FIRST LIGHT

Journal of the South Bay Astronomical Society – October 2017
on line at http://sbastro.net/
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On Yahoo Groups at: https://groups.yahoo.com/neo/groups/SBASTRO/info

Monthly General Meeting: Friday October 6th 7:30 PM

"The Future of Mars Exploration"

Anita Sengupta, NASA JPL

The September 8 Meeting

President Ken Rossi rang the meeting to order at 7:41, and described the successful partial eclipse event at Hesse Park on August 21. SBAS members set up four telescopes there, providing views for three hundred or more people. Kurt Stenzel from Lomita STEAM School described their efforts to educate their students about astronomy, and thanked the SBAS for agreeing to host an upcoming star party for the students. President Rossi also thanked the SBAS members who have actively contributed to the running of the Society, and noted that the SBAS recently provided Astronomy Magazine annual subscriptions to eleven promising astronomy students at El Camino College, to thank the College for the use of their facilities.

After a fifteen-minute social break, Ken Munson began the meeting dedicated to the recent solar eclipse by describing his own experience at Rye Valley in Oregon with his brother, who found a remote and uncrowded site that provided an excellent view, as seen in the pictures that he presented. He also commented about the remarkably-large temperature drop that the eclipse produced, and presented some nice photos of the partial and total phases taken by Al Berman from Madras, Oregon.

George Nestojko showed an eight-minute video of the reaction of spectators to the eclipse just before and after totality, as seen near St. Louis, Missouri. Greg Benecke recounted his adventures in observing totality from Dubois, Wyoming. Steve Lindsey screened a six-minute movie that he took of the Grand Tetons, including the excited commentary of the observers during totality. He also screened a four-minute mini-documentary available on the Internet about the difficulties involved in taking some dramatic pictures of a rock climber silhouetted against the totally-eclipsed Sun. Shimonee Kadakia saw shadow bands a few minutes before and after totality as seen from Caspar, Wyoming, and she contrasted her feelings with the feelings of awe and even fear that ancient peoples must have felt.

Ann Koons passed around several color prints of the partial and total eclipse that she photographed at Jackson Hole, Wyoming. She said that she looked forward to the next American total eclipse of April 8, 2024, a feeling matched by many others in the audience. President Ken Rossi thanked all the contributors on behalf of the 30 people present, ending the meeting at 10:02.

- Dr. Steven Morris

This article is provided by NASA Space Place.

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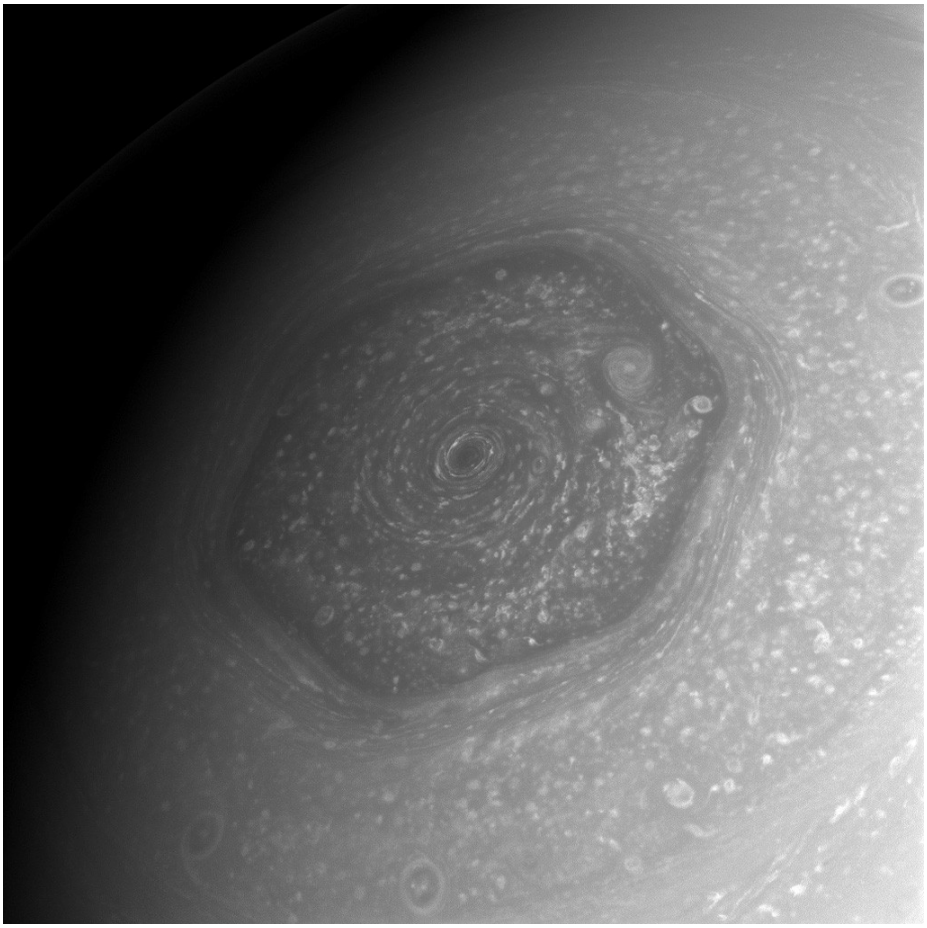
Cassini Says Goodbye

