Star Dust

Newsletter of National Capital Astronomers, Inc.

capitalastronomers.org

November 2014 ***Volume 73, Issue 3***

Next Meeting

When: Sat. Nov.8th, 2014

Time: 7:30 pm

Where: UMD Observatory

Speaker: Gail Zasowski

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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.

Exploring the Milky Way Galaxy

and the

APOGEE Project

Gail Zasowski, The Johns Hopkins University

Abstract: Our Milky Way Galaxy, the only massive galaxy in which we can resolve large numbers of individual stars, serves as the primary test bed for our understanding of galaxy formation, structure, and evolution. However, because the Sun is embedded within the disk of the Milky Way, much of the inner parts of the Galaxy -- where most of the stars are -- are heavily obscured from view by the gas and dust clouds that fill interstellar space.

Courtesy ESO/S. Brunier

The center of the Milky Way Galaxy

The obscuring effects of interstellar dust clouds can be mitigated by taking data at infrared wavelengths, which are invisible to the human eye but can penetrate dust far more easily than visible light; however, only

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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.

Stellar Heat

Courtesy NASA-JPL/Caltech

Young stars in the outer ring of galaxy NGC 1291 (Constellation Eridanus) are igniting gas as fuel (documented in infrared light by the Spitzer Telescope). Older stars in the galactic center have already completed this process and the bulk of star-formation has been pushed to the outer edges of the galaxy.

The World At Night
TWAN
http://www.twanight.org/

Photographers from all over the world have contributed to a database of breathtaking images of the World at Night:

APOGEE – continued from page 1

recently has the technology been available to observe large numbers of stars at these wavelengths. This month, we will briefly review what we know (and don't know!) about our home galaxy, and then discuss an exciting new survey that is taking advantage of infrared capabilities to explore the Milky Way in unique detail. This survey, the Apache Point Observatory Galactic Evolution Experiment (APOGEE), is an ongoing project to measure the fundamental properties and space motions of hundreds of thousands of luminous red giant stars residing in the Milky Way, from its innermost bulge regions all the way to the outer halo.

Dr. Zasowski will describe the survey's design, including the custom-built multi-object cryogenic spectrograph, and then highlight some of APOGEE's intriguing findings to date, including new measurements of how the Galaxy is rotating, maps of how heavy elements may have been produced and distributed during earlier periods of star formation, and new analyses of special types of the interstellar material that co-exists and interacts with the stars.

Biographical Sketch:

Dr. Gail Zasowski is an astronomer and an NSF Postdoctoral Fellow at The Johns Hopkins University in Baltimore, MD. Her research interests include the stellar populations of the Milky Way and nearby galaxies and the properties of interstellar dust, and she is the head of the targeting team for the SDSS/ APOGEE survey. Gail is also very excited about science education and outreach; she has been involved in numerous outreach efforts, including the writing of a bilingual children's book about space science, and during part of the Summer, she runs an astronomy camp for middle school students. She earned her Ph.D. from the University of Virginia and spent time as a postdoc fellow at The Ohio State University before coming to Johns Hopkins. Besides trying to understand how the Universe works on a fundamental level, she feels that the most rewarding part about being an astronomer is being able to travel and work with other scientists all over the planet.

NASA's Astrophysics Science Division, Goddard Space Flight Center & Michigan Technological University host a website called Astronomy Picture of the Day. Check out these other amazing images of the Milky Way taken by talented photographers:

http://apod.nasa.gov/apod/ap140619.html
http://apod.nasa.gov/apod/ap130601.html
http://apod.nasa.gov/apod/ap120911.html

Courtesy ESO/HH Heyer

Exploring the Sky
will resume in April 2015!

"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!

For more information, check:

National Capital Astronomers, Inc:
http://capitalastronomers.org/

Rock Creek Park:
http://www.nps.gov/rocr/planyourvisit/expsky.htm

"NASA-powered" Rock, Indie & Alternative music (well, and space updates, of course!) Listen online with your computer, tablet or phone:

http://thirdrockradio.rfcmedia.com/

…streaming everywhere…

Sky Watchers

Late Autumn Schedule

November

14	1:00 pm – **Planets**, N. Hemisphere. Moon 5º south of Jupiter
18	Pre-dawn – **Meteors**, N. & S. Hemisphere (look up & east). *Leonids*
22	7:32 pm – **New Moon**, Global.
26	5:00 am – **Planets**, N. Hemisphere. Moon 7º north of Mars
29	4:00 am – **Planets**, N. Hemisphere. Moon 4º north of Neptune

Times EST

December

1	7:00 pm **– Planets**, N. Hemisphere. Moon 1.2º north of Uranus
9	7:00 pm **– Asteroids**, N. Hemisphere. (in conjunction with Sun). *Ceres*

