



NEWSLETTER

RITTENHOUSE ASTRONOMICAL SOCIETY

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January 2011

OPEN TO PUBLIC AND STUDENTS
Upcoming Meeting on January 5th
NOTE: Special Meeting Date!
7:15 PM
The Franklin
20th Street and Benjamin Franklin Parkway



Explanation: Orion always comes up sideways ... and was caught in the act earlier this month by over a snowy landscape in Donegal, Ireland. To compose this serene picture, the photographer found a picturesque setting to the east, waited until after sunset, and then momentarily lit the foreground with a flashlight. The three bright stars in Orion's belt stand in a nearly vertical line above the snow covered road at the bottom. Hanging from his belt, the stars and nebulae of the Hunter's sword are visible lower and to the right. Yellow-orange Betelgeuse is the brightest star on the image left. As winter progresses in Earth's northern hemisphere, Orion will rise earlier and so appear continually higher in the sky at sunset.

January's Meeting

Dr. Robert Nemiroff

Astronomy Picture of the Day

This month's meeting features Dr. Robert Nemiroff. Dr. Robert Nemiroff will speak about astronomical highlights of 2010. Dr. Nemiroff is the creator and editor of Astronomy Picture of the Day, an amazing hyper linked resource for anyone at any level interest of astronomy. Students are encouraged to attend.

February's Meeting

At our February meeting Laura Misajet from Zeiss Planetaria/Optics will be our featured speaker. Zeiss Planetaria/Optics is among the top producers of planetarium projectors. Laura is also a former lecturer/producer of planetarium shows at the Fels Palentarium at The Franklin Institute. It will be an exciting night of viewing all the possibilities that now exist in the world of planetaria.

December's Meeting

Our December's meeting was an exciting look into the world of studying "Dark Matter" and "Dark Energy". It was interesting to see all the different ways that scientists measure and view the elements of our universe to try and better explain "how it all works". It was fascinating to see how looking at one part of the universe would appear so differently when viewed from different parts of the light spectrum. This presentation solidified just how much we do know and how much we have yet to learn about the Universe in which our solar system and galaxy are a part.

Visible Planets 01/05/2011

	Rises	Transit	Sets
Mercury	05:39 am	10:27 am	03:15 pm
Venus	03:42 am	08:47 am	01:53 pm
Mars	07:55 am	12:36 pm	05:18 pm
Jupiter	10:57 am	04:51 pm	10:46 pm
Saturn	12:16 am	06:03 am	11:51 pm

President's Message

"Seeing Red"

Dr. Milton Friedman

Red is a color that draws our attention especially this time of the year. Santa Claus wears a red suit. The jolly deliverer of toys never seems depressed or overwhelmed with his workload on Christmas Eve.

Rudolph the Red-nosed Reindeer has been a hit with children ever since it was created in 1939 and made famous by singers of the past, Gene Autry, a cowboy who recorded the song in 1949, and singer, Bing Crosby, who helped make Rudolph famous when he recorded the song in 1950.

A red sunrise has driven every sailor or weather forecaster to pull in the sails while reciting the poem: "Red sky in morning, sailor take warning, red sky at night, sailors delight." A red sky in the morning was a sign that a storm was coming. A red sky at night meant the storm had passed and a clear day would follow.

Mars is known as the red planet and to the ancients; the red planet was considered the planet of war. The red color of Mars is due to the oxides of iron up there.

The most prevalent stars in the vast universe are the red dwarfs. These contain less than half the mass of our sun and live billions of years longer. They are best seen in infrared and may harbor life. Gliese 581 is a star with planets, one of which, Gliese 581g, may have liquid water on its surface and be Earth-like.

Red giants are different, being stars in the final stage of a star about to become white dwarfs at the end of their existence as the core stops converting hydrogen into helium and the shell of the star expands.

