Star Dust

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June Speaker: Dr. Nancy Grace Roman - "The Hertzsprung-Russell Diagram"

Dr. Nancy Grace Roman, NASA, Retired, will present the talk "The Hertzsprung-Russell Diagram" at the June 9 meeting of the National Capital Astronomers, 7:30 P.M., at the University of Maryland Observatory in College Park, Maryland.

Abstract
The H-R (Hertzsprung-Russell) diagram was originally a plot of spectral type against apparent magnitude. It has been extended in various ways over time, primarily with the substitution of absolute magnitudes for apparent magnitudes and temperature or color for spectral type. This talk will be a tutorial on the components of the diagram starting with a review of spectral types of normal stars and their physical bases. The interpretation of stellar evolution as illustrated by the H-R diagram will be discussed briefly. Next, various ways of calibrating features of the diagram and the use of the diagram will be described. Finally, spectral types that have been added to the original set will be described and, if time permits, the spectra of some important types of peculiar stars,

Biography
Dr. Roman's thesis was on the study of the Ursa Major moving cluster as a way of calibrating the absolute magnitudes of main sequence stars from type A to type K. She then studied younger clusters and associations to extend the calibration to hotter stars. Finally, she studied the motions of bright stars to calibrate the absolute magnitudes of G and K giant stars. The recognition of differences in the spectra of the bright stars led her to an exploration of old stars. Leaving work in spectral classification and photoelectric photometry, she spent 3 1/2 years at the U.S. Naval Research Laboratory working in radio astronomy before embarking on 21 years with the scientific responsibility for NASA's astronomy program. After taking early retirement, she worked for several "beltway bandits" supporting the Goddard Space Flight Center.

Note: This month only, we will be going to a new restaurant for our Dinner Before the Meeting.
See Pages 2 and 6.

Elections at June 9 Meeting

Jay H. Miller, Nominating Committee Chairman

NCA will hold its annual election at the June meeting. Note that the various positions have assistants. This is something new for NCA and should make it easier for the officers. The vice president is also the assistant president. Also note that the offices of secretary and treasurer have been combined. This is common in many organizations and they normally work closely together in NCA, anyway.

The candidates for NCA offices are:
President - Walter Faust
Vice president - Jack Gaffey
Asst. V.P. - John Hornstein
Secretary-Treasurer - Michael Brabanski
Asst. Sec'y-Treas. - Jeffrey Norman
Trustee - Wayne Warren

Additional nominations may be made at the election meeting on June 9.

Science Fair Award Winners to be Honored

We will honor the winners of the NCA Astroscience Awards in the 2007 science fairs at the June NCA meeting. The winners will bring their projects to the meeting, where each will give a three to five-minute summary of his or her project. Each student will be presented with a certificate, a one-year membership in NCA, and a one-year subscription to Sky and Telescope.

Calendar of Monthly Events

The Public is Welcome!

NCA Home Page: http://capitalastronomers.org

NCA Mirror- and Telescope-making Classes: Fridays, June 1, 8, 15, 22, and 29, 6:30 to 9:30 P.M. at the Chevy Chase Community Center, at the northeast corner of the intersection of McKinley Street and Connecticut Avenue, N.W. Contact instructor Guy Brandenburg at 202-635-1860 or email him at gfbrandenburg @yahoo.com.

Open house talks and observing at the University of Maryland Observatory in College Park on the 5th and 20th of every month at 8 P.M. (Nov.-Apr.) or 9 P.M. (May-Oct.). The talks are non-technical. There is telescope viewing afterward if the sky is clear.

Dinner with NCA members and speaker: Saturday, June 9 at 5:30 P.M., preceding the meeting, at the Three Brothers Pizza of Greenbelt restaurant, 6160 Greenbelt Road, Greenbelt, MD. 301 474 5330 www.threebrotherspizza.com. See map and directions on Page 6.

Upcoming NCA Meetings—Saturdays

June 9, Dr. Nancy Grace Roman, NASA, Retired, will speak about the Hertzsprung-Russell Diagram.

Come See the Stars!

Exploring the Sky

by Joe Morris

2007 Schedule

Date	Time	Things of interest
6/16	9:00 P.M.	Venus, Saturn, and Regulus in a line
7/14	9:00 P.M.	Venus bright but low; new Moon
8/18	8:30 P.M.	Perseid meteors; Moon at apogee
9/29	8:00 P.M.	Rock Creek Park day; Moon just past full
10/20	7:30 P.M.	Orionid meteors; Moon past first quarter
11/3	7:00 P.M.	Pleiades; Andromeda near zenith

Exploring the Sky is an informal program that for over 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 next to the field.

