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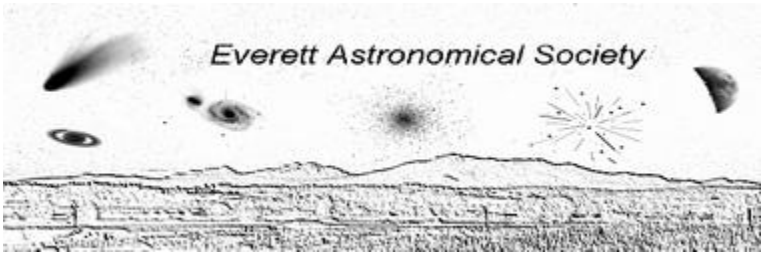

The Stargazer

November 2009

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EAS BUSINESS…

NEXT EAS MEETING – SATURDAY NOVEMBER 21ST AT 6:00 PM, AT THE AURORA ASTRO PRODUCTS STORE

The meeting program will be a talk by Dr. John Wisniewski, a postdoctoral fellow from UW on 'Imaging Circumstellar Disks - Exoplanet Diagnostics'. He will describe the high contrast imaging techniques which are used to image the circumstellar disks of protostars, i.e. protoplanetary disks, which are believed to serve as the active birthplace of planets. Slightly older debris disks may indicate the presence of exoplanets and allow the study the early dynamical evolution of exoplanet systems. He shows state-of-the-art images of circumstellar disks, taken by HST or adaptive optics telescopes. He will discuss some of the interesting science results from imaging the HD 163296 protoplanetary disk, and the Fomalhaut debris disk system. John has also involved himself in public outreach, including Project Astro, science fair judging, talks to young people and to amateur astronomers.

Attending members will be eligible for a monthly door prize.
(We have several new nice books to choose from).

The meeting will be at the Aurora Astro Products store in Silver Lake area (directions below) located at Silver Lake Plaza *11419 19th Avenue SE #A102, Everett, WA 98208*.

Map / Directions to store location – click the address link above:

If you are traveling northbound on I-5: Take exit #186/128th St. and go east - to the right on 128th St. continue until you come to Murphy's Corner/Intersection with Highway 527/19th Ave SE/Old Bothell-Everett Highway (all one in the same) and turn left/north. Follow until you see Silver Lake Plaza (red brick construction) on your right with the lake is on your left.

If you are traveling southbound on I-5: Take exit 187/Everett Mall Way and at the top of the exit's hill turn right following signs for Highway 527. At the light turn right following the signs for Highway 527. Then stay on Highway 527/19th Ave SE/Old Bothell-Everett Highway until you have Silver Lake on your right and the Silver Lake Plaza on your left. You may also continue down I-5 until exit 186 and turn left onto 128th then follow previous directions. If you have a problem you can always call 425-337-4384

★ STAR PARTY INFO ★

★ Scheduled EAS Star Parties at Ron Tam's: ★

No more star parties scheduled until spring, due to wet weather.

EAS member Ron Tam has offered a flexible opportunity to EAS members to come to his home north of Snohomish for observing on clear weekend evenings and for EAS starparties. Anyone wishing to do so needs to contact him in advance and confirm available dates, and let him know if plans change**.** *"Our place is open for star parties any Saturday except weekends of the Full Moon. People can call to get weather conditions or to confirm that there is a star party. Our phone number is (360) 568-5152. They can e-mail me too (tam1951@verizon.net) but I don't check my email daily. They can email me for directions if they never have been out here."* Listed below are proposed dates for **planned EAS star parties** at my [Ron Tam's] place, depending upon the weather, of course. Call Ron about spur-of-the-moment observing.

Please also join the EAS mail list, **and then send mail to the mail list** at ***everett_astronomy@topica.com*** to coordinate spur-of-the-moment observing get-togethers, on nights when the sky clears. We try to hold informal close-in star parties each month during the spring, summer, and fall months on a weekend near the New moon at a member's property or a local park.
(call Jim Bielaga at (425) 337-4384 for info or check the EAS website.)
Members contact Jim Bielaga for scope borrowing.

Other Western US Star Parties This Season

Other Star parties:
http://www.cloudynights.com/ubbthreads/showflat.php/Cat/0/Number/2858373/Main/2858366

EAS MEMBER NEWS

Other Member News…

November is election month for EAS officer positions. This year we have several people who have been in the same role for a long time who are retiring, so need new folks to take on the open positions. This is different than

recent years, where the same slate of officers has been reinstated.

Most clubs have bylaws which have term-limits of 2 or 3 consecutive terms, which results in healthy turnover and broader participation by members. (This often takes the form of a group of people who actively serve the club, but in different roles in different years, such as Secretary one year, and Programs chairperson another year.)

This approach usually works out very well, and should be considered.

Nominations and elections for 2010 will be held at the November meeting. We will need people to support and serve their club this year, and step up to new roles, since we will not just be maintaining the status quo.

President: (vacant for 2010) Schedule and run the club monthly meetings.

Vice president: (currently held by James Bielaga) Run monthly meetings if President is absent, and store/loan club telescopes.

Treasurer: (vacant for 2010) Collect club mail, and club dues, pay club bills, and maintain the club membership rolls.

Newsletter Co-editor #1: (Incumbent Mark Folkerts will continue) Organize and publish StarGazer newsletter on a monthly basis.

Newsletter Co-editor #2: (vacant for 2010) Contribute columns or articles for the StarGazer on a regular basis.

Programs chairperson: (currently vacant) Contact potential speakers and invite them for monthly meeting, schedule the speakers, and introduce them at meetings.

Librarian: (currently vacant) Maintain the club books, movies, and software; and check materials out to members.

Astronomy Day chairperson: (status not confirmed) Reserve venues for annual Astronomy Day events, organize participants and publicity.

Publicity chairperson: (status not confirmed) Contact news media, and e-mail and blog to raise public awareness of EAS activities.

Star party organizer: (currently held by Ron Tam) Organize regular monthly suburban star parties March-November, and potentially other observing events as well.

Outreach chairperson: (currently vacant) - Coordinate requests from public for EAS member volunteers to conduct star parties or presentations at visits to schools, senior centers, scout meetings, etc. We often have requests for members of the EAS to come and help with an 'astronomy night' event from local schools, scout groups, senior homes, or similar groups. Usually this would be in the form of a star party at their gathering, or perhaps a short slide show or night sky talk. Providing education and support to the community about interest astronomy is one of the main missions of the EAS. A star party night can be a rewarding event for all involved. **Please email Mark Folkerts with your interest (or suggestions).**

Sidewalk astronomy committee: (currently vacant). – Plan and conduct urban/suburban sidewalk astronomy events to allow passers-by to experience astronomy. Needs 2-3 people for each event, and to schedule events. We are looking for volunteers who could do a series of Sidewalk Astronomy sessions this spring and summer, at a local park or public venue. For safety, moral support, and effectiveness, this should be done in teams of at least two people with telescopes. Special events like eclipse or comets especially draw the interest of the public.

Other volunteers? Find a way to help and contribute. Come up with a new idea to promote the EAS and astronomy in your community.

EAS Member Submission -- Some Facts & Commentary -

- submitted by John W. Goerger pos1@earthlink.net

[The EAS welcomes newsletter article contributions and submissions of all types from its members.]

***"Space Shuttles** - The crew of STS-128 and the crew of the ISS made the work they did on the ISS, look like a walk-in-the-park! However, the reality is, working in space is among the most dangerous of human activities, but must be done to ensure humankinds' ability to live and work beyond our home world. A major concern is what would happen if there were the loss of another Space Shuttle and her crew? We cannot allow for the loss of another one and all means must be taken by the US Government, to prevent such an occurrence!*

STS-129, Atlantis is scheduled to launch on Nov 12, 2009 for a 12-day mission to the ISS. Returning from the ISS on STS-129 will be Nicole Stott who had come to the ISS via STS-128. There are 3 spacewalks planned for this mission. According to a Summary Report, issued Sept 8, 2009, for NASA, to get Americans to the Moon by 2020, NASA will need at least $3 billion-per-year to reach that milestone; otherwise the U.S.A. is stuck in low-earth-orbit. For those of you that were present at the park, last Fall, overlooking Port Gardner Bay when EAS had their scopes set-up for public viewing, and saw the meteor falling over in the west, go to this website http://transientsky.wordpress.com/2009/09/13/fireball-over-british-columbia-and-the-american-northwest/

***Here's a question for one and all. How come Space Shuttles were never launched from Vandenberg California?** The Air Force & NASA built a VAB and launching platform to launch space shuttles from there. The U.S. would have been able to orbit humans in polar orbit, which has never been done by the US. By going into polar orbit, a spacecraft eventually orbits the entire planet. There are those who, when asked that question, do not have an answer; instead of admitting they didn't know, they pontificate saying things like; it was because of fault-lines that no one knew about at the time, but the truth is simpler---CHALLENGER.*

Before the loss of Challenger and her fine crew (Jan 28 1986), Morton Thiokol, was the sole-source (and still is) to NASA for the SRM's (Solid Rocket Motor) which are the motors of the SRB's (Solid Rocket Boosters) that are attached to the ET (External Tank) of the Space Shuttles. Because of weight and other limitations of launching the space shuttles from Vandenberg, lighter SRM'S were being developed by Morton Thiokol and known as FWC-SRM (Filament-Wound Case). The Air Force was looking at keeping its ability to launch payloads on expendable boosters because it didn't want to rely totally on the Space Shuttle System, so they were preparing a proposal, in the early 80's, to develop the complementary expendable launch vehicle (CELV).

*In July 1983 Thiokol was told by NASA, that it was looking at the possibility of a second-source for SRM's, something that Thiokol learned had never happened to any of the other shuttle systems. One key individual was instrumental in discovering that fact and in telling NASA not to launch that fateful day---Allan J. McDonald! The book, **TRUTH, LIES, AND O-RINGS (2009)** will open your eyes into NASA, contractors and lessons not learned that lead to Columbia's loss, as well.*

***AWESOME, is the way to describe the launch of STS-129, the Space Shuttle Atlantis** on Monday November 16, 2009! This is considered a "stock-up" mission for additional "spares" for the ISS. Next fall 2010, unless an intelligent decision is made, the last Shuttle will launched to the ISS and then the Space Shuttles will be retired. Hopefully this will*

not occur as there is the idea being suggested to keep them operational until the next generation of manned-rated spacecraft can become operational by the United States.

If we do not continue the space shuttle system the United States of America will not have any space machine capable of sending American crews into space, but rather will have to depend upon Russian spacecraft for at least 4-7 yrs! The idea with the space shuttles is to be able to launch as needed, about 1-4 times per year, until NASA can get the next generation of human-rated spacecraft launching.

Ignorance? Rationality? *- In the first week of November, FOX NEWS mentioned there is a large increase of Americans contacting soothsayers, fortunetellers and the like, wanting answers in investing and related fields, because of the worry of the worsening American economy. This, from a rational scientific point-of-view is very disturbing. This society was built upon an analytical and reasoned citizenry.*

Since the late 1960's and the beginning and into the middle of the 1970's there had been a slow steady movement going on claiming such things as drastic climate change (in the mid to late 70's was the belief that the Earth was going into another Ice Age because of human activity), Human Beings had evolved from "killer apes" (think baboons) NOT! [See---Leaky Family]. UFO invasions/abductions, human auras, astral projections, remote viewing (the US Gov't spent over $20 million on this crap), spoon-bending with one's mind, ESP in all its forms, Scientology, Creationism, appearance of angels, people possessed by the devil, and the rise of those who think our Universe is only a few 10,000 or a million yrs old, at most and that Darwinian Evolution is totally wrong (think Stalin and T.D. Lysenko and the attacks they leveled on Darwinian concepts).

