Star Dust

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April Talk: Dr. Andrew F. Cheng, "New Horizons: First Mission to Pluto"

Submitted by Gary Joaquin

Dr. Andrew F. Cheng will present the featured talk for the April 6 meeting of National Capital Astronomers, "New Horizons: First Mission to Pluto". 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

The region of space beyond Neptune that contains the planet Pluto, its moon Charon, and the icy planetary embryos of the Kuiper Belt, is a scientific and intellectual frontier. In recent years, this region has become recognized as key to understanding the origin of the outer solar system. NASA has approved a one year study of what would be the first mission to Pluto, Charon, and the Kuiper Belt. This mission, called New Horizons, would launch in 2006, fly past Jupiter, and arrive at Pluto as early as 2015. The Pluto-Charon binary system may offer spectacular insights into the nature of primitive organic materials, complex volatile transport processes, hydrodynamic atmospheric escape, as well as a rich surface and atmospheric chemistry. Pluto's size, density, albedo, surface composition, and atmosphere make it similar to Triton, Neptune's large and fascinating icy satellite, but Pluto may be even more primitive. The discovery of the Kuiper Belt, within which Pluto-Charon orbits, has fueled a revolution in our understanding of the formation and structure of the solar system. The Kuiper Belt is now recognized as the source region of the short period comets. The promise of New Horizons is that the first explorations of Pluto, Charon and the Kuiper Belt are within our grasp.

Biography

Dr. Andrew F. Cheng is a principal staff physicist in the Space Department of the Johns Hopkins University Applied Physics Laboratory. He received a Ph.D. degree in physics from Columbia University in 1977. He was a post-doctoral fellow at AT&T

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The President's Corner

I would like to thank all those who judged the science fairs. As a note to keep on your calendar, I am planning on repeating my solar tutorial in May, probably on Sunday the 19th. I don't know when Mother's Day is so I may have to move it. If anyone else would like to run a tutorial for the members on occultations, variables, planet observations, or simply how to set up a telescope to use, let me know. We can run these during the summer, also. If they are successful we could open them to the public and run some at Exploring the Sky. It could get more people using their telescopes and maybe get more NCA members.

Jay H. Miller

June Meeting Notice

Early warning: The June meeting of the National Capital Astronomers will be held on the 15th of June.

"Some Binary Star Studies with Space Telescopes" A Talk by Dr. Sidney Parsons

Reviewed by Dr. Nancy Grace Roman

Dr.Sidney Parsons was the principal speaker at the NCA meeting on March 2 in Bethesda, MD. The subject of his talk was "Some Binary Star Studies with Space Telescopes."

Dr. Parsons is particularly interested in hot secondaries of cool stars. Because these are usually bluer than their primaries, they are more easily studied in the ultraviolet where they are brighter relative to their companions. Since ultraviolet radiation does not reach the surface of the earth, these studies must be conducted with space telescopes. He is also using observations with space telescopes to discover new hot secondaries.

Dr. Parsons showed plots of the luminosity of a star as a function of temperature for stars of 5, 7, and 10 times the mass of the Sun. Small deviations at the higher luminosities for each mass were also illustrated. In general, as the star leaves the main sequence, it becomes cooler and brighter; there is then a kink in the path as

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NCA Events This Month

The Public is Welcome!

NCA Home Page: http://capitalastronomers.org

Fridays, April 5, 12, 19, and 26, 7:00 to 10:00 P.M., NCA Mirror-Making Classes. See article, this page.

Saturday, April 6, 8:00 P.M., Fridays, April 12, & 19, 9:00 P.M. Open nights with NCA's 14-inch telescope at Ridgeview Observatory near Alexandria, Virginia. See below.

Saturday, April 6, 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. Andrew F. Cheng will present the featured talk "New Horizons: First Mission to Pluto".

Saturday, April 6, following the meeting, dinner with the speaker and NCA members at the

Jaleo Restaurant
7271 Woodmont Avenue
Bethesda, MD
301 913-0003

See Page 6 for more National Capital Area astronomical doings.

