

Star Dust

Newsletter of National Capital Astronomers, Inc.

capitalastronomers.org

October 2016

Volume 75, Issue 2

Next Meeting

When: Sat. Oct. 8th, 2016

Time: 7:30 pm

Where: UMD Observatory

Speaker: Erin Kara

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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 Metzert Rd about halfway between Adelphi Rd and University Blvd.

Need a Ride?

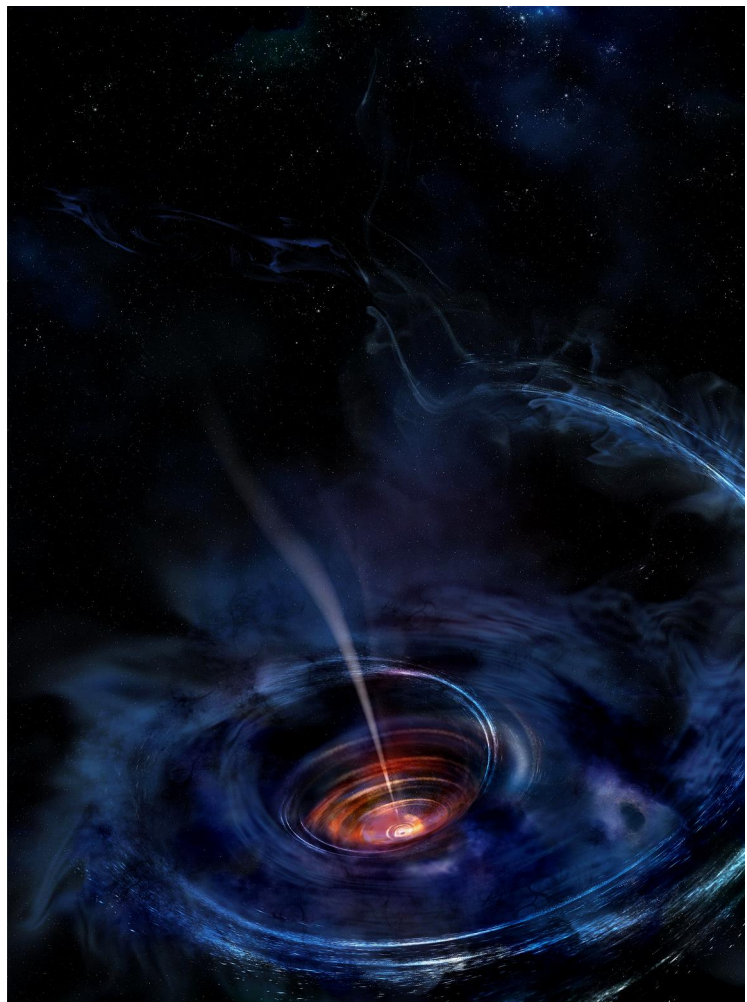
Please contact Jay Miller, 240-401-8693, if you need a ride from the metro to dinner or to the meeting @ observatory. Please try to let him know in advance by e-mail at rigel1@starpower.net.

How We See Supermassive Black Holes

Erin A. Kara

University of Maryland and NASA's Goddard Space Flight Center

Abstract: The material spiraling toward the event horizon of a black hole is subject to the strongest gravitational distortions in the Universe, so



Courtesy NASA/Swift/Aurore Simonnet, Sonoma State University
Artist conceptualization of a black hole accretion disk where X-ray light and light echoes are produced.

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Observing after the Meeting

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

Stellar-Mass vs. Supermassive Black Holes

Stellar-mass black holes are about 10-100 times the Sun's mass and form when massive stars reach the end of their lives. They can be found throughout galaxies, just as one finds any other stars.

Supermassive black holes can be million to billions of times the Sun's mass and are too big to be formed by collapsing stars (there are a number of theories on their formation). These black holes are found at the centers of galaxies. Sagittarius A*, the black hole at the center of the Milky Way (measured using the orbit of a circling star), is estimated to be about 4.3 million solar masses.