Mixed in with all of this is the political crap both from the extreme Right and Left political movements (think "Liberation Theology"). Also, during the mid 1970's were claims the US did not land human beings on the moon and by the 1980's major radio stations in the US were interviewing those who wrote books claiming the missions were faked. Then there was a TV special show with those claiming they had "proof" the manned landings never happened. Is it any wonder we are at the state we are now? Recently I saw a program funded in part by the NSA and Astronomy Society of the Pacific discussing how to present astronomy and science to the general public and how not to upset folks who do not agree with what knowledge we have discovered about the Universe and the formation of life.

It was 400 yrs ago, this year, when Galileo was using a telescope to examine the objects in the sky. His evidence showed him what people believed, was WRONG! Totally and absolutely WRONG! What if you are giving a "star party" and someone in the group claims you are upsetting him or her because he/she knows everything obits the earth, including the sun, and furthermore he/she are angry that you claim the earth rotates on its axis when he/she knows that the Earth does not move! They are NUTS! Are we as educators suppose to just say; "well everyone is entitled to their opinion?" That is not what western science is, and it is time we who are in the field, stand up and explain what science is, how theories and laws are discovered and what is just hogwash!

WOW! There is a whole lot of water on the Moon! *Results from the LCROSS mission! According to Anthony Colaprete, LCROSS project scientist, "we didn't find just a little bit, we found a significant amount", and estimated the plume that was generated by the impact, which was in the instrument's field of view contained close to 25 gallons of water! The thinking is it is in the form of ice and not just on the surface but below the lunar surface!*

Mercury is in the southwest in the second week of December*, at a visual -0.6 on the 9th, and is about 5 degrees above the horizon and shows up 30 minutes after sunset, and by the 10th, it will have an angular diameter of 6 arc seconds (6"). On the 18th, it will be 20 degrees in elevation and visible 30 minutes after sunset. Jupiter at a -2.2 is in the southwest as twilight fades and through a telescope its disk spans 36". By month's end, Jupiter sets by 8:30 pm local time. Neptune is at a 7.9 on the 15th, and by the 19th Jupiter passes south of Neptune by only 34" seconds---way cool! Around the 21st, Neptune is then only .6 of a degree from Jupiter, and is only 2.2" across.*

Mars rises 5 hrs before the sun a bit before 10 pm *and by month's end, 2 hours earlier. It increases in brightness from a -0.1 to a -0.7 during the month. Its angular diameter also increases from 10" to 13". Saturn shows up about 4 hours after Mars, in the East and with the rings giving an angular size of 39". The rings tilt will increase to 5 degrees to our line-of-sight by the end of this year. They will continue to widen until the year 2025 when they will once again be seen edge-on with respect to our line-of-sight. The First Day of Winter for the Northern Hemisphere occurs on 21st of December.*

This is the Christmas Season and the idea of purchasing a telescope as a present for someone or maybe having someone get them a telescope always comes up*. CAREFUL! Most of the 'scopes you see for sale at a general hobby store, a sporting goods or a large discount warehouse store are considered to be "Christmas Trash Telescopes". Many of them have wobbly tripods, plastic eyepieces as well as the optical lens or mirrors. Also, if you have problems setting them up, whom are you going to go to, to get help using it? Consider your local astronomy store in your community, there you will find a person(s) who are experts in the field and are observers themselves who can help you (Aurora Astro in Everett)?. Also, if there is a problem with the instrument they can assist you, assuming you purchased it from them!*

Before you purchase a telescope for a friend, or a friend is planning on giving you one, as a Christmas present, contact your local astronomy club, your local physics/astronomy Junior College instructor. Check out magazines like ASTRONOMY or SKY & TELESCOPE. Consider joining your local astronomy club (like Everett Astronomy Society). Many astronomy clubs have telescopes that members can use for free! Check with your local librarian who probably has a list of astronomy/science clubs in your city or county.

For the novice, telescopes come in two basic types, a REFRACTOR which is a lens (light passes through the glass as in eye glasses) and a REFLECTOR which is a mirror (light bounces off the surface and back toward you). Given the same diameter, a REFRACTOR will be around 2 times the cost of a REFLECTOR for the same diameter. A good pair of binoculars would be a wonderful gift for a beginner and is a major asset to any stargazing session and can be used for many other activities. Have a safe and enjoyable holiday season. Hopefully, 2010 will be the beginning of a turn-around of the problems we are all facing on this planet and that humankind will realize that a major option for solving the long-range problems we are facing will be the opening of the Industrialization of Space, or what I would call The Humanization of Space."

EAS MEMBERSHIP BENEFITS & INFORMATION

EAS Benefits - Membership in the Everett Astronomical Society (EAS) includes invitations to all of the club meetings and star parties, and entitles members to the monthly newsletter, *The Stargazer.* Also, a 10% discount is also being offered to EAS members for purchases at Aurora Astro Products in Everett. Only members may vote in EAS elections, or be eligible for EAS drawings.

Magazine Discounts –

In addition you will be able subscribe to ***Sky and Telescope*** for $7 off the normal subscription rate, contact the treasurer (Carol Gore) for more information. http://everettastro.org/application.htm (**When renewing your subscription to *Sky & Telescope* you should send your S&T renewal form along with a check made out to Everett Astronomical Society to the EAS address.** The EAS treasurer Carol Gore will renew your *Sky and Telescope* subscription for you. **Astronomy** magazine offers a similar opportunity to club members.)

Membership in the Astronomical League -
EAS is a member of the **Astronomical League** and you will receive the Astronomical League's quarterly newsletter magazine, ***The Reflector***.

EAS Club Telescope Borrowing -
Being a member also allows you the use of the club's telescopes, including an award winning 10 inch Dobsonian mount reflector, a second 10" dob, or and 8" Dobsonian. Contact Jim Bielaga (425) 337-4384 to borrow a telescope.

10% Discount on Purchases at 'Aurora Astro Products' in Everett -
EAS members are currently offered a 10% discount for all purchases of any telescopes, accessories, or other items at Aurora Astro Products, when they show their EAS membership card.

EAS Library -
Membership will give you access to all the material in the lending library. The library, consists of VCR tapes, DVDs, many books, magazines, and software titles. The EAS has a library of books, videotapes, and software for members to borrow, **located at Aurora Astro Products store**. We always value any items you would like to donate to this library. You can contact a club officer or **Librarian Mike Locke**, phone (425) 259-5995, email lockemi at comcast.net, to borrow or donate any materials, or **contact Jim Bielaga at Aurora Astro**. See library items list here: http://everettastro.org/eas_library.htm

Joining or Renewing with the EAS -

EAS dues are $25 / year per family. Funds obtained from membership dues allows the EAS to publish the Stargazer newsletter, pay Astronomical League dues, pay insurance, host a web site, and maintain our library. If it has been a year since you paid your dues, please re-subscribe to keep the club financially solvent, and to continue to receive membership benefits. http://everettastro.org/application.htm

Send your annual dues renewals to the
Everett Astronomical Society
P.O. Box 12746, Everett, WA 98206.

Those who have **subscriptions to Sky and Telescope** can now pay their own subscription as long as they are EAS members in good standing. Members will now be able to renew directly via mail or phone and still obtain the club discount. The subscribers may mail in the renewal notices with their payment, or renew via phone at (800) 253-0245. Payment at the time of renewal is required. Once a year, Sky and Telescope will check with the EAS club treasurer to see that the subscribers are still members in good standing to qualify for the discount. New members will continue to subscribe through the club treasurer.

Attention EAS Members – 10% Discount for all Everett Astronomical Society Members at Aurora Astro Products

"Mention your EAS club membership at Jim Bielaga's astronomy store 'Aurora Astro Products' and receive a 10% discount on all purchases. This is an exclusive discount to current E.A.S. members only.

I am proud to be able to offer this discount to Everett club members, and thanks for the support you have shown me on opening my new store. Also I have made great friends and learned a lot being a club member since 1991.

- Clear Skies, Jim Bielaga"

>> Members – please look at your EAS membership card to see when your membership dues are payable. If you are more than three months past due, the club will officially assume that you no longer wish to be a member, and remove you from the membership rolls. <<

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425-337-4384
425-337-4758 fax

Hours:
Monday, Thursday, Friday – 9:00 am to 6:00 pm
Tuesday/Wednesday – Noon to 6:00 pm
Saturday – 10:00 am to 5:00 pm

$$ - Financial Health - $$

The club maintains a $750+ balance. We try to keep approximately a $500 balance to allow for contingencies.

Club Scopes

Scope	Loan Status
13-inch thin-mirror Dob	Finishing Rehabilitation
10-inch Ward Dobsonian	Available
10-inch Sonotube Dobsonian	Available
8-inch Dobsonian	Available

EAS members: contact VP James Bielaga at (425) 337-4384 or jamesbielaga at aol.com to borrow a scope.

Astro Calendar for 2009

November 2009

Nov 14 – EAS Star Party at Ron Tam's place
Nov 21 – EAS Meeting at Aurora Astro – 6:00 PM

December 2009

Dec 12 or 19 – EAS Holiday Meeting at Alfy's on Broadway – 6:00 PM

UW Astronomy Speakers Colloquium Schedule

Astronomy Department weekly colloquium meets Thursdays at 4:00 pm in PAB A102 - the classroom part of the Physics/Astronomy Building complex. http://www.astro.washington.edu/pages/colloquium.html

'It's Over Your Head' – Astronomy Podcasts

Web page with lots of archives and other info is available at http://www.celestialnorth.org/radio/index.php and podcasts at http://www.celestialnorth.org/radio/index.php

KPLU 88.5 FM National Public Radio has daily broadcasts of "Star Date" by the McDonald Observatory of the University of Texas at

Austin, Monday through Friday at about 6:05 pm. The short 2 minute radio show deals with current topics of interest in astronomy. The University of Washington TV broadcasts programs from NASA at 12:00 AM Monday through Friday, 12:30 AM Saturday, and 1:30 AM Sunday on the Channel 27 cable station.

OBSERVER'S INFORMATION…

LUNAR FACTS

Nov 24	First Quarter Moon
Dec 02	Full Moon
Dec 09	Last Quarter Moon
Dec 16	New Moon
Dec 24	First Quarter Moon
Dec 31	Full Moon
Jan 07	Last Quarter Moon
Jan 15	New Moon
Jan 23	First Quarter Moon
Jan 30	Full Moon
Feb 05	Last Quarter Moon
Feb 14	New Moon

UP IN THE SKY -- THE PLANETS (AND PLUTO)

Object	*Rises*	*Sets*	*Con*	*Diam.*	*Mag*
Sun	***07:24 am***	***16:45***	***Lib***	***30'***	***-27.5***
Mercury	**08:21 am**	**16:46**	**Oph**	**05"**	**-0.7**
Venus	**06:15 am**	**15:57**	**Lib**	**10"**	**-3.9**
Mars	**21:48**	**15:57**	**Can**	**09"**	**+0.1**
Jupiter	**15:36**	**01:13 am**	**Cap**	**39"**	**-2.5**
Saturn	**02:11 am**	**14:25**	**Vir**	**17"**	**+1.0**
Uranus	**13:51**	**01:29 am**	**Aqr**	**04"**	**+5.8**
Neptune	**12:48**	**22:51 am**	**Cap**	**02"**	**+7.9**
Pluto	**09:35 am**	**18:52**	**Sag**	**--**	**+14.1**

(*times listed are in local time for Everett PST*)

Mercury and Saturn are visible low in the west after sunset. **Jupiter, Uranus, and Neptune** are well placed for observation throughout the night. **Pluto** is visible in the evening sky with a large scope. **Mars, and Venus** are visible in the morning sky.