To join NCA, use the membership application on Page 9.

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

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

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
Saturday, April 6, 8:00 p.m.	Saturn, Jupiter
Friday, April 12, 9:00 p.m.	Jupiter
Friday, April 19, 9:00 p.m.	First quarter Moon, Jupiter
Friday, April 26, 9:00 p.m.	Saturn, Jupiter

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.

Mirror Making Classes

by Guy Brandenburg

News from the NCA Mirror-Making Workshop:

In the past month or so, various participants, including Ed Witkowski, Steve Johnson, John Stewart, and Sam Lamphier have finished mirrors ranging in size from 6" (at an f/4 focal ratio—very fast) to 12.5" (at f/6, if I recall correctly). We have also set up the old AU "student lathe," which is a South Bend 9-inch Model A lathe with a 4 1/2 foot bed, so that it can be used. We have a very interesting assortment of old optical glass from about 1950, both crowns and flints, of small to medium sizes, so that anybody brave and foolish enough to make a refractor doublet can actually give it a try. Guy Brandenburg is one such person; he is using a prescription prepared by Steve Johnson, but needs to use the lathe to make a wedge-o-meter before he can make much more progress. Many thanks to Bob Bolster, who did much of the supervising, while the rest of us followed his directions on setting up the lathe. Kent Miller and Jerry Schnall were also of great assistance.

Jerry and Guy helped Ed, Steve, and John aluminize their mirrors, or was it the other way around? On Ed's mirror, it took two tries because on the first time the pressure inside the aluminizer wasn't low enough. A newly aluminized mirror is a beautiful thing. 12.5 inches is the biggest we can accommodate. If anybody needs a mirror aluminized or realuminized, then if you are willing to pitch in with the cleaning, we can do it.

Dates and times for April: we have had to return to Fridays because of conflicts with room assignments for classes by the University. The dates will be April 5, 12, 19, and 26, from 7:00 to 10:00 P.M. at the American University's McKinley Hall, Rooms 9 and 13, just off Ward Circle in Northwest Washington, DC. Classes are very informal, and you can start or finish a mirror at any time. We have all the necessary abrasives, glass, pitch, and testing equipment on hand.

For more information, email Guy Brandenburg at gfbranden@earthlink.net or phone him in the evenings or weekends at 202-635-1860.

Dr. Sidney Parsons

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it becomes hotter while increasing in brightness; it then becomes gradually fainter as the temperature decreases from as much as 25000°K to about 5000°K. (K indicates the Kelvin scale. It is the same as the Centigrade scale except that it is measured from absolute zero instead of the freezing point of water. Obviously, for these temperatures, this difference is insignificant.) After this, it continues to cool slowly as it increases sharply in brightness, pausing for a loop toward higher temperatures with only a little increase in brightness. From predicted curves such as these, it is possible to plot isochrones, i.e., plots of absolute magnitude versus temperature at specific times. Since we can assume that both components of a binary have the same age, both stars should lie on the same isochrone. Plots of the components of four pairs showed that, indeed, each pair lies on a single isochrone with a range in ages of from 50 million years to one billion years for the four pairs. For example, for a secondary near the main sequence, the primary is a red supergiant. If the companions have nearly equal visual absolute magnitudes, it is possible to see them as double in the visible but if one is much hotter, at about the same ultraviolet magnitude, it is necessary to observe in the ultraviolet to see both stars. These are single-line spectroscopic binaries in the visible. Occasionally, binaries show only a single set of lines (and thus are single-line spectroscopic binaries) but show indications that the spectrum is composite. In this case, the relative intensities of some of the lines are different from those normally observed in a star of the same apparent type.

Dr. Parsons has used data from several space telescopes to discover companions. He first used observations from TD1, a European satellite launched in 1972 with an 11-inch telescope. This satellite measured star colors from which hot companions could be discovered by their bright ultraviolet colors. He showed plots of log flux (essentially magnitude) against wavelength in the range 1150Å to 1900Å for dwarf stars of types A5, A3, A1, B9, and B7. Although this represents only a temperature range from 9500 deg. to 13000 deg., the change in the spectral energy distribution is striking. The B-type stars are brightest at 1150Å while the A3 and A5 stars have little flux below 1530Å.

