Southwest Florida Astronomical Society
SWFAS

The Eyepiece
June 2012

A MESSAGE FROM THE PRESIDENT

Well, the clouds won! We were clouded out for the Transit! (Ron Apple up in KY did get a nice PST picture and Steve Cobb said it cleared off some in Nashville!)

Thanks to those that came out to help at Centennial Park. Even though it was cloudy, it was a good PR event with WINK, WBBH and the News-Press in attendance.

The summer is a fairly quiet time for us. There are a few camps that ask for assistance and I know Carol Stewart is planning on helping one at Rotary Park. I will be checking on the Cape Coral Parks and Rec day to see if we can setup again at the Yacht Club Park.

Tony, Lee and I went out to the Girl Scout Camp last month and had some early issues with clouds, but it suddenly cleared and we were able to show them the planets, a few other bright objects and the full moon.

CRP Star Party Schedule for 2012: June 23rd, July 2st, August 18th, September 15th, October 13th, November 10th, and December 15th. Please contact Bruce Dissette if you have any questions.

Carol Stewart will be giving the evening's presentation on the Astronomical League and what it can do for you. They have many interesting programs that you can participate in.

Moon: Last Quarter 11th, New 19th, 1st Quarter 27th

Planets: Mercury will start to appear in the evening sky. On the 21st the moon will be near Mercury. Mars is high in the west sky at sunset and is starting to fade a bit. Saturn is a little further east, near Spica. Jupiter and Venus will be appearing in the morning sky by the end of the month.

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June Meeting

Our June monthly meeting will be held on Thursday June 7 at 7:30 pm at Calusa Nature Center and Planetarium. Carol Stewart will speak on *Your Astronomical League and Its Benefits to You*.

Upcoming Meetings

We have a talk on Spectroscopy "*You Can Almost Touch the Stars!*" by Tom Field covering amateur spectroscopy equipment scheduled for December. The talk will be a remote presentation.

CRP Star Party Schedule

June 23rd, July 21st, August 18th, September 15th, October 13th, November 10th, and December 15th. Please contact Bruce Dissette if you have any questions.

New SWFAS Materials Donated

Mark Kelly has donated 4 telescopes to the club. Some need repairs and Brian Risley will be doing that. They are:
Meade 8" f6 reflector on a battery operated German EQ Mount (RA motor only)
Celestron 4.5" Short Tube reflector on a non motorized GEM mount
Meade 4.5" Long Tube reflector on a non motorized GEM mount.
Meade 60mm refractor on Alt Az Mount.
Mark also donated student The Sky programs and textbook and other instructor material.

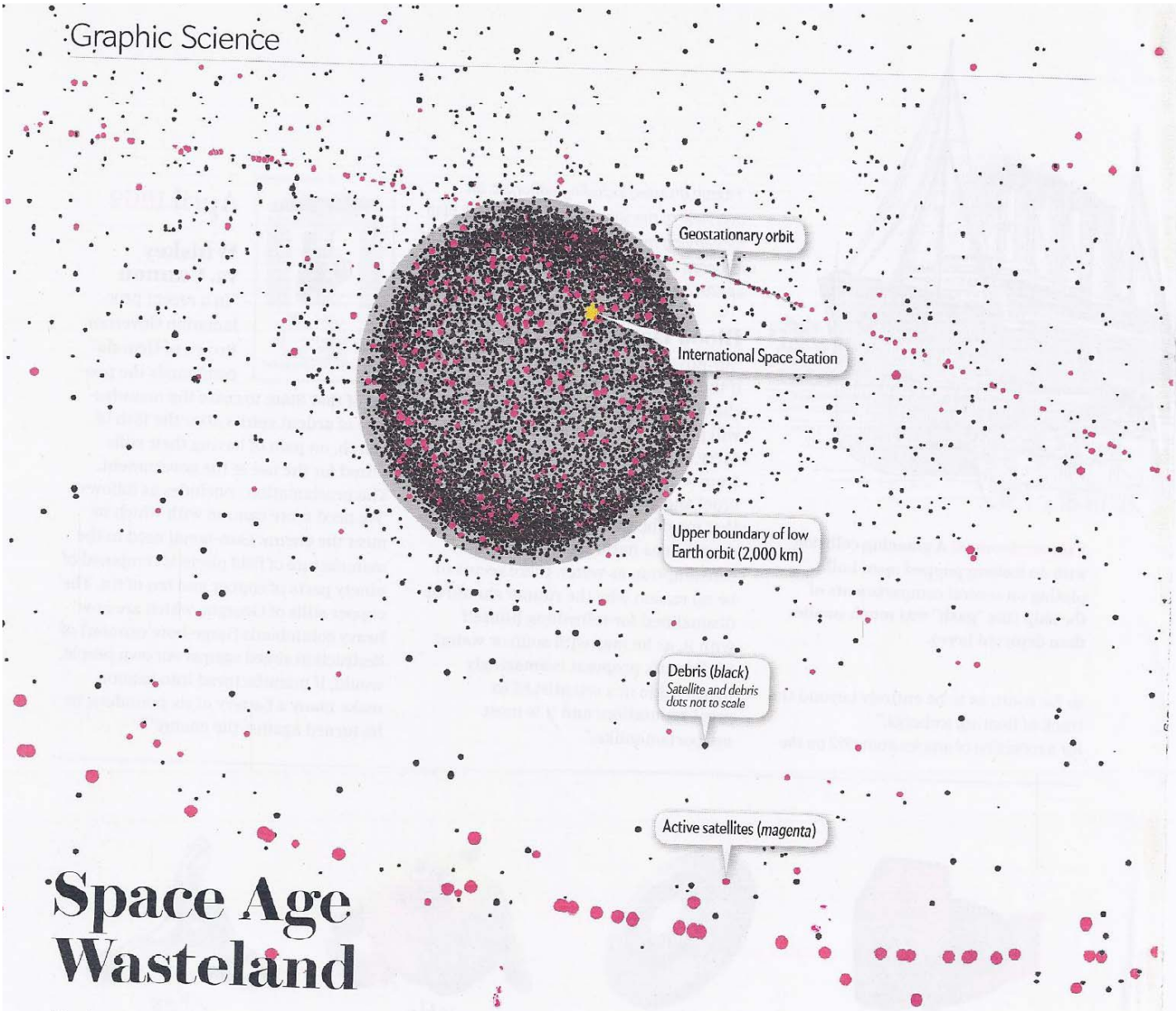
Video: Allegheny Observatory 1872 Lens Theft Case