Digital Lunar Orbiter Photographic Atlas of the Moon

The Lunar and Planetary Institute has created a digital version of the Lunar Orbiter Photographic Atlas of the Moon, and Consolidated Lunar Atlas available online at:
http://www.lpi.usra.edu/research/cla/menu.html
http://www.lpi.usra.edu/research/lunar_orbiter

Observing Jupiter's Moons – Java tool
http://skytonight.com/observing/objects/javascript/jupiter

Transit times for Jupiter's Great Red Spot in 2008
http://skytonight.com/observing/objects/planets/3304091.html

NOAA SUN CALCULATOR

Need to know exactly what time the sun will set on Sept. 26, 2065? Or when it rose in 565 BC? How about the length of daylight a week from Tuesday in Albuquerque, N.M.? Just go to NOAA's solar calculator, now available on the Web. http://www.srrb.noaa.gov/highlights/sunrise/gen.html

INTERNATIONAL SPACE STATION – VISIBLE SEATTLE PASSES

ISS Visibility – Heavens Above:

http://www.heavens-above.com/PassSummary.asp?lat=47.979&lng=-122.201&alt=0&loc=Everett&TZ=PST&satid=25544

CONSTELLATIONS OF THE MONTH –

LEO (The Lion). One of the 48 "original" constellations. The possessive form of this famous constellation is known as Leonis. Asterisms associated with Leo include The Sickle, The Spring Triangle, and The Diamond (of Virgo). Constellations bordering on Leo (and the directions from Leo) include Cancer(W), Coma Berenices (E), Crater(S), Hydra(S), Leo Minor(N), Sextans (S and W), Ursa Major(N), and Virgo(S and E). The overall brightness (the number of visible stars per unit area = # of visible stars in constellation/size of constellation in square degrees x 100) of Leo is 5.491 (ranking Leo 70th in brightness among the constellations). The central point of Leo is located at RA=10h37m, and Dec. = +13.5 degrees. The size of Leo is 946.96 square degrees (2.296% of the sky), making Leo the 12th largest constellation in area.

Messier objects included within its borders are M65 (spiral galaxy – NGC 3623), M66 (spiral galaxy – NGC 3627), M95 (spiral galaxy – NGC 3351), M96 (spiral galaxy – NGC 3368), and M105 (elliptical galaxy – NGC 3379). Meteor showers (and peaks) associated with Leo are the delta Leonids (Feb. 26), the sigma Leonids (April 17), and the famous Leonids (Nov. 17). The midnight culmination date is March 1st, making Leo a wonderful Spring constellation for observing. The solar conjunction date is August 31st. There are 52 visible stars brighter than magnitude 5.5; some of the famous named stars in Leo include Regulus, Denebola, Algieba, Adhafera, and Chort. Regulus is one of the four Royal Stars of the ancient Persians (the other three are Aldebaran (Taurus), Antares (Scorpius), and Fomalhaut (Piscis Austrinus). Among the nearest stars to our solar system include Wolf 359 (the 4th nearest star), AD Leo (the 37th nearest star), and Ross 104 (the 79th nearest). Wolf 359 has an apparent magnitude of 13.5; an absolute magnitude of 16.5; a parallax (arcsec) of 0.429; and is at a distance of 7.6 light years. Leo is completely visible from latitudes +84 degrees to -57 degrees, and portions of it are visible worldwide.

The Leonid meteor shower (peak Nov. 17th) is unusually active every 33 years. Fantastic and well-known displays were noted in 1799, 1833, 1866, and 1966, with meteors in the tens of thousands reported per hour on these occasions. This year, a last quarter moon will be visible, which may interfere with some of the fainter meteors which might be visible, but the Leonids are always worth checking out if the night is clear.

GEMINI (The Twins), as this winter constellation is also known, borders on the constellations of Auriga, Cancer, Canis Minor, Lynx, Monoceros, Orion, and Taurus, and ranks 26th in overall brightness among the constellations, containing 47 stars brighter than magnitude 5.5. Its central point is located at RA=7h,1m and Dec.= +22.5 degrees. It is completely visible from latitudes North of –55 degrees, and completely invisible from latitudes South of –80 degrees; this constellation ranks 30th in overall size. Gemini's most famous bright stars are Castor (Alpha) and Pollux (Beta), better known as "The Twins".

Gemini has two associated meteor showers: the Epsilon Geminids (19 Oct.), and the Geminids (14 Dec.), and one Messier object: the open cluster M35 (NGC 2168).

Two of the planet "discoveries" took place within this constellation. In 1781 William Herschel found the planet Uranus near Eta Geminorum; in the first half of this century (1930), Clyde Tombaugh (working at

Flagstaff's Lowell Observatory), discovered Pluto near Delta Geminorum. Castor, appearing as one star to the naked eye, is officially designated as a triple star, but is in reality six stars, each of the three having a companion. Studies indicate that star systems containing more than six stars will more rapidly become unstable and separate. Gemini's midnight culmination date is January 5th, so try to enjoy the beauty of this constellation, and its beautiful and interesting neighbors, on the next clear night.

TAURUS (The Bull), as this late fall and winter constellation is also known, borders on the constellations of Aries, Auriga, Cetus, Eridanus, Gemini, Orion, and Perseus, and ranks 12th in overall brightness among the constellations, containing 98 stars brighter than magnitude 5.5. Associated asterisms involving Taurus include The Heavenly G, The Hyades, The Pleiades, The V, The Winter Octagon, and the Winter Oval. Its central point is located at RA=4h,39m and Dec.= +15.5 degrees. It is completely visible from latitudes North of –59 degrees, and portions of it are visible worldwide; this constellation ranks 17th in overall size, and takes up 797.25 square degrees (or 1.933% of the sky).

Some of Taurus's most famous bright stars are Aldebaran, Merope, Alcyone, Electra, Pleione, Sterope, and Nath and El Nath. Taurus has three associated meteor showers: the Daytime Beta Taurids (29 June); the S. Taurids (3 November) and the N. Taurids (13 November); this wonderful constellation also contains two Messier objects: M1 (the Crab Nebula) and M-45 (the Pleiades). Aldebaran is one of the four Royal Stars of the ancient Persians. The star Beta Tauri was once shared by both the constellations of Auriga and Taurus; before the 20th century, star catalogs frequently listed this star as gamma Aurigae. Ever since the Belgian astronomer Delporte's standards for constellation boundaries were adopted, this star has been officially part of Taurus. M-45 (the Pleiades or "Seven Sisters") is the brightest open cluster in the sky. It is also one of the few members of Messier's list which does not possess a corresponding NGC number (probably because it is too bright); indeed, some cataloguers down through history had listed the Pleiades as a separate and distinct constellation. About one degree north of Zeta Tauri lies M-1 (the Crab Nebula, which received its name from Lord Rosse in the mid-19th century when he noticed that its broad filaments resembled a crab's pincers. The Crab Nebula is a gaseous remnant of a supernova which first became visible in 1054, and is the brightest supernova remnant in the sky. It is within this beautiful constellation that the Italian astronomer Piazzi discovered the first asteroid, Ceres, on New Year's Day, 1801. Taurus has a midnight culmination date of November 30th (and a solar conjunction date of June 2): try to enjoy the beauty of this wonderful constellation, and its interesting neighbors, on the next clear fall or winter night.

YOUNG ASTRONOMER'S CORNER

IT'S TIME FOR SOME QUESTIONS AND ANSWERS AGAIN!!!

The Young Astronomer's Corner will return this month to a question and answer format. Here are the answers to some familiar questions heard in young astronomer circles! (Note: If you, or a friend, ever have any questions that you would like answered in this column, please e-mail one of the EAS newsletter editors and we will do our best to find and provide the answer for you!!).

Q: WHAT IS A RED GIANT?

A: A big, old red star. Stars are not born this way however. A star like our Sun becomes a red giant when it uses up its main hydrogen fuel and begins to swell and expand. As such a star grows in size, its surface begins to cool off and turn red in color. (In star temperature colors, cool=red; warm=yellow; and hot=blue or white). When our Sun becomes a red giant a few billion years from now, it will grow and expand until it swallows Mercury and Venus and extends even out to the vicinity of the Earth, if not beyond. That is why it is also called a "giant".

Q: How many stars can you actually see at night?

A: Although it may seem like "billions and billions"(!), what we can actually see on a clear night is "only" about 5,500. There are approximately 200 billion stars in the Milky Way Galaxy. However, even on the darkest of nights, human can only pick up less than 6,000 of these, and only again if you stay up all night to see them all (as the Earth rotates different stars will come into view). Human eyes are not sensitive enough to see the remaining 199+++ billion stars, because they are too faint. That is one reason why astronomers use telescopes!!

A Young Astronomer's Corner special topic:

Twinkle, Twinkle, Little Star….There is a question that many people have with respect to stars, planets, and the Earth's atmosphere, and that is this: we know that stars "twinkle", but why is that(?); and on a related note, do planets "twinkle" too? Additionally, if you were an astronaut orbiting the Earth above its atmosphere, would either the stars or planets appear to twinkle to him or her? Let's explain some things first, and then answer the questions.

Twinkling results from different densities, or different layers of temperature, moisture, and resulting "weights" of air, which comprise our atmosphere. These different densities cause swirling currents of air, and are responsible for the shimmering effect you see in the warmed layers of air above a hot surface (similar to driving down a highway in the middle of the California desert in July). If there is enough air separating the observer (you) from the object (star, planet, or highway), it will appear to shimmer (or "twinkle"). From Earth, there is enough air (or atmosphere) separating the stars and planets, especially at the horizon where there is the most atmosphere to look through.

This is why stars and planets seem to shimmer or twinkle most when they are rising or setting. At the horizon, the color of the object you are looking at can even change because the direction of the light is changed by the atmosphere to the greatest degree at the horizon (this is called refraction). However, planets appear to twinkle less because they present a bigger angle in the sky, simply because they are closer: that is, the air currents do not alter our line of sight (refract the light) as much as they can for stars, which appear far smaller to us, even in larger telescopes., because they ARE so far away. The different air densities in our atmosphere cause the currents which alter our line of sight; this causes the twinkling. There is also a more biological reason for perceiving this twinkling from stars and, less readily, planets.

Only a very small amount of starlight actually enters our eyes because they are so far away. We have light detecting elements in our eyes and retina called rods and cones. The rods are used more for night vision, and this small amount of star light activates only a very few rods. When the small amount of starlight is disturbed by the Earth's atmosphere, this causes the starlight to bounce from one rod to the other, turning off one rod and activating and turning on another. Our brain picks up this bouncing light as twinkling!!!! Planets on the other hand appear to shimmer or twinkle less simply because they are closer to us: they send more light to our eyes and form a larger image on our retina and rods. As such, light from planets activates far more retinal rods than does starlight. When several rods are turned on at once, if one or two are turned off, there is not an apparent change or disturbance (i.e., shimmer) to us. That is, the image of the planet is large enough (with more light sent to our eyes) that you don't notice

the disturbances caused by the atmosphere quite as easily as you do with stars, unless the disturbances are very pronounced at the horizon. So the answers to our questions as posed above are first: both stars and planets appear to shimmer or twinkle at times, and secondly, an astronaut will not notice any twinkling because they are orbiting high above....you guessed it…the Earth's atmosphere, far beyond the shimmering air densities!!!