Beginners (including children) and experienced stargazers are all welcome — and it's free!

Questions? Call the Nature Center at (202) 895-6070 or check the Internet sites: www.nps.gov/rocr/planyourvisit/expsky.htm or www.capitalastronomers.org

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

Changes in *Sky & Telescope* Renewal Process

Mike Brabanski, NCA Treasurer

For those members who subscribe to *Sky & Telescope* through NCA, there will be a change in the annual subscription renewal process: instead of including the S&T mail-in stub with your NCA membership renewal, as has been the case since the special discount rate was first offered to astronomy club members decades ago, you should now mail in your annual S&T renewal with payment directly to Sky Publishing Corporation.

The astronomy-club discount rate (currently at $32.95) will continue to remain in effect for astronomy club members. Verification to Sky & Telescope of a subscriber's membership in NCA will be done annually by the Secretary/Treasurer.

Only new NCA members who wish to get S&T will need to include the first year's subscription cost with their initial NCA membership application (so that the Treasurer can officially notify S&T of their membership status and at the same time pass through the subscription price for that first year.) In succeeding years they will then renew directly with S&T.

NCA membership forms have been modified to reflect these changes: the forms found in Star Dust and on our website are meant for prospective new members and hence retain the $38/$43 option for a student/adult membership with S&T while the annual renewal form mailed out by the Secretary shows only the basic $5/$10 membership options.

If you encounter any problems with your subscription renewal, especially if S&T does not seem to recognize your membership in our astronomy club, i.e., its discounted rate, please let me know by e-mail or phone.

The deadline for the September Star Dust is August 22. Please send your material to Elliott Fein by that date to ensure inclusion.

Send submissions to Elliott Fein at elliott.fein @verizon.net.

Articles submitted may be edited to fit the space available.

Review of Talk by Dr. Neil Gehrels: "Gamma-Ray Burst Discoveries with Swift"

by Dr. Wayne H. Warren Jr.

The monthly NCA meeting of November 11, 2006 was highlighted by a lecture on the most energetic events in the Universe. The lecture was given by Dr. Neil Gehrels, Head of the Astroparticle Physics Laboratory at NASA's Goddard Space Flight Center. Dr. Gehrels is the Principal Investigator of NASA's SWIFT Gamma-Ray Burst (GRB) mission.

Dr. Gehrels began his lecture by explaining that γ rays are very high energy (meaning extremely high frequency and short wavelength, since $c = \lambda\nu$) electromagnetic radiation. Recalling that the energy of a photon is given by the Planck equation, $E = h\nu = hc/\lambda$, where h is Planck's constant (6.63×10^{-34} Js), the very high frequency of γ radiation means that it is very energetic and extremely penetrating. GRBs are flashes of γ rays that originate at distant sources in the Universe.

Cosmic γ rays were discovered by the *Vela* satellites, which were launched in the early 1960s to enforce the nuclear test ban treaty made with the Soviets in 1962. The identification of the source of the γ radiation was difficult, even with the suite of satellites all detecting events in the γ-ray spectrum. This was similar in principle to the difficulty that Karl Jansky had when he detected unknown noise in the radio region of the spectrum in the 1930s. The γ-ray events detected by the *Vela* satellites were anywhere from a few to tens of seconds in duration and occurred with a typical frequency of once daily. The intriguing thing about these flashes from the first discoveries is that they are so bright, far outshining all other sources in the γ-ray sky. Although it has taken many years to gain an understanding of the physical phenomena that produce GRBs, we are beginning to comprehend the high-energy processes from which they originate.

This knowledge has accumulated through a series of γ-ray observatories. The first large observatory dedicated to the γ-ray region was the Compton Observatory that flew from 1991 to 2000. A plot of the some 2700 bursts detected by the CGRO mission showed an isotropic distribution over the whole sky. Since the sources were so bright, the speculation was that they were local. Their isotropic distribution suggested that they might even originate in a region around the Solar System such as the Oort Cloud, from which long-period comets come. When the Oort Cloud hypothesis was shown not to be feasible and the galactic origin was ruled out by the uniform distribution (a galactic origin would have shown strong concentration toward the galactic plane), the cosmological origin of the GRBs was pretty firmly established.