Much of the data that Dr. Parsons has used were obtained with the International Ultraviolet Explorer, a joint US and European satellite launched in 1978 and operated productively for 20 years. This carried an 18-inch telescope feeding both near and far ultraviolet spectrographs. He acquired many observations himself, but the archive of observations obtained by others were particularly useful.

One particularly interesting object, 22 Vul, is an eclipsing binary discovered by him and Tom Ake with IUE. New eclipsing binaries provide valuable information since for an eclipsing binary for which both radial velocity curves and a light curve are available, it is possible to determine the individual stellar masses and radii. In this case, 22 Vul is one of a small class of eclipsing binaries in which the secondary can be seen through the atmosphere of the primary. The G3 supergiant is the hottest primary and the B9 dwarf the coolest secondary found in such systems. For 22 Vul, the view through the primary atmosphere is complicated by the presence of circumstellar material seen well beyond the atmosphere. As an example of the importance of eclipsing binaries, recently one was used to find the distance to the LMC with greater precision than by any other method. Much information about the stars can be derived from the spectral energy distributions.

Dr. Parsons has compiled a list of 134 cases of cool + hot binaries. About half of these are from observations by Parsons or by Ake; the remainder are from the IUE archive.

Dr. Parsons explained that the spectra of stars in more than three hundred photos taken with Skylab were difficult to process because of the background. He then showed Skylab spectra of stars of various types. The Skylab spectra were made with an objective prism. The hot companions to cool stars are recognized by the ultraviolet tails on the spectra; G8 III stars for example have almost none.

Dr. Parsons then showed a picture of the Space Telescope Science Institute. An addition had to be added to the building fairly early as both AURA (who holds the NASA contract to manage the Institute) and NASA underestimated the amount of work that would be involved. There are now about 400 - 500 on the Institute staff. On its web site, the STScI now includes data from most other visual and ultraviolet missions as well as plans for the Next Generation Space Telescope. There is also a great deal of other information as illustrated by the two web pages Dr. Parsons showed.

The Fine Guidance Sensors (FGS) on Hubble that hold the pointing of the telescope are interferometers. While two are occupied in the task of holding the telescope, the third can be used to scan across other stars. It can detect binaries as close as 0.02 arcsecs. By comparing the fringes observed with those from nearby stars, close binaries can be detected. These observations reach a distance for cool giants plus hot companions up to 300 - 500 parsecs (~1000 - 1500 lt.yr.). Observations are taken both with the star entering the fringes and leaving, but the two do not repeat well. Nevertheless, the FGS measured the separations and positions of the relative orbit of two M dwarfs that yielded a parallax good to +/- 0.4 mas and masses with errors of only 1.5%. Two transparencies illustrated the small change in the interferometer curve when the two stars were separated by only 0.016 arcsec. The radial velocity curves do not determine the inclination for this system.

There is a suggestion that the HST might be able to measure the orbit of Beta Sct, a G4II primary and a B9 secondary. The semi-major axis of the orbit is 0.006 arcsec., but there are systematic effects at this level. As a result, the observations were not accurate enough to obtain the mass of the bright giant primary. Hipparcos showed that the star is much more distant (and hence brighter) than predicted.

The Faint Object Camera on HST was used to resolve the two components of Cappella at a separation ~0.055 arcsec. and to obtain individual spectra of the two stars. By comparison, a quarter in Paris seen from New York subtends a diameter of 0.001 arcsec.

We thank Dr. Parsons for coming to the NCA meeting and giving a very interesting talk.

Congratulations to NCA Science Fair Winners!