One of the little known cases in astronomy history is the case of the "lens-napping" of the 13-inch Fitz objective lens of the original Allegheny Observatory, which was located on Old Observatory Hill overlooking Downtown Allegheny, Pennsylvania, now Pittsburgh's North Side. When the original Allegheny Observatory was constructed in 1861, the Fitz telescope was the third largest in the world (behind 15-inch refractor telescopes at Harvard and in Russia).

Dan Handley, Producer of the history film, "UNDAUNTED: The Forgotten Giants of the Allegheny Observatory," has just released a short film segment about the "lens-napping" case. In this film segment, the facts about the case are explained by Allegheny Observatory Historian Art Glaser.

This film segment, which could not be included in the original film due to time constraints, will be included as a "special feature" on the planned DVD. However, you do not have to wait for the DVD to be issued to see this segment; Dr. Handley has just posted it to YouTube:
http://www.youtube.com/watch?v=caBc_uLfj_4

In a May 23 electronic mail message, Dr. Handley stated that he is behind schedule in issuing the film DVD. In the e-mail, Dr. Handley also says, "There is a lot of history left out in this short piece, but maybe it will inspire people to start looking into the history of astronomy on their own. I really wish we could make a comprehensive history of astronomy documentary series. In any case, I hope you enjoy this small tidbit."
- http://spacewatchtower.blogspot.com/2012/05/video-allegheny-observatory-1872-lens.html



Space Age Wasteland

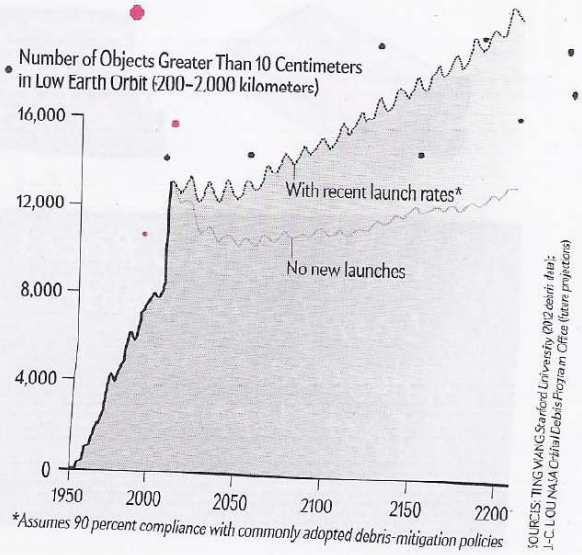
Debris in orbit is here to stay

Space may be incomprehensibly vast, but Earth's environs are crowded with junk. Spent rockets, derelict spacecraft, satellite fragments and loose hardware now form a cloud of debris that poses a threat to orbiting satellites and astronauts. Sky watchers have catalogued more than 16,000 objects larger than about 10 centimeters, most of them in low Earth orbit, at altitudes of 200 to 2,000 kilometers (*right*).

And the junk is self-sustaining. If humankind were to cease all spacefaring activities, the hardware we have already cast off would continue to collide and fragment into bits for centuries. Maintaining current launch rates would make the problem even worse. The number of space objects has shot up in the past five years because of China's 2007 test of an antisatellite weapon and the 2009 crash between Russian and U.S. satellites. Governments are contemplating cleanup measures but have yet to devise a workable solution. —*John Matson*

SCIENTIFIC AMERICAN ONLINE

See more data in an interactive graphic at ScientificAmerican.com/apr2012/graphic-science



Graphic by Jan Willem Tulp

Space X Dragon Craft Panorama

Check out the interior of the Dragon capsule in this panorama image.
http://www.spacex.com/panorama/index.html

NASA Scientist Figures Way to Weigh Space Rock

A scientist at NASA's Jet Propulsion Laboratory has accurately determined the mass of a nearby asteroid from millions of miles away. The celestial equivalent of "guess your weight" was achieved by Steve Chesley of JPL's Near-Earth Object Program Office.

For Chesley to define the asteroid's mass, he first needed to understand its orbit and everything that could affect that orbit - including neighboring celestial bodies and any propulsive force (however minute) the asteroid could generate.

Incorporating extraordinarily precise observations collected at Arecibo Observatory in 2011, Arecibo and Goldstone radar observations made in 1999 and 2005, and the gravitational effects of the sun, moon, planets and other asteroids, Chesley was able to calculate how far the asteroid deviated from its anticipated orbit. He found that 1999 RQ36 had deviated from the mathematical model by about 100 miles in the past 12 years. The only logical explanation for this orbital change was that the space rock itself was generating a minute propulsive force known in space rock circles as the Yarkovsky effect.