By Teagan Wall

On September 15th, the Cassini spacecraft will have its final mission. It will dive into the planet Saturn, gathering information and sending it back to Earth for as long as possible. As it dives, it will burn up in the atmosphere, much like a meteor. Cassini's original mission was supposed to last four years, but it has now been orbiting Saturn for more than 13 years!



Caption: This image of the hexagonal storm on Saturn's north pole was taken by Cassini in 2013. Image credit: NASA/JPL-Caltech/Space Science Institute

The spacecraft has seen and discovered so many things in that time. In 2010, Cassini saw a massive storm in Saturn's northern hemisphere. During this storm, scientists learned that Saturn's atmosphere has water vapor, which rose to the surface. Cassini also looked at the giant storm at Saturn's north pole. This storm is shaped like a hexagon. NASA used pictures and other data from Cassini to learn how the storm got its six-sided shape.

Cassini also looked at some of Saturn's moons, such as Titan and Enceladus. Titan is Saturn's largest moon. Cassini carried a lander to Titan. The lander, called Huygens, parachuted from Cassini down to the surface of the moon. It turns out, Titan is quite an exciting place! It has seas, rivers, lakes and rain. This means that in some ways, Titan's landscape looks a bit like Earth. However, its seas and rivers aren't made of water—they're made of a chemical called methane.

Cassini also helped us learn that Saturn's moon Enceladus is covered in ice. Underneath the ice is a giant liquid ocean that covers the whole moon. Tall geysers from this ocean spray out of cracks in the ice and into space, like a giant sneeze. Cassini flew through one of these geysers. We learned that the ocean is made of very salty water, along with some of the chemicals that living things need.

If there is life on Enceladus, NASA scientists don't want life from Earth getting mixed in. Tiny living things may have hitched a ride on Cassini when it left Earth. If these germs are still alive, and they land on Enceladus, they could grow and spread. We want to protect Enceladus, so that if we find life, we can be sure it didn't come from Earth. This idea is called planetary protection.

Scientists worry that when Cassini runs out of fuel, it could crash into Titan or Enceladus. So, years ago, they came up with a plan to prevent that from happening. Cassini will complete its exploration by diving into Saturn—on purpose. The spacecraft will burn up and become part of the planet it explored. During its final plunge, Cassini will tell us more about Saturn's atmosphere, and protect the moons at the same time. What an exciting way to say goodbye!

To learn more about Saturn, check out NASA Space Place: https://spaceplace.nasa.gov/all-about-saturn

SBAS Executive Board

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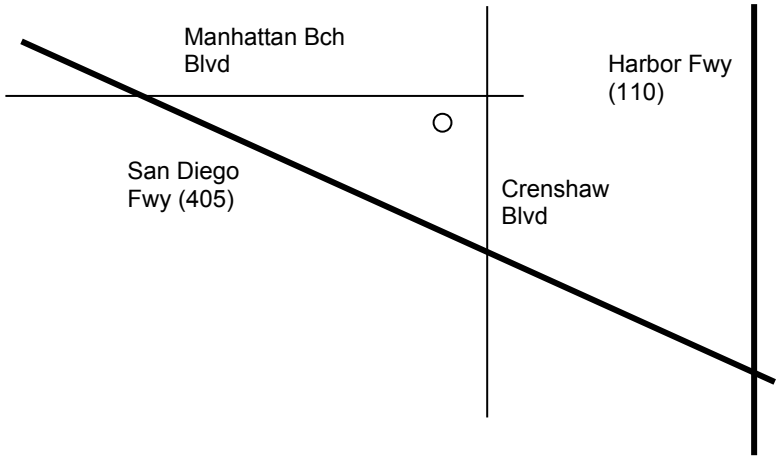
Monthly General Meetings