ASTRONOMY FUN FACTS

★★ The estimated mass of the entire Milky Way Galaxy is equal to about 180 billion Suns. Even if this entire mass were converted to energy, it would still not be enough to accelerate the period at the end of this sentence to the speed of light. Theory states that an infinite amount of energy would be needed to thrust the tiny dot of the period to the speed of light, and even though massive, the Galaxy's mass is NOT infinite.

★★ Our Galaxy has a diameter of approximately 100,0000 light years, or about 500 million billion miles!

★★ The Milky Way Galaxy is flying through the Universe at a speed of about 1.4 million miles an hour; it is heading in the direction of the constellation Hydra. No one quite knows where we are going(!!!), but some believe we are being pulled along and strongly influenced by a supercluster of distant galaxies. Even though the galactic velocity is fast, it would still take a spacecraft over 2,100 years, traveling at this speed, just to reach our nearest star system, Alpha Centauri. It would take 50 million years for the Milky Way to cover a distance equal to its own diameter (about 100,000 light years)!

★★ In November of 1980, the Voyager I spacecraft passed by Saturn's moon Titan at a distance of only 2,500 miles from the surface: this was the closest approach to any celestial body encountered by either of the two Voyager spacecraft. At that particular time, the spacecraft was traveling at a speed of about 43,000 miles per hour and was more than 946 million miles from Earth. This solar system target accuracy is comparable to shooting an arrow at an apple 6 miles away and having the arrow pass by the apple at a carefully calculated distance of 1 inch!

★★ The remaining moons of Saturn are much smaller than massive Titan, but the densities of all of Saturn's moons are all very low. The best determined density is that of Titan, and it is only 1.32 times that of water. Because of these low densities, these moons of Saturn are mostly ice. Indeed, with diameters of its moons in the range of over 3,000 miles (Titan) to the smaller moons like Mimas and Hyperion (in the range of 50-325 mile diameters), these are probably the largest "snowballs" that we Earthlings will ever see!

★★ Voyager 1 and 2 together took more than 70,000 television pictures of Jupiter, Saturn, and their moons and surrounding environments. If all of these groundbreaking photographs were developed in a standard 8x10 format and mounted side by side to form a rectangular montage, the total area formed by the montage would be about 97.5 square miles, approximately equal to twice the area of Boston, Massachusetts!

★★ The longest winter (when the Sun is far south of the celestial equator) in the solar system is 21 Earth years long and is found on the south polar regions of the planet Uranus. The deep winter temperatures in this area of Uranus are estimated to be -362 degrees F. (-219 degrees C.). Any future astronauts exploring the liquid hydrogen "surface" of Uranus (if indeed that ever were to occur) would need much, much more than thermal undergarments to keep them warm!

MIRROR IMAGES

"MIRROR" IMAGES": Because we live in the Northern Hemisphere, we often tend to focus (in both observing and reading) on celestial objects in this hemisphere. The point of this column is to inform club members about similar objects in the Southern Hemisphere (to the ones we are already familiar with in the Northern Hemisphere). The general class of object will first be defined, and then a representative object from each hemisphere will be described. ***Note: "MIRROR" IMAGES" is strictly the name of the new column, and is not intended to imply that there is optical mirror symmetry between the two objects.***

CLASS OF OBJECT: CLUSTER OF GALAXIES (or GALAXY CLUSTER): This is a grouping of galaxies, which may contain as much as a few thousand member galaxies. The majority of galaxies appear to occur in clusters or in smaller groups such as doublets or triplets. The Local Group (of which the Milky Way is a member), is a smaller, irregular galaxy cluster; irregular clusters may be large or small, but tend to contain more variable types of galaxies as members (e.g., barred spirals, ellipticals, regular spirals). The larger, denser clusters tend to have more uniform membership amongst their hundreds or thousands of members (for example, most members of the group may be elliptical galaxies, rather than a more variable mix). Adjacent galaxy clusters are grouped into larger superclusters. Rich galaxy clusters are those with higher concentrations of galaxies in their centers; the Abell Catalogue lists many of this latter type, and the Coma and Perseus clusters are examples. The mass required to keep the galaxies in rich clusters gravitationally bound is about 10 times greater than the mass actually observed. The large amount of hot gas that galaxy clusters have been shown to contain is not sufficient to explain this "missing mass". In irregularly shaped clusters, the gas is associated with individual galaxies, but in regular galaxy clusters, this gas has been shown to form more of a large common pool between the galaxies; this "regular cluster" gas then is more enriched as a result of cluster member interactions, and tends to be more metallic as a result.

Hot, intracluster gas loses energy via X-ray radiation; gas in the cluster core is most dense. Cooling gas flows inward towards the center of the cluster to maintain the pressure required to support the mass of the outer hot atmosphere; this forms a cooling flow. Cooling flows have been detected from X-ray spectra in 70-90% of all larger galaxy clusters; these cooling flows can deposit up to several hundred solar masses per year towards the center of the cluster. A significant portion of this flow will be deposited to the centrally located cD galaxy, which are the most massive galaxies yet detected. Recent studies show that galaxy clusters are a relatively recent phenomenon, evolving from the merging of smaller clusters to form the rich clusters observed today. More distant galaxy clusters show a greater proportion of blue galaxies; this color is due to star formation (initiated either by ram pressure stripping of galaxies in merging subclusters, or by interactions between galaxies on the periphery of the cluster).

REPRESENTATIVE NORTHERN HEMISPHERE OBJECT: Virgo Cluster: A giant irregular galaxy cluster lying near the North Galactic Pole in the constellation of Virgo. With a distance of approximately 15 megaparsecs, it is the nearest large cluster to earth. About 2,500 galaxies have been observed in this cluster, and about 75% are spirals; the remaining members are mostly ellipticals. One of this cluster's brightest members (the giant elliptical M-87), is a radio source and an X-ray source, and the X-ray halo around this galaxy is contributing about 10 solar masses per year to the slight cooling flow. Another large member of the group (M-86), is, (in addition to being an X-ray source as well), exhibiting this X-ray source as a 'plume' directed away from the center of the galaxy; this is as a result of the gas being stripped away

from the galaxy by ram pressure as it descends into the cluster proper. The Virgo cluster is the center of the Local Supercluster, which itself exerts a considerable gravitational influence on the Local Group of galaxies, of which the Milky Way is a member.

REPRESENTATIVE SOUTHERN HEMISPHERE OBJECT: Fornax Cluster: This cluster in the constellation of the same name contains 18 bright galaxies and at least 10 fainter ones; these are all compressed into an area of about a 6-degree diameter circle, and most members lie between 20 and 25 megaparsecs away from Earth. NGC-1380 is at the center of the cluster, and is a lenticular shaped galaxy.

There are several other member galaxies within the one degree field of this central cluster galaxy: it is possible to see nine galaxies total with NGC-1380 centered. There are still other galaxies just outside this immediate area.

About one degree southwest of this main cluster is NGC-1365, also known as the "Great Barred Spiral of Fornax". NGC-1365 shines at magnitude 9.5, and measures 9.8' x 5.5'; it is one of the brightest galaxies in the area, and the spiral arms and bar structure are visible in backyard telescopes.

ASTRONOMY AND TELESCOPE "LINGO"

ASTRONOMY "LINGO": BLAZAR: A small percentage of the quasar population that apparently shares some of the extreme characteristics of the BL Lac objects (very compact, violent, and variable extragalactic objects resembling quasars but lacking both emission and absorption spectral lines), as a result of relativistic beaming (radiation beamed forward in the direction of motion of relativistic electrons: a phenomena of synchrotron emission). The luminosity of the blazar's emission lines stays constant while continuum emission varies profoundly; blazars are highly polarized and demonstrate superluminal motion (apparent velocities greater than the speed of light) at radio wavelengths..

TELESCOPE / EQUIPMENT "LINGO": APERTURE RATIO (or RELATIVE APERTURE): The ratio (d/f) of the effective diameter 'd' (i.e., aperture) of a lens or mirror to its focal length 'f'. (The ratio 'f/d' is the focal ratio).

PLANETARY FOCUS –

This column will return next month.

ASTRONOMICAL NOTES -- ON & OFF THE WEB...

NASA & MICROSOFT ALLOW EARTHLINGS TO BECOME MARTIANS

NASA and Microsoft have collaborated to create a Web site where Internet users can have fun while advancing their knowledge of Mars. Drawing on observations from NASA's Mars missions, the "Be a Martian" Web site will enable the public to participate as citizen scientists to improve Martian maps, take part in research tasks, and assist Mars science teams studying data about the Red Planet.

"*We're at a point in history where everyone can be an explorer*," said Doug McCuistion, director of the Mars Exploration Program at NASA . "*With so much data coming back from Mars missions that are accessible by all, exploring Mars has become a shared human endeavor. People worldwide can expand the specialized efforts of a few hundred Mars mission team members and make authentic contributions of their own*." Participants will be able to explore details of the solar system's grandest canyon, which resides on Mars. Users can call up images in the Valles Marineris canyon before moving on to chart the entire Red Planet. The collaboration of thousands of participants could assist scientists in producing far better maps, smoother zoom-in views, and make for easier interpretation of Martian surface changes. By counting craters, the public also may help scientists determine the relative ages of small regions on Mars. In the past, counting Martian craters has posed a challenge because of the vast numbers involved. By contributing, Web site users will win game points assigned to a robotic animal avatar they select.

With a common goal of inspiring digital-age workforce development and life-long learning in science, technology, engineering and mathematics, NASA and Microsoft unveiled the Web site at the Microsoft Professional Developers Conference in Los Angeles this week. The site also beckons software developers to win prizes for creating tools that provide access to and analysis of hundreds of thousands of Mars images for online, classroom and Mars mission team use. "*Industry leaders like NASA and Microsoft have a social responsibility as well as a vested interest in advancing science and technology education*," said Walid Abu-Hadba, corporate vice president of the Developer and Platform Evangelism Group at Microsoft. "*We are excited to be working with NASA to provide new opportunities to engage with Mars mission data, and to help spark interest and excitement among the next generation of scientists and technologists*."