The next advance was made by BeppoSAX, an Italian satellite having a Dutch GRB detector on board. Not only did the satellite have X-ray detectors as well, but it had the capability of rapid repointing after the detection of a GRB. Thus, following a γ-ray burst, the satellite was able to detect X rays from the same source and locate that source accurately on the sky, since X rays can be traced back to an accurate position, whereas γ rays cannot. It was found that each burst, although of a different brightness from all others, occurred only once and, again, with an isotropic distribution. The next step was to detect GRB afterglows in the optical region of the spectrum, where extremely accurate positions could be determined. Here, the collaboration of professional and amateur astronomers was significant. The AAVSO became interested in applying its considerable resources and groups of observers to the problem. Workshops for variable-star observers were convened and advanced amateurs were taught how to identify GRB afterglows and report them to professional observatories for accurate position determinations.

Optical detections allowed the identification of host galaxies and subsequent redshift determinations showed that many GRBs were coming from immense distances. This confirmed that the bursts were releasing very large amounts of energy comparable to the quantities generated by supernovae (10^{51} ergs), but within the few seconds that a burst occurred. This is approximately the amount of energy emitted by a large spiral galaxy such as the Milky Way.

Dr. Gehrels pointed out the fact that there are two classes of GRBs, the long ones lasting > 2 s and the more recently discovered short bursts of < 2 s duration. All of the work before SWIFT dealt with the former group. Naturally, the obvious question popped up: how can a physical process that occurs throughout the Universe produce so much energy in such a short time?

The two models proposed for the generation of this much energy were the collapse of a massive star to form a black hole and the merging of two neutron stars to form a singularity. In both cases, almost the entire rest mass energy of the source(s) goes into producing the GRB. This can be seen by equating the energy $E = GM_m/r \approx mc^2$. Setting $r = R_{BH}$, we have an energy of $2GM/c^2$, which for a mass of 3 times solar, yields 3×10^{54} ergs. Following significant numbers of observations by the Hubble Space Telescope and subsequent analyses, it became apparent that the collapsar (collapse of a massive star) model seemed to explain the data best. This was consistent with the fact that we already knew that the central areas of galaxies are populated by massive, short-lived stars.

In the late 1990s, the state of knowledge of GRBs was such that we had pretty good ideas about the nature of the long bursts, but almost no information at all about the short ones. Thus, the SWIFT mission was proposed as an observatory dedicated to detecting and studying GRBs. The spacecraft was designed as a self-contained observatory containing γ- and X-ray detectors, plus a UV-sensitive optical telescope having a slewing time of only about 1 minute. Thus, afterglows can be observed almost immediately after a GRB occurs. The sequence is that the γ-ray detector gives an approximate position that is refined by the X-ray image, then further refined with a finder image produced by the optical telescope. The latter chart allows direct comparison with optical objects and transmission to large ground-based observatories that can follow up with deeper images right away. Ground-based facilities include some tens of GRB-dedicated telescopes, 8-meter telescopes with rapid response infrared spectrographs, space observatories such as HST, Chandra, XMM, and the Spitzer infrared observatory. Radio facilities such as the VLA, ALMA, and coming neutrino detectors and gravitational wave interferometers will all improve the coverage in multi wavelength regions.

Dr. Gehrels then described the proposal process, the intense competition involved, and the construction of the satellite starting in 2003 after the awarding of mission in 1999. The optical telescope was provided through a collaboration between groups in the UK and Penn State. The X-ray telescope

(Continued on page 4)

(Continued from page 3)
was built by groups in Italy and the UK. The γ-ray burst detector (known as BAT) was developed as a new type of instrument at the Goddard Space Flight Center. Tests of the large grid of sophisticated γ-ray detectors showed good performance

As of the date of the talk, the SWIFT detectors had observed 190 GRBs. Events are being observed at the rate of two per week, a higher frequency than observed by any of the previous satellites. A display of many of the plots showed the remarkable property that no two bursts are the same. It is also significant that the detailed (and erratic) time structure of each burst is different. According to Dr. Gehrels, this may have something to do with the differing gas flows onto the black hole event horizons. Interestingly, unlike the GRB structures, the X-ray light curves look a little more like supernova decays; i.e., there is a monotonic drop of the intensity over days to weeks. The optical telescope also has a filter wheel that allows light curves to be measured in many different colors from the UV through the visible part of the spectrum.