Times EST

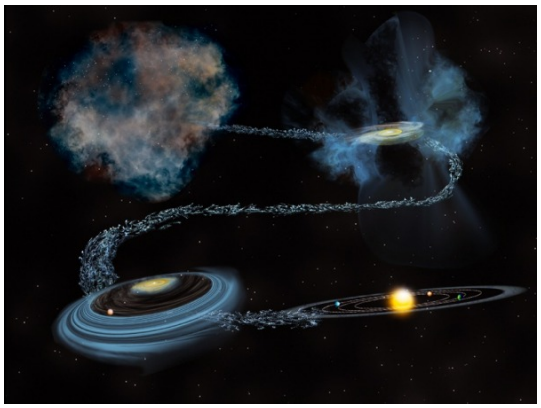
Member Photo Feature

Courtesy Bernard Kaufman

On October 8th, there was a lunar eclipse (a "Blood Moon") that was captured by NCA member Bernard Kaufman. Irrespective of Bernie's camera concerns, the image turned out beautifully.

Older than Sunshine…

What's accessible from your kitchen and older than sunshine? That would be water! According to a recent article in *Science*, it was unclear as to the source of the ice in our newly-formed Sun's protoplanetary ring (the solar nebula that births planets). If the water arrived as ice from interstellar space, then protoplanetary disk ice around other stars (as well as prebiotic matter) will be similar. However, if the source of our water was from local chemical reactions after the Sun was formed, then water availability will be highly differentiated across planetary systems.



To decide on the disk ice source, Cleeves et al (University of Michigan) investigated the ratio of hydrogen to deuterium. Interstellar ice has a higher level of deuterium. However, was it possible for a local chemical reaction to also produce deuterium to match levels found in comets, meteorites and Earth's ocean water? Apparently not. Therefore, scientists concluded that we have water originating from interstellar space, before the formation of our Sun, and that similar ice (and matter) can be found in other newly-forming planetary systems.

*Source: Cleeves et al. (2014), Science, **345** (6204): 1590-1593.*
Image: Water through the evolution of our Solar System. Courtesy Bill Saxton, NSF/AUI/NRAO

SKA and the Moon

Rare UHE (Ultra High Energy) cosmic rays contain incredible power. Scientists have proposed a variety of theories on the origins of these particles. Possible UHE sources include active galactic nuclei (AGN), colliding-galaxy shockwaves, supernova emissions and cosmic string decay. However, the true source is still unknown (although many scientists believe that the subatomic particles of the rays are mostly protons). When detected, UHEs have usually entered Earth's upper atmosphere where they initiate subsequent particles to emit very short (nanosecond) radio waves.

The Square Kilometer Array (SKA) is scheduled to be operational in the 2020s and has been proposed to be the most sensitive radio telescope in the world. It will have an area 10 times bigger than the

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Star Dust is published ten times yearly September through June, by the National Capital Astronomers, Inc. (NCA).

ISSN: 0898-7548

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Thank you!

At 6:22 pm EDT on October 28th, an Antares rocket carrying a Cygnus spacecraft with 5,000 lbs of supplies & experiments launched from Wallops. It was destined for the ISS, but seconds later, it exploded, crashed & exploded again into a large fireball.

Courtesy NASA

Ride with Rosetta

Courtesy ESA/Rosetta/NAVCAM

https://twitter.com/Philae2014

Rosetta's navigation camera (NAVCAM) is recording images of Comet 67P/C-G as the spacecraft approaches. Rosetta has also detected specific molecules in the comet's gases via ROSINA (Rosetta Orbiter Sensor for Ion and Neutral Analysis):

Water (H_2O)
Carbon monoxide (CO)
Carbon dioxide (CO_2)
Ammonia (NH_3)
Methane (CH_4)
Methanol (CH_3OH)
Formaldehyde (CH_2O)
Hydrogen sulphide (H_2S)
Hydrogen cyanide (HCN)
Sulphur dioxide (SO_2)
Carbon disulphide (CS_2)

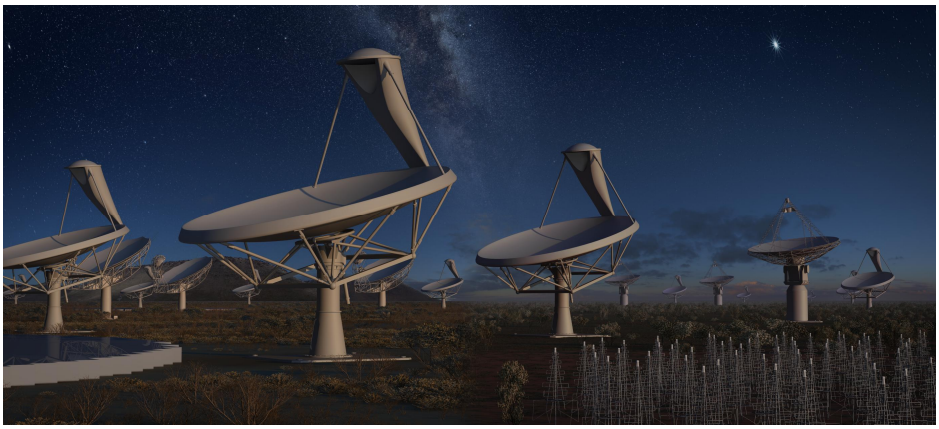
ESA has created a short film, "Ambition," which features Rosetta. The film was screened at the British Film Institute in London under the theme "Sci-Fi: Days of Fear & Wonder."