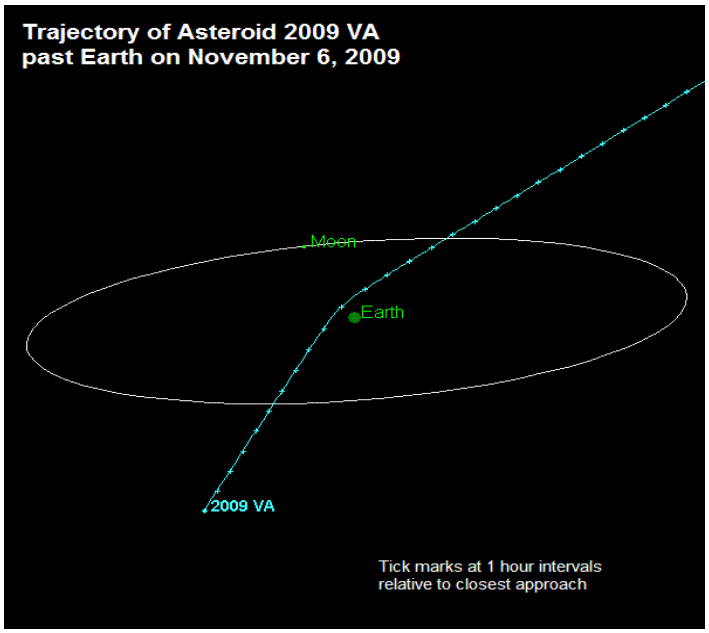
New 'Be A Martian' site – NASA - http://beamartian.jpl.nasa.gov

To encourage more public participation, the site also provides a virtual town hall forum where users can expand their knowledge by proposing Mars questions and voting on which are the most interesting to the community. Online talks by Mars experts will address some of the submitted questions. Other features include interactive tools for viewing Martian regions and movies about people who study Mars in diverse ways. "*Mars exploration inspires people of all ages, and we are especially eager to encourage young people to explore Mars for themselves*," said Charles Elachi, director of JPL. "We are delighted to be involved in providing the creative opportunity for future explorers to contribute to our understanding of Mars." "*The beauty of this type of experience is that it not only teaches people about Mars and the work NASA is doing there, but it also engages large groups of people to help solve real challenges that computers cannot solve by themselves*," said Marc Mercuri, director of business innovation in the Developer and Platform Evangelism Group at Microsoft. To enroll as a virtual Martian citizen and start exploring, visit: http://beamartian.jpl.nasa.gov

SMALL ASTEROID 2009 VA WHIZZES BY THE EARTH

A newly discovered asteroid designated 2009 VA, which is only about 7 meters in size, passed about 2 Earth radii (14,000 km) from the Earth's surface Nov. 6 at around 16:30 EST. This is the third-closest known

(non-impacting) Earth approach on record for a cataloged asteroid. The two closer approaches include the 1-meter sized asteroid 2008 TS26, which passed within 6,150 km of the Earth's surface on October 9, 2008, and the 7-meter sized asteroid 2004 FU162 that passed within 6,535 km on March 31, 2004. On average, objects the size of 2009 VA pass this close about twice per year and impact Earth about once every 5 years.



Trajectory of Asteroid 2009 VA Past Earth on November 6, 2009

Asteroid 2009 VA was discovered by the Catalina Sky Survey about 15 hours before the close approach, and was quickly identified by the Minor Planet Center in Cambridge MA as an object that would soon pass very close to the Earth. JPL's Near-Earth Object Program Office also computed an orbit solution for this object, and determined that it was not headed for an impact. Only thirteen months ago, the somewhat smaller object 2008 TC3 was discovered under similar circumstances, but that one was found to be on a trajectory headed for the Earth, with impact only about 11 hours away. http://neo.jpl.nasa.gov/news/news166.html

MESSENGER SPACECRAFT REVEALS MORE HIDDEN MERCURY TERRITORY

A spacecraft's third and final flyby of Mercury gives scientists, for the first time, an almost complete view of the planet's surface and provides new scientific findings about this relatively unknown world. The MESSENGER, flew by Mercury on Sept. 29. The probe completed a critical gravity assist to remain on course to enter into orbit around Mercury in 2011. Despite shutting down temporarily because of a power system switchover during a solar eclipse, the spacecraft's cameras and instruments collected high-resolution and color images unveiling another 6 percent of the planet's surface never before seen at close range.

Approximately 98 percent of Mercury's surface now has been imaged by spacecraft. After MESSENGER goes into orbit around Mercury, it will see the polar regions, which are the only unobserved areas of the planet. "Although the area viewed for the first time by spacecraft was less than 350 miles across at the equator, the new images reminded us that Mercury continues to hold surprises," said Sean Solomon, principal investigator for the mission. Many new features were revealed during the third flyby, including a region with a bright area surrounding an irregular depression, suspected to be volcanic in origin. Other images revealed a double-ring impact basin approximately 180 miles across. The basin is similar to a feature scientists call the Raditladi basin, which was viewed during the probe's first flyby of Mercury in January 2008.

"*This double-ring basin, seen in detail for the first time, is remarkably well preserved*," said Brett Denevi, a member of the probe's imaging team and a postdoctoral researcher. "*One similarity to Raditladi is its age, which has been estimated to be approximately one billion years old. Such an age is quite young for an impact basin, because most basins are about four times older. The inner floor of this basin is even younger than the basin itself and differs in color from its surroundings. We may have found the youngest volcanic material on Mercury*."

One of the spacecraft's instruments conducted its most extensive observations to date of Mercury's exosphere, or thin atmosphere, during this encounter. The flyby allowed for the first detailed scans over Mercury's north and south poles. The probe also has begun to reveal how Mercury's atmosphere varies with its distance from the sun. "*A striking illustration of what we call 'seasonal' effects in Mercury's exosphere is that the neutral sodium tail, so prominent in the first two flybys, is 10 to 20 times less intense in emission and significantly reduced in extent*," says participating scientist Ron Vervack. "*This difference is related to expected variations in solar radiation pressure as Mercury moves in its orbit and demonstrates why Mercury's exosphere is one of the most dynamic in the solar system.*"

The observations also show that calcium and magnesium exhibit different seasonal changes than sodium. Studying the seasonal changes in all exospheric constituents during the mission orbital phase will provide key information on the relative importance of the processes that generate, sustain, and modify Mercury's atmosphere.

The third flyby also revealed new information on the abundances of iron and titanium in Mercury's surface materials. Earlier Earth and spacecraft-based observations showed that Mercury's surface has a very low concentration of iron in silicate minerals, a result that led to the view that the planet's crust is generally low in iron. "*Now we know Mercury's surface has an average iron and titanium abundance that is higher than most of us expected, similar to some lunar mare basalts*," says David Lawrence, a participating mission scientist.

The spacecraft has completed nearly three-quarters of its 4.9-billion-mile journey to enter orbit around Mercury. The full trip will include more than 15 trips around the sun. In addition to flying by Mercury, the spacecraft flew past Earth in August 2005 and Venus in October 2006 and June 2007. http://www.nasa.gov/messenger

MESSENGER GETS CLOSEST-EVER LOOK AT SOLAR-FLARE NEUTRONS

On Dec. 31, 2007, the sun awoke from the relatively quiescent period between Solar Cycles 23 and 24 to produce a solar flare that spewed high-energy neutrons into interplanetary space. The Neutron Spectrometer flying aboard the MESSENGER spacecraft recorded the event, giving scientists a first-ever, up-close look at neutron production from a solar flare. In fact, it was the first time scientists detected solar neutrons at less than 1 AU from the sun. When the flare erupted, MESSENGER was flying at about half an AU, said William C. Feldman, lead author on a paper which includes an initial analysis of the data collected by MESSENGER during and after the flare. For the first time, scientists were able to directly observe the neutron output from an average-sized solar flare, Feldman said. Previously, only the neutron bursts from the most powerful solar flares have been recorded on neutron spectrometers on Earth or in near-Earth orbit, he added. These bursts typically last about 50 to 60 seconds at the sun. "*But we recorded neutrons from this flare over a period of six to ten hours*,"

Feldman said. "*And what that's telling us is that at least some moderate-sized flares continuously produce high-energy neutrons in the solar corona*." "*From this fact, we inferred the continuous production of protons in the 30-to-100-MeV (million electron volt) range due to the flare*," he added.

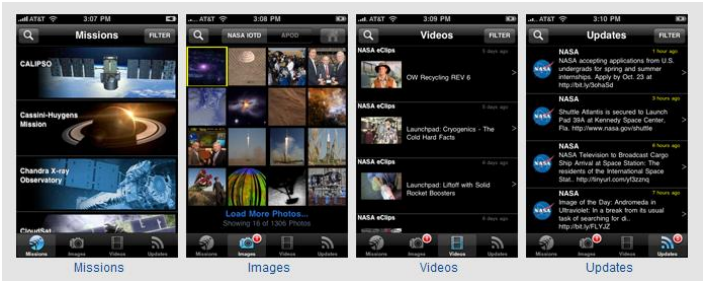
About 90 percent of all ions produced by a solar flare remain locked to the sun on closed magnetic lines, but another population results from the decay of the neutrons near the sun. This second population of decayed neutrons forms an extended seed population in interplanetary space that can be further accelerated by the massive shock waves produced by the flares, Feldman said. "*So the important results are that perhaps after many flare events two things may occur: continuous production of neutrons over an extended period of time and creation of seed populations of neutrons near the sun that have decayed into protons*," he explained. "*When coronal mass ejections (nuclear explosions in the corona) send shock waves into space, these feedstock protons are accelerated into interplanetary space*." "There has always been the question of why some coronal mass ejections produce almost no energetic protons that reach the Earth, while others produce huge amounts," he added. "*It appears that these seed populations of energetic protons near the sun could provide the answer, because it's easier to accelerate a proton that already has an energy of 1 MeV than a proton that is at 1 keV (the solar wind).*" The seed populations are not evenly distributed, Feldman said. Sometimes they're in the right place for the shock waves to send them toward Earth, while at other times they're in locations where the protons are accelerated in directions that don't take them near Earth.

The radiation produced by solar flares is of more than academic interest to NASA, Feldman added. Energetic protons from solar flares can damage Earth-orbiting satellites and endanger astronauts on the International Space Station or on missions to the Moon and Mars. "*People in the manned spaceflight program are very interested in being able to predict when a coronal mass ejection is going to be effective in generating dangerous levels of high-energy protons that produce a radiation hazard for astronauts*," he said. To do this, scientists need to know a lot more about the mechanisms that produce flares and which flare events are likely to be dangerous. At some point they hope to be able to predict space weather -- where precipitation is in the form of radiation -- with the same accuracy that forecasters predict rain or snow on Earth.

MESSENGER could provide significant data toward this goal, Feldman observed. "*What we saw and published is what we hope will be the first of many flares we'll be able to follow through 2012*," he said. "*The beauty of MESSENGER is that it's going to be active from the minimum to the maximum solar activity during Solar Cycle 24, allowing us to observe the rise of a solar cycle much closer to the sun than ever before*." MESSENGER is currently orbiting the sun between 0.3 and 0.6 AU on its way to orbit insertion around Mercury in March 2011. At Mercury, it will be within 0.45 AU of the sun for one Earth year.

NASA App Now Available From App Store

A NASA App for the iPhone and iPod touch is available free of charge at the App Store from Apple. The NASA application will deliver a wealth of information, videos, images and news updates about NASA missions to people's fingertips. "*Making NASA more accessible to the public is a high priority for the agency*," said Gale Allen. "*Tools like this allow us to provide users easy access to NASA information and progress at a fast pace." The NASA App collects, customizes and delivers an extensive selection of dynamically updated information, images and videos from various online NASA sources. Users can access NASA countdown clocks, the NASA Image of the Day, Astronomy Image of the Day, online videos, NASA's many Twitter feeds and other information in a convenient mobile package.*



It delivers NASA content in a clear and intuitive way by making full use of the iPhone and iPod touch features, including the Multi-Touch user interface. The New Media Team at developed the application. The NASA App also allows users to track the current positions of the International Space Station and other spacecraft currently orbiting Earth in three views: a map with borders and labels, visible satellite imagery, or satellite overlaid with country borders and labels. "We're excited to deliver a wide range of up-to-the-minute NASA content to iPhone and iPod touch users," said Gary Martin. "*The NASA App provides an easy and interesting way for the public to experience space exploration*." For more information about NASA's iPhone application, visit: http://www.nasa.gov/iphone

Asteroid Impactor Reported over Indonesia

On October 8, 2009 about 03:00 Greenwich time, an atmospheric fireball blast was observed and recorded over an island region of Indonesia. The blast is thought to be due to the atmospheric entry of a small asteroid about 10 meters in diameter that, due to atmospheric pressure, detonated in the atmosphere with an energy of about 50 kilotons (the equivalent of 50,000 pounds of TNT explosives). The blast was recorded visually and reported upon by local media representatives. A report from Elizabeth Silber and Peter Brown at the University of Western Ontario indicates that several international very-long wavelength infrasound detectors recorded the blast and fixed the position near the coastal city of Bone in South Sulawesi, island of Sulewesi. They note that the blast was in the 10 to 50 kT range with the higher end of this range being more likely. Assuming an estimated size of about 5-10 meters in diameter, we would expect a fireball event of this magnitude about once every 2 to 12 years on average. As a rule, the most common types of stony asteroids would not be expected to cause ground damage unless their diameters were about 25 meters in diameter or larger.