As we go to press, we are pleased to announce the winners in the 2002 science fair judging, to date. They are

Prince George's Regional Science Fair

Junior Division

James M. Bonnell, Kenmoor Middle School, Grade 8
Moon Shadow: Correlating Crater Wall Heights with Size

Senior Division

Katherine R. Conner, Northwestern High School, Grade 9
Estimating the Hyades Diameter with Drift Observations

Sruti Sathyanadhan, Eleanor Roosevelt High School, Grade 12
Asteroidal Occulations and their Comparison with Appulse Observations

Judges: Dr. Wayne H. Warren, Jr. and Dr. Harold Williams

Montgomery County Science Fair

Clair Briggs, Stone Ridge
The Nature of Missing Matter

Peter Yang, Montgomery Blair H.S.
Determination of a Correlation Between Ion and Electron Acceleration in Weak Solar Flares

Judges: Dr. Nancy Grace Roman and Jay Miller

The Fairfax County Science Fair

Margaret Barusch
NRL Infrared Supernovae Search at USNO

Sandeep Garg and Ryan Cooper
The Effect of Light Pollution on Limiting Magnitude of Stars.

These winners will be honored at the May NCA meeting. They will be invited to the dinner with the speaker and NCA members before the meeting. The science fair winners will bring their projects to the meeting, where each will give a three to five minute summary of his or her project. The student will be presented with a certificate. The award also includes a one-year membership in NCA with a one-year subscription to *Sky and Telescope.*

AAVSO Workshop on High-Energy Astrophysics

by Dr. Nancy Grace Roman

You may remember the interesting presentation we had in the fall on the first High-Energy Astrophysics Workshop for Amateur Astronomers. The gist of the workshop was gamma-ray bursts and the help that can be provided by the amateur astronomy community in discoveries and observations of these bursts.

A second workshop on the same subject will be held in Hawaii from June 30 through July 6. Details can be obtained on the AAVSO Web site (www.aavso.org). The deadline for completing the Workshop Attendance/Funding Application has passed, but it is likely that they will accept late registrations.

Support the IDA

Join the International Dark-Sky Association

3225 N. First Avenue Tucson, AZ 85719-2103

www.darksky.org

Meteor Showers April Radiants

Full Moon: March 28, April 27

Major Activity

Radiant	Duration	Maximum
Lyrids (LYR)	April 16-25	April 22

Minor Activity

Radiant	Duration	Maximum
Tau Draconids	March 13-April 17	March 31-April 2
Librids	March 11-May 5	April 17/18
Delta Pavonids	March 21-April 8	April 5/6
Pi Puppids (PPU)	April 18-25	April 23/24
April Ursids	March 18-May 9	April 19/20
Alpha Virginids	March 10-May 6	April 7-18
April Virginids	April 1-16	April 7/8
Gamma Virginids	April 5-21	April 14/15

Daylight Activity

Radiant	Duration	Maximum
April Piscids	April 8-29	Apr. 20/21

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

Other National Capital Area Meetings

University of Maryland Observatory on Metzerott Road. The Department of Astronomy at the University of Maryland, College Park hosts open houses at the Campus Observatory on the 5th and the 20th of every month. On Open House evenings a guest speaker will give approximately a half hour talk about a topic in astronomy. The talk is followed by viewing celestial objects through the observatory's telescopes, weather permitting. If weather does not permit viewing, the talk will still go on as scheduled. Starred talks are those that are likely to be kid-friendly.

Friday, April 5 7:15 and 8:00 p.m.
Dr. Steven White on "Space Weather".
Info: (301) 405-0355. Source: http://www.astro.umd.edu/openhouse/

Goddard Scientific Colloquia
Due to continued construction in Building 3, the Colloquium will be held in the Building 8 auditorium. For the time being, access to Goddard Space Flight Center is limited to those holding Goddard badges or official visitors. You can become an official visitor by finding a badged Goddard employee to escort you. The Scientific Colloquium Committee cannot promise to provide escorts. We regret the inconvenience to our regular guests. Coffee and tea will be served at 3:00 p.m., courtesy of GEWA. If you plan to attend and do not have a NASA badge, please contact Carol Krueger at (301) 286-6878, at least 24 hours beforehand.
April 12 Paul Steinhardt, Princeton University, "The Endless Universe".
Source: lheawww.gsfc.nasa.gov/users/djt/colloq/

