Next Meeting
When: Sat. Nov. 12, 2011
Time: 7:30 pm
Where: UM Observatory
Speaker: Dan Wik, GSFC

Table of Contents
Preview of Nov. 2011 Talk ........... 1
NCA Constitution .................. 2
Ballot .................................. 3
Carlova Occultation ............... 4
Occultations ......................... 5
NASA News .......................... 6
Calendar .............................. 7

Directions to Dinner/Meeting
Members and guests are invited to join us for dinner at the Garden Restaurant located in the UMUC Inn & Conference Center, 3501 University Blvd E. The meeting is held at the UM Astronomy Observatory on Metzerott Rd about halfway between Adelphi Rd and University Blvd.

Need a Ride?
Please contact Jay Miller, 240-401-8693, if you need a ride from the metro to dinner or to the meeting at the observatory. Please try to let him know in advance by e-mail at rigel1@starpower.net.

Observing after the Meeting
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.

November 2011: Dr. Dan Wik
NASA Goddard Space Flight Center
The Capitalist Cosmos: How Mergers and Acquisitions have built our Universe

Abstract: The original view of galaxies as ‘island universes,’ separated by insurmountable gulfs, has been replaced by a more exciting and dynamic picture of galaxies forming and evolving through interactions and mergers with each other. Only recently, however, has the underlying framework crystallized, with the Nobel Prize-winning discovery that the universal expansion is accelerating, and with the precision measurements made possible by the WMAP satellite. I will briefly introduce this paradigm, and how we think structures like galaxies, galaxy groups, and massive clusters of galaxies are created and evolve through cosmic time. A particular focus will be the observations of the hot, X-ray emitting gas that fills the space in between the galaxies in clusters, and what these observations tell us about events that are the most energetic in the Universe, apart from the Big Bang itself. Lastly, I will discuss the NuSTAR hard X-ray telescope, which is on track to be launched next February, and how NuSTAR will shed new light on this emerging picture.

Continued on Page 2
Continued from Page 1

**Biography:** Dan Wik has just finished his first year as a NASA Postdoctoral Fellow at GSFC, in the X-ray Astrophysics Laboratory, where he has been fortunate to join the science and optics calibration teams for NASA’s Nuclear Spectroscopic Telescope ARray (NuSTAR) mission. The majority of his time is spent exploring the physics of galaxy clusters with data from the XMM-Newton, Suzaku, ROSAT, and Chandra X-ray observatories. He recently acquired a Ph.D. from the University of Virginia, where he investigated the effect of mergers on inverse Compton processes in the gas of galaxy clusters. Less recently, he emerged with the first undergraduate Astrophysics degree awarded by Ohio University, where he was lucky enough get an early start on research that led to summer internships at the National Optical Astronomy Observatory and the Harvard-Smithsonian Center for Astrophysics.

**Proposed update to the constitution and by-laws of National Capital Astronomers**

The board of Directors of the National Capital Astronomers recommends that the constitution and bylaws of National Capital Astronomers be amended by the adoption of the proposed text as the entire document. In addition to correcting typographical errors and making non-substantive changes to improve readability and organization of the material, the following significant changes (in order of their appearance in the constitution and by-laws) are proposed, many of which represent current practice:

- The amendment process explicitly lists email as an acceptable method of both notification and voting. The meeting where proposed amendments are discussed is at least 14 calendar days after the proposed changes are issued, and the references to separating the member’s signature from the voting choice is deleted as unrealistic for email-based voting. The voting period is extended to permit voting in most cases until just before the meeting following the start of voting.

- Because the changes in some cases reflect current practice that conflicts with the formal requirements of the current constitution and bylaws, previous good-faith actions that the changes officially authorize are ratified.

- References to the Sky and Telescope subscription are deleted, the payment of annual dues in September is reinforced, and provisions for new members who join at times other than September call for their membership to expire in the following September if they join prior to March 1, or in September of the following year if they join on or after March 1.

- Term limits for NCA officers and trustees are deleted. The unfortunate fact is that there is a very small number of people willing to perform the duties of officers and trustees, and a term limit restriction makes it overly difficult to fill those positions.

- The optional combining of the positions of Secretary and Treasurer is explicitly permitted.

Continued on Page 3
Continued from Page 2

Voting Procedure

The new constitution and bylaws will be adopted if two-thirds of the votes favor adoption, and the total number of votes represents no less than fifteen percent of the NCA members eligible to vote.