A more extensive report by Elizabeth Silber and Peter Brown of the University of Western Ontario is here: ***Summary of Preliminary Infrasonic Analysis of the Oct 8, 2009 Indonesian Superbolide*** - Elizabeth Silber and Peter, Brown Meteor Infrasound group

"On Oct 8, 2009, media reports appeared in the local press in Indonesia concerning a loud air blast occurring near 11am local time (0300 UT). Subsequent to these first media reports, additional English language reports appeared suggesting the event was meteoritic. Indonesian language reports more clearly identify a bright fireball, accompanied by an explosion and lingering dust cloud as the origin of the air blast. Finally, a ***YouTube video*** *posted on the same day appears to show a large dust cloud consistent with a bright, daylight fireball."* http://www.youtube.com/watch?v=yeQBzTkJNhs&videos=jkRJgbXY-90

Based on these initial reports, a detailed examination was made of all International Monitoring System (IMS) infrasound stations of the Comprehensive Nuclear-Test-Ban Treaty Organization (CTBTO). From

this initial examination, a total of 11 stations showed probable signals from a large explosion centered near 4.5S, 120E, with an origin time near 0300 UT on Oct 8, 2009, consistent with the media reports. This signal was notable for having been (a) detected at many IMS stations, including five at ranges over 10,000 km (and one at a nearly 18,000 km range) and (b) being confined to very low frequencies. Both of these observations suggest the explosion source was of very high total energy. All signal motions were between 0.27 - 0.32 km/s, consistent with stratospheric signal returns.

The yield estimates based on infrasonic amplitude are very uncertain in this instance as the propagation distances are much larger than is typical and outside the range limits where such relations have been developed (e.g. Edwards et al, 2006) and hence the period relationship (which was generated using a dataset of nuclear explosions having yields in this range) is more applicable.

Based on these infrasound records, it appears that a large (40-50 kT TNT) bolide detonation occurred near 0300 UT on Oct 8, 2009 near the coastal city of Bone in South Sulawesi, Indonesia. The infrasonic geolocation is not precise enough to determine if the bolide was over water or land, but it was relatively near the coast.

Follow-on observations from other instruments or ground recovery efforts would be very valuable in further refining this unique event.

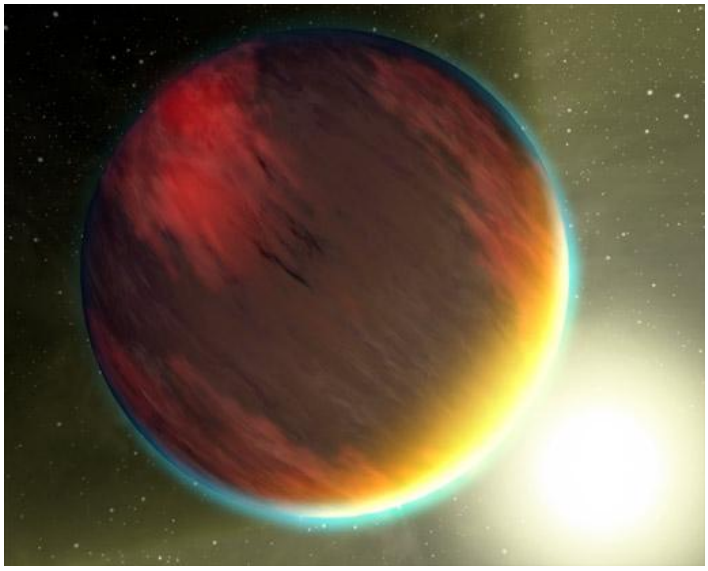
Using an average impact velocity for NEAs of 20.3 km/s, the energy limits (10 - 70 kT) suggested by this analysis correspond to an object 5-10 m in diameter. Based on the flux rate from Brown et al (2002), such objects are expected to impact the Earth on average every 2 - 12 years. http://neo.jpl.nasa.gov/news/news165.html

ASTRONOMERS FIND ORGANIC MOLECULES AROUND GAS PLANET

Peering far beyond our solar system, researchers have detected the basic chemistry for life in a second hot gas planet, advancing astronomers toward the goal of being able to characterize planets where life could exist. The planet is not habitable but it has the same chemistry that, if found around a rocky planet in the future, could indicate the presence of life. "*It's the second planet outside our solar system in which water, methane and carbon dioxide have been found, which are potentially important for biological processes in habitable planets*," said researcher Mark Swain. "*Detecting organic compounds in two exoplanets now raises the possibility that it will become commonplace to find planets with molecules that may be tied to life*."

Swain and his co-investigators used data from two orbiting Great Observatories, the Hubble Space Telescope and Spitzer Space Telescope, to study HD 209458b, a hot, gaseous giant planet bigger than Jupiter that orbits a sun-like star about 150 light years away in the constellation Pegasus. The new finding follows their breakthrough discovery in December 2008 of carbon dioxide around another hot, Jupiter-size planet, HD 189733b. Earlier Hubble and Spitzer observations of that planet had also revealed water vapor and methane. The detections were made through spectroscopy, which splits light into its components to reveal the distinctive spectral signatures of different chemicals. Data from Hubble's near-infrared camera and multi-object spectrometer revealed the presence of the molecules, and data from Spitzer's photometer and infrared spectrometer measured their amounts.

"*This demonstrates that we can detect the molecules that matter for life processes*," said Swain. Astronomers can now begin comparing the two planetary atmospheres for differences and similarities. For example, the relative amounts of water and carbon dioxide in the two planets is similar, but HD 209458b shows a greater abundance of methane than HD 189733b. "*The high methane abundance is telling us something," said Swain. "It could mean there was something special about the formation of this planet*."



The basic chemistry for life has been detected in a second hot gas planet, HD 209458b, depicted in this artist's concept. Image credit: NASA/JPL-Caltech

Other large, hot Jupiter-type planets can be characterized and compared using existing instruments, Swain said. This work will lay the groundwork for the type of analysis astronomers eventually will need to perform in shortlisting any promising rocky Earth-like planets where the signatures of organic chemicals might indicate the presence of life. Rocky worlds are expected to be found by the Kepler mission, which launched earlier this year, but astronomers believe we are a decade or so away from being able to detect any chemical signs of life on such a body.

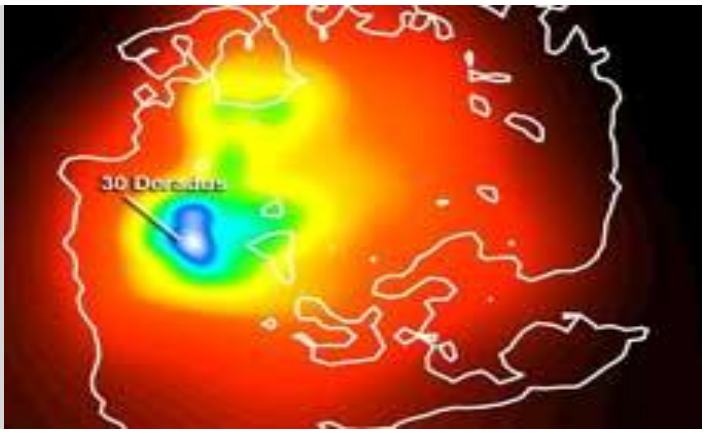
You can follow the history of planet hunting from science fiction to science fact with NASA's PlanetQuest Historic Timeline at http://planetquest.jpl.nasa.gov/timeline/ - NASA

If and when such Earth-like planets are found in the future, "*the detection of organic compounds will not necessarily mean there's life on a planet, because there are other ways to generate such molecules*," Swain said. "*If we detect organic chemicals on a rocky, Earth-like planet, we will want to understand enough about the planet to rule out non-life processes that could have led to those chemicals being there*." "*These objects are too far away to send probes to, so the only way we're ever going to learn anything about them is to point telescopes at them. Spectroscopy provides a powerful tool to determine their chemistry and*

dynamics." This interactive web feature, developed by JPL, conveys the story of exoplanet exploration through a rich tapestry of words and images spanning thousands of years, beginning with the musings of ancient philosophers and continuing through the current era of space-based observations by Spitzer and Kepler missions. The timeline highlights milestones in culture, technology and science, and includes a planet counter that tracks the pace of exoplanet discoveries over time.
http://planetquest.jpl.nasa.gov
http://www.jpl.nasa.gov/news/features.cfm?feature=2340

FERMI TELESCOPE CAPS ITS FIRST YEAR WITH A GLIMPSE OF SPACE-TIME

During its first year of operations, the Fermi Gamma Ray Space Telescope mapped the extreme sky with unprecedented resolution and sensitivity. It captured more than one thousand discrete sources of gamma rays -- the highest-energy form of light. Capping these achievements was a measurement that provided rare experimental evidence about the very structure of space and time, unified as space-time in Einstein's theories. "*Physicists would like to replace Einstein's vision of gravity -- as expressed in his relativity theories -- with something that handles all fundamental forces*," said Peter Michelson, principal investigator of Fermi's Large Area Telescope, or LAT. "*There are many ideas, but few ways to test them*." Many approaches to new theories of gravity picture space-time as having a shifting, frothy structure at physical scales trillions of times smaller than an electron. Some models predict that the foamy aspect of space-time will cause higher-energy gamma rays to move slightly more slowly than photons at lower energy. Such a model would violate Einstein's edict that all electromagnetic radiation -- radio waves, infrared, visible light, X-rays and gamma rays -- travels through a vacuum at the same speed.



(LAT) shows that an intense star-forming region in the Large Magellanic Cloud named 30 Doradus is also a source of diffuse gamma rays. Brighter colors indicate larger numbers of detected gamma rays. Credit: NASA/DOE/Fermi LAT Collaboration

On May 10, 2009, Fermi and other satellites detected a so-called short gamma ray burst, designated GRB 090510. Astronomers think this type of explosion happens when neutron stars collide. Ground-based studies show the event took place in a galaxy 7.3 billion light-years away. Of the many gamma ray photons Fermi's LAT detected from the 2.1-second burst, two possessed energies differing by a million times. Yet after traveling some seven billion years, the pair arrived just nine-tenths of a second apart. "*This measurement eliminates any approach to a new theory of gravity that predicts a strong energy dependent change in the speed of light*," Michelson said. "*To one part in 100 million billion, these two photons traveled at the same speed. Einstein still rules*."

Fermi's secondary instrument, the Gamma ray Burst Monitor, has observed low-energy gamma rays from more than 250 bursts. The LAT observed 12 of these bursts at higher energy, revealing three record setting blasts. GRB 090510 displayed the fastest observed motions, with ejected matter moving at 99.99995 percent of light speed. The highest energy gamma ray yet seen from a burst -- 33.4 billion electron volts or about 13 billion times the energy of visible light -- came from September's GRB 090902B. Last year's GRB 080916C produced the greatest total energy, equivalent to 9,000 typical supernovae.