We normally meet on the first Friday of each month at 7:30 p.m. in the Planetarium at El Camino College (16007 Crenshaw Bl. In Torrance). If the first Friday is on or close to a holiday, we usually defer the meeting until the second Friday of the month. The Planetarium is on the south side of Manhattan Beach Blvd., one block west of Crenshaw Blvd. (near the center of the map at left).



The planetarium is the only round, domed building on campus. There is on-street parking, and we can often use campus parking: check inside to see if you need a FREE parking permit for your car.

We enjoy the planetarium facilities through the courtesy of the El Camino College Administration, and have several faculty members of the Astronomy Department as

members of our Club. Our meetings always include an informal opening, when new attendees are invited to introduce themselves and let us know about their interests in astronomy. Members share their latest news and observations at this time. The rest of the evening is devoted to guest speakers, who range from amateur astronomers to professional astronomers to representatives from local aerospace companies to college professors. We are fortunate to have all these talented people in our area, willing to come and talk to us.

Monthly Planning Meeting

Committee members (and anyone else with an interest in Society activities) meet each month, usually on the Monday following the general meeting. Meetings are sometimes rescheduled due to travel and other circumstances. Exact date and time of each month's meeting will be announced in the monthly meeting. The October planning meeting will be held at the home of TBD.

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SBAS Dues

Month Join/Due	Member (Family) Email Only	Student	Expires
January	$40.00	$25.00	Dec
February	$36.67	$22.92	Dec
March	$33.33	$18.75	Dec
April	$30.00	$20.83	Dec
May	$26.67	$18.75	Dec
June	$23.33	$16.67	Dec
July	$20.00	$14.58	Dec
August	$16.67	$12.50	Dec
September	$13.33	$10.42	Dec
October	$10.00	$8.33	Dec
November	$6.67	$6.25	Dec
December	$3.33	$4.17	Dec

Note to Current U.S. Mail Members: The SBAS Board has decided that it is no longer cost effective to publish and mail out hard copies of the FirstLight. Since this decision was made after some 2016 renewals for U.S. Mail memberships were received, we will either refund the difference or extend your full 2015 membership though March of 2016.

To simplify the dues, we suggest that all membership expire in December. Dues are $40.00/year ($25.00/year for students) and expire on December 31, of the current year. The FirstLight is now only available via Email notification and on our web site. New members use Month Join, and current members select your expiring Month to calculate the amount. Members that expire in October or November may wish to write one check and include next year's membership. Make checks payable to the South Bay Astronomical Society. Dues may be paid at the general meeting or mailed to:

South Bay Astronomical Society

Attn: Greg Benecke
P.O. Box 1937
Redondo Beach, CA 90278

SBAS Membership Benefits

Contact Greg Benecke for magazine subscriptions at club rates: "Sky & Telescope" $32.95 and "Astronomy" $34.00/1 year or $60.00/2 years!
Note: S&T subscribers at the club rate renew their subscriptions by mailing their renewal notice and check or calling the 800# on the renewal notice.
Only new subscribers or subscribers converting their subscription to the club rate need to contact Arnie or send a check to the PO Box. Astronomy subscriptions and renewals still go through Arnie or via the PO Box.

Astronomy Technology Today has become a digital only magazine. They have stated that current print subscribers will continue to be able to access digital issues without any cost. New subscribers should check their website for ordering details and subscription costs (www.astronomytechnologytoday.com).

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2) When prompted for the promotion code, type in your club's unique offer code "RCLUB165" and click the "Get Offer" button.
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5) Click on the "Submit" button. You will receive a confirmation page immediately. Please print this page for your records.

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Astronomical League Observing Clubs

All SBAS members in good standing are also members of the Astronomical League and are eligible to participate in the League's Observing Clubs. The Astronomical League provides many different observing programs (clubs). These programs are designed to provide a direction for your observations and to provide a goal. The programs have certificates and pins to recognize the observers' accomplishments and for demonstrating their observing skills with a variety of instruments and objects. For more information, go to:
http://www.astroleague.org/observing.html.