Beginning with the November meeting where the changes will be discussed and continuing for the following 20 days (ending on Friday, December 2) ballots may be submitted to the NCA Secretary by hand at the meeting, by postal mail, or by email. Printed ballots may be mailed to Michael L. Brabanski, 10610 Bucknell Drive, Silver Spring MD 20902-4254.

Email ballots should be sent to mlbrabanski@verizon.net, and should include “NCA Constitution Amendment” in the subject line. The body must clearly state that the vote is for or against adoption of the changed constitution and bylaws, and must also include the name of the member voting. Each member voting by email must send a separate message.

BALLOT

National Capital Astronomers has before it a proposal to amend its constitution and bylaws as discussed at its meeting in November 2011. Please mark one of the following choices:

I vote FOR the adoption of the proposed changes

I vote AGAINST the adoption of the proposed changes

________________________________________________________________________

Please PRINT your name here

________________________________________________________________________

Please SIGN your name here

_________________________________________ Today’s date (month-day-year)

If you do not choose to vote by email (see the “Voting Procedure” instructions), deliver this ballot by hand (there will be a box for it at the November meeting) or mail it to:

Michael L. Brabanski
10610 Bucknell Drive
Silver Spring, MD 20902-4254
On August 15, 2011 NCA member David Dunham took part in an expedition to observe an occultation of the star SAO 95144 by the asteroid 360 Carlova. He and the expedition’s other observers set up observation stations which consisted of automated telescopes that created time-stamped video recordings of the star as its light was briefly blocked by the asteroid. David’s observation stations were spread roughly NW-SE near US 25 in South Carolina, while most of the other observers’ stations were set up in Alabama. The three-dimensional shape model of Carlova (right) was created.
Occultation Notes

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.

Some stars in Flamsteed's catalog are in the wrong constellation, according to the official IAU constellation boundaries that were established well after Flamsteed's catalog was published. In these cases, Flamsteed's constellation is in parentheses and the actual constellation is given in the notes following a /.

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 the main IOTA Web site.

Sp. is the star's spectral type (color), O,B,blue; A,F,white; G,yellow; K,orange; M,N,S,C red.

Also in the notes, information about double stars is often given. "Close double" with no other information usually means nearly equal components with a separation less than 0.2", "mg2" or "m2" means the magnitude of the secondary component, followed by its separation in arc seconds ("), and sometimes its PA from the primary. If there is a 3rd component (for a triple star), it might be indicated with "mg3" or "m3". Double is sometimes abbreviated "dbl".

Sometimes the Watts angle (WA) is given; it is aligned with the Moon's rotation axis and can be used to estimate where a star will reappear relative to lunar features. The selenographic latitude is WA -270. For example, WA 305 - 310 is near Mare Crisium.