http://youtu.be/H08tGjXNHO4

SKA & the Moon – continued from page 4

Pierre Auger Observatory (which covers 3,000 square kilometers, i.e., the size of Luxembourg). University of Southampton scientists have suggested that SKA can detect UHEs by using the Moon as a "cosmic ray detector." The scientists state that SKA's high sensitivity and large collecting surface area will effectively detect the nanosecond-long radio waves from the visible lunar surface. This approach will hopefully lead to detecting 165 UHEs/year vs. the current 15 UHEs/year, thereby providing more data on these rare rays.

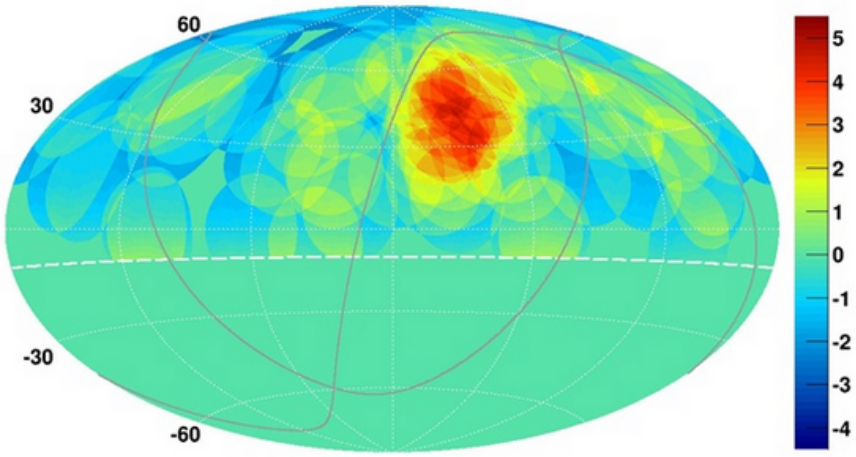
How much energy is UHE? According to physicists at the University of Utah, it's "1 billion billion electron volts." In other words, if just one UHE subatomic particle entered our atmosphere and hit someone in the head, it would "feel like a fast-pitch baseball to the skull."



Courtesy SKA Organization

SKA instruments in a composite illustration - www.skatelescope.org

UHE Hotspot: Southwest corner of Ursa Major



Courtesy K. Kawata, University of Tokyo Institute for Cosmic Ray Research

Northern sky hotspot found using a University of Utah-operated Telescope Array (Delta, Utah)

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Planetary Destinations

The Rosetta/Philae landing site was confirmed by the European Space Agency (ESA) a few weeks ago. Philae is scheduled to touch down at Site J on the comet 67P/Churyumov–Gerasimenko on November 12th.

Courtesy ESA/ATG Medialab

"Who's Your Planet?"

- ☑ *1. In orbit around the Sun*
- ☑ *2. Is round or nearly round*
- ☒ *3. Has "cleared the neighborhood" around its orbit*

See the debate:
http://youtu.be/2RNGSuFqmro

The submission deadline for the December issue of Star Dust is Nov. 30th.

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

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

Owens Science Center Planetarium: "The Rainbow Universe," Fri. Nov. 14, at 7:30 pm; $5/adult; $3/students/senior/teachers/military; children under 3 free. Doors open 7:15 for pre-show activities. www1.pgcps.org/howardbowens

Mid-Atlantic Senior Physicists Group: "MESSENGER at Mercury: Water, Sulfur, & Other Geochemical Surprises" with Larry Nittler (Carnegie Institution of Washington), Wed. Nov. 19, at 1 pm at the American Center for Physics (1st floor conference room). http://www.aps.org/units/maspg/

NASA Goddard Visitors Center: Monthly Model Rocket Launch, Sun. Dec. 7, at 12:45 pm, ICESat Road, Greenbelt, MD.

Upcoming NCA Meetings at the University of Maryland Observatory:
13 Dec: Drake Deming (UMD), "Habitable Extrasolar Planets to be Discovered by the TESS Mission."

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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First Class
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Next NCA Meeting:

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7:30 pm
@ UMD Observatory

Dr. Gail Zasowski

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