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Useful and Interesting Astronomy Websites

Website	Description
http://www.calsky.com/	A useful site for planning an evening's star gazing if you don't have your own planetarium software.
https://www.aavso.org/	Information for observers with an interest in tracking variable stars.
http://www.cleardarksky.com/csk/prov/California_clocks.html	Good site to check to know what the weather will be like where you might be planning on going.
http://ssd.jpl.nasa.gov/horizons.cgi	Great site to use when you want to find a new comet or asteroid that isn't already in your planetarium software's list. See the Ephemeris Generator file on the SBAS Yahoo group site for instructions.
http://heavens-above.com	Check this site to find out what satellites may be visible in your sky.
http://www.lunar-occultations.com/iota/iotandx.htm	Website for the International Occultation Timing Association. Good place to find information on asteroid occultations of background stars.
http://pictures.ed-morana.com/ISSTransits/predictions/	Find out when the ISS will transit in front of the Sun or Moon as seen from your location.
http://www.aerith.net/comet/weekly/current.html	Weekly information on bright comets. Good place to learn where there are bright comets to be seen. Refer to the Horizons website above to generate ephemerides.
http://sohowww.nascom.nasa.gov/	See the sun in ways you might never have imagined! You can even create your own movies of the sun in different the different frequencies imaged by the SOHO spacecraft.

Observing Reports

Inyokern Road – With New Moon arriving on Tuesday, I figured my best opportunity for some dark-sky observing was going to be on Saturday, September 16th. So, I packed all my gear into the car, making sure I didn't forget anything this time, and headed off to the Redrock-Inyokern Road site that I frequently go to. The Clear Dark Sky website predicted this location would have been observing conditions that the other two places I frequent.

It didn't look very promising when I arrived. There was a high, thin cloud layer over most of the sky. But, I set up anyway. And, surprisingly, as predicted the sky cleared as it got closer to sunset and by full dark the sky was pretty good. The seeing wasn't the best as there was a lot of twinkling going on but at least there wasn't any wind

I had some difficulty getting an alignment at first. I'd do an initial alignment and then start the polar alignment only, after much pushing and shoving of the scope, find that it had lost alignment. It wasn't until the next morning that I

found out why. The power cable was cracked and the wires were exposed and apparently were occasionally losing contact, causing the scope to reset. Luckily, I have a second cable to use while I get this one fixed. Once I got a good alignment, I settled down for a night of imaging. It was a remarkably successful night in which I mostly concentrated on Messier star clusters. M11, with only about a 10 or 15-minute exposure time showed so many stars when I processed it that I didn't recognize it. I initially mistook it for an extreme closeup of M2 which I shot immediately after M11. It wasn't until a few days later that I tried re-processing it again and found the way to make M11 recognizable again. Still, it has so many fainter stars, that thing as they get farther from the bright central group, that it makes me wonder if it isn't really an old burned out globular cluster. M2 came out looking very nice after a couple of variations in processing.

M74 and M77 were the only two galaxies I shot that night, both of which came out ok. The seeing was a bit fuzzy while shooting those so it was hard to get a really good focus. I did learn some more tricks about the focusing took in SGP, at least.

After the galaxies, it was back to star clusters. The seeing had improved so, in fairly quick succession, I went after M36, M37 and M38. The all came out looking very nice. M37 makes a really nice image of an open star cluster.

Then I went back to a target I've done a few times with different cameras, most of which I felt were not very good. NGC 1514, a nice, bright planetary nebula in Taurus, just under the foot of Perseus makes an interesting photographic target because of the different shading that come out quite readily in photographs. In the various photos I've done of this one, I've sometimes seen a secondary star near the bright one at the center of the nebula and in other images, the second star isn't there. I finally read up on this one and found that it's a double star system at the heart of the nebula. The secondary star orbits the primary about once every 10 days. So that's why sometimes it's there and sometimes it's not! Not sure if it was the secondary that gave off the gas that makes the nebula though. Maybe the fact that it's a double star system contributes to creating the shadings of the expanding gas cloud.