Scanning the entire sky every three hours, the LAT is giving Fermi scientists an increasingly detailed look at the extreme universe. "*We've discovered more than a thousand persistent gamma ray sources -- five times the number previously known*," said project scientist Julie McEnery. "*And we've associated nearly half of them with objects known at other wavelengths*." Blazars -- distant galaxies whose massive black holes emit fast-moving jets of matter toward us -- are by far the most prevalent source, now numbering more than 500. In our own galaxy, gamma ray sources include 46 pulsars and two binary systems where a neutron star rapidly orbits a hot, young star.
http://www.nasa.gov/fermi

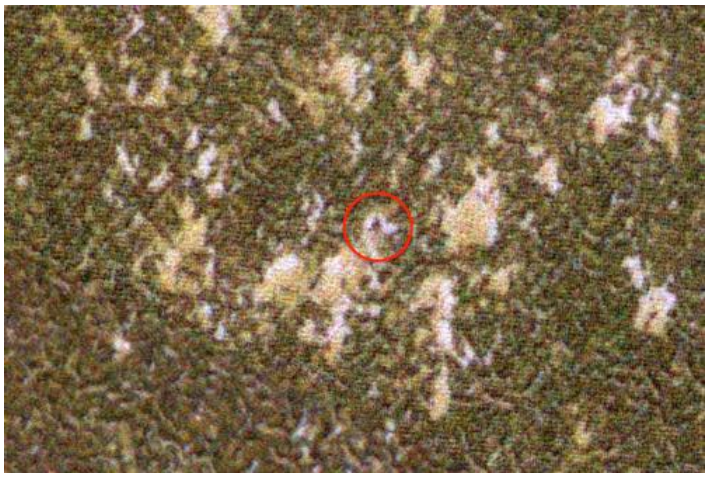
FROST-COVERED PHOENIX LANDER SEEN IN WINTER IMAGES

Winter images of the Phoenix polar Lander showing the lander shrouded in dry-ice frost on Mars have been captured with the High Resolution Imaging Science Experiment, or HiRISE camera, aboard Mars Reconnaissance Orbiter. The camera team captured one image of the Phoenix lander on July 30, 2009, and the other on Aug. 22, 2009. That's when the sun began peeking over the horizon of the northern polar plains during winter, the imaging team said. The first day of spring in the northern hemisphere began Oct. 26. "*We decided to try imaging the site despite the low light levels*," said HiRISE team member Ingrid Spitale. "*The power of the camera helped us see it even under these poor light conditions*," added team member Michael Mellon who was also on the Phoenix Mars Lander science team.

The team targeted their camera at the known location of the lander to get the new images and compared them to a image of the frost-free lander taken in June 2008. That enabled them to identify the hardware disguised by frost, despite the fact that their views were hindered by poor lighting and by atmospheric haze, which often obscures the surface at this location and season. Carbon dioxide frost completely blankets the surface in both images. The amount of carbon dioxide frost builds as late winter transitions to early spring, so the layer of frost is thicker in the Aug. 22 image. The maximum thickness was expected to be on the order of tens of centimeters, which would have reached its peak in September 2009. Scientists noted that brightness doesn't necessarily indicate the amount of frost seen in the images because of the way the images are processed to produce optimal contrast. Even the darker areas in the frost-covered images are still brighter than typical soil that surrounds the lander in frost-free images taken during the lander's prime mission in 2008. Other factors that affect the relative brightness include the size of the individual grains of carbon dioxide ice, the amount of dust mixed with the ice, the amount of sunlight hitting the surface and different lighting angles and slopes, Spitale and Mellon said.

Studying these changes will help us understand the nature of the seasonal frost and winter weather patterns in this area of Mars. Scientists predicted that the ice layer would reach maximum thickness in September 2009, but don't have images to confirm that because camera operations were suspended when Mars Reconnaissance Orbiter entered an extended safe mode on Aug. 26.

The Phoenix Mars Lander ceased communications last November, after successfully completing its mission and returning unprecedented primary science phase and returning science data to Earth. During the first quarter of 2010, teams will listen to see if Phoenix is still able to communicate with Earth. Communication is not expected and is considered highly unlikely following the extended period of frost on the lander.



Phoenix Lander in Winter (ESP_014393_2485) - In this image, the albedo (brightness) doesn't necessarily indicate the amount of frost. Keep in mind that each of these images is stretched differently for optimal contrast, so "bright" and "dark" can't be compared directly between images without doing complex calibrations. In fact, if you stretched all of them exactly the same, the darker areas in the frost-covered ESP images are still brighter than typical soil, like that surrounding the lander in the frost-free PSP_008855_2485 image.- Credit: NASA/JPL/University of Arizona

The full version of this story with accompanying images is at: http://www.jpl.nasa.gov/news/news.cfm?release=2009-160

LOG ON, TAKE A SURVEY, GET A CHANCE AT WINNING SOME AEROGEL…

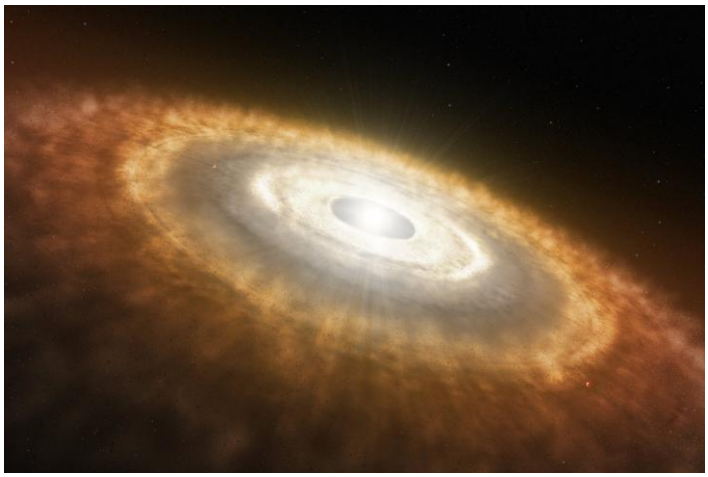
NASA's Stardust-NExT mission is offering the public a chance to win a small cube of aerogel (the lightest and lowest-density solid) or a mission cookie cutter. What's the catch? Visitors to their mission Web site must review it and take an online survey. A total of 100 surveys submitted through Nov. 30, 2009, will be randomly selected to win the cookie cutter or aerogel. The survey and Web site are here: http://stardustnext.jpl.nasa.gov/survey.html

EXOPLANETS CLUE TO SUN'S CURIOUS CHEMISTRY

A ground-breaking census of 500 stars, 70 of which are known to host planets, has successfully linked the long-standing "lithium mystery" observed in the Sun to the presence of planetary systems. Using ESO's successful HARPS spectrograph, a team of astronomers has found that Sun-like stars that host planets have destroyed their lithium much more efficiently than "planet-free" stars. This finding does not only shed light on the lack of lithium in our star, but also provides astronomers with a very efficient way of finding stars with planetary systems.

"*For almost 10 years we have tried to find out what distinguishes stars with planetary systems from their barren cousins*," says Garik Israelian, lead author of a paper appearing Nature. "*We have now found that the amount of lithium in Sun-like stars depends on whether or not they have planets*." Low levels of this chemical element have been noticed for decades in the Sun, as compared to other solar-like stars, and astronomers have been unable to explain the anomaly. The discovery of a trend among planet-bearing stars provides a natural explanation to this long-standing mystery. "*The explanation of this 60 year-long puzzle is for us rather simple*," adds Israelian.

"*The Sun lacks lithium because it has planets*." This conclusion is based on the analysis of 500 stars, including 70 planet-hosting stars. Most of these stars were monitored for several years with ESO's High Accuracy Radial Velocity Planet Searcher. This spectrograph, better known as HARPS, is attached to ESO's 3.6-metre telescope and is the world's foremost exoplanet hunter. "*This is the best possible sample available to date to understand what makes planet-bearing stars unique*," says co-author Michel Mayor.



ESO PR Photo 42a/09 Burning lithium inside a star - Artist's impression of a baby star still surrounded by a protoplanetary disc in which planets are forming. Using ESO's very successful HARPS spectrograph, a team of astronomers has found that Sun-like stars which host planets have destroyed their lithium much more efficiently than planet-free stars. This finding does not only shed light on the low levels of this chemical element in the Sun, solving a long-standing mystery, but also provides astronomers with a very efficient way to pick out the stars most likely to host planets. It is not clear what causes the lithium to be destroyed. The general idea is that the planets or the presence of the protoplanetary disc disturb the interior of the star, bringing the lithium deeper down into the star than usual, into regions where the temperature is so hot that it is destroyed. – Image credit: ESO

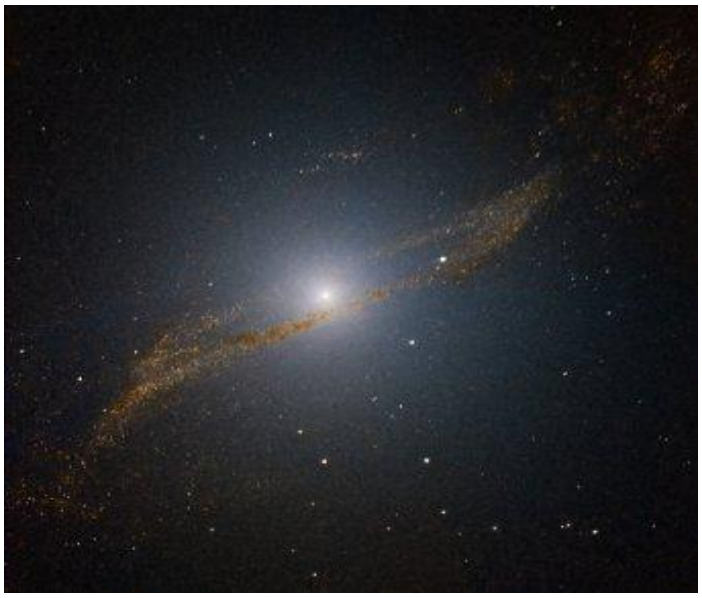
The astronomers looked in particular at Sun-like stars, almost a quarter of the whole sample. They found that the majority of stars hosting planets possess less than 1% of the amount of lithium shown by most of the other stars. "*Like our Sun, these stars have been very efficient at destroying the lithium they inherited at birth*," says team member Nuno Santos. "*Using our unique, large sample, we can also prove that the reason for this lithium reduction is not related to any other property of the star, such as its age*." Unlike most other elements lighter than iron, the light nuclei of lithium, beryllium and boron are not produced in significant amounts in stars. Instead, it is thought that lithium, composed of just three protons and four neutrons, was mainly produced just after the Big Bang, 13.7 billion years ago. Most stars will thus have the same amount of lithium, unless this element has been destroyed inside the star.