Hard & Soft X-Rays

There are 2 types of X-rays: soft & hard. On the electromagnetic spectrum, **soft X-rays** (the weaker rays) have frequencies of about 3×10^{16} - 10^{18} Hz and have photon energies of less than 5 keV. The photons are easily absorbed by air & water. **Hard X-rays** (the ones used by doctors & scientists) are stronger at 10^{15} to over 10^{20} Hz, with energies above 5 keV. They overlap the gamma-ray part of the spectrum, the only difference being the source (X-rays from accelerating electrons, gamma rays from atomic nuclei).

Black Hole Simulation

Check out NASA's simulation of a stellar-mass black hole, showing X-rays around the accretion disk:

https://youtu.be/-OtUVDRL_wM

Supermassive Black Holes – continued from page 1

studying these extreme environments can help us understand how gravity behaves when it is pushed to its limits. As material (mainly gas and dust) plunges into the black hole, a significant fraction of its gravitational potential energy is released into the surrounding environments, heating up the remaining infalling material. This material becomes so hot and energetic that it radiates light, much of which is in the X-ray band. So, while the common colloquialism is that black holes are *black*, they are, in fact, the most luminous objects in the universe because of the energetic material around them.

It is impossible to simply take a picture of the space-time around a black hole because the region is too small and too far away. Instead, astronomers develop sophisticated ways of analyzing the limited data available. In this talk, a new and innovative technique that was discovered just 5 years ago will be discussed. The technique is called X-ray reverberation, and it allows us to measure distances of tens of light seconds around black holes that are hundreds of millions of light years away. Just as sound waves reverberate in a large auditorium, X-ray light reverberates in the inflowing material. Since we know the speed of light, we can relate this reverberation time delay to a distance, which helps us determine the size and shape of the material spiraling toward the event horizon.

Understanding these environments close to the event horizon is helping us to understand how black holes grow and how they feed energy back into their surrounding environments.

Biographical Sketch:

Dr. Erin Kara is a Hubble Postdoctoral Fellow and a Joint Space-Science Institute Fellow, working at the University of Maryland and NASA's Goddard Space Flight Center. Her research is on understanding the inner accretion flows around black holes and other compact objects using X-ray observations. She works with a new technique called X-ray reverberation mapping that probes the flow's geometry and dynamics by measuring the echoes produced when light is scattered by the inner accretion flow. Dr. Kara completed her graduate studies at the University of Cambridge in the UK before moving to Maryland.



Favorite Star Trek Episode Survey

Hailing All Local Star Trek – Original Series Fans!

Submit your favorite episode from each of the 3 broadcast seasons in this short survey:

<https://www.surveymonkey.com/r/CHN7CLD>

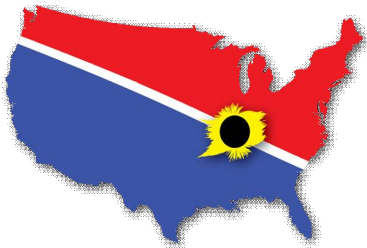


Courtesy Panda ClipArt

Deadline: October 31, 2016 ~ Star Dust will post the results!



The Great North American Eclipse



August 21st 2017

<http://www.greatamericaneclipse.com/>

Star Trek 50 Online Art

50 Artists. 50 Years.

A global art exhibition commemorating the 50th anniversary with original 2D & 3D art by artists from around the world.



Courtesy CA Brooks

The original 11-foot TV prop of the USS Enterprise for Star Trek – The Original Series, at the Nat'l Air & Space Museum

Sky Watchers

Autumn Schedule

October

8	 International Astronomy Day! Global.
11	12:00 am - Planets , N. Hemisphere. Mercury 0.9° north of Jupiter.
16	12:23 am . Full Moon , Global. Other Moon Names: <i>Full Hunter's Moon, Full Travel Moon, Full Dying-Grass Moon (time to reap grain & stock up on meat for the winter)</i>
21 (peak)	12:00 am - Dawn - Meteors , N. Hemisphere. <i>Orionids</i> (debris from Comet Halley, radiant point west of Betelgeuse & Orion) %club+
21-31	Evening . Globe at Night , Global. Features: <i>Constellation Pegasus</i> (N. Hemisphere) & <i>Grus</i> (S. Hemisphere).
30	4:00 am - Planets , N. Hemisphere. Venus 3° south of Saturn.