On the morning of December 21, we were treated to a total eclipse of the moon, the first visible in North and Central America since 2008. The next to be seen here will happen in April, 2014. At mid-eclipse which occurred at 3:17 a.m. on the east coast, the color of the moon was used



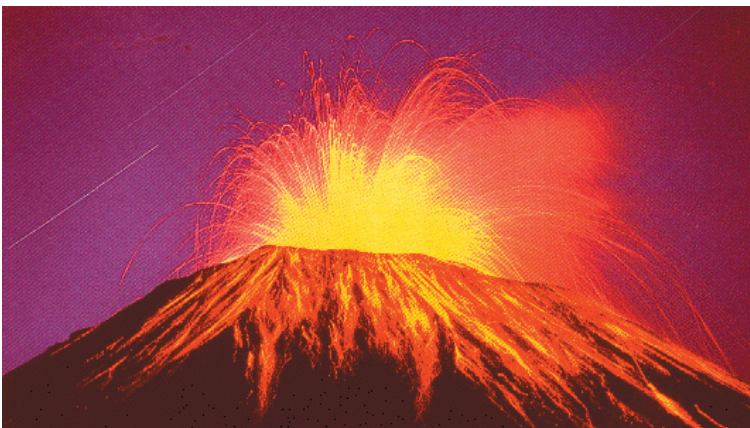
to estimate pollution of the atmosphere here on Earth.

When the atmosphere is polluted with volcanic ash, less light from the sun is passed over Earth and this affects the appearance of the moon. A dark or invisible eclipse could indicate considerable volcanic ash. A copper-red or orange eclipse would mean little ash in Earth's atmosphere.

In 2010, two major volcanoes erupted: Mount Eyjafjallajökull in Iceland and Mount Merapi in Indonesia. The worst volcanic eruption was Mount Tambora on the island of Sumbawa in Indonesia in 1815. This killed over 72,000 people and the next summer was known as the "Year Without a Summer." The Earth had cooled because sunlight was blocked and snow occurred during the summer in Albany, New York and in Canada.

This year's eclipse on December 21 as seen from Florida appeared L-2 on the Danjon scale. The scale is the visual appearance of a lunar eclipse as seen with the naked eye. There are five levels from L = 0 that is a moon at mid eclipse in which the moon is nearly invisible to L = 4 which is a very bright or orange eclipse.

A major factor in the appearance of the moon at mid-eclipse is the amount of volcanic dust in Earth's atmosphere. From my view in Florida, mid-eclipse was an L = 2. The moon appeared deep red a rust color and the center of the moon appeared dark. This would indicate some volcanic ash was present in the atmosphere, but it was minimal. We await the views and decisions on appearance by other people in other locations in the United States.



Mount Eyjafjallajökull in Iceland



Taken near to “Bonechilling” Princeton NJ with a 250 mm lens at about 1 sec exposure. Dr. Ken Kremer

Night of the Eclipse

Joe Stieber

Four of us were at Coyle Field this morning (21-Dec-2010) to watch the Total Lunar Eclipse. We arrived shortly before 1 am, during the penumbral phase that started around 12:30 am. Some modest penumbral darkening was noted before the first umbral contact at 1:33 am EST.

I left the camera in the car to concentrate on visual observing with both my 12.5-inch dob and with my bare eyes. It was cold (probably mid-20s F) and windy, but we were bundled up so it wasn't too bad. Besides, it was really clear on the night of a major astronomical event, so how could you complain?

In any case, it was worth the travel to a dark site to see the eclipse rather than just watching from the comfort of one's backyard. The moon itself probably didn't look any different, but the backdrop of sky that emerged as the moon crept into the earth's shadow was stunning, especially in the rich region where the moon was located near the Taurus-Gemini border. Much of the time I just gazed at the splendor of all the stars that appeared around the dull rusty glow of the eclipsed moon. I was even able to spot M35 naked eye (with averted vision) about 3.5 degrees from the moon at mid-eclipse. Not bad for a full moon!

It was marvelous through the scope too. Using my 40 mm eyepiece (for 40x with a 1.5 degree field), the eclipsed moon floated against a black background peppered with faint stars. I saw relatively bright 7th magnitude SAO 77647 as it was occulted about the time of first umbral contact and then saw it pop out about 70 minutes later just after the start of totality.

With the scope, M35 looked like a cluster, but fainter nearby NGC 2158 was also seen. Almost 5 degrees on the

other side of the moon, I was easily able to find M1 (the Crab Nebula) in the scope. I then moved the scope to NGC 2129, a small open cluster in Gemini at the border with Taurus. Just across the border (and well within the field of view) was the June Solstice point, just 1.5 degrees from the center of the moon at mid-eclipse. I looked, but I couldn't find the “x” marking the spot. It was interesting to imagine the Summer Solstice sun being represented by the eclipsed moon, and that's what the June daytime sky would look like if we could see it without the glare of the sun.

