Next Meeting
When: Sat. Nov 14th, 2015
Time: 7:30 pm
Where: UMD Observatory
Speaker: Sergio Dieterich

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Directions to Dinner/Meeting
Our time and location for dinner with the speaker before this meeting is 5:30 pm at “The Common,” the restaurant in the UMD University College building located at 3501 University Blvd.

The meeting is held at the UMD 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 @ 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.

Understanding our Closest and Smallest Stellar Neighbors
Sergio Dieterich,
Carnegie Institution – Department of Terrestrial Magnetism (DTM)

Abstract: Most stars in the Galaxy are significantly smaller than our Sun. Red or M dwarfs are the most numerous and comprise more than 70% of the stars in the Galaxy; however, they are arguably the least understood type of star. This talk will highlight recent developments and advances in our understanding of very low mass stars.

There will be particular emphasis on how recent observations have allowed us to pinpoint the end of the stellar main sequence and how the smallest stars compare and contrast to their even lower mass cousins, the sub-stellar brown dwarfs. Additionally, the types of observations needed to understand the fundamental properties of a star and the interpretation of those observations will be discussed.
Reminder

After the meeting, everyone is invited to join us at Plato's Diner in College Park. Plato's is located at 7150 Baltimore Ave. (US Rt. 1 at Calvert Rd.), just south of the university’s campus. What if it’s clear and you want to stick around and observe? No problem -- just come over when you’re through. This is very informal, and we fully expect people to wander in and out.

http://hubble25th.org/

Quick Stellar Classification

Spectral Type & Temperature

Denoted with letters: O (= hottest stars [30,000-60,000 K]), B, A, F, G, K & M (= coolest stars [2,000-3,500 K]). Arabic numbers are also used: 0 (hottest) – 9 (coolest). For example, a G3 star is hotter than a G4, which is hotter than a K0. There are also additional specifications for other stars: W, T, L, S & C (e.g., brown dwarfs = L).

Luminosity

Roman numerals are used: 0/IA+ (= very luminous [e.g., hypergiants]), Ia, II, III, IV, V, VI (sd sub dwarfs, low luminosity) and D (white dwarfs).

At a surface temperature of about 6,000 K, our hydrogen-burning Sun holds a stellar classification of “G2V” ("yellow" dwarf star)... right in the middle of the main sequence.

Stellar Neighbors – continued from page 1

Biographical Sketch:

Serge Dieterich began working with data from the Hubble Space Telescope while still an undergraduate physics major at The Johns Hopkins University. He went on to earn an MS in Physics and a PhD in astronomy at Georgia State University. He then won an NSF Astronomy and Astrophysics Postdoctoral Fellowship, which brought him to his current position at the Department of Terrestrial Magnetism (DTM) at the Carnegie Institution for Science. Beginning with his PhD dissertation, he has become an expert on the new and important topic of the most massive non-stars and the least massive stars, regarding their similarities and differences. In the course of his work, he has also become an expert on the stars that are the Sun’s neighbors in the Galaxy. He is a skilled observational astronomer, who has acquired optical and near-infrared data at many of the great ground-based telescopes. He has also extensively used the Hubble Space Telescope.

Meteor Showers and Solar Wind

John Hornstein

Timothy Stubbs, last month’s speaker, conveys his pleasure at meeting and sharing his research with the NCA members at the October meeting. As a follow-up, Tim is also sharing the internet links and references below for anyone who is interested in meteor showers or getting a clearer picture of how the solar wind affects the planets, moons, asteroids and comets that are immersed in it.

Web Links

- International Meteor Organization (lots of meteor observation advice):  www.imo.net/
- The “Frozen-in Theorem” (in regard to the NCA member’s question about why the solar wind has an electric field. Tim feels that this will enhance his explanation from the meeting):  www.sp.ph.imperial.ac.uk/~mkd/Handout4.pdf

continued on page 4
## Can you see the Stars?

**Coming in April 2016**

"Exploring the Sky" is an informal program that, for over 60 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. Presented by the National Park Service and National Capital Astronomers, sessions are held in Rock Creek Park once each month on a Saturday night from April through November. Beginners (including children) and experienced stargazers are all welcome—and it’s free!