Dr. Gehrels next talked about some of the individual GRBs observed. One fascinating burst on 2005 September 5 showed a light curve with a slow rise not typical of a GRB at all. Optical observations by the Subaru telescope on Mauna Kea showed spectral lines that were used to determine an incredible redshift of 6.3, meaning that the travel time for the γ rays to reach the spacecraft was 12.8 billion years, less than a billion years after the Big Bang. Thus, the light curve had been stretched out by the expansion of spacetime. When the curve was recompressed to what it looked like at the source, it looked like a typical GRB. The multi wavelength observations of this distant source allowed the metallicity (the ratio of all elements heavier than helium to hydrogen and helium combined) of the host galaxy to be determined. As expected for an object so distant, the metallicity turned out to be only 5% solar.

It turns out that there are pluses and minuses to using distant GRBs to study the early Universe. One definite plus is that these events are extremely bright, sometimes far outshining their host galaxies. A down side is that the events must be discovered and studied immediately, since they decay quickly over a timescale of a few hours to a few days. It is often difficult to break in on the programs of large telescopes to get them to observe a recent GRB. Dr. Gehrels displayed a rather clean (for such a faint object) spectrum of a GRB that occurred on 2005 May 5. That spectrum, taken with one of the 10-meter Keck telescopes on Mauna Kea, allowed the determination of elemental abundances of carbon, nitrogen, oxygen, and iron. The mass and metallicity of the progenitor, as well as the density in the region surrounding the star have also been determined. As part of the big picture, it should be possible to determine the metallicity as a function of distance; this would be a major achievement that this reviewer would judge to be comparable to the accurate determination of the redshift-distance relation.

Dr. Gehrels then showed a montage of GRBs that occurred prior to SWIFT and were imaged with the HST. It turns out the all these long bursts have common characteristics: they all occur in the brightest regions of the host galaxies, which are all subluminous irregular galaxies; they are concentrated in regions of the most massive stars; and they are almost entirely restricted to low-metallicity galaxies. Why should these unexpected characteristics prevail? It may be that these events, which produce black holes directly, do not occur very often (or not at all) in higher metallicity objects. This may be because of higher binding energy in low-metallicity objects. This might result in high-mass stars collapsing only to neutron stars if they have higher metal abundances. Of course, there are many known black holes in our own Galaxy, but they may have formed when the Milky Way was younger and lower in metallicity. If this turns out to be the case, it will be a major discovery and may send theorists back to their drawing boards.

Dr. Gehrels showed a simulation of the collapse of a massive star to form a black hole and the resulting discharge of γ rays that bounce off the core as it collapses. This may occur because, for some reason, the γ rays can't be absorbed by the black hole. The radiation comes out in jets 180° apart, so that we only see a rather small fraction of the events that occur when the jets just happen to be pointing toward us.

A tabulation of GRBs observed for which redshifts have been determined shows that a rather large number of high-redshift bursts are being observed. A histogram shows clearly that SWIFT is seeing quite a bit farther than previous missions.

Dr. Gehrels next turned to the only nearby GRB that has been so far observed by SWIFT. This event had a redshift of only 0.03 (145 Mpc) and occurred on 2006 February 18. There had been a few nearby bursts observed with other satellites and they all seem to have unusual properties. The burst cited above lasted for about 35 minutes, as opposed to a matter of seconds for most bursts. The real shock was that a new supernova appeared in exactly the part of the sky that had produced the GRB. Thus, the same object that produced the GRB also produced a supernova (SN 2006aj). The early detection allowed this supernova to be observed with large telescopes from core collapse all the way through the fading of the light curve to below detection brightness. Further study of the event shows that it was subluminous.

Finally, the short bursts were described. A short burst that occurred on 2005 May 5 gave an X-ray position that fell right atop a giant elliptical galaxy. Two more short bursts occurred outside the central region of a star-forming galaxy and in another elliptical galaxy, where no classical GRBs have been observed. Going back to the merging neutron-star model, it appears that the short bursts fit this model nicely. The events are outside the central regions of galaxies and occur in elliptical galaxies where neutron stars certainly exist. Thus, as supernovae, GRBs seem to occur in two distinct classes that are due to completely separate physical processes. Only future observations will allow us to gain a full understanding of short bursts. Hopefully, we will eventually be able to detect the gravitational waves that are being emitted from such neutron-star mergers.