By time totality ended (3:53 am), Saturn was well up in the east. In the scope, the rings are now getting back to “normal.” Instead of looking like a ball speared by a pencil as it has been for much of the past two years, there's an easily-seen gap between the ball and rings. Soon after 4 am, I started packing up, but not before I took a look at Venus, which was peeking over the treetops below Saturn. It was too low to get a good view, but nevertheless, a crescent shape was visible.

It was a great night!

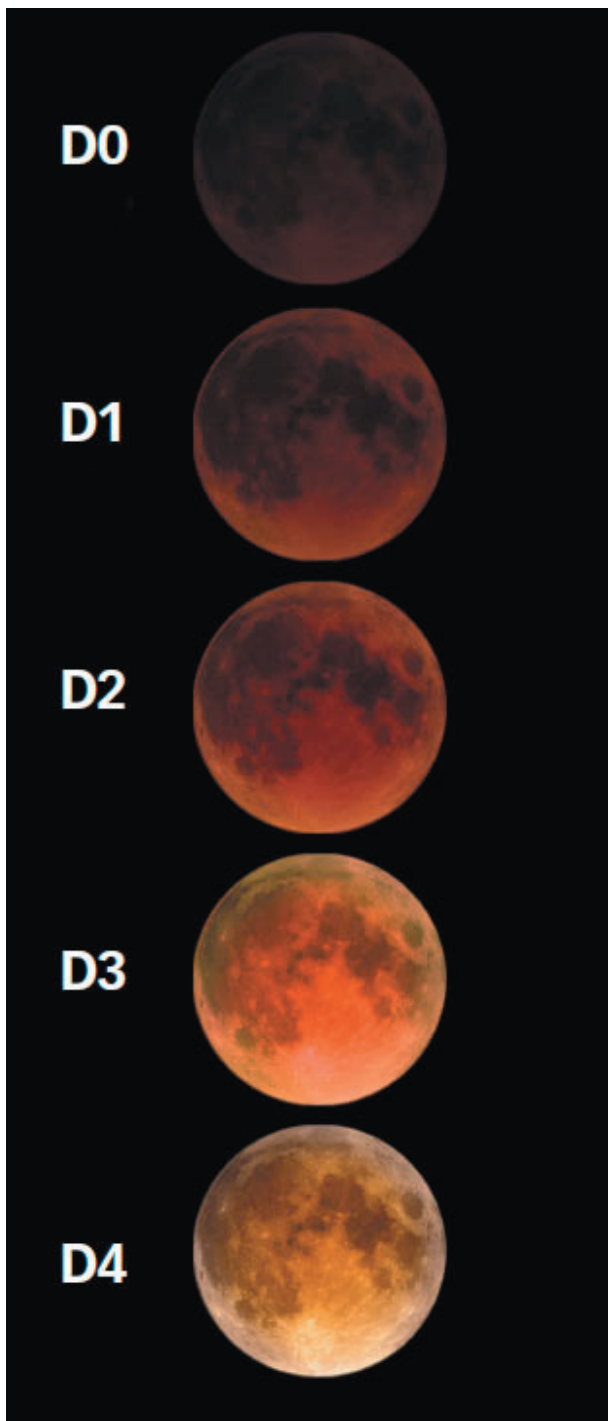
Evaluating an Eclipse

Dr. Milton Friedman

The Danjon Scale of lunar eclipse brightness is a five-point scale useful for measuring the appearance and luminosity of the Moon during a lunar eclipse. It was proposed by André-Louis Danjon .

Consider posting your Danjon scale rating with us on our Members site or on our Facebook page. We would like to record your perspective as to how the moon looks to you from your location. Path of totality.

D-L0	Darkest eclipse, moon almost disappears from view.
D-L1	Very dark, grey or brownish in coloration.
D-L2	Deep red or Rust colored eclipse, tends to be darker in center and lighter towards out edge of umbra.
D-L3	Brick-Red, umbra shadow can have a bright yellow rim.
D-L4	Bright copper-red or orange eclipse. Umbral shadow can be bluish towards rim.



WHY IS IT SO COLD IN JANUARY?