University of Maryland at College Park Astronomy Colloquia
All Astronomy Colloquia are held in Room CSS 2400 on Wednesdays at 4:00-5:00 p.m.
April 3 Prof. Caty Pilachowski, Indiana, "Heavy Metal from Ancient Superstars".
April 10 Prof. Jeffrey Linsky, University of Colorado, "The Local Interstellar Medium: Structure, Physical Properties, and Interaction with Stellar Winds".
Special accommodations for individuals with disabilities can be made by calling (301) 405-3001. It would be appreciated if we are notified at least one week in advance. Parking: Please note that most parking meters in Parking Garage 2 have been removed. Parking for visitors is available in the Cashier-Attended Parking Lot at the intersection of Paint Branch & Technology Drive. It is a 5-10 minute walk from the parking lot to the Computer & Space Sciences building.
Source:http://www.astro.umd.edu/colloquia/colloquium.html

NASA/GSFC LEP Seminar Laboratory for Extraterrestrial Physics Brown Bag Seminar
The Laboratory for Extraterrestrial Physics (LEP) at NASA's Goddard Space Flight Center conducts weekly science seminars Fridays at Noon in Room 8 in Building 2 at Goddard.
April 5 Prof. Robert Winglee, University of Washington (Bio), "Prototyping of Mini-Magnetospheric Plasma Propulsion (M2P2)".
April 12 Dr. Robert Benson, NASA Goddard Space Flight Center (Bio), "Magnetospheric Electron Densities and Electron Density Structures Determined from the RPI on IMAGE".
Source: http://lep694.gsfc.nasa.gov/seminar/

Stellar & Extragalactic Astronomy Lunch
Talks are Wednesdays at 12:00 Noon in Room 191 of Building 21.
April 17 George Sonneborn, GSFC, "Report on IAU Symp. 209: Planetary Nebulae".
May 1 Harry Teplitz, GSFC/NOAO, "Emission-Line Galaxies in the STIS Parallels".
Source: http://hires.gsfc.nasa.gov/~gardner/seal

Solar Physics Talk Calendar
Talks are Wednesday at 3:30 in Building 26, Rm. G10 of Goddard Space Flight Center.
April 3 Jack Ireland, Emergent, "Longitudinal Oscillations in Coronal Loops".
http://orpheus.nascom.nasa.gov/~kucera/solar_talks/

Department of Terrestrial Magnetism
Carnegie Institution of Washington
5241 Broad Branch Road, N.W., Washington, D.C. 20015. (202) 478-8820
April 10 Richard J. Walker, University of Maryland Department of Geology, "Highly Siderophile Element Insights to Formation of the Terrestrial Planets".
Seminars are all at 11:00 a.m. and are generally held on Wednesdays in the Seminar Room of the Main Building. DTM is located on 32nd Street one block south of its intersection with Military Road. Proceed south on 32nd Street one block to Jocelyn Street, turn left on Jocelyn and right into the parking lot. Coffee and tea will be served at 10:45 a.m. Please call to confirm that there have been no cancellations.
Source: esparza@dtm.ciw.edu

Space Telescope Science Institute (STScI) Free public Lectures at the Space Telescope Science Institute. Lectures are at 8 p.m. the first Tuesday of every month in the STScI auditorium, on the campus of Johns Hopkins University. Free parking is available. For directions, call 410-338-4700.
April 2 Andrew Fruchter, "Gamma Ray Bursters".
Source: http://hubble.stsci.edu/about_us/open-night.shtml