This result also provides the astronomers with a new, cost-effective way to search for planetary systems: by checking the amount of lithium present in a star astronomers can decide which stars are worthy of further significant observing efforts. Now that a link between the presence of planets and curiously low levels of lithium has been established, the physical mechanism behind it has to be investigated. "*There are several ways in which a planet can disturb the internal motions of matter in its host star, thereby rearrange the distribution of the various chemical elements and possibly cause the destruction of*

lithium. It is now up to the theoreticians to figure out which one is the most likely to happen," concludes Mayor. Exoplanet media kit PDF - http://www.eso.org/public/outreach/products/publ/brochures/pdf/exoplanet_lowres.pdf

WATCHING CENTAURUS A - A CANNIBAL GALAXY - DINE

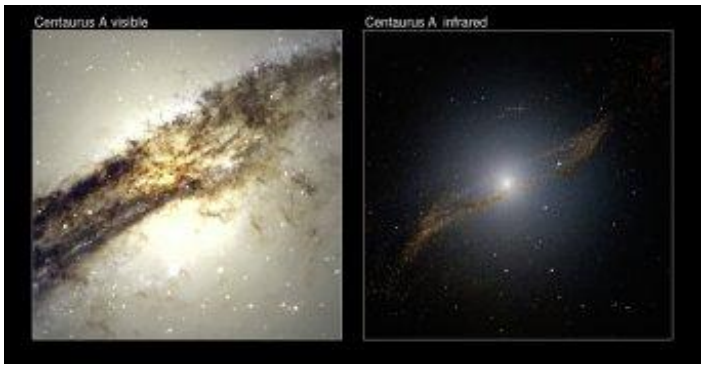
A new technique using near-infrared images, obtained with ESO's 3.58-metre New Technology Telescope (NTT), allows astronomers to see through the opaque dust lanes of the giant cannibal galaxy Centaurus A, unveiling its "last meal" in unprecedented detail — a smaller spiral galaxy, currently twisted and warped. This amazing image also shows thousands of star clusters, strewn like glittering gems, churning inside Centaurus A. Centaurus A (NGC 5128) is the nearest giant, elliptical galaxy, at a distance of about 11 million light-years. One of the most studied objects in the southern sky, by 1847 the unique appearance of this galaxy had already caught the attention of the famous British astronomer John Herschel, who catalogued the southern skies and made a comprehensive list of nebulae. Herschel could not know, however, that this beautiful and spectacular appearance is due to an opaque dust lane that covers the central part of the galaxy. This dust is thought to be the remains of a cosmic merger between a giant elliptical galaxy and a smaller spiral galaxy full of dust. Between 200 and 700 million years ago, this galaxy is indeed believed to have consumed a smaller spiral, gas-rich galaxy — the contents of which appear to be churning inside Centaurus A's core, likely triggering new generations of stars.



Dinner for Centaurus A - This image of the central parts of Centaurus A reveals the parallelogram-shaped remains of a smaller galaxy that was gulped down about 200 to 700 million years ago. The image is based on data collected with the SOFI instrument on ESO's New Technology Telescope at La Silla. The original image, obtained by observing in the near-infrared through three different filters (J, H and K) was specially processed to look through the dust, providing a clear view of the centre. The field of view is about 4 x 4 arcminutes. – ESO

First glimpses of the "leftovers" of this meal were obtained thanks to observations with the ESA Infrared Space Observatory , which revealed a 16,500 light-year-wide structure, very similar to that of a small barred galaxy. More recently, the Spitzer Space Telescope resolved this structure into a parallelogram, which can be explained as the remnant of a gas-rich spiral galaxy falling into an elliptical galaxy and becoming twisted and warped in the process. Galaxy merging is the most common mechanism to explain the formation of such giant elliptical galaxies.

The new SOFI images allow astronomers to get an even sharper view of the structure of this galaxy, completely free of obscuring dust. The original images, obtained by observing in the near-infrared through three different filters (J, H, K) were combined using a new technique that removes the dark, screening effect of the dust, providing a clear view of the centre of this galaxy.



ESO PR Photo 44b/09 - The "meal" of Centaurus A - Comparison between a visible-light image (left) of Centaurus A, as seen with the Wide-Field Imager on the MPG/ESO 2.2-metre telescope, and a near-infrared view (right) obtained with the SOFI instrument on ESO's New Technology Telescope, also at La Silla. Centaurus A (NGC 5128) is the nearest giant, elliptical galaxy, at a distance of about 12 million light-years. Between 200 and 700 million years ago, this galaxy is believed to have consumed a smaller spiral, gas-rich galaxy — the contents of which appear to be churning inside Centaurus A's core, triggering new generations of star birth. The SOFI image was specially processed to look through the dust, providing a clear view of the centre and revealing a previously unknown ring of stars and clusters.

What the astronomers found was surprising: "*There is a clear ring of stars and clusters hidden behind the dust lanes, and our images provide an unprecedentedly detailed view toward it*," says Jouni Kainulainen, lead author of the paper reporting these results. "*Further analysis of this structure will provide important clues on how the merging process occurred and what has been the role of star formation during it*."

The research team is excited about the possibilities this new technique opens: "*These are the first steps in the development of a new technique that has the potential to trace giant clouds of gas in other galaxies at high resolution and in a cost-effective way*," explains co-author João Alves. "*Knowing how these giant clouds form and evolve is to understand how stars form in galaxies*."

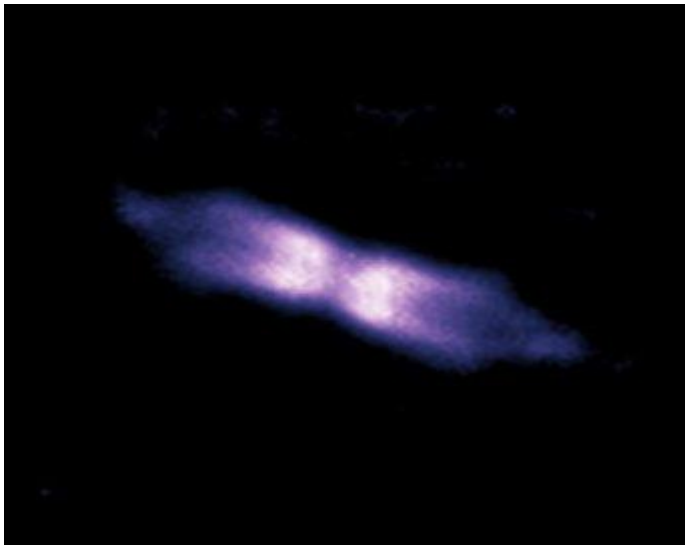
Looking forward to the new, planned telescopes, both on the ground and in space, "this technique is very complementary to the radio data ALMA will collect on nearby galaxies, and at the same time it poses interesting avenues of research for extragalactic stellar populations with the future European Extremely Large Telescope and the James Webb Space Telescope, as dust is omnipresent in galaxies," says co-author Yuri Beletsky.

Previous observations done with ISAAC on the VLT (ESO 04/01) have revealed that a supermassive black hole lurks inside Centaurus A. Its mass is about 200 million times the mass of our Sun, or 50 times more massive than the one that lies at the centre of our Milky Way. In contrast to our own galaxy, the supermassive black hole in Centaurus A is continuously fed by material falling onto into it, making the giant galaxy a very active one. Centaurus A is in fact one of the brightest radio sources in the sky (hence the "A" in its name). Jets of high energy particles from the centre are also observed in radio and X-ray images.

TICKING STELLAR TIME BOMB IDENTIFIED - ASTRONOMERS FIND PRIME SUSPECT FOR A TYPE IA SUPERNOVA

Using ESO's Very Large Telescope and its ability to obtain images as sharp as if taken from space, astronomers have made the first time-lapse movie of a rather unusual shell ejected by a "vampire star", which in November 2000 underwent an outburst after gulping down part of its companion's matter. This enabled astronomers to determine the distance and intrinsic brightness of the outburst object. It appears that this double star system is a prime candidate to be one of the long-sought progenitors of the exploding stars known as Type Ia supernovae, critical for studies of dark energy. "*One of the major problems in modern astrophysics is the fact that we still do not know exactly what kinds of stellar system explode as a Type Ia supernova*," says Patrick Woudt, lead author of the paper reporting the results. "*As these supernovae play a crucial role in showing that the Universe's expansion is currently accelerating, pushed by a mysterious dark energy, it is rather embarrassing*."

The astronomers studied the object known as V445 in the constellation of Puppis ("the Stern") in great detail. V445 Puppis is the first, and so far only, nova showing no evidence at all for hydrogen. It provides the first evidence for an outburst on the surface of a white dwarf dominated by helium. White dwarfs represent the evolutionary end product of stars with initial masses up to a few solar masses. A white dwarf is the burnt-out stellar core that is left behind when a star like the Sun sheds its outer layers towards the end of its active life. It is composed essentially of carbon and oxygen. This process normally also leads to the formation of a surrounding planetary nebula. "*This is critical, as we know that Type Ia supernovae lack hydrogen*," says co-author Danny Steeghs, "*and the companion star in V445 Pup fits this nicely by also lacking hydrogen, instead dumping mainly helium gas onto the white dwarf*."



The expanding shell around V445 Puppis - Using the NACO adaptive optics instrument on ESO's Very Large Telescope and its ability to obtain images as sharp as if taken from space, astronomers looked at a bipolar shell ejected by a "vampire star", which underwent an outburst after gulping down part of its companion's matter - ESO

In November 2000, this system underwent a nova outburst, becoming 250 times brighter than before and ejecting a large quantity of matter into space. The team of astronomers used the NACO adaptive optics instrument on VLT to obtain very sharp images of V445 Puppis over a time span of two years. The images show a bipolar shell, initially with a very narrow waist, with lobes on each side. Two knots are also seen at both the extreme ends of the shell, which appear to move at about 30 million kilometers per hour. The shell — unlike any previously observed for a nova — is itself moving at about 24 million kilometers per hour. A thick disc of dust, which must have been produced during the last outburst, obscures the two central stars. "*The incredible detail that we can see on such small scales — about hundred milliarcseconds, which is the apparent size of a one euro coin seen from about forty kilometers — is only possible thanks to the adaptive optics technology available on large ground-based telescopes such as ESO's VLT*," says Steeghs.

A supernova is one way that a star can end its life, exploding in a display of grandiose fireworks. One family of supernovae, called Type Ia supernovae, are of particular interest in cosmology as they can be used as "standard candles" to measure distances in the Universe [3] and so can be used to calibrate the accelerating expansion that is driven by dark energy. One defining characteristic of Type Ia supernovae is the lack of hydrogen in their spectrum. Yet hydrogen is the most common chemical element in the Universe. Such supernovae most likely arise in systems composed of two stars, one of them being the end product of the life of sun-like stars, or white dwarfs. When such white dwarfs, acting as stellar vampires that suck matter from their companion, become heavier than a given limit, they become unstable and explode . The build-up is not a simple process. As the white dwarf cannibalizes its prey, matter accumulates on its surface. If this layer becomes too dense, it becomes unstable and erupts as a nova. These controlled, mini-explosions eject part of the accumulated matter back into space. The crucial question is thus to know whether the white dwarf can manage to gain weight despite the outburst, that is, if some of the matter taken from the companion stays on the white dwarf, so that it will eventually become heavy enough to explode as a supernova.

Combining the NACO images with data obtained with several other telescopes the astronomers could determine the distance of the system — about 25 000 light-years from the Sun — and its intrinsic brightness — over 10 000 times brighter than the Sun. This implies that the vampire white dwarf in this system has a high mass that is near its fatal limit and is still simultaneously being fed by its companion at a high rate. "*Whether V445 Puppis will eventually explode as a supernova, or if the current nova outburst has pre-empted that pathway by ejecting too much matter back into space is still unclear*," says Woudt. "*But we have here a pretty good suspect for a future Type Ia supernova!"*

http://www.eso.org/public/astronomy/technology/adaptive_optics.html
http://www.eso.org/~bleibund/papers/EPN/epn.html

FROM THE EDITOR'S TERMINAL

The Stargazer is your newsletter and therefore it should be a cooperative project. Ads, announcements, suggestions, and literary works should be received by the editor at least two weeks prior to the next upcoming scheduled EAS meeting.

If you wish to contribute an article or suggestions to ***The Stargazer*** please contact Mark Folkerts by email or by telephone (425) 486-9733 or co-editor Bill O'Neil, at (774) 253-0747.

The Star Gazer
P.O. Box 12746
Everett, WA 98206

In November StarGazer:

The next EAS Meeting is 6:00 pm, Saturday November 21st at the Aurora Astro products store near Silver Lake in SE Everett