Reprinted from "What's Up New York"

Written by Steven Beyer and Edited by Elizabeth Stachow
for the Hayden Planetarium NYC

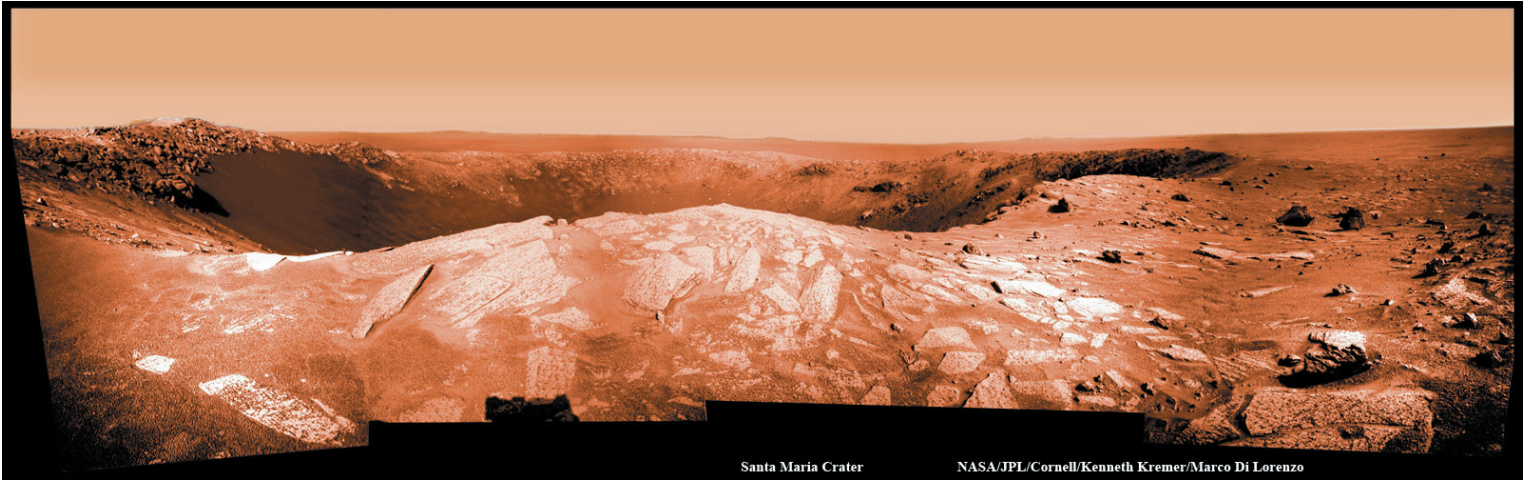
On January third at about 2:00p.m., Earth reaches perihelion, our closest approach to the Sun this year. But, if we're at our minimum annual distance from the Sun, why is January so cold? This paradox occurs because in mid-January the northern part of Earth's rotation axis leans about 45 degrees further from the Sun's direction than it does at the start of summer. Therefore the Sun is low in our sky during early winter, even at noontime. This glancing angle of solar rays distributes sunlight over a much longer footprint, significantly decreasing light's concentration and its ability to warm northern latitudes.

Another factor causing low winter temperatures is the diminished number of hours the Sun is above the horizon each day. These causes combine to overwhelm any advantage accruing from our slightly closer proximity to the sun during January compared with July. On the Fourth of July this year, Earth's location on its elliptical orbit, a point called aphelion, marks our maximum separation from the Sun. At aphelion we are 4% further from the Sun than we are at the start of January.

The coldest daily average temperature recorded in Central Park, is 25 degrees, associated with January 22nd. This might seem like yet another paradox. If the shortest day, with the least number of minutes that the Sun is above the horizon, and the lowest solar angle usually occurs on December 21, why do New York temperatures reach annual minimums about one month later? It is because the city and its surrounding waters do a good job retaining thermal energy accumulated during earlier, warmer weeks. Therefore, about a month passes after the date of minimum solar heating before New York City temperatures usually reach their annual minimum.



Even a red-winged blackbird could see its breath as it sang in Woolwich, Maine. Associated Press File Photo by Robert F. Bukaty



Santa Maria Crater

NASA/JPL/Cornell/Kenneth Kremer/Marco Di Lorenzo

Panoramic view of Santa Maria Crater taken by Opportunity Mars rover about 5 meters from the rim on Dec 16, 2010 on Sol 2451. Water bearing materials are located at the southeastern edge of the rim located roughly at the center of this image. . Credit: NASA/JPL/Cornell, Marco Di Lorenzo, Ken Kremer

Opportunity Rover Snaps Gorgeous Panoramas of Santa Maria Crater and Intrepid Crater

Dr. Ken Kremer

The Opportunity rover is sending back a multitude of awesome views of Santa Maria Crater since arriving at the western edge on Dec. 15 (Sol 2450). This intermediate stop on the rovers 19 km long journey from Victoria Crater to giant 14 km wide Endeavour Crater certainly looks to be well worth the trip.