Mid-Atlantic Occultations and Expeditions

David Dunham

Asteroidal Occultations

<table>
<thead>
<tr>
<th>Date</th>
<th>EDT</th>
<th>Star</th>
<th>Mag.</th>
<th>Asteroid</th>
<th>dmag</th>
<th>s</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nov 10 Thu</td>
<td>2:03</td>
<td>SAO 76864</td>
<td>8.9</td>
<td>Bulgaria</td>
<td>7.4</td>
<td>2</td>
<td>cenNJ, sPA, cenOH</td>
</tr>
<tr>
<td>Nov 11 Fri</td>
<td>18:24</td>
<td>2UC22095884</td>
<td>12.2C</td>
<td>Hertia</td>
<td>0.5</td>
<td>30</td>
<td>nwSC, wSC, VA, eMD</td>
</tr>
<tr>
<td>Nov 15 Tue</td>
<td>4:24</td>
<td>HIP 17308</td>
<td>9.4</td>
<td>Baucus</td>
<td>2.6</td>
<td>6</td>
<td>sMD, DC, nVA, WV, OH</td>
</tr>
<tr>
<td>Nov 20 Sun</td>
<td>21:12</td>
<td>TYC24400335</td>
<td>9.4C</td>
<td>Harmonia</td>
<td>0.2</td>
<td>12</td>
<td>sNJ, sDE, eMD, DC, nVA</td>
</tr>
<tr>
<td>Nov 22 Tue</td>
<td>5:38</td>
<td>TYC13790179</td>
<td>10.3</td>
<td>Knopfa</td>
<td>6.1</td>
<td>2</td>
<td>5sON, PA, sNJ, neMD?</td>
</tr>
<tr>
<td>Nov 25 Fri</td>
<td>2:24</td>
<td>TYC18110638</td>
<td>10.3C</td>
<td>Auenia</td>
<td>0.8</td>
<td>8</td>
<td>7sNJ, sDE, MD, DC, nVA</td>
</tr>
<tr>
<td>Nov 25 Sun</td>
<td>19:25</td>
<td>R A247574</td>
<td>9.4</td>
<td>Fitzgerald</td>
<td>6</td>
<td>2</td>
<td>4sNJ, sEA, sOR, MD?</td>
</tr>
<tr>
<td>Nov 28 Mon</td>
<td>22:26</td>
<td>TYC18010686</td>
<td>9.5</td>
<td>Matteranera</td>
<td>5.5</td>
<td>1</td>
<td>4sNJ, sPA, MD, VA, DC</td>
</tr>
<tr>
<td>Nov 29 Tue</td>
<td>6:18</td>
<td>SAO 77380</td>
<td>9.4</td>
<td>Stebbins</td>
<td>6.2</td>
<td>1</td>
<td>4sMD, DC, nVA, sPA, OH</td>
</tr>
<tr>
<td>Dec 2 Sat</td>
<td>6:10</td>
<td>TYC3302126</td>
<td>10.1</td>
<td>Scooterber</td>
<td>5.7</td>
<td>1</td>
<td>5sNJ, sDE, sMD, eVA, NC</td>
</tr>
</tbody>
</table>

Lunar Grazing Occultations (*, Dunham plans no expedition)

<table>
<thead>
<tr>
<th>Date</th>
<th>EDT</th>
<th>Star</th>
<th>Mag.</th>
<th>%</th>
<th>alt</th>
<th>CA</th>
<th>Location</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nov 17 Thu</td>
<td>4:04</td>
<td>SAO 98040</td>
<td>8.5</td>
<td>63-</td>
<td>61</td>
<td>98</td>
<td>*Winchstr, VA; Gaithr&amp;Laurl, MD</td>
</tr>
</tbody>
</table>