The final target of the night was M1. Unfortunately, the seeing had gotten bad again and it was really tough to try to get a good, sharp focus. Not a terrible image but not as good as I was hoping for. I'll have to try this one again next month when it should be a little higher in the sky.

By then it was getting on to nearly dawn so I started packing up for the trip home. Nine images in one night! Quantity rather than quality perhaps but it was still fun.

- ***Ken Munson***

Secrets of Bright, Rapidly Spinning Star Revealed

Science Daily September 18, 2017 - Almost 50 years after it was first predicted that rapidly rotating stars would emit polarised light, a UNSW Sydney-led team of scientists has succeeded in observing the phenomenon for the first time.

They used a highly sensitive piece of equipment designed and built at UNSW and attached to the Anglo-Australian Telescope at Siding Spring Observatory in western NSW to detect the polarised light from Regulus, one of the brightest stars in the night sky.

The research has provided unprecedented insights into the star, which is in the constellation Leo, allowing the scientists to determine its rate of spinning and the orientation in space of the star's spin axis.

The study, by a team at UNSW, University College London, University of Washington and University of Hertfordshire, is published in the journal *Nature Astronomy*.

"We found Regulus is rotating so quickly it is close to flying apart, with a spin rate of 96.5 per cent of the angular velocity for break-up," says study first author and UNSW scientist Dr Daniel Cotton, of the School of Physics.

"It is spinning at approximately 320 kilometres per second -- equivalent to travelling from Sydney to Canberra in less than a second."

Indian astrophysicist and Nobel laureate Subrahmanyan Chandrasekhar first predicted the emission of polarised light from the edges of stars in 1946, prompting the development of sensitive instruments called stellar polarimeters to try and detect this effect.

Optical polarisation is a measure of the orientation of the oscillations of a light beam to its direction of travel.

In 1968, other researchers built on Chandrasekhar's work to predict that the distorted, or squashed shape, of a rapidly rotating star would lead to the emission of polarised light, but its detection has eluded astronomers until now.

"The instrument we have built, the High Precision Polarimetric Instrument, HIPPI, is the world's most sensitive astronomical polarimeter. Its high precision has allowed us to detect polarised light from a rapidly spinning star for the first time," says Dr Cotton.

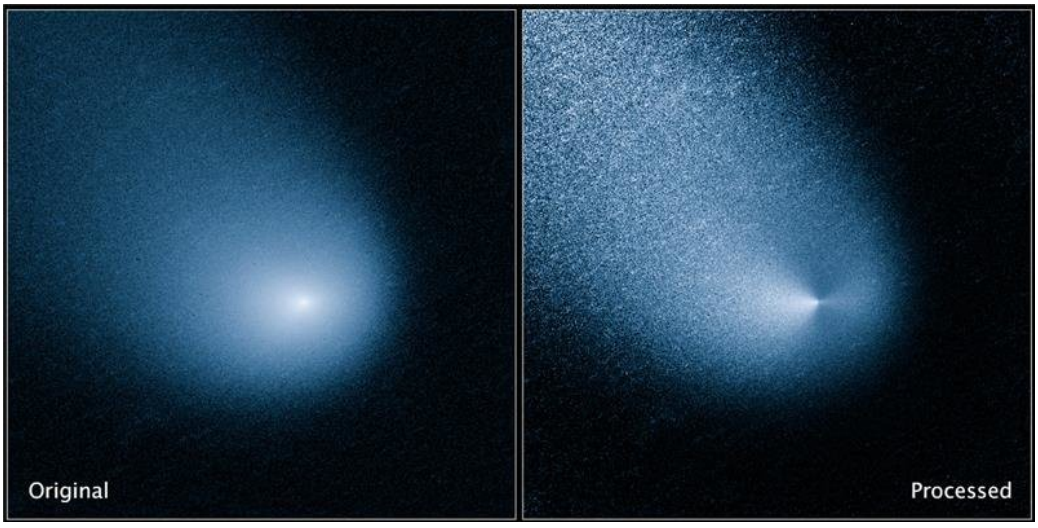
"We have also been able to combine this new information about Regulus with sophisticated computer models we have developed at UNSW to determine the star's inclination and rotation rate.

"It has previously been extremely difficult to measure these properties of rapidly rotating stars. Yet the information is crucial for understanding the life cycles of most of the hottest and largest stars in the galaxies, which are the ones that produce the heaviest elements, such as iron and nickel, in interstellar space."