As a wrap-up to his talk, Dr. Gehrels discussed the statistics of different types of explosions. Taking into consideration the number of supernovae observed per year and integrating over the whole Universe, it is estimated that about six Type II (massive stars) supernovae are occurring each second in the whole Universe. This translates to 200,000 per Gpc per year. Other types of explosions occur at lower rates, but the numbers are still mind-boggling.

Hopefully, the SWIFT satellite will last well into the future because its continuing observations are sure to produce greatly improved statistics that will heighten our understanding of both late stellar evolution and the structure of the distant Universe.

The NCA is indebted to Dr. Gehrels for this very interesting and stimulating talk. Hopefully, we can invite him back sometime in the future for an update on what we have learned from the SWIFT mission and new observations from the next exciting γ-ray mission, which is named GLAST (Gamma-Ray Large Area Space Telescope).

Mid-Atlantic Occultations and Expeditions to Mid-September

by Dr. David Dunham

Asteroidal Occultations

2007 Date	Day	EDT	Star	Mag	Asteroid	dmag	dur. s	Ap. in.	Location
Jun 22	Fri	4:06	TYC50660205	10.3	Vitja	4.4	6	5	s.VA,s.KY
Jul 7	Sat	5:01	SAO 146541	7.3	Tamashima	9.5	3	2	eVA,wMD,wPA
Jul 13	Fri	1:24	2UC25217319	13.6	2004 OK14	9.6	4	12	TNO event
Jul 18	Wed	23:08	TYC61561399	11.1	Deborah	4.0	6	6	TN,sVA,seMD
Jul 23	Mon	21:12	SAO 124555	9.1	Meliboea	2.5	18	2	sGA,SC,seNC?
Jul 30	Mon	23:04	2UC29462601	12.0	2001 FZ173	9.5	10	9	TNO event
Aug 2	Thu	5:05	TYC06130905	11.6	Vindobona	3.0	15	8	eVA,seMD,DE,NJ
Aug 19	Sun	3:54	2UC33330854	13.7	2002 PQ152	8.4	3	12	TNO event
Aug 27	Mon	0:47	TYC57990982	11.9	Rollandia	3.0	7	8	NJ,sMD,DC,VA
Sep 7	Fri	0:07	SAO 108787	8.2	Warhol	7.3	1	2	VA,WV,KY

TNO event: Trans-Neptunian Object, event valuable but path uncertain

Lunar Grazing Occultations

DATE	Day	EDT	Star	Mag	%	alt	CA	Location
Jun 19	Tue	21:20	Regulus	1.4	26+	35	16N	Charleston, SC; Sun alt. -9
Jul 10	Tue	5:09	SAO 75882	8.5	21-	35	14N	Mercersburg & Millville, PA
Jul 20	Fri	21:58	SAO 138970	8.7	38+	18	6N	Crocket&TriangleVA;NanjemoyMD
Aug 6	Mon	1:50	ZC 438	6.8	46-	19	9N	Pittsburgh, PA; Rochester, NY
Aug 8	Wed	3:21	ZC 756	6.6	23-	20	11N	Doswell,VA;Oakvil&Tuckahoe,MD
Aug 8	Wed	5:33	ZC 771	6.0	23-	45	13N	Salvo, NC; Sun alt. -9 deg.
Sep 8	Sat	0:19	SAO 80439	8.2	10-	7	6N	Deerwood,Columbia,&BaltimorMD