The Yarkovsky effect is named for the 19th-century Russian engineer who first proposed the idea that a small, rocky space object would, over long periods of time, be noticeably nudged in its orbit by the slight push created when it absorbs sunlight and then re-emits that energy as heat. The effect is hard to measure because it’s so infinitesimally small.

"At its peak, when the asteroid is nearest the sun, the Yarkovsky force on 1999 RQ36 is only about a half ounce -- around the weight of three grapes," said Chesley. "When you're talking about the force of three grapes pushing something with a mass of millions of tons, it takes a lot of high-precision measurements over a long time to see any orbital changes. Fortunately, the Arecibo Observatory provided a dozen years of great radar data, and we were able to see it."

The final piece to the puzzle was provided by Josh Emery who used NASA’s Spitzer Space Telescope in 2007 to study the space rock's thermal characteristics. Emery’s measurements of the infrared emissions from 1999 RQ36 allowed him to derive the object’s temperatures. From there he was able to determine the degree to which the asteroid is covered by an insulating blanket of fine material, which is a key factor for the Yarkovsky effect.

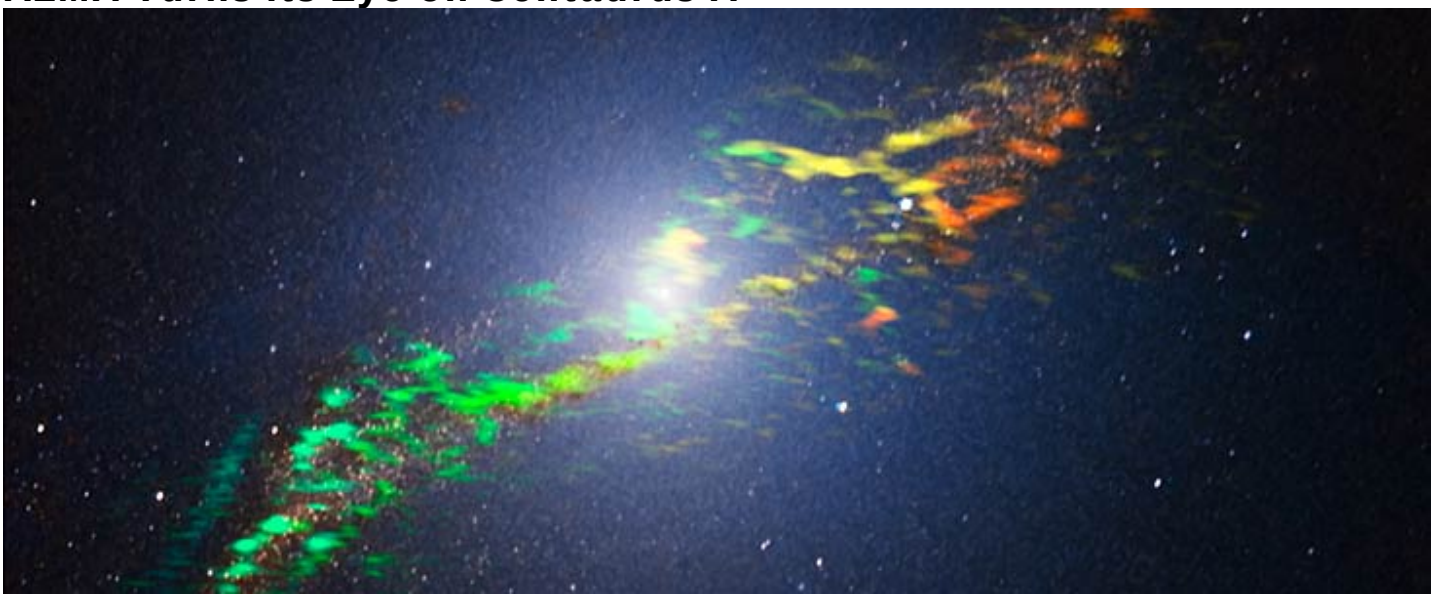
With the asteroid’s orbit, size, thermal properties and propulsive force understood, Chesley was able to perform the space rock scientist equivalent of solving for "X" and calculate its bulk density.

“While 1999 RQ36 weighs in at about 60 million metric tons, it is about a half kilometer across," said Chesley. "That means it has about the same density as water, so it’s more than likely a very porous jumble of rocks and dust.”

Asteroid 1999 RQ36 is of particular interest to NASA as it is the target of the agency's OSIRIS-REx (Origins, Spectral Interpretation, Resource Identification, Security, Regolith Explorer) mission. Scheduled for launch in 2016, ORIRIS-Rex will visit 1999 RQ36, collect samples from the asteroid and return them to Earth.

More information about asteroids and near-Earth objects is at www.jpl.nasa.gov/asteroidwatch .
- The full version of this story with accompanying images is at: www.jpl.nasa.gov/news/news.cfm?release=2012-145&cid=release_2012-145

ALMA Turns its Eye on Centaurus A



A new image of the center of the distinctive galaxy Centaurus A, made with the Atacama Large Millimeter/Submillimeter Array (ALMA), shows how the new observatory allows astronomers to see through the opaque dust lanes that obscure the galaxy's center, with unprecedented quality. ALMA is currently in its Early Science phase of observations and is still under construction, but is already the most powerful telescope of its kind.

Centaurus A is a massive elliptical radio galaxy — a galaxy which emits strong radio waves — and is the most prominent, as well as by far the nearest radio galaxy in the sky. Centaurus A has therefore been observed with many different telescopes. Its very luminous center hosts a supermassive black hole with a mass of about 100 million times that of the Sun.

In visible light, a characteristic feature of the galaxy is the dark band that obscures its center. This dust lane harbors large amounts of gas, dust and young stars. These features, together with the strong radio emission, are evidence that Centaurus A is the result of a collision between a giant elliptical galaxy and a smaller spiral galaxy whose remains form the dusty band.