Montgomery College's Planetarium
Fenton St. in Takoma Park, MD.
Astronomy is the oldest science and one of the few sciences that welcomes amateurs. Astronomy is one of the few sciences accessible to any inquiring mind. Come to a public planetarium program and explore the universe with us. Everyone who looks up at the stars with wonder is an astronomer. The next program is Saturday, April 20 at 7:00 P.M. "Black Holes, Gravity to the Max".
Synopsis: Gravity bends light. If gravity is too strong it bends light completely. Gravity bends (distorts) not only space, but space-time. This planetarium show is a friendly introduction to the General Theory of Relativity suitable for general audiences. You do not have to know what the local metricization of Riemanian manifolds are to appreciate the basis and the results of the General Theory of Relativity. Black Holes are the most extreme results of this theory. They are literally Gravity to the Max. By looking at something in its most extreme case, facets that are not revealed in mundane application like normal falling motion on the earth are shown. The infinite time dilation (time asymmetry) between an

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Other National Capital Area Meetings

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outside the hole observer and an observer who decides to visit the hole are explained. Some of the other weird properties of Black Holes including recent observation of the vicinity of black holes will be shared with the audience. Anyone with an inquiring mind and imagination of a typical third grader can enjoy this planetarium show. Those few people who do not want to flex (distort) or exercise (move) their minds are advised to stay home and watch mindless television situation comedies that are doubtless on at the same time on Saturday evening.

Saturday, 11 May at 7:00 P.M. "The Search for Extraterrestrial Intelligence". The planetarium shows 1,834 naked eye stars, the Milky Way (the diffuse band of light caused by the disk of our own galaxy), and the five naked-eye planets (Mercury, Venus, Mars, Jupiter, and Saturn) under a twenty-four-foot dome with forty-two comfortable chairs. The planetarium is located on Fenton Street on the Takoma Park campus of Montgomery College. It is attached to the Science South building on the ground level and has a conspicuous silver-colored domed roof.
The stars are the province of all of mankind. An astrophysicist will answer questions about the universe. Phone 301-650-1463.
Source: http://www.mc.cc.md.us/Departments/planet/

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. 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: 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.
April 14 Dr. David DeVorkin, "Explore the Universe". 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.

Greenbelt Astronomy Club
The Greenbelt Astronomy Club meets at 7:30 p.m. on the last Thursday of each month (except when it falls on a holiday) at the H.B. Owens Science Center on Greenbelt Road east of Greenbelt, Maryland.
April 25 Club Meeting Main Presentation: Margaret Alleva, "The Dynamic Universe". Ms. Alleva, established area artist, is a painterly abstractionist who will be exhibiting works from her Cosmic Series. Inspired by satellite imagery from the Hubble telescope, the artist has produced a series of paintings dramatizing the immense, mysterious, and dynamic forms of the universe. See www.margaretalleva.com for details about her upcoming show May 30.

Dr. Andrew F. Cheng

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Bell Laboratories and an assistant professor of physics at Rutgers University prior to joining the Applied Physics Laboratory in 1983. He has been an Interdisciplinary Scientist on the Galileo mission to Jupiter, a Co-Investigator on the Cassini mission to Saturn, and a team member on the Japanese-US MUSES-C mission to a near-Earth asteroid. He has been the Project Scientist for the Near Earth Asteroid Rendezvous (NEAR) mission to asteroid Eros. He is currently a science team member on the Mercury Surface, Space Environment, Geochemistry, and Ranging (MESSENGER) and the Comet Nucleus Tour (CONTOUR) missions. Dr. Cheng is a fellow of the American Physical Society and a member of the American Geophysical Union and the American Astronomical Society.

Come See the Stars!

by Joe Morris

Exploring the Sky 2002-2003 Schedule

Date	Time	Notes
April 13	8:30 P.M.	Astronomy Day April 20
May 11	9:00 P.M.	Mercury, Venus, Mars, Saturn low in WNW
June 8	9:00 P.M. June 21	Summer solstice 9:23 A.M.
July 13	9:00 P.M.	3-1/2 day old Moon
August 3	8:30 P.M.	Perseid meteor shower August 12-13
September7	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
http: //www.capitalastronomers.org