Total Lunar Occultations

DATE	Day	EDT	Ph	Star	Mag	%	alt	CA	Sp.	Notes
Jun 10	Sun	4:54	R	62 Piscium	5.9	29-	30	83S	G8	ZC 103; Sun alt. -8 dg.
Jun 10	Sun	5:11	R	delta Psc	4.4	29-	33	54N	K5	ZC 105; Sun alt. -6 dg.
Jun 17	Sun	21:49	D	ZC 1269	6.9	10+	13	41S	G5	Azimuth 286 deg.
Jun 18	Mon	9:40	R	Venus	-4.4	15+	4	-34S		Dur 83s; Az 69; Sun +43
Jul 3	Tue	0:23	R	eta Cap	4.9	92-	17	76N	A5	ZC3078;mg2 7 ".2,PA185
Jul 5	Thu	3:47	R	lambda Aqr	3.7	76-	40	81N	M2	ZC 3353
Jul 7	Sat	1:37	R	ZC 64	6.5	55-	14	18S	F5	Azimuth 95 deg.
Jul 16	Mon	21:58	D	23 Leonis	6.5	7+	1	35S	M0	ZC 1449; Azimuth 286
Jul 31	Tue	22:46	R	sigma Aqr	4.8	94-	13	45S	A0	ZC3307;Az115;mg2 8,4"
Aug 5	Sun	5:57	R	ZC 317	6.4	55-	68	41S	F5	Sun alt. -3 deg.
Aug 6	Mon	1:59	R	ZC 438	6.8	45-	23	38N	A3	mg2 7.6,".5, PA graze
Aug 6	Mon	2:08	R	epsilonAri	4.7	45-	24	71S	A2	ZC440;mg2 5.6,1.4",209
Aug 21	Tue	20:54	D	ZC 2370	6.9	60+	21	65N	B8	Sun alt. -12 deg.
Aug 26	Sun	3:12	D	ZC 2991	6.1	94+	8	80N	K5	Azimuth 232 deg.
Aug 28	Tue	5:32	D	ZC 3282	7.8	30E	11	55U	K0	Az 247; lunar eclipse
Aug 30	Thu	23:23	R	delta Psc	4.4	90-	28	40S	K5	ZC 105
Sep 2	Sun	0:57	R	mu Arietis	5.7	71-	34	55S	A0	ZC 399; close triple
Sep 3	Mon	2:20	R	Taygeta	4.3	59-	41	43S	B6	ZC 539; close double
Sep 3	Mon	2:35	R	18 Tauri	5.7	59-	44	59N	B8	ZC 538; close double
Sep 3	Mon	2:41	R	22 Tauri	6.4	59-	45	36S	A0	ZC 543;maybe double?
Sep 3	Mon	2:43	R	21 Tauri	5.8	59-	45	46S	B8	ZC 542; Pleiades
Sep 3	Mon	4:09	R	ZC 555	6.4	58-	61	88S	K5	
Sep 3	Mon	5:56	R	ZC 571	6.8	58-	76	62S	A2	Sun -9; spec. binary
Sep 5	Wed	2:59	R	ZC 885	5.6	36-	27	79N	G7	

More information is at http://iota.jhuapl.edu/exped.htm .

David Dunham, dunham@starpower.net, phone 301-474-4722

Getting to the June NCA Dinner Before the Meeting

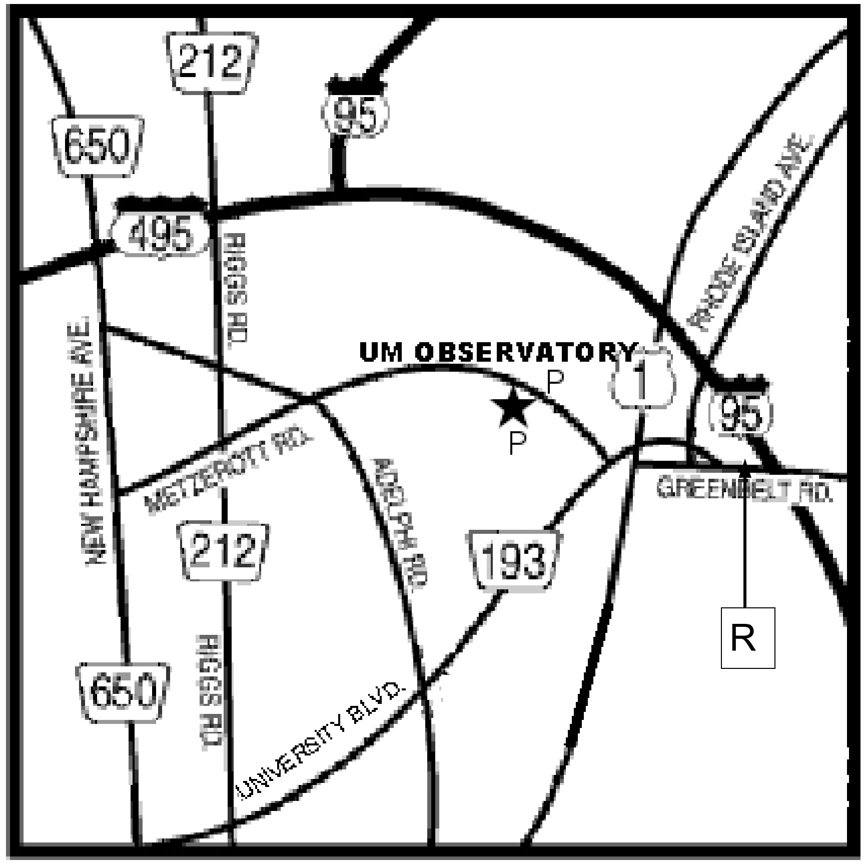
I would suggest that people enter the Beltway Plaza Shopping Center at the 62nd Avenue entrance, which is near the Wendy's and across Greenbelt Road from Blockbuster Video. From the inner loop of the Beltway, take the Kenilworth Avenue exit and bear right up the ramp to Greenbelt Road West. 62nd Avenue is the second light. Enter the shopping center and turn right at the STOP sign, then proceed around the side of the Target to the rear of the shopping center. Go through the enclosed garage behind the Target to an open area where the rear entrance to the 3 Brothers Restaurant is located. This is much easier than parking in the front and going through the mall to the restaurant. Reserved seating will be in the elevated area of the restaurant inside the windows separating the restaurant from the mall entrance. The 3 Brothers entrance is next to the rear entrance to the mall.
Wayne Warren