Regulus is about 79 light years away. During the total solar eclipse in the US in August, Regulus was just 1 degree away from the Sun and was, to many people, the only star visible during the eclipse.

Solar Eruption 'Photobombed' Mars Encounter with Comet Siding Spring

Science Daily September 21, 2017 - When Comet C/2013 A1 (Siding Spring) passed just 140,000 kilometres from Mars on 19th October 2014, depositing a large amount of debris in the Martian atmosphere, space agencies coordinated multiple spacecraft to witness the largest meteor shower in recorded history. It was a rare opportunity, as this kind of planetary event occurs only once every 100,000 years. However, scientists analyzing the data have found that a very powerful Coronal Mass Ejection (CME) launched by the Sun also arrived at Mars 44 hours before the comet, creating significant disturbances in the Martian upper atmosphere and complicating analysis of the data. Results describing the combined effects of the comet and the CME throughout the Martian atmosphere are being presented in a special session at the European Planetary Science Congress (EPSC) 2017 in Riga on Thursday, 21st September.



Hubble image of Comet Siding Spring before and after filtering, as captured by Wide Field Camera 3 on NASA's Hubble Space Telescope.
Credit: NASA, ESA, and J.-Y. Li (Planetary Science Institute)

Dr Beatriz Sanchez-Cano, of the University of Leicester and co-organizer of the session, explains: "Comet Siding

Spring flew very close to Mars, at one third of the Earth-Moon distance. This is one of the most exciting planetary events that we'll see in our lifetime. Mars was literally engulfed by the coma, the comet's outer atmosphere, for several hours. However, a deeper analysis of the data shows that the comet's interaction with Mars is much more difficult to understand than we expected because of the effects of a CME that hit Mars a few hours earlier. In addition, the encounter happened at the peak of the Martian dust season. We need to understand the full context of the observations in order to separate out the real cometary effects on Mars."

CMEs occur when magnetic field lines at the visible surface of the Sun become tangled and break, releasing large quantities of electrically charged particles into space. The interval before, during and after the Comet Siding Spring encounter with Mars was one of the most disturbed periods of the current solar cycle. The CME was launched from the largest sunspot group observed in the last 24 years and several additional solar flares were detected that would have impacted on Mars around this time.

Sanchez-Cano has investigated the interaction of the comet with energetic particles from the Sun, and the effects of the CME and cometary encounter on the Martian atmosphere, using data from ESA's Mars Express mission, NASA's MAVEN and Mars Odyssey orbiters, and the Curiosity rover on the Martian surface. Her results show clear signs of 'showers' of energetic oxygen ions and dust from the time that Mars was inside the coma up to 35 hours after comet's closest approach. These ions, most likely from the comet, were accelerated by the highly active solar wind during the comet encounter and delivered into the Martian atmosphere. This created an extra electrically-conducting layer (ionosphere) at a lower level than the planet's usual ionosphere. None of those particles seem to have arrived at the Martian surface as observed by the Curiosity rover, confirming that they were absorbed in the atmosphere.

Prof Mats Holmström, of the Swedish Institute of Space Physics, who will present the first results of the encounter from the Mars Express ASPERA-3 instrument, says: "Our data and modelling show that the upper layers of the Martian atmosphere were disturbed by the passing comet. The precipitation from the comet was mainly water, either in the form of neutral molecules or broken down into ions through interactions with light. However, the ASPERA-3 results show that the amount of ionised water interacting with the Martian atmosphere was much smaller than expected, compared to the amount of neutral water molecules and the charged particles from the solar wind. This means that there were less of the ions interacting with the upper atmosphere and more water molecules interacting at lower depths. We think that, because of the relatively large size and activity of the comet, the majority of ionised water was carried away by the solar wind rather than dropping down into Mars's atmosphere.

Matteo Crismani, of the University of Colorado at Boulder, will present observations of the encounter from the MAVEN orbiter. These indicate that the meteor shower was the largest in recorded history, peaking at 30 meteors per second and lasting up to 3 hours. Dust grains from the comet, travelling at 200,000 kilometres per hour, entered Mars's atmosphere with enough energy to melt and release their constituent atoms, such as magnesium and iron. Data from MAVEN's Imaging UltraViolet Spectrograph (IUVS) enabled Crismani and colleagues to determine the composition these metallic species, how they evolved and how they moved through the Martian atmosphere.