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## The Great North American Eclipse

**August 21st, 2017**

[www.greatamericaneclipse.com/](http://www.greatamericaneclipse.com/)

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## Sky Watchers

### Late Autumn Schedule

### November

<table>
<thead>
<tr>
<th>Date</th>
<th>Event</th>
</tr>
</thead>
<tbody>
<tr>
<td>11-12</td>
<td>Overnight – <strong>Meteors</strong>, N. Hemisphere. <em>North Taurids</em> (eastern – southern sky, debris from Comet 2P/Encke, radiant point near Pleiades). <em>Compared to other showers, Taurids don’t generate many meteors, but do have more “fireballs” (bright ones).</em></td>
</tr>
<tr>
<td>17</td>
<td>Overnight – <strong>Open Clusters</strong>, N. Hemisphere. M45 – Pleiades [RA 3:47:30, Dec +24°6′] (mag = 1.6, visible w/o binoculars, but they’ll provide a better view).</td>
</tr>
<tr>
<td>25</td>
<td>5:44 pm – <strong>Full Moon</strong> (moonrise time), N. Hemisphere. Other Moon Names: <em>Full Beaver's Moon, Full Frosty Moon. Beavers are active, preparing for winter, and humans take the opportunity to set traps for them as they also prepare for winter.</em></td>
</tr>
</tbody>
</table>

### December

<table>
<thead>
<tr>
<th>Date</th>
<th>Event</th>
</tr>
</thead>
</table>

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**Meteor Showers & Solar Wind – continued from page 2**

**Helpful Books**


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**Planetary Destinations**

Since there is a NASA Mars mission planned for 2035, a meeting was held last month at the Lunar and Planetary Institute (Houston) to begin the process of identifying the data and robotic missions required to select a Mars landing site as well as assessing the resources that would be available at the landing site. The meeting was called “First Landing Site/ Exploration Zone Workshop for Human Missions to the Surface of Mars.” In attendance and opening the meeting were Ellen Ochoa (Director, Johnson Space Center) and John Grunsfeld (Associate Administrator, NASA Headquarters Science Mission Directorate). NASA’s proposal is that there will be crews of 4-6 people on each of 3-5 missions, each lasting about 500 Martian days. The missions would include constructing a “surface field station” in the middle of the EZ (exploration zone) where all the missions would land.

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*Thank you!*

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**UNESCO**’s 2015 International Year Theme is “*Light and Light-Based Technologies.*” A segment of this theme has been allocated to the night sky, including star gazing, dark sky awareness issues, cosmic radiation and the centenary anniversary of the general theory of relativity.


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A proposed EZ from the meeting and relevant ROIs (Regions of Interest)


*The Hebrus Valles Exploration Zone: Access to the Martian Surface and Subsurface*

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**continued on page 6**
**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", "mb2" 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 "m3" or "m3". Double is sometime 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.

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**Mid-Atlantic Occultations**

**Asteroidal and Planetary Occultations**

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**Lunar Grazing Occultations**

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<td>18:05</td>
<td>SAO 160222</td>
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<td>Strong Occultation</td>
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**Total Lunar Occultations**

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<th>Location &amp; Remarks</th>
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<td>Chantilly, VA; Kensington, Laurel, MD</td>
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<td>Sharp Occultation</td>
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<tr>
<td>Nov 16</td>
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<td>ZC 3308</td>
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<td>Very Sharp Occultation</td>
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<tr>
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<td>0.1</td>
<td>Sharp Occultation</td>
</tr>
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**The ISS celebrates 15 years of continuous habitation in space!**

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**November 2nd 2000-2015**

**The ISS celebrates 15 years of continuous habitation in space!**

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Planetary Destinations – continued from page 4

Almost 50 possible EZs were proposed, including Gale Crater (the rover landing site), Chryse Planitia (Viking 1 landing site) and Hebrus Valles (where caves are located). The presentations are posted online by the Lunar and Planetary Institute. The idea is that the astronauts “live off the land” to the highest extent possible.