November

2	12:00 am - Planets , N. Hemisphere. Venus 7° south of Moon.
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Times EDT

(EST begins Nov. 6th at 2 am)

Exploring the Sky

“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!



2016 Observation Dates for Autumn

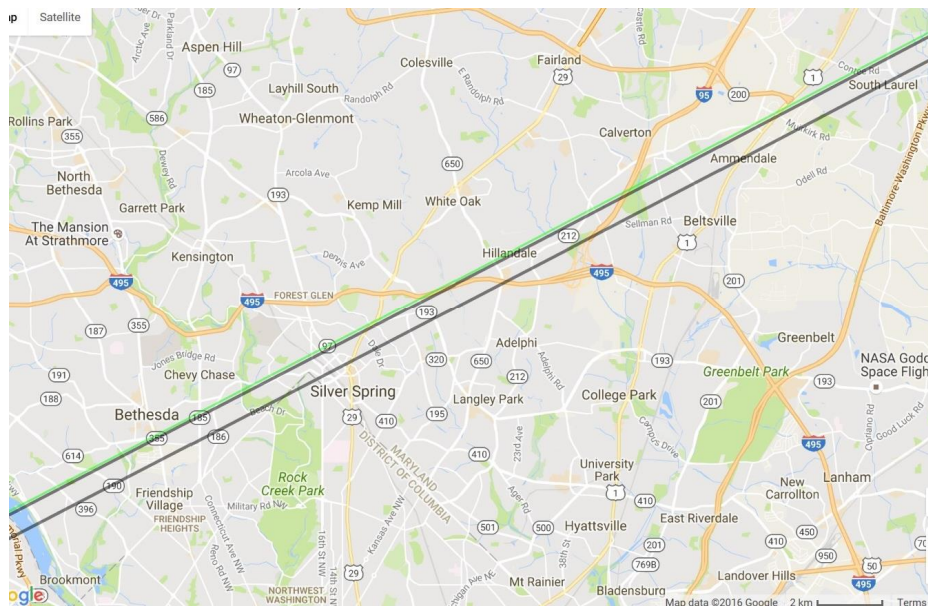
1 October (7:30 pm) . Summer Triangle
5 November (7:00 pm) . Pleiades & Winter Constellations

Hosted by: [National Capital Astronomers, Inc](#) and [Rock Creek Park](#)

SAO 164269 Occultation

David Dunham

The narrow zone for the grazing occultation of SAO 164269 on Monday evening, Nov. 7, will be between the two dark gray lines on the map of the Maryland suburbs (below). This is the zone that promises the most occultations of the star by hills and craters along the southern edge of the first quarter Moon. However, at least some of this area is likely to be sunlit, possibly rendering some of the contacts unobservable. The Sun altitude of - 8 degrees should not pose any problems with most small telescopes. Another map showing the path over northern Virginia can be found at <http://iota.jhuapl.edu/exped.htm>. If the weather forecast is good, we'll probably have a small expedition to observe the event from locations near Ammendale Road.



Courtesy D. Dunham
Local Map of Nov. 7th Occultation Path

NCA 2016 Board Meeting Report

Guy Brandenburg

The NCA Board had its annual meeting on August 7, 2016. To keep the membership up-to-date, here are the important business items from that meeting:

1. We are selling the NCA's Celestron 14-inch Schmidt-Cassegrain telescope and all of its accessories, since it has not been used at all in a long time. Heinrich Bofinger and Guy Brandenburg volunteered to be in charge of figuring out a fair market value, placing ads, and so on. If you want to purchase it, please let us know.

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 • Henry Bofinger, the NCA Secretary-
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Thank you!



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Board Meeting Report – continued from page 4

2. The club will have a membership coordinator position. Among other things, the MC will welcome new members and connect new and current members with tasks that need doing. Guy Brandenburg volunteered to take this on until another person steps up to take over.
3. John Hornstein will be coordinating the science fair judgments.
4. Dues will remain at \$10/member until our bank account is reduced to \$5,000. Meanwhile, you will soon be able to pay your dues for anything up to five years at one time, instead of needing to renew every single year.
5. We will have a contest to design a new NCA logo, with a deadline of New Year's Eve 2016. A vote will be taken on winning designs, and one option will be to retain the current one.
6. The current Stardust editor (CA Brooks) will be stepping down from that position in June 2017, and will need to be replaced by another volunteer.