Gamma-ray burst captured in unprecedented detail

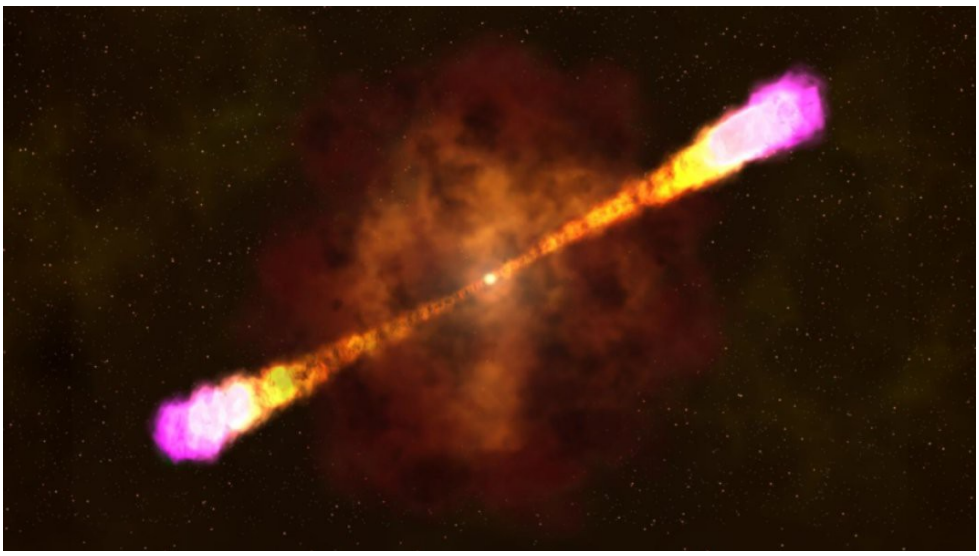
Science Daily July 26, 2017 - Gamma-ray bursts are among the most energetic and explosive events in the universe. They are also short-lived, lasting from a few milliseconds to about a minute. This has made it tough for astronomers to observe a gamma-ray burst in detail.

Using a wide array of ground- and space-based telescope observations, an international team led by University of Maryland astronomers constructed one of the most detailed descriptions of a gamma-ray burst to date. The event, named GRB160625B, revealed key details about the initial "prompt" phase of gamma-ray bursts and the evolution of the large jets of matter and energy that form as a result of the burst. The group's findings are published in the July 27, 2017 issue of the journal *Nature*.

"Gamma-ray bursts are catastrophic events, related to the explosion of massive stars 50 times the size of our sun. If you ranked all the explosions in the universe based on their power, gamma-ray bursts would be right behind the Big Bang," said Eleonora Troja, an assistant research scientist in the UMD Department of Astronomy and lead author of the research paper. "In a matter of seconds, the process can emit as much energy as a star the size of our sun would in its entire lifetime. We are very interested to learn how this is possible."

The group's observations provide the first answers to some long-standing questions about how a gamma-ray burst

evolves as the dying star collapses to become a black hole. First, the data suggest that the black hole produces a strong magnetic field that initially dominates the energy emission jets. Then, as the magnetic field breaks down, matter takes over and begins to dominate the jets. Most gamma-ray burst researchers thought that the jets were dominated by either matter or the magnetic field, but not both. The current results suggest that both factors play key roles.



This image shows the most common type of gamma-ray burst, thought to occur when a massive star collapses, forms a black hole, and blasts particle jets outward at nearly the speed of light. An international team led by University of Maryland astronomers has constructed a detailed description of a similar gamma-ray burst event, named GRB160625B. Their analysis has revealed key details about the initial 'prompt' phase of gamma-ray bursts and the evolution of the large jets of matter and energy that form as a result.
Credit: NASA's Goddard Space Flight Center

"There has been a dichotomy in the community. We find evidence for both models, suggesting that gamma-ray burst jets have a dual, hybrid nature," said Troja, who is also a visiting research scientist at NASA's Goddard Space Flight Center. "The jets start off magnetic, but as the jets grow, the magnetic field degrades and loses dominance. Matter takes over and dominates the jets, although sometimes a weaker vestige of the magnetic field might survive."