A presentation of the National Park Service and National Capital Astronomers

Mid-Atlantic Occultations and Expeditions

by David Dunham

Asteroidal Occultations

DATE	Day	EST	Star	Mag	Asteroid	dmag	Dur s	Ap. in.	Location
Apr 8	Mon	22:23	TYC28961051	11.0	Atalante	2.3	3	7	S. Carolina
Apr 8	Mon	23:42	TYC09000632	12.1	Prokne	0.6	12	8	n. Penn.
Apr 15	Mon	3:07	S04 08576	11.4	ITA	2.7	5	8	n. New York
Apr 15	Mon	22:57	SAO 117121	7.3	Hyperborea	8.2	6	2	n. Minnesota
Apr 20	Sat	3:45	PPM 731421	10.3	Juewa	1.0	16	6	n. OH, s. ON
Apr 23	Tue	22:25	TYC01593079	11.6	Palisana	3.1	3	8	n. Maine
May 2	Thu	0:27	TYC19321078	11.8	Metis	0.4	8	8	Louisiana
May 5	Sun	1:22	TYC14190791	10.3	Bellona	1.6	12	6	DC, Maryland

Grazing Occultations

DATE	Day	EST	Star	Mag	% alt	CA	Location
Apr 16	Tue	20:47	SAO 76776	7.8	15+ 31	0N	Randallstown, MD; Sun -11
Apr 21	Sun	0:07	SAO 80431	9.3	57+ 35	6N	La Plata, MD; Manassas, VA
Apr 23	Tue	1:44	ZC 1569	6.9	78+ 32	4N	Edgewood, MD; New Freedom, PA
Apr 30	Tue	2:37	SAO 185375	8.5	87- 24	12S	Laurel & e. Beltsville, MD
May 6	Mon	4:22	SAO 165327	7.8	31- 7	5S	Lakesville & Assateague, MD

Total Lunar Occultations

DATE	Day	EST		Star	Mag	%	alt	CA	Sp.	Notes
Apr 16	Tue	20:40	D	SAO 076776	7.8	16+	32	13N	A0	Sun -11;graze,Baltimore
Apr 17	Wed	20:42	D	SAO 077526	7.9	24+	43	81S	A0	Sun alt. -11 deg.
Apr 18	Thu	21:42	D	SAO 078706	7.0	34+	42	58N	K2	dbl.,7.2&10.1,15",PA261
Apr 18	Thu	23:10	D	SAO 078761	8.0	34+	26	76S	F8	
Apr 19	Fri	22:47	D	SAO 079679	7.7	45+	40	42S	B9	
Apr 19	Fri	23:02	D	SAO 079688	7.5	45+	37	83S	K0	
Apr 20	Sat	0:05	D	T Gem	8-15	45+	26	49N	S4	Mira var., SAO 79717
Apr 20	Sat	21:58	D	gamma Cnc	4.7	56+	58	10S	A1	ZC 1308, spectrosc.bin.
Apr 20	Sat	23:28	D	SAO 080425	8.1	56+	42	62N	K0	
Apr 23	Tue	1:38	D	ZC 1569	6.9	79+	33	17N	A2	Graze at Aberdeen, MD
Apr 25	Thu	20:28	D	ZC 1923	6.8	98+	22	21N	K0	Sun -7; 4"to terminator
Apr 30	Tue	1:57	R	ZC 2510	6.2	87-	25	62N	K0	
Apr 30	Tue	3:21	R	44 Oph	4.2	87-	26	23N	A3	possible close double
May 5	Sun	4:13	R	ZC 3227	6.3	40-	10	57N	K0	

D following the time denotes a disappearance, while R indicates that the event is a reappearance. When a power (x; actually, zoom factor) is given in the Notes, the event can probably be recorded directly with a camcorder of that power with no telescope needed. The times are for Greenbelt, MD, and will be good to within +/-1 min. for other locations in the Washington-Baltimore metropolitan areas unless the cusp angle (CA) is less than 30 deg., in which case, it might be as much as 5 minutes different for other locations across the region. Mag is the star's magnitude. % is the percent of the Moon's visible disk that is sunlit, followed by a + indicating that the Moon is waxing and - showing that it is waning. So 0 is new moon, 50+ is first quarter, 100+ or - is full moon, and 50- is last quarter. The Moon is crescent if % is less than 50 and is gibbous if it is more than 50. Cusp Angle is described more fully at http://www.lunar-occultations.com/iota. Sp. is spectral type-color, O,B, blue; A,F,white; G,yellow; K,orange; M,N,S,C red