Courtesy Eric Kaufman

Eric Kaufman, son of NCA member, Bernard Kaufman, took this beautiful picture of the Milky Way this summer from the dark skies of West Virginia.

Hopewell Open House & Star Party

Guy Brandenburg

All are welcome to attend a star party at the Hopewell Observatory. The event is scheduled for the night of October 29-30. The observatory is about 30 miles due west from the DC beltway, near the intersection of I-66 and US-15 at Haymarket, VA. You can stay all night looking for celestial wonders through our telescopes or through your own.

You can find a very complete guide at this link: <http://bit.ly/1MPDNQW>



HOPEWELL
OBSERVATORY

There's still time to enter Air & Space Magazine's 4th Annual Photo Contest



Courtesy Ivan Eder (cc) Comet 17P/Holmes (2007)

There are 4 categories: **Astronomy, Military, Civilian and People & Planes.** You can compete to win cash prizes.

The contest is free to enter and open until midnight (EST), **November 1, 2016.**

The submission deadline for the November issue of Star Dust is October 29th.

Clear Skies!

Calendar of Events

- **NCA Mirror- or Telescope-making Classes:** Tuesdays and Fridays, from 6:30 to 9:30 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
- **Lockheed Martin IMAX Theater** in DC: "The Voyage of Time" (not rated), Premieres Fri. Oct. 7, \$9 (adults) and \$7.50 (youth), evening shows only. Check dates here: <https://www.si.edu/Imax/Movie/1260>
- **International Astronomy Day:** "Bringing Astronomy to the People," Sat. Oct. 8. (Astronomy Week: Oct. 3-9).
- **Mid-Atlantic Senior Physicists Group:** "Down-to-Earth Searches for Cosmological Dark Matter" with Carter Hall (UMD), Wed. Oct. 19, at 1 pm at the American Center for Physics (1st floor conference room). <http://www.aps.org/units/maspg/>
- **Owens Science Center Planetarium** (First Friday of the Month): "Follow the Sun," (includes a preparation for the Great North American Eclipse of 2017), Fri. Nov. 4, 7:30 pm; \$5/adult; \$3/students/senior/teachers/military; children under 3 free. www1.pgcps.org/howardbowens
- **Upcoming NCA Meetings** at the University of Maryland Observatory: 12 Nov: Pamela Conrad (GSFC), "Why the Earth and Mars are so Different."

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.?

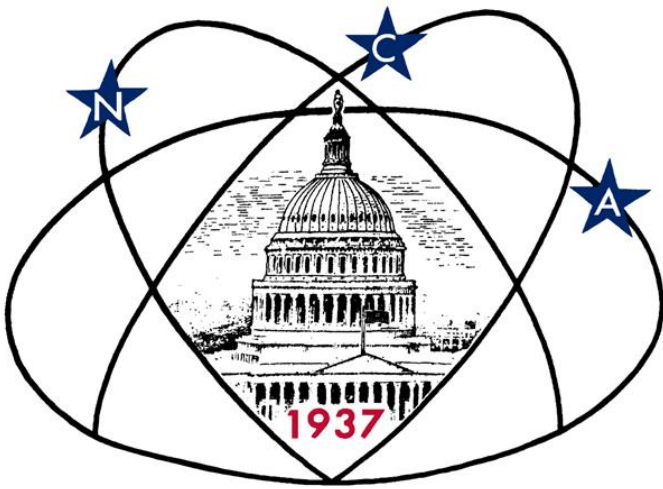
Are you interested in volunteering for: Telescope making, Exploring the Sky, Star Dust, NCA Officer, etc.?

Please mail this form with check payable to **National Capital Astronomers** to: Henry Bofinger, NCA Treasurer; 727 Massachusetts Ave. NE, Washington, DC 20002-6007

National Capital Astronomers, Inc.

If undeliverable, return to
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First Class
Dated Material



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2016 October 8th
7:30 pm
@ UMD Observatory

**Dr. Erin A.
Kara**

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