To see through the obscuring dust in the central band, astronomers need to observe using longer wavelengths of light. This new image of Centaurus A combines observations at wavelengths around one millimeter, made with ALMA, and observations in near-infrared light. It thus provides a clear view through the dust towards the galaxy's luminous center.

The new ALMA observations, shown in a range of green, yellow and orange colors, reveal the position and motion of the clouds of gas in the galaxy. They are the sharpest and most sensitive such observations ever made. ALMA was tuned to detect signals emitted by molecules of carbon monoxide gas. The motion of the gas in the galaxy causes slight changes to this wavelength, due to the Doppler effect. The motion is shown in this image as changes in color. Greener features trace gas coming towards us while more orange features depict gas moving away. We can see that the gas to the left of the center is moving towards us, while the gas to the right of the center is moving away from us, indicating that the gas is orbiting around the galaxy.

The ALMA observations are overlaid on a near-infrared image of Centaurus A. The image was processed using an innovative technique that removes the screening effect of the dust. We see a clear ring of stars and clusters glowing in a golden color, the tattered remains of the spiral galaxy being ripped apart by the gravitational pull of the giant elliptical galaxy.

The alignment between the ring of stars seen by the NTT in infrared light and the gas seen by ALMA at millimeter wavelengths highlights different aspects of similar structures in the galaxy. This is an example of how observations with other telescopes can complement these new observations from ALMA.

Construction of ALMA, on the Chajnantor Plateau in northern Chile, will be completed in 2013, when 66 high-precision antennas will be fully operational.

- The release, images and videos are available at www.eso.org/public/news/eso1222/

Ancient Egyptian Observations of a Variable Star Discovered

The study of the "Demon star", Algol, made by a research group of the University of Helsinki, Finland, has received both scientific and public attention. The period of the brightness variation of this eclipsing binary star has been connected to good prognoses three millennia ago. This result has raised a lot of discussion and the news has spread widely in the Internet.

The Egyptian papyrus Cairo 86637 calendar is probably the oldest preserved historical document of bare eye observations of a variable star. Each day of one Egyptian year was divided into three “parts in this calendar. A good or a bad prognosis was assigned for these parts of a day.

The texts regarding the prognoses are connected to mythological and astronomical events,” says Master of Science Sebastian Porceddu.

A modern period analysis revealed that two statistically significant periods of 29.6 and 2.850 days have been recorded into the good prognoses. The former is clearly the period of the Moon. The second period differs slightly from the period Algol. In this eclipsing binary, the dimmer star partially covers the brighter star with a period of 2.867 days.

“These eclipses last about ten hours and they can be easily observed with bare eyes. Their period was discovered by Goodricke in the year 1783,” says docent Lauri Jetsu.

“We can explain why the period of Algol has increased by about 0.017 days,” says Lauri Jetsu. The period increase during the past three millennia could have been caused by the observed mass transfer between the two members of this binary. In fact, this would be the first observation that confirms the period increase of Algol and it also gives an estimate of the mass transfer rate.

The ancient Egyptians have made accurate measurements that provide useful constraints for modern astronomers.

“It seems that the first observation of a variable star was made 3000 years earlier than was previously thought,” says Lauri Jetsu. “However, I want to emphasize that our research has only been sent to a scientific journal about two weeks ago. This type of results can raise a lot of controversy before they are accepted.”

- http://phys.org/news/2012-05-astronomers-ancient-egyptian-variable-star.html

Only the Huge Die Young

This young, glittering cluster of stars is surrounded by clouds of interstellar gas and dust—the raw material for new star formation. The nebula, located 20,000 light-years away in the constellation Carina, contains a central cluster of huge, hot stars called NGC 3603. Ultraviolet radiation and violent stellar winds have blown out an enormous cavity in the surrounding gas and dust, providing an unobstructed view of the cluster within. Although most of these stars were born around the same time, they differ greatly in size and include some of the most massive stars known. These huge stars live fast and die young, burning through their hydrogen fuel quickly and ultimately ending their lives in supernova explosions. This Hubble image combines visible and

infrared data.
- Image credit: NASA / ESA / R. O'Connell / F. Paresce / E. Young / WFC3 Science Oversight Committee / Hubble Heritage Team (STScI/AURA), From The Year In Space

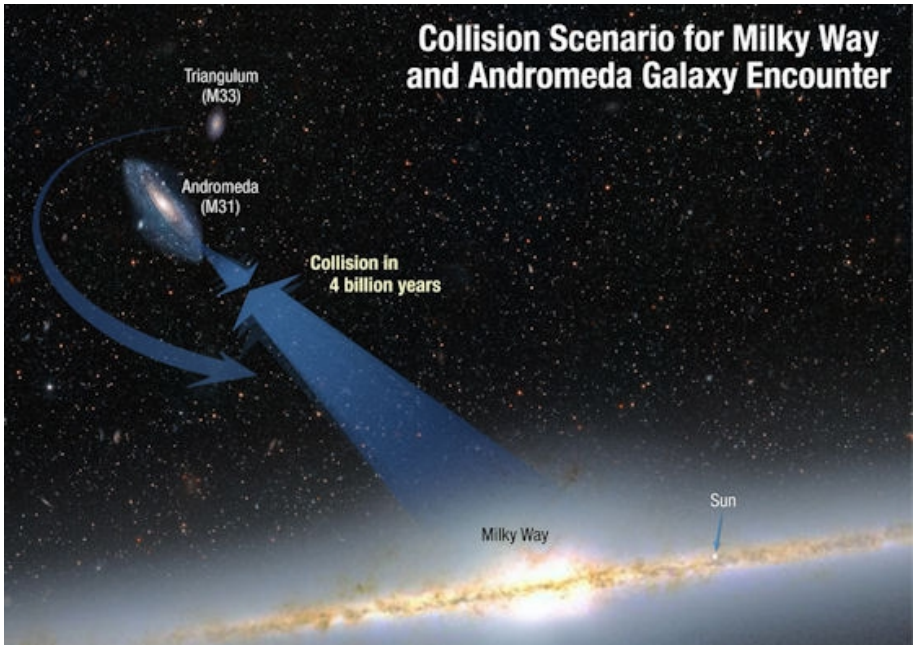
Astronomers Predict Titanic Collision: Milky Way vs. Andromeda

