact our congressional representatives to express our support for the mission for several good reasons:

- Pluto is the last unexplored planet;
- Pluto is closer to us now than it is going to get for more than 100 years. Our window of opportunity is now, especially to study its atmosphere which could condense into frost on the surface at any time; and
- Pluto is an object left over from the formation of the solar system; we can learn much about its evolution, especially about the evolution of life.

I would encourage you all to write or call your congressional representatives.

NCA thanks Dr. Cheng for a fascinating and entertaining presentation.

Meteor Showers
August Radiants

Major Activity

Radiant	Duration	Maximum
Perseids (PER)	July 23-August 22	Aug. 12 at 08:49 UT
Northern Iota Aquarids (NIA)	August 11-September 10	August 25/26
Southern Iota Aquarids (SIA)	July 1-September 18	August 6/7
Alpha Capricornids (CAP)	July 15-September 11	August 1/2

Minor Activity

Radiant	Duration	Maximum
Northern Delta Aquarids (NDA)	July 16-September 10	August 13/14
Kappa Cygnids (KCG)	July 26-September 1	August 18
August Eridanids	August 2-27	August 11/12
Upsilon Pegasids	July 25-August 19	August 8/9
Alpha Ursa Majorids	August 9-30	August 13/14

Daylight Activity

Radiant	Duration	Maximum
Gamma Leonids	August 14-September 12	August 25/26

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

Washington Area Astronomers Meetings Ended

Reported by Elliott Fein

The following is abstracted from the (former) WAA web site, http://aa.usno.navy.mil/waa/mtg_info.htm.

2001 Nov 13
Dear Colleagues:
I have received a number of recent e-mails inquiring about the next Washington Area Astronomers Meeting. I regret to report that the 21-year series of Washington Area Astronomers Meetings has come to an end. This series of professional meetings, held on at least a yearly basis, provided the many astronomers and astrophysicists in the Washington-Baltimore area with an opportunity to hear and discuss recent research results that spanned specialty and wavelength boundaries. The meetings were organized by an Executive Committee with representatives from the University of Maryland, Johns Hopkins University, Goddard Space Flight Center, Naval Research Lab, U.S. Naval Observatory, Space Telescope Science Institute, Applied Physics Lab, George Mason University, and Universities Space Research Association. The committee also had a member representing the many other institutions in the area with small numbers of astronomers on their staff (e.g., DTM, NASA HQ, Catholic U., etc.)

Although the meetings developed a dedicated following of astronomers, attendance in recent years has been consistently below previous attendance figures and our expectations. In recent years, the Executive Committee tried various meeting format changes, without much success. In May, the committee reluctantly decided to bring the series of meetings to an end. The committee also decided at its final meeting that the remaining funds in the committee's bank account should go to furthering the progress of astronomy in developing countries. The final Executive Committee for the Washington Area Astronomers Meetings was: David Holdridge, Universities Space Research Association, Stanley Hunter, NASA Goddard Space Flight Center, George Kaplan, U.S. Naval Observatory, Patricia Knezek, Space Telescope Science Institute, Mukul Kundu, University of Maryland, David Neufeld, The Johns Hopkins University, Leonid Ozernoy, George Mason University, David Rust, JHU Applied Physics Laboratory, Gerald Share, Naval Research Laboratory, Eric Smith, NASA Goddard Space Flight Center, John Trasco, University of Maryland

I agree with those who say that events of this kind should have a place in our professional lives, but it seems that for many people, the work load and pace of their day-to-day responsibilities makes it difficult to set aside the time for such meetings, given the competition they face.

I've very much enjoyed serving as the chair of the Executive Committee for the last 8 years and look forward to seeing you at colloquia and other events in the area. By the way, the part of the home page of the Washington Area Astronomers web site that provided links to all the astronomy colloquia series and meetings in our area is now being maintained on the USNO Astrometry Department web site at http://ad.usno.navy.mil/astro_events_dc/. I am always interested in receiving updates and additional listings for that page.

George Kaplan

U.S. Naval Observatory
gkaplan@usno.navy.mil

Other National Capital Area Meetings

Attention: 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.