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

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

Getting to the NCA Monthly Meeting

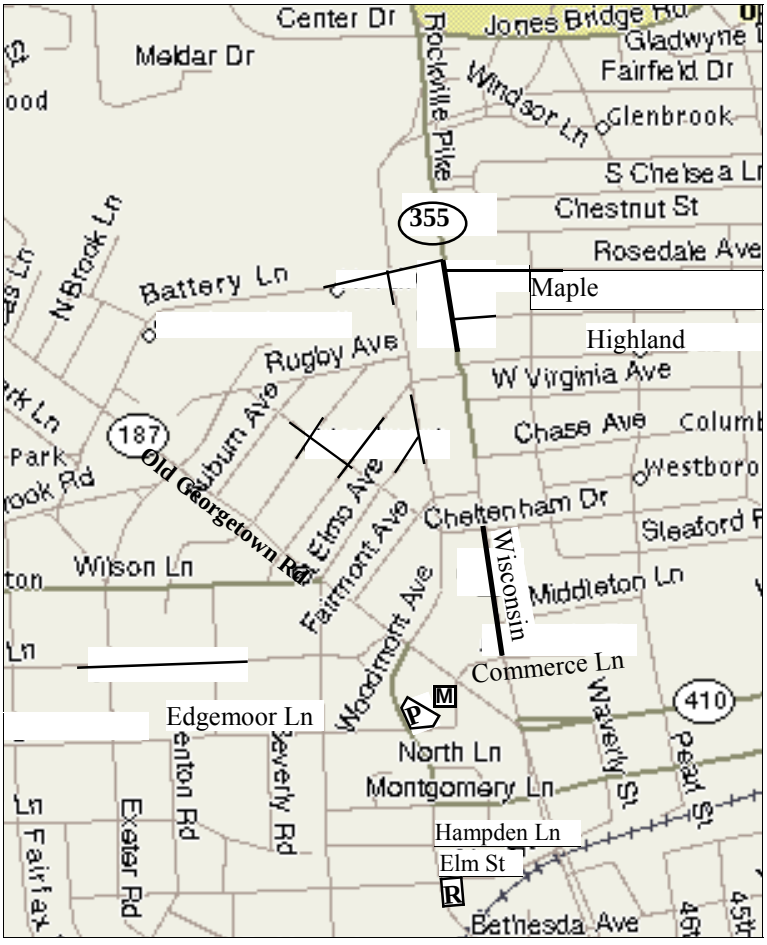
Saturday, April 6

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. Andrew F. Cheng will present the featured talk for the March 2 meeting of National Capital Astronomers, ."New Horizons: First Mission to Pluto"

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

Jaleo Restaurant
7271 Woodmont Avenue
Bethesda, MD
301 913-0003



Directions to the New Meeting Place

From North of Bethesda

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

From South of Bethesda

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

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

Directions to the Restaurant

1. Following the meeting, go South on Woodmont Ave.
2. Go past Montgomery Lane and Hampden Lane.
3. The restaurant is on the Southeast corner of Woodmont Ave. and Elm St. (See **R** on map.)

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

National Capital Astronomers, Inc.

SERVING SCIENCE & SOCIETY SINCE 1937

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

SERVICES & ACTIVITIES:

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

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

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

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

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

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

Tours: On several occasions, NCA has sponsored tours of astronomical interest, mainly to observatories (such as the National Radio Astronomy Observatory) and to the solar eclipses of 1998 and 1999. Contact: Sue Bassett wb3enm@amsat.org

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

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

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

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

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

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

Name(s): _____

Address: _____

_____

Telephone: _____ E-mail: _____

Other family members who should receive a membership card: _____

Dues:

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

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