NASA astronomers say they can now predict with certainty the next major cosmic event to affect our galaxy, sun, and solar system: the titanic collision of our Milky Way galaxy with the neighboring Andromeda galaxy.

The Milky Way is destined to get a major makeover during the encounter, which is predicted to happen four billion years from now. It is likely the sun will be flung into a new region of our galaxy, but our Earth and solar system are in no danger of being destroyed.

"After nearly a century of speculation about the future destiny of Andromeda and our Milky Way, we at last have a clear picture of how events will unfold over the coming billions of years," says Sangmo Tony Sohn of the Space Telescope Science Institute (STScI).

"Our findings are statistically consistent with a head-on collision between the Andromeda galaxy and our Milky Way galaxy," adds Roeland van der Marel of the STScI.

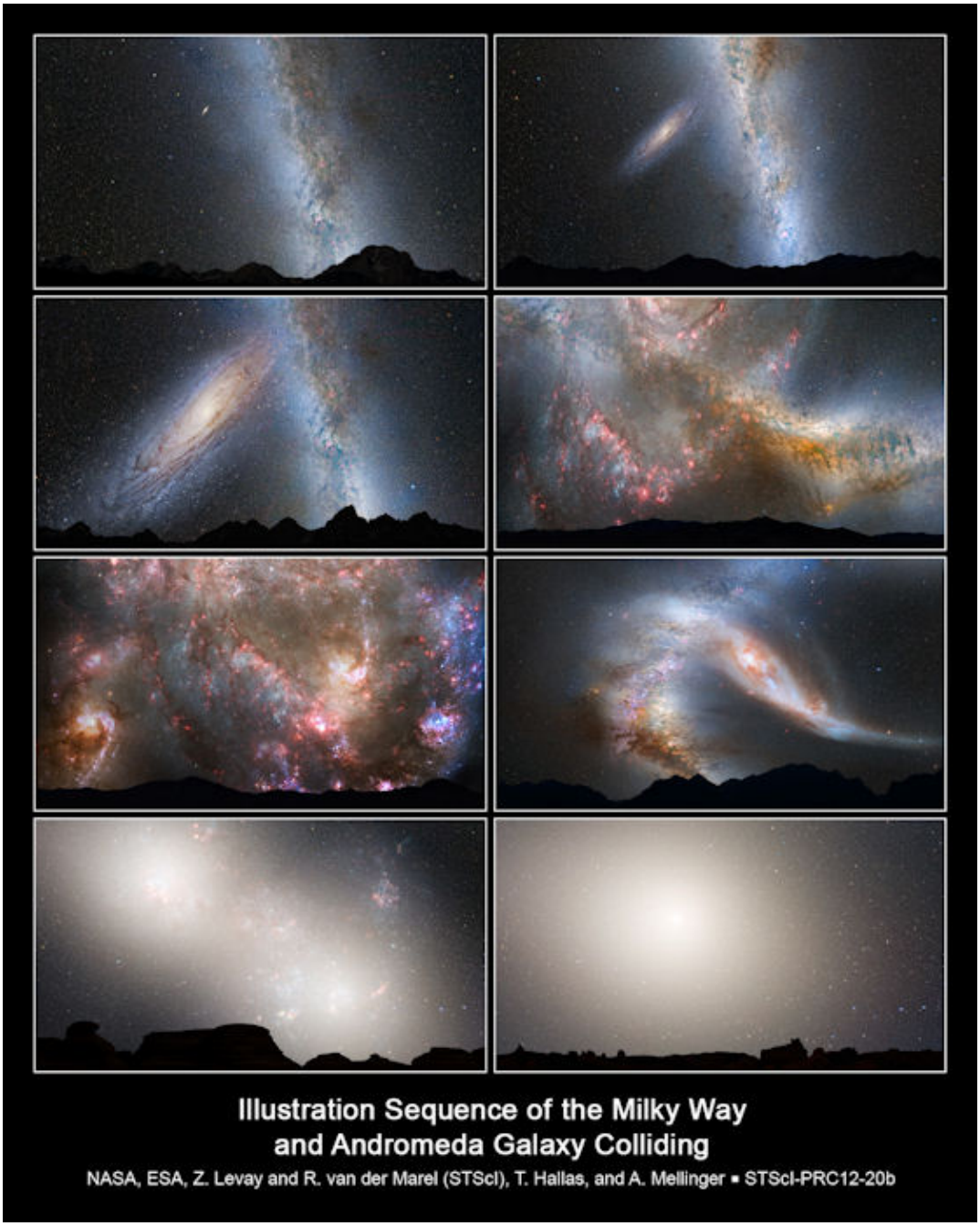


The Milky Way and Andromeda are moving toward each other under the inexorable pull of gravity. Also shown is a smaller galaxy, Triangulum, which may be part of the smashup.