Total Lunar Occultations

<table>
<thead>
<tr>
<th>Date</th>
<th>EDT</th>
<th>Star</th>
<th>Mag.</th>
<th>%</th>
<th>alt</th>
<th>CA</th>
<th>Sp.</th>
<th>Notes</th>
</tr>
</thead>
<tbody>
<tr>
<td>Nov 10 Thu</td>
<td>3:03</td>
<td>D 27</td>
<td>Arietis</td>
<td>6.2</td>
<td>100+</td>
<td>49</td>
<td>51N</td>
<td>G5</td>
</tr>
<tr>
<td>Nov 12 Sat</td>
<td>6:28</td>
<td>R 5</td>
<td>Tauri</td>
<td>5.6</td>
<td>98+</td>
<td>70</td>
<td>79B</td>
<td>F0</td>
</tr>
<tr>
<td>Nov 14 Mon</td>
<td>3:09</td>
<td>R 9</td>
<td>Zeta</td>
<td>5.6</td>
<td>89+</td>
<td>71</td>
<td>66B</td>
<td>A0</td>
</tr>
<tr>
<td>Nov 15 Tue</td>
<td>3:53</td>
<td>R 61612</td>
<td>7.4</td>
<td>81+</td>
<td>53</td>
<td>3</td>
<td>A0</td>
<td>Comp.</td>
</tr>
<tr>
<td>Nov 15 Tue</td>
<td>22:48</td>
<td>R 74</td>
<td>Gem</td>
<td>5.0</td>
<td>74+</td>
<td>19</td>
<td>80B</td>
<td>M0</td>
</tr>
<tr>
<td>Nov 17 Thu</td>
<td>1:07</td>
<td>R SAO 97952</td>
<td>7.4</td>
<td>64+</td>
<td>33</td>
<td>55B</td>
<td>A0</td>
<td>mag2 8.1, 44', PA 313</td>
</tr>
<tr>
<td>Nov 17 Thu</td>
<td>1:08</td>
<td>R SAO 97953</td>
<td>8.1</td>
<td>64+</td>
<td>33</td>
<td>53A</td>
<td>A0</td>
<td>Comp. SAO 97953 +56s</td>
</tr>
<tr>
<td>Nov 19 Sat</td>
<td>4:54</td>
<td>R RX Sex</td>
<td>6.7</td>
<td>47+</td>
<td>47</td>
<td>50A</td>
<td>Z3</td>
<td>ZC1528, mg2 9.117&quot;, PA 191</td>
</tr>
<tr>
<td>Nov 16 Sat</td>
<td>6:08</td>
<td>R SAO 118314</td>
<td>7.4</td>
<td>41+</td>
<td>54</td>
<td>80N</td>
<td>K0</td>
<td>Sun-9, mg2 9.05&quot;, PA 140</td>
</tr>
<tr>
<td>Nov 19 Sat</td>
<td>6:41</td>
<td>R SAO 118319</td>
<td>7.8</td>
<td>40+</td>
<td>54</td>
<td>71B</td>
<td>A0</td>
<td>Sun alt. -3</td>
</tr>
<tr>
<td>Nov 20 Sun</td>
<td>2:52</td>
<td>R 1629</td>
<td>6.6</td>
<td>31+</td>
<td>16</td>
<td>68B</td>
<td>K0</td>
<td></td>
</tr>
<tr>
<td>Nov 20 Sun</td>
<td>5:27</td>
<td>R SAO 138129</td>
<td>7.9</td>
<td>30+</td>
<td>41</td>
<td>61N</td>
<td>F8</td>
<td>mg2 7.9, 10&quot;, PA 254 deg.</td>
</tr>
<tr>
<td>Nov 21 Sun</td>
<td>5:38</td>
<td>R 1639</td>
<td>7.1</td>
<td>30+</td>
<td>41</td>
<td>61N</td>
<td>F8</td>
<td>mg2 7.9, 10&quot;, PA 254 deg.</td>
</tr>
<tr>
<td>Nov 22 Mon</td>
<td>19:06</td>
<td>D SAO 163793</td>
<td>7.8</td>
<td>26+</td>
<td>23</td>
<td>60B</td>
<td>F0</td>
<td>mg2 11.8, 1&quot;, PA 227</td>
</tr>
<tr>
<td>Nov 23 Mon</td>
<td>19:57</td>
<td>R ZC 1629</td>
<td>6.6</td>
<td>31+</td>
<td>16</td>
<td>68B</td>
<td>K0</td>
<td></td>
</tr>
<tr>
<td>Nov 24 Tue</td>
<td>6:18</td>
<td>SAO 77380</td>
<td>9.4</td>
<td>61B</td>
<td>18</td>
<td>81N</td>
<td>B9</td>
<td></td>
</tr>
</tbody>
</table>

Explanations & more information is at http://iota.jhuapl.edu/exped.htm. David Dunham, dunham@starpower.net, phone 301-526-5590.

Timing equipment and even telescopes can be loaned for most expeditions that we actually undertake; we are always shortest of observers who can fit these events into their schedules, so we hope that you might be able to.

Information on timing occultations is at: http://iota.jhuapl.edu/timng920.htm.
Spiral Arms Point to Possible Planets in a Star’s Dusty Disk 10.19.11

A new image of the disk of gas and dust around a sun-like star is the first to show spiral-arm-like structures. These features may provide clues to the presence of embedded but as-yet-unseen planets.

"Detailed computer simulations have shown us that the gravitational pull of a planet inside a circumstellar disk can perturb gas and dust, creating spiral arms. Now, for the first time, we're seeing these dynamical features," said Carol Grady, an astronomer with Eureka Scientific, Inc., who is based at NASA’s Goddard Space Flight Center in Greenbelt, Md. She revealed the image today at the Signposts of Planets meeting hosted this week at the center.

Grady's research is part of the Strategic Exploration of Exoplanets and Disks with Subaru (SEEDS), a five-year-long near-infrared study of young stars and their surrounding dust disks using the Subaru Telescope atop Mauna Kea in Hawaii. The international consortium of researchers now includes more than 100 scientists at 25 institutions.

"What we’re finding is that once these systems reach ages of a few million years, their disks begin to show a wealth of structure -- rings, divots, gaps and now spiral features," said John Wisniewski, a collaborator at the University of Washington in Seattle. "Many of these structures could be caused by planets within the disks."

The newly imaged disk surrounds SAO 206462, an 8.7-magnitude star located about 456 light-years away in the constellation Lupus. Astronomers estimate that the system is only about 9 million years old. The gas-rich disk spans some 14 billion miles, which is more than twice the size of Pluto's orbit in our own Solar System.