Stellar & Extragalactic Astronomy Lunch
Talks are Wednesdays at 12:00 Noon in room 242 of Building 21, except as noted.
June 12 Brad Whitmore, STScI, "The Formation of Globular Clusters in the Local Universe"(BWSS)
June 19 Katya Verner, GSFC/CUA, "Fe+ Emitting Plasma in the Vicinity of Eta Carinae"
Talks labeled BWSS are part of the Baltimore-Washington Starburst Seminar Series. The BWSS talks are in the Aerospace building at 10210 Greenbelt Road, Room 408 on the 4th floor; a free pizza lunch will be provided. To get to the Aerospace building, go out the main gate of GSFC, turn left and go about 3/4 mile. The Aerospace building will be on your left, just after a Lutheran church. To volunteer to give a talk, for additions to the email announcement list, or if you have any questions, please contact: Jon Gardner, gardner@harmony.gsfc.nasa.gov
Source: http://hires.gsfc.nasa.gov/~gardner/seal ok

Northern Virginia Astronomy Club
General membership meetings are open to the public, and are held at Enterprise Hall, Room 80, on the campus of George Mason University. 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. Meetings start at 7:00 P.M., on the second Sunday of every month.
July 14 Join Patty Seaton, amateur astronomer and poet, tonight to enjoy selections of what we call "Poetry Under the Stars". It's a little literary and a lot of fun.
.August 11 Dr. David DeVorkin Have you seen the major new exhibit, "Explore the Universe", at the National Air and Space Museum? The exhibit curator, David DeVorkin, will speak about "Explore the Universe" and some of the thoughts and materials that went into its creation.
Source: http://novac.com ok

Mid-Atlantic Occultations and Expeditions

by David Dunham

Asteroidal Occultations

DATE	Day	EST	Star	Mag	Asteroid	dmag	Dur s	Ap. in.	Location
Jun 9	Sun	2:31	TYC62391425	11.7	Cheruskia	2.3	6	8	DE, MD, sw PA
Jun 17	Mon	22:46	TYC02561373	12.1	Phyllis	2.3	1	9	w. & s. N.Car.
Jun 26	Wed	23:28	TYC03301483	10.8	Ganymed	2.1	7	7	n.e. Maryland
Jul 20	Sat	4:13	TYC06030336	11.4	Althaea	1.7	6	8	e. Carolinas
Aug 8	Thu	3:23	TYC46740397	10.9	Valentine	3.1	40	7	sw VA, e NC
Sep 4	Wed	21:54	TYC05580652	10.6	Vinifera	2.4	5	6	n. NJ, n. PA

Grazing Occultations

DATE	Day	EST	Star	Mag	% alt	CA	Location
Jun 24	Mon	22:18	lambda Sgr	2.8	100-13	25N	Petersburg, VA; ZC 2672
Jul 4	Thu	4:14	SAO 110254	8.8	34- 28	10N	Point Lookout, MD
Jul 6	Sat	4:23	SAO 093484	7.0	17- 18	10N	Ocean City, MD; Sun -13 deg.
Jul 14	Sun	22:45	nu Vir	4.0	26+ 13	7N	Wilson, NC; ZC 1702
Aug 1	Thu	3:07	SAO 092948	7.3	52- 32	13N	Oraville, MD
Aug 22	Thu	4:31	kappa Cap	4.7	99+ 12	26N	Hagerstown, MD ZC 3175 sp G8
Aug 31	Sat	3:21	SAO 076666	9.1	48- 41	16N	Sykesville & Germantown, MD
Sep 2	Mon	3:14	SAO 078376	8.8	28- 20	14N	St. James, MD

Total Lunar Occultations

DATE	Day	EST	Star	Mag	%	alt	CA	Sp.	Notes
Jun 12	Wed	20:51	D 48 Gem	5.9	5+	15	26S	F5	Sun -4; ZC 1092
Jun 13	Thu	21:23	D ZC 1239	6.6	10+	20	35N	A4	Sun -9
Jun 16	Sun	23:37	D ZC 1612	7.3	40+	17	25S	F5	
Jun 20	Thu	0:06	D ZC 1969	7.1	74+	26	31S	K0	
Jun 23	Sun	20:58	D 44 Oph	4.2	99+	11	78N	A3	ZC 2513; term.dist. 14"
Jun 28	Fri	3:15	R 33 Cap	5.4	88-	29	83S	K0	ZC 3130
Jun 30	Sun	1:45	R ZC 3374	6.1	73-	16	66S	K3	
Jul 16	Tue	22:21	D ZC 1933	7.1	49+	25	26S	K0	
Jul 16	Tue	23:47	D 74 Vir	4.7	49+	10	47S	M3	ZC 1941
Jul 17	Wed	23:02	D 2 Librae	6.2	60+	22	75S	G7	ZC 2060
Jul 17	Wed	23:39	D ZC 2064	6.5	60+	16	68N	F4	close double
Jul 19	Fri	23:50	D ZC 2330	6.4	81+	22	71S	B9	
Jul 20	Sat	1:20	D ZC 2337	6.6	81+	10	57S	B9	
Jul 23	Tue	1:58	D ZC 2804	5.8	98+	21	28S	K2	Terminator dist. 7"
Jul 27	Sat	5:46	D tau2 Aqr	4.1	91-	30	-76S	K5	Sun -4 ZC 3349
Jul 27	Sat	6:50	R tau2 Aqr	4.1	91-	21	38S	K5	Sun +7
Jul 28	Sun	23:57	R ZC 0018	5.8	79-	9	71S	K1	Azimuth 105
Jul 31	Wed	3:11	R nu Piscium	4.5	60-	37	77S	K3	
Aug 1	Thu	2:06	R ZC 0352	7.1	51-	21	52N	K0	maybe close double
Aug 1	Thu	3:52	R ZC 0360	6.7	51-	41	76N	F0	
Aug 5	Mon	6:03	R ZC 0898	6.0	14-	37	66N	A0	Sun -2
Aug 13	Tue	22:27	D 96 Vir	6.5	35+	9	85N	G8	ZC 2028, close dble.?
Aug 16	Fri	22:20	D 22 Oph	6.8	68+	22	69S	G8	ZC 2430
Aug 21	Wed	21:52	D 37 Cap	5.7	99+	19	51S	F5	ZC 3158; term. dist.10"
Aug 22	Thu	4:21	D kappa Cap	4.7	99+	14	45N	G8	ZC 3175; term. dist. 6"
Aug 27	Tue	23:36	R WZ Piscium	6.2	77-	14	47S	M4	ZC 0308 min.mag. 6.38
Aug 30	Fri	1:34	R ZC 0532	7.1	58-	26	3S	G0	maybe close double