The solution came through painstaking NASA Hubble Space Telescope measurements of the motion of Andromeda, which also is known as M31. The galaxy is now 2.5 million light-years away, but it is inexorably falling toward the Milky Way under the mutual pull of gravity between the two galaxies and the invisible dark matter that surrounds them both.

The scenario is like a baseball batter watching an oncoming fastball. Although Andromeda is approaching us more than 2,000 times faster than a fastball, it will take 4 billion years before the strike. Computer simulations derived from Hubble's data show that it will take an additional two billion years after the encounter for the interacting galaxies to completely merge under the tug of gravity and reshape into a single elliptical galaxy similar to the kind commonly seen in the local universe.

Although the galaxies will plow into each other, stars inside each galaxy are so far apart that they will not collide with other stars during the encounter. However, the stars will be thrown into different orbits around the new galactic center. Simulations show that our solar system will probably be tossed much farther from the galactic core than it is today.



This series of photo illustrations shows the predicted merger between the Milky Way and Andromeda as seen from Earth. The first frame is the present day; the last frame is 7 billion years from now.

To make matters more complicated, M31's small companion, the Triangulum galaxy, M33, will join in the collision and perhaps later merge with the M31/Milky Way pair. There is a small chance that M33 will hit the Milky Way first.

A century ago astronomers did not realize that M31 was a separate galaxy far beyond the stars of the Milky Way. Edwin Hubble measured its vast distance by uncovering a variable star that served as a "milepost marker."

Hubble went on to discover the expanding universe where galaxies are rushing away from us, but it has long been known that M31 is moving toward the Milky Way at about 250,000 miles per hour. That is fast enough to travel from here to the moon in one hour. The measurement was made using the Doppler effect, which is a change in frequency and wavelength of waves produced by a moving source relative to an observer, to measure how starlight in the galaxy has been compressed by Andromeda's motion toward us.

Previously, it was unknown whether the far-future encounter will be a miss, glancing blow, or head-on smashup. This depends on M31’s tangential motion. Until now, astronomers had not been able to measure M31's sideways motion in the sky, despite attempts dating back more than a century. The Hubble Space Telescope team, led by van der Marel, conducted extraordinarily precise observations of the sideways motion of M31 that remove any doubt that it is destined to collide and merge with the Milky Way.

"This was accomplished by repeatedly observing select regions of the galaxy over a five- to seven-year period," says Jay Anderson of STScI.

"In the worst-case-scenario simulation, M31 slams into the Milky Way head-on and the stars are all scattered into different orbits," adds Gurtina Besla of Columbia University. "The stellar populations of both galaxies are jostled, and the Milky Way loses its flattened pancake shape with most of the stars on nearly circular orbits. The galaxies' cores merge, and the stars settle into randomized orbits to create an elliptical-shaped galaxy."
The space shuttle servicing missions to Hubble upgraded it with ever more-powerful cameras, which have given astronomers a long-enough time baseline to make the critical measurements needed to nail down M31's motion.
- Production editor: Dr. Tony Phillips | Credit: Science@NASA
Full story at http://science.nasa.gov/science-news/science-at-nasa/2012/31may_andromeda/

Venus, a Planetary Portrait of Inner Beauty

A Venus transit across the face of the sun is a relatively rare event - occurring in pairs with more than a century separating each pair. There have been all of 53 transits of Venus across the sun between 2000 B.C. and the last one in 2004. On Tuesday, June 5, Earth gets another shot at it – and the last for a good long while. But beyond this uniquely celestial oddity, why has Venus been an object worthy of ogling for hundreds of centuries?

"Venus is a fascinating yet horrendously extreme place all at once," said Sue Smrekar, a scientist at NASA's Jet Propulsion Laboratory. "Although the surface is hot enough to melt lead due to its runaway greenhouse atmosphere, in many respects it is Earth's twin [size, gravity and bulk composition]."

Venus is not only nearby, but its orbit brings it closest to Earth of all the planets. Which along with its bright atmosphere goes a long way toward making it the third brightest object in the sky (the sun and moon are one and two). Along with Smrekar and many other equally intrigued planetary scientists, you can add to the list of those studying the second planet from the sun the ancient Babylonians, who noted its wanderings in texts as far back as 1600 BC. And anyone who has ever sweated out a Pythagorean Theorem in school (A2+B2=C2) might find some solace in knowing that Greek mathematician Pythagoras sweated out the orbits of Venus, eventually becoming the first to determine that what had been believed to be unique and separate evening and morning stars (as believed by the ancient Egyptians and Greeks), was actually just one object – Venus.

But for all that these ancient astronomers and their medieval contemporaries (including the Aztecs back in the 1500s) were able to deduce, no human had ever laid eyes on Venus as more than a bright dot in the sky until Galileo Galilee, who in 1610 was the first human to actually see Venus in various kinds of light. With his telescope, Galileo started cranking out Venetian discoveries, including how the planet changed its illumination phase just like the moon as it circles Earth. Galileo's telescope provided strong evidence that Venus goes around the sun, and not Earth, as most of his contemporaries believed.

After Galileo, Venus came under even more intense scrutiny, both scientific and fanciful. More than one astronomer (and science fiction author) theorized it was home to some type of life form. The thick, impenetrable clouds allowed them to imagine tropical environs with steady rainfall and lush vegetation.

With the dawn of robotic space probes, America's Mariner 2 became history's first interplanetary traveler when it flew past Venus on Dec. 14, 1962. All told, 45 missions targeting Earth's twin have been launched by the United States, Russia, and Japan. All this probing by astronomers and robotic explorers has found Venus to be replete with 900° Fahrenheit temperatures in a carbon-dioxide-rich atmosphere with pressures equivalent to being half a mile below the ocean surface. It is not a particularly hospitable environment.