Santa Maria is just 6 km from the western rim of Endeavour which is surrounded by phyllosilicate clays - which formed in water and have never before been directly analyzed on the Martian surface.

Opportunity has been on a swift advance over smooth terrain since departing from Intrepid crater in mid-November which was named in honor of the Apollo 12 mission which landed 2 men on the moon 41 years ago in November 1969.

Santa Maria appears to be relatively unweathered and

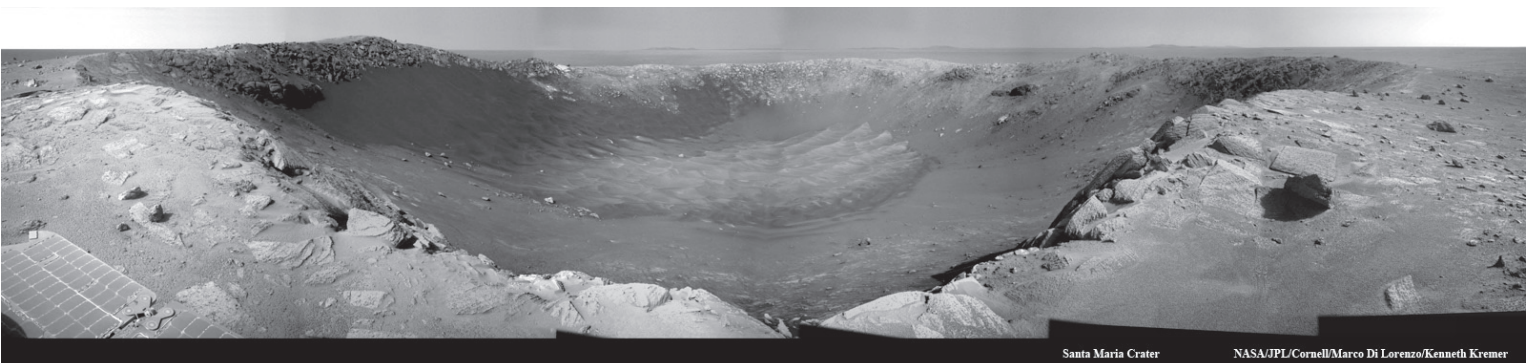
fresh. The crater is 90 meters in diameter. A multitude of inviting rocks and boulders from the impact ejecta are strewn about making this a Martian geologists dream.

After initially driving to a distance of about five meters from the rim on Dec. 16 (Sol 2451), Opportunity has now carefully crawled even nearer to the precipice of the craters steep cliffs. The rover snaps a series of panoramic images at each stop to document the site scientifically and esthetically.

The team back on Earth must tread with extreme caution as Opportunity creeps ever closer to the edge lest she fall off a cliff. Opportunity is now positioned close enough to point her cameras directly at the steep walled cliffs and towards the sand dunes at the crater floor crater unveiling another stunningly gorgeous Martian vista.

Compare the panoramic mosaics from Sols 2451 and 2454 above and below - created by Ken Kremer and Marco Di Lorenzo for Universe Today - as Opportunity pulled up to the rim in stages and began exploring the crater environment from different vantage points.