To get to the Observatory from 3 Brothers, coming out of the mall turn right (west) onto MD 193/Greenbelt Rd. Follow 193 approximately 2.0 miles, turn right at the light onto Metzerott Rd. and proceed about a mile to the observatory. (The observatory is after the traffic light at St. Andrews Place.) The observatory is on the south side of Metzerott Rd., directly opposite the UM System Administration building; you can park there if the observatory lot is full, but be careful crossing Metzerott Road.
Jeff Guerber

Getting to the NCA Monthly Meeting

Jeff Guerber

NCA meetings are now held at 7:30 p.m. at the University of Maryland Observatory, in College Park on Metzerott Rd. between University Blvd. (MD-193) and Adelphi Rd. To get there from the Capital Beltway (I-495), either take US Rt. 1 south about a mile, turning right onto MD-193 West, then at the first light turn right onto Metzerott; or, take New Hampshire Ave. (MD-650) south, turn left at the second light onto Adelphi Rd., two more lights, turn left onto Metzerott, and proceed about a mile to the observatory. (The observatory is after the traffic light at St. Andrews Place.) The observatory is on the south side of Metzerott Rd., directly opposite the UM System Administration building; you can park there if the observatory lot is full, but be careful crossing Metzerott Rd.



Getting to the NCA Meeting
Star=Observatory R=Restaurant P=Parking

Observing after the Meeting

Elizabeth Warner

Following the meeting, members and guests are welcome to tour through the Observatory. Weather permitting, several of the telescopes will also be set up for viewing.

Are You Coming to Dinner?

If you are planning to come to the dinner before the meeting, please tell Benson J. Simon, telephone: 301-776-6721, e-mail bjs32@cornell.edu so that we can make reservations for the right number of people.

Do You Want to Get *Star Dust* Electronically?

Any member wishing to receive *Star Dust,* the newsletter of the National Capital Astronomers, via e-mail as a PDF file attachment, instead of hardcopy via U.S. Mail, should contact Nancy Grace Roman, the NCA Secretary, at nancy.roman6 @verizon.net or 301-656-6092 (home).

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National Capital Astronomers, Inc.

http://capitalastronomers.org

SERVING SCIENCE & SOCIETY SINCE 1937

NCA is a nonprofit, membership-supported, volunteer-run, public-service corporation dedicated to advancing astronomy, space technology, and related sciences through information, participation, and inspiration, via research, lectures, presentations, publications, expeditions, tours, public interpretation, and education. NCA is the astronomy affiliate of the Washington Academy of Sciences. NCA is an IRS Section 501(c)(3) tax-deductible organization. All are welcome to join NCA.

SERVICES & ACTIVITIES:

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

NCA Volunteers serve in a number of capacities. Many members serve as teachers, clinicians, and science fair judges. Some members observe total or graze occultations of stars occulted by the Moon or asteroids.

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

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

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

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

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

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

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

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

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

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

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

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NCA Will Meet on June 9!

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