"If our research tells us anything, it is that while Venus is devoid of life, it should be anything but avoided," said Smrekar. "Throughout history, Venus has been one of the most studied and speculated-about celestial bodies in our sky. Venus is a remarkable world with many lessons for us about the climate and interior of Earth and Earth-like planets in other solar systems."
- The full version of this story with accompanying images is at: http://www.jpl.nasa.gov/news/news.cfm?release=2012-150&cid=release_2012-150

Enceladus Plume is a New Kind of Plasma Laboratory

Recent findings from NASA's Cassini mission reveal that Saturn's geyser moon Enceladus provides a special laboratory for watching unusual behavior of plasma, or hot ionized gas. In these recent findings, some Cassini scientists think they have observed "dusty plasma," a condition theorized but not previously observed on site, near Enceladus.

Data from Cassini's fields and particles instruments also show that the usual "heavy" and "light" species of charged particles in normal plasma are actually reversed near the plume spraying from the moon's south polar region.

99% of the matter in the universe is thought to be in the form of plasma, so scientists have been using Saturn as a site other than Earth to observe the behavior of this cloud of ions and electrons directly. Scientists want to study the way the sun sends energy into Saturn's plasma environment, since that jolt of energy drives processes such as weather and the behavior of magnetic field lines. They can use these data to understand how Saturn's plasma environment is similar to and different from that of Earth and other planets.

The small, icy moon Enceladus is a major source of ionized material filling the huge magnetic bubble around Saturn. About 200 pounds of water vapor per second – about as much as an active comet – spray out from long cracks in the south polar region known as "tiger stripes." The ejected matter forms the Enceladus plume – a complex structure of icy grains and neutral gas that is mainly water vapor. The plume gets converted into charged particles interacting with the plasma that fills Saturn's magnetosphere.

The nature of this unique gas-dust-plasma mixture has been revealed over the course of the mission with data from multiple instruments. What scientists found most interesting is that the grains range continuously in size from a few water molecules to thousandths of an inch. They also saw that a large fraction of these grains trap electrons on their surface. Up to 90% of the electrons from the plume appear to be stuck on large, heavy grains.

In this environment, Cassini has now seen positively charged ions become the small, "light" plasma species and the negatively charged grains become the "heavy" component. This is just the opposite of "normal" plasmas, where the negative electrons are thousands of times lighter than the positive ions.

A team of scientists on the Cassini mission examined radio and plasma wave science instrument observations from four flybys of Enceladus during 2008. They found a high plasma density (both ions and electrons) within the Enceladus plume region, although the electron densities are usually much lower than the ion densities in the plumes and in the E ring. The team concluded that dust particles a hundred millionth to a hundred thousandth of an inch in size are sweeping up the negatively charged electrons. The mass of the observed "nanograins" ranges from a few hundred to a few tens of thousands of atomic mass units (proton masses), and must therefore contain tens to thousands of water molecules bound together. At least half of the negatively charged electrons are attached to the dust, and their interaction with the positively charged particles causes the ions to be decelerated. Because the dust is charged and behaves as part of the plasma cloud, this paper distinguishes this state of matter from dust that just happens to be in plasma.

“Such strong coupling indicates the possible presence of so-called ‘dusty plasma’, rather than the ‘dust in a plasma’ conditions which are common in interplanetary space,” said Michiko Morooka a Cassini radio and plasma wave science co-investigator. “Except for measurements in Earth’s upper atmosphere, there have previously been no in-situ observations of dusty plasma in space.”

In a dusty plasma, conditions are just right for the dust to also participate in the plasma’s collective behavior. This increases the complexity of the plasma, changes its properties and produces totally new collective behavior. Dusty plasma are thought to exist in comet tails and dust rings around the sun, but scientists rarely have the opportunity to fly through the dusty plasma and directly measure its characteristics in place.

The nature of the Enceladus plume has been revealed over time by Cassini, which has been in residence in Saturn’s magnetosphere since 2004. Following the original detection of the plume based on magnetometer measurements, astronomers found that the observed perturbation of Saturn’s magnetic field required the presence of negatively charged dust grains in the plume. Previous data obtained by the ion and neutral mass spectrometer revealed the complex composition of the plume gas, and the cosmic dust analyzer revealed that the plume grains were rich in sodium salts. Because this scenario can only arise if the plume originated from liquid water, it provides compelling evidence for a subsurface ocean. Cassini will continue to study the complex nature of the plume region in the three planned additional flybys of Enceladus.

- The full version of this story with accompanying images is at: http://www.jpl.nasa.gov/news/news.cfm?release=2012-149&cid=release_2012-149

Thank Goodness for Magnetism

By Dr. Tony Phillips

Only 93 million miles from Earth, a certain G-type star is beginning to act up.

Every 11 years or so, the solar cycle brings a period of high solar activity. Giant islands of magnetism—”sunspots”—break through the stellar surface in increasing numbers. Sometimes they erupt like a billion atomic bombs going off at once, producing intense flares of X-rays and UV radiation, and hurling massive clouds of plasma toward Earth.

This is happening right now. Only a few years ago the Sun was in a state of deep quiet, but as 2012 unfolds, the pendulum is swinging. Strong flares are becoming commonplace as sunspots once again pepper the solar disk. Fortunately, Earth is defended from solar storms by a strong, global magnetic field.

In March 2012, those defenses were tested. At the very beginning of the month, a remarkable sunspot appeared on the Sun’s eastern limb. AR1429, as experts called it, was an angry-looking region almost as wide as the planet Jupiter. Almost as soon as it appeared, it began to erupt. During the period March 2nd to 15th, it rotated across the solar disk and fired off more than 50 flares. Three of those eruptions were X-class flares, the most powerful kind.