D following the time denotes a disappearance, while R indicates that the event is a reappearance.
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 301-474-47220

Getting to the NCA Monthly Meeting

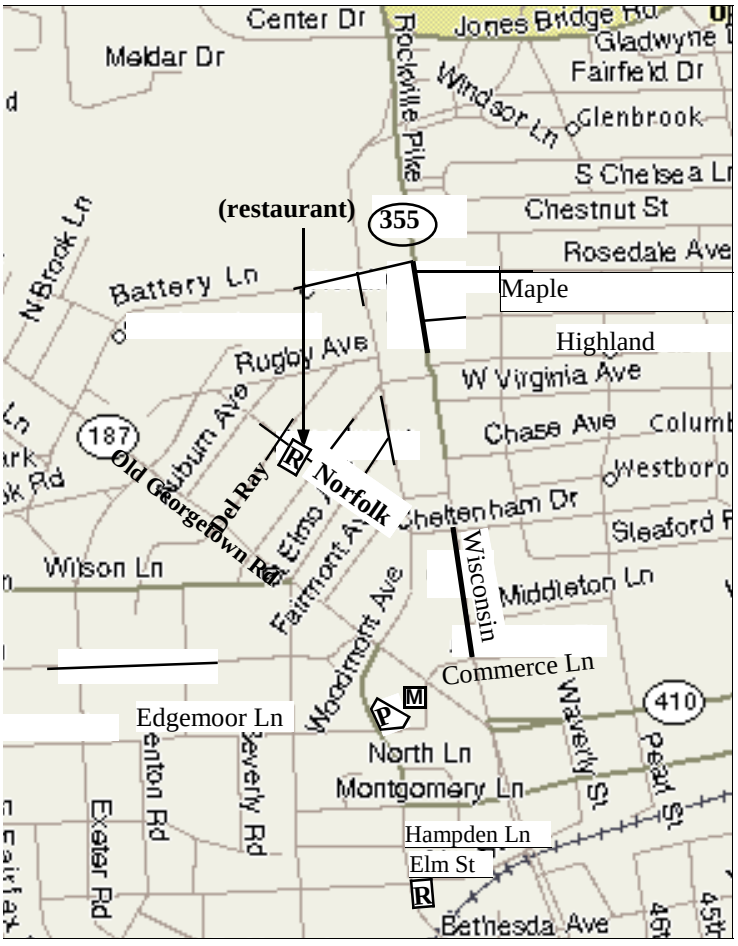
Saturday, June 15

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. R. Paul Butler will present the featured talk for the June meeting of National Capital Astronomers, "Extrasolar Planets: First Reconnaissance".

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

Bacchus
7945 Norfolk Avenue
Bethesda, MD
301-657-1722
(Lebanese 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

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

Because Woodmont Ave. is one-way Southbound coming out of the parking garage, we are offering you what may appear to be circuitous, but is actually a fairly efficient way of getting to the restaurant after the NCA meeting

1. Following the meeting, turn left out of the parking garage. If you are on Woodmont Ave., turn left at the next intersection, which is Edgemoor Lane.
2. Continue on Edgemoor Lane to Old Georgetown Road.
3. Turn left on Old Georgetown Rd. and then turn right on Woodmont Ave.
4. Turn slight left onto Norfolk Ave.
5. Go four blocks to corner of Norfolk and Del Ray.
6. The restaurant is on the right side of Norfolk. Look for the red awnings.

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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: _____

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

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