The disc itself is some 14 billion miles across, or about twice the size of Pluto's orbit in our own solar system. (Credit: NAOJ/Subaru)

The Subaru near-infrared image reveals a pair of spiral features arcing along the outer disk. Theoretical models show that a single embedded planet may produce a spiral arm on each side of a disk. The structures around SAO 206462 do not form a matched pair, suggesting the presence of two unseen worlds, one for each arm.

However, the research team cautions that processes unrelated to planets may give rise to these structures.

The view was made possible by the High Contrast Instrument for the Subaru Next Generation Adaptive Optics, or HiCIAO, which is designed to block out harsh direct starlight.

"Together with improvements to Subaru's adaptive optics system, which counteracts the blurring effects of Earth's atmosphere, the telescope is operating near its theoretical performance limits," said SEEDS principle investigator Motohide Tamura at National Astronomical Observatory of Japan, which operates the telescope. "We are just beginning to see what it will do."

"The Signposts of Planets meeting is all about understanding these kinds of patterns," said NASA Goddard's Marc Kuchner, who organized the conference. "It's a new kind of planet-hunting technique that is just now coming to fruition, and this new image from SEEDS is the perfect example of how it can work."

Two spiral arms emerge from the gas-rich disk around SAO 206462, a young star in the constellation Lupus. This image, acquired by the Subaru Telescope and its HiCIAO instrument, is the first to show spiral arms in a circumstellar disk. (Credit: NAOJ/Subaru)
### Calendar of Events

- **NCA Mirror- and Telescope-making Classes:** Tuesdays Nov. 1, 8, 15, 22 and Fridays, Nov. 4, 18, 25, (NOT Nov. 11), 6:30 to 9:30 pm 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 gbbrandenburg@yahoo.com. In case there is snow, call 202-282-2204 to see if the CCCC is open.


- **Open house talks and observing** at the University of Maryland Observatory in College Park on the 5th and 20th of every month at 8:00 pm (Nov-Apr) or 9:00 pm (May-Oct). There is telescope viewing afterward if the sky is clear.

- **Dinner:** Saturday, Nov. 12 at 5:30 pm, preceding the meeting, at the [Garden Restaurant](http://www1.pgcps.org/howarbo/) in the University of Maryland University College Inn and Conference Center.

- **Montgomery College Planetarium:** Saturday, Nov. 19 at 7 pm. 7621 Fenton Street, Takoma Park, MD (240) 567-1463. “Black Bubbles (Holes), Gravity to the Max: or how c, G, and M make a bubble in the fabric of time-space (reality)” [http://www.mc.cc.md.us/Departments/planet/](http://www.mc.cc.md.us/Departments/planet/)

- **Upcoming NCA Meetings** at the University of Maryland Observatory
  - Nov. 12, 2011  Dan Wik (GSFC) - Merging Galaxies and Clusters of Galaxies
  - Dec. 10, 2011  Justin Finke (NRL) - Gamma Rays from Radio Galaxies
  - Jan. 14, 2012  Guy Brandenburg (DCPS-retired) - Making Your Own Telescope

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**National Capital Astronomers Membership Form**

Name: ___________________________________________ Date: ___/___/___

Address: ___________________________________________ ZIP Code: ______

Home Phone: ___-___-______  E-mail: __________________________  Age: ______

Present or Former Occupation (Or, If Student, Field of Study): _________________________

Academic Degrees: __________________________  Field(s) of Specialization: _______________________

Employer or Educational Institution: __________________________

Student Membership: .................................................. $ 5

Standard Individual or Family Membership: ........................................ $10

Optional additional contribution to NCA: ........................................ $__

Total Payment (circle applicable membership category above): ........................................ $___

*Members receive Stardust, the monthly newsletter announcing NCA activities, by e-mail. If you would like to receive a paper copy of Stardust via regular mail, please check here: ___

Please mail this form with check payable to National Capital Astronomers to: Michael L. Brabanski, NCA Treasurer; 10610 Bucknell Drive; Silver Spring, MD 20902

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Inside This Issue

Preview of Nov. 2011 Talk........1
NCA Constitution..................2
Ballot..................................3
Carlova Occultation...............4
Occultations........................5
NASA News..........................6
Calendar..............................7

Next NCA Mtg:
Nov. 12
7:30 pm
@ UM Obs
Dr. Dan Wik