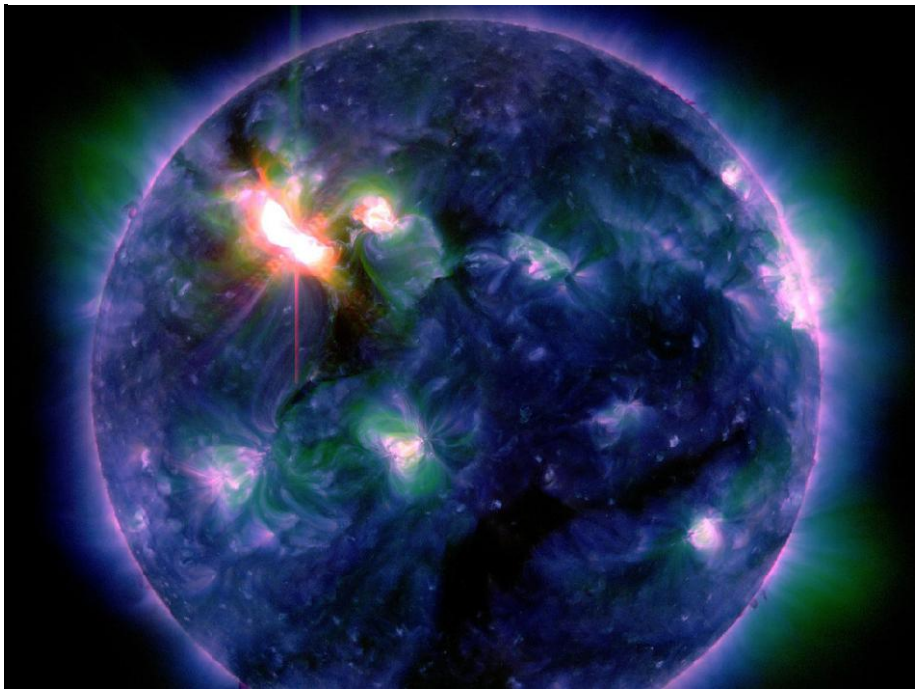
As the eruptions continued almost non-stop, Earth’s magnetic field was buffeted by coronal mass ejections or “CMEs.” One of those clouds hit Earth’s magnetosphere so hard, our planet’s magnetic field was sharply compressed, leaving geosynchronous satellites on the outside looking in. For a while, the spacecraft were directly exposed to solar wind plasma.

Charged particles propelled by the blasts swirled around Earth, producing the strongest radiation storm in almost 10 years. When those particles rained down on the upper atmosphere, they dumped enough energy in three days alone (March 7-10) to power every residence in New York

City for two years. Bright auroras circled both poles, and Northern Lights spilled across the Canadian border into the lower 48 states. Luminous sheets of red and green were sighted as far south as Nebraska. When all was said and done, the defenses held—no harm done.

This wasn't the strongest solar storm in recorded history—not by a long shot. That distinction goes to the Carrington Event of September 1859 when geomagnetic activity set telegraph offices on fire and sparked auroras over Mexico, Florida, and Tahiti. Even with that in mind, however, March 2012 was remarkable. It makes you wonder, what if? What if Earth didn't have a magnetic field to fend off CMEs and deflect the most energetic particles from the Sun.

The answer might lie on Mars. The red planet has no global magnetic field and as a result its atmosphere has been stripped away over time by CMEs and other gusts of solar wind. At least that's what many researchers believe. Today, Mars is a desiccated and apparently lifeless wasteland.



Only 93 million miles from Earth, a G-type star is acting up. Thank goodness for magnetism.
With your inner and outer children, read, watch, and listen in to "Super Star Meets the Plucky Planet," a rhyming and animated conversation between the Sun and Earth, at http://spaceplace.nasa.gov/story-superstar.

Caption: Multiple-wavelength view of X5.4 solar flare on March 6, captured by the Solar Dynamics Observatory (SDO) in multiple wavelengths (94, 193, 335 angstroms). Credit: NASA/SDO/AIA

- This article was provided by the Jet Propulsion Laboratory, California Institute of Technology, under a contract with the National Aeronautics and Space Administration.

Night Sky Network
Astronomy Clubs bringing the wonders of the universe to the public

Hello NSN StarGazers!

Have you seen the giant sunspot coming around the northeast limb of the Sun? Spaceweather.com reports that the 100,000 km stretch of sunspots is "crackling with M-Class flares." Are you ready to bring views of these sunspots to your visitors?

AstroByte: Still not convinced that social media is an important part of outreach? 86% of adults engage in social media in the U.S. Here's a great graphic that shows you how people are engaging: http://blogs.forrester.com/gina_sverdlov/12-01-04-global_social_technographics_update_2011_us_and_eu_mature_emerging_markets_show_lots_of_activity

Spread the word about Go StarGaze, the NSN iPhone app that helps you find NSN astronomy clubs and events and Distant Suns, the astronomy app that lists NSN events!

Wishing you clear skies and oodles of outreach,
- Marni Berendsen, Vivian White, and Jessica Santascoy, Night Sky Network

SWFAS Minutes

May minutes will be published in a future newsletter.

Future Events

CALUSA NATURE CENTER PLNTRM	6-7-12	7:30 PM	MONTHLY MEETING
CALOOSAHATCHEE REGIONAL PARK	6-23-12	DUSK	STAR PARTY
CALUSA NATURE CENTER PLNTRM	7-5-12	7:30 PM	MONTHLY MEETING
CALOOSAHATCHEE REGIONAL PARK	7-21-12	DUSK	STAR PARTY

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