The rover handlers are highly adept at precisely

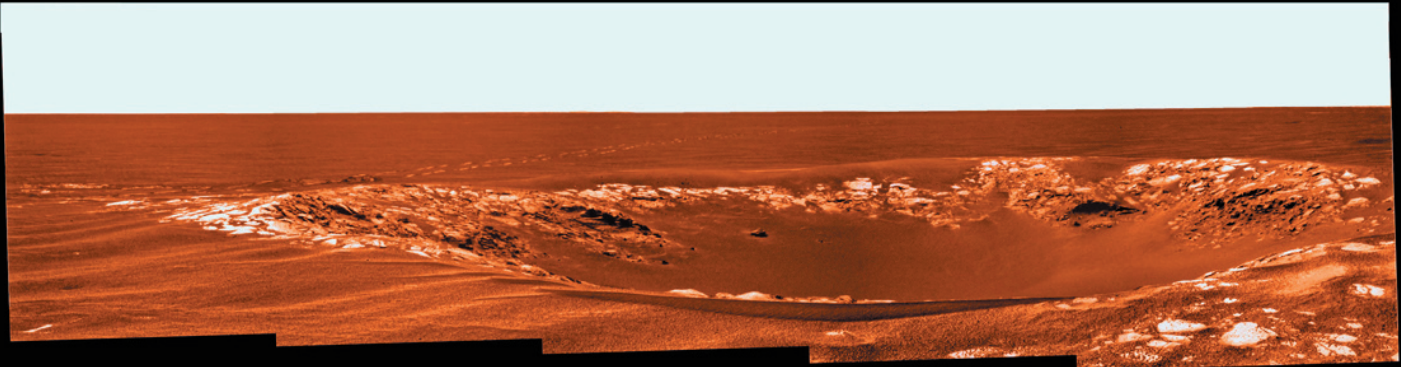


Santa Maria Crater

NASA/JPL/Cornell/Marco Di Lorenzo/Kenneth Kremer

Opportunity drove closer to within 5 meters of the rim on Sol 2454 and snapped this gorgeous panoramic vista revealing interior steep cliffs and sand dunes. Credit: NASA/JPL/Cornell, Marco Di Lorenzo, Ken Kremer

OPPORTUNITY MARS ROVER



Opportunity at Intrepid Crater Sol 2420 Nov. 2010

Kenneth Kremer, Marco Di Lorenzo NASA/JPL/Cornell

Opportunity arrived at 'Intrepid' Crater on Mars during November 2010 and drove around crater rim. See rover wheel tracks at left. Intrepid crater was named in honor of the Apollo 12 lunar module named 'Intrepid' – which landed two men on the moon on 19 November 1969. Mosaic Credit: NASA/JPL/Cornell, Marco Di Lorenzo, Ken Kremer

maneuvering the 175 kg vehicle back and forth inside the danger zone at crater rims. After all Opportunity has been on a crater tour for her entire 7 year extended mission to the red planet and controllers at NASA's Jet Propulsion Laboratory (JPL) have honed their driving techniques at countless locales both treacherous and dazzling.

High priority activity on the west side of Santa Maria includes collecting a series of high resolution stereo panoramas which will be used to create a digital elevation map in 3 D. JPL engineers will move Opportunity in a counterclockwise direction around the rim before heading to Endeavour crater.

Opportunity will drive to an area on the southeast portion of Santa Maria that shows exposures of water bearing sulfate.

Opportunity will stay at Santa Maria through the upcoming Solar conjunction which starts in late January and ends in mid-February. The rover will remain stationary during that period and conduct a lengthy investigation of a specific spot using the instruments on the robotic arm – which include spectrometers, a microscope and the rock drill known as the RAT or Rock Abrasion Tool

Opportunity remains healthy, has abundant solar power for the final leg of the eastward march to Endeavour and celebrates 7 Years on Mars on 24 Jan 2011.

More details in my articles online at Universe Today:

<http://www.universetoday.com/81838/opportunity-shoots-awesome-views-of-santa-maria-crater/>

<http://www.universetoday.com/81738/landfall-at-santa-maria-for-opportunity-on-mars/>

<http://www.universetoday.com/81789/powerful-mars-orbiter-directs-opportunity-to-clays-and-hydrated-minerals/>

Astronomy Outreach:

Dr. Ken Kremer

Please contact me for more info or science outreach presentations by email. My upcoming Astronomy talks include:

- **Amateur Astronomers Association of Princeton:** Princeton, NJ, Jan 11, Tue, 8 PM - "Whats Beyond for NASA : Shuttle, Orion, SpaceX & Robots". Website: <http://www.princetonastronomy.org/>

Dr. Ken Kremer Email: kremerken@yahoo.com
Spaceflight Magazine & The Planetary Society
<http://www.rittenhouseastronomicalsociety.org/Dr.Kremer/K.htm>

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Upcoming Speakers

February	Laura Misajet Zeiss Planetaria / Optics
March	Dr. Bill Metz Author: Inquiry By Design
April	Dr. Milton Friedman - RAS President
May	Dave Walker - Franklin Institute, Fels Planetarium
June	Members Night: Members Presentations