The data also suggest that synchrotron radiation -- which results when electrons are accelerated in a curved or spiral pathway -- powers the initial, extremely bright phase of the burst, known as the "prompt" phase. Astronomers long considered two other main candidates in addition to synchrotron radiation: black-body radiation, which results from the emission of heat from an object, and inverse Compton radiation, which results when an accelerated particle transfers energy to a photon.

"Synchrotron radiation is the only emission mechanism that can create the same degree of polarization and the same spectrum we observed early in the burst," Troja said. "Our study provides convincing evidence that the prompt gamma-ray burst emission is driven by synchrotron radiation. This is an important achievement because, despite decades of investigation, the physical mechanism that drives gamma-ray bursts had not yet been unambiguously identified."

Comprehensive coverage of GRB160625B from a wide variety of telescopes that gathered data in multiple spectra made these conclusions possible, the researchers said.

"Gamma-ray bursts occur at cosmological distances, with some dating back to the birth of the universe," said Alexander Kutyrev, an associate research scientist in the UMD Department of Astronomy and a co-author of the research paper. "The events are unpredictable and once the burst occurs, it's gone. We are very fortunate to have observations from a wide variety of sources, especially during the prompt phase, which is very difficult to capture."

NASA's Fermi Gamma-ray Space Telescope first detected the gamma-ray emission from GRB160625B. Soon afterward, the ground-based MASTER-IAC telescope, a part of Russia's MASTER robotic telescope network located at the Teide Observatory in Spain's Canary Islands, followed up with optical light observations while the prompt phase was still active.

MASTER-IAC gathered critical data on the proportion of polarized optical light relative to the total light produced by the prompt phase. Because synchrotron radiation is one of only a limited number of phenomena that can create polarized light, these data provided the crucial link between synchrotron radiation and the prompt phase of GRB160625B.

A magnetic field can also influence how much polarized light is emitted as time passes and the burst evolves. Because the researchers were able to analyze polarization data that spanned nearly the entire timeframe of the burst -- a rare achievement -- they were able to discern the presence of a magnetic field and track how it changed as GRB160625B progressed.

"There is very little data on polarized emission from gamma-ray bursts," said Kutyrev, who is also an associate scientist at NASA's Goddard Space Flight Center. "This burst was unique because we caught the polarization state at an early stage. This is hard to do because it requires a very fast reaction time and there are relatively few telescopes with this capability. This paper shows how much can be done, but to get results like this consistently, we will need new rapid-response facilities for observing gamma-ray bursts."

Schedule of Coming Events

Date	Event
5 October	**Venus Passes 0.2° from Mars** See them pass each other in the pre-dawn sky to the east.
6 October Friday Night 7:30PM	**Monthly General Meeting** **Topic: "**The Future of Mars Exploration**"** **Speaker:** Anita Sengupta, NASA JPL
9 October Monday Night 7:30 PM	**Monthly Planning Meeting** See directions on Page 4.
9 October	**Draconids Meteor Shower Peak** The Zenith Hourly Rate for this shower is highly variable with some years experiencing rates of several thousand per hour.
14 October Saturday Evening	**In Town Dark Sky Observing Session at Ridgecrest Middle School–** 28915 NortbBay Rd. RPV, Weather Permitting**:** Please contact Greg Benecke to confirm that the gate will be opened!
17 October	**Mercury Passes 1o from Jupiter** Look for these two low in the western sky after sunset.
19 October	**Uranus at Opposition**
21 October	**Orionids Meteor Shower Peak** The **Orionid meteor shower**, usually shortened to the **Orionids**, is the most prolific meteor shower associated with Halley's Comet. The Orionids are so-called because the point they appear to come from, called the radiant, lies in the constellation Orion, but they can be seen over a large area of the sky. Orionids are an annual meteor shower which last approximately one week in late October. In some years, meteors may occur at rates of 50–70 per hour
21 October Saturday Night	**Out of Town Dark Sky Observing Session** Contact Greg Benecke to coordinate a location.
28 October	**International Observe the Moon Night** See http://www.lpi.usra.edu/observe_the_moon_night/ for information on participating.

South Bay Astronomical Society

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Next General Meeting at El Camino College Planetarium

Friday, October 6th 7:30 PM

"The Future of Mars Exploration"

Anita Sengupta, NASA JPL

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South Bay Astronomical Society
P.O. Box 1937
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