Naturally, water will be an important resource, but in more ways than one might think. It will be needed for sustaining life, but also for use in necessities such as radiation shielding and manufacturing rocket propellant (unlike the Mars One proposal, NASA astronauts intend to return to Earth).

See all of the structures in the sample Mars EZ Surface Field Station here starting at timestamp 2:05:30: https://youtu.be/ONp6xaOJ_c0

Through the Clouds…

Courtesy Bernard Kaufman
The September 2015 Lunar Eclipse

It was cloudy in the DC area during September’s lunar eclipse; however, NCA member Bernie Kaufman was able to get this quick photo of the Moon through a brief break in the clouds.
Adieu!

Crescent of Pluto as New Horizons looked back at the planet in the July 2015 fly-by. Some of the features include Sputnik Planum (sunlit) bordered above by Norgay Montes (mountains reaching 11,000 feet). Below Sputnik are glaciers. The entire image was cleaned & released in October.

The submission deadline for the December issue of Star Dust is Nov. 27th.

Clear Skies!

Calendar of Events

- **NCA Mirror- or Telescope-making Classes**: Tuesdays and Fridays, from 6:30 to 9:45 pm at the Chevy Chase Community Center (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 8:00 pm (Nov.-Apr.) or 9:00 pm (May-Oct.). Details: [www.astro.umd.edu/openhouse](http://www.astro.umd.edu/openhouse)

- **Phoebe Waterman Haas Public Observatory** at the National Air & Space Museum, Solar viewing, Wed. - Sun., 12 - 3 pm (weather permitting).

- **Owens Science Center Planetarium**: “Andromeda & the Demon Star,” Fri. Nov. 13, 7:30 pm; $5/adult; $3/students/senior/teachers/military; children under 3 free. [www1.pgcps.org/howardbowens](http://www1.pgcps.org/howardbowens)

- **Saturday Star Party**: Sat. Nov. 14, 4:30 - 7:30 pm, Sky Meadows State Park, VA. (parking $5). Includes Jr. Astronomer program, a speaker from JPL and observations. [airandspace.si.edu/events/star-parties/](http://airandspace.si.edu/events/star-parties/)

- **Mid-Atlantic Senior Physicists Group**: “Global Warming 56 Million Years Ago and What It Means for Us” with Scott Wing (Smithsonian), Tues. Nov. 17*, at 1 pm at the American Center for Physics (1st floor conference room). [www.aps.org/units/maspg/](http://www.aps.org/units/maspg/)
  *Note: this meeting is the 3rd Tuesday instead of Wednesday.

- **Upcoming NCA Meetings** at the University of Maryland Observatory:
  - 12 December: Hiroya Yamaguchi (UMD/GSFC), “What Produced Supernova 3C 397?”

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National Capital Astronomers Membership Form

Name: ____________________________________________ Date: ___/___/___

Address: ____________________________________________ ZIP Code: ______

Home Phone: _____-____-____ E-mail: ______________________ Print / E-mail Star Dust (circle one)

Membership (circle one): Student..... $5; Individual / Family.....$10; Optional Contribution.....$__

Please indicate which activities interest you:

- Attending monthly scientific lectures on some aspect of astronomy
- Making scientific astronomical observations
- Observing astronomical objects for personal pleasure at relatively dark sites
- Attending large regional star parties
- Doing outreach events to educate the public, such as Exploring the Sky
- Building or modifying telescopes
- Participating in travel/expeditions to view eclipses or occultations
- Combating light pollution

Do you have any special skills, such as videography, graphic arts, science education, electronics, machining, etc.?

Are you interested in volunteering for: Telescope making, Exploring the Sky, Star Dust, NCA Officer, etc.?

Please mail this form with check payable to National Capital Astronomers to:

Henry Bofinger, NCA Treasurer; 727 Massachusetts Ave. NE, Washington, DC 20002-6007

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Next NCA Meeting:
2015 November 14th
7:30 pm
@ UMD Observatory
Dr. Sergio Dieterich

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