COMING EVENTS
Saturday February 11
USD497 Science Fair Expo
South Middle School
Fair Open House/EXPO
2:00 - 4:30 PM

Friday, Feb. 17, 2012
2001 Malott - 7:30 PM
Dr. Brian Thomas
The Dangerous Universe!

Public Observing
Sunday February 26
Prairie Park Nature Center
8:00 PM

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A Galactic Welcome to new club members
Carol and Rick Shelton

The world will end December 21, 2012! (NOT)
By Michael E. Bakich

The Mayans were terrific architects, and they watched the planets carefully. They did not, however, predict the end of the world. Wikipedia image Photo by Wikipedia The myth that the world will end in December 2012 started with claims that Nibiru, a supposed planet discovered by the Sumerians, is heading toward Earth. Zecharia Sitchin, who writes fiction about the ancient Mesopotamian civilization of Sumer, claimed in several books (e.g., The Twelfth Planet, The Stairway to Heaven, The End of Days) that he has found and translated Sumerian documents that identify a planet — Nibiru — orbiting the Sun every 3,600 years. Sitchin's Sumerian fables include stories of astronauts visiting Earth from an alien civilization called the Anunnaki.

After these books appeared, Nancy Lieder, a self-declared psychic, wrote on her web site ZetaTalk that the inhabitants of a fictional planet orbiting the nearby star Zeta Reticuli warned her that Earth was in danger from Nibiru. The prediction said the collision of Nibiru and Earth would occur in May 2003.

When nothing happened in that month, claimants moved the doomsday date forward to December 2012. Only recently have people linked these two fables to the end of the Mayan long-count at the winter solstice in 2012 — hence the predicted doomsday date of December 21, 2012.

Nibiru is a name in Babylonian astrology sometimes associated with the god Marduk. Scholars of ancient Mesopotamia refute Sitchin's claims that Nibiru is a planet and that the Sumerians knew about it. Sumer was a great civilization, but they left few astronomical records. They had no understanding that the planets orbited the Sun. That idea first developed in ancient Greece two millennia after the end of Sumer.

Some people claim NASA found Nibiru in 1983 using the Infrared Astronomy Satellite (IRAS), which carried out a 10-month sky survey. IRAS cataloged 350,000 infrared
(Continued on page 2)
As noted last month, the annual dues notices were mailed out and you should have received yours by now. If you didn’t, it’s either because you are paid up or we have the wrong address for you. If the latter is the case, please send an email with your correct address to btwarog@ku.edu, or download the membership form from the club web site and mail in the appropriate info and dues. Thanks for your cooperation.

Calling all Earthlings! Take a few minutes to get involved in the GLOBE at Night campaign to preserve dark skies!

GLOBE at Night is a citizen-science campaign open to people all over the world to raise awareness of the impact of light pollution by inviting citizen-scientists to measure their night sky brightness and report their observations to a website from a computer or smart phone. Light pollution threatens not only our “right to starlight”, but can affect energy consumption, wildlife and health. Through 2011, people in 115 countries contributed 66,000 measurements, making GLOBE at Night one of the most successful light pollution awareness campaigns to date. Please join us to participate in the 2012 campaign an hour after sunset til about 10pm January 14 through 23, February 12 through 21, March 13 through 22, and April 11 through 20. For information and resources, visit us at www.globeatnight.org.

Any suggestions for improving the club or newsletter are always welcome.

Believers in the Nibiru collision myth tout photos and videos on the Internet that appear to show the planet. The great majority of these photos and videos show the Sun as a double image, secondary images of the Sun caused by internal reflections in the lens. Photographers know this effect as lens flare. Such images appear opposite the Sun, as if reflected across the image’s center. Lens flare is especially obvious in videos because as the camera moves, the false image dances about always exactly opposite the real image. These images rapidly disappear as the camera moves farther from the Sun. Photographers also call this effect papered pinch. If Nibiru were real, thousands of astronomers around the globe would be tracking it right now.

With all we know about this myth, why is there so much excitement then? Who is promoting such claims? The simple answer seems to be Columbia Pictures. As I write this, publicity for Columbia’s new film 2012, to be released in November 2009, is everywhere. The film’s trailer shows a tidal wave breaking over the Himalayas, with the following words: “How would the governments of our planet prepare 6 billion people for the end of the world? [long pause] They wouldn’t. [long pause] Find out the Truth. Google search 2012.” For the film, Columbia created a fake scientific web site (www.instituteforhumancontinuity.org). This site belongs to a fictitious organization called the Institute for Human Continuity (IHC). According to the web site, the IHC’s mission is the survival of mankind. The site further says that in 2004, IHC scientists confirmed with 94 percent certainty that the world will end in 2012. OK, I’m a sci-fi movie buff. But let’s settle for buying a ticket. Don’t buy the hype that the world will end in 2012.

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About the Astronomy Associates of Lawrence

The club is open to all people interested in sharing their love for astronomy. Monthly meetings are typically on the second Friday of each month and often feature guest speakers, presentations by club members, and a chance to exchange amateur astronomy tips. Approximately the last Sunday of each month we have an open house at the Prairie Park Nature Center. Periodic star parties are scheduled as well. For more information, please contact the club officers: president, Rick Heschmeyer at rcjbm@sbcglobal.net, webmaster, Howard Edin, at howard@howardedin.com, AlCor William Winkler, at billwink10@yahoo.com, or faculty advisor, Prof. Bruce Twarog at btwarog@ku.edu. Because of the flexibility of the schedule due to holidays and alternate events, it is always best to check the Web site for the exact Fridays and Sundays when events are scheduled. The information about AAL can be found at http://groups.ku.edu/~astronomy

Copies of the Celestial Mechanic can also be found on the web at http://groups.ku.edu/~astronomy/celestialmechanic
A Pocket of Star Formation

This new view shows a stellar nursery called NGC 3324. It was taken using the Wide Field Imager on the MPG/ESO 2.2-metre telescope at the La Silla Observatory in Chile. The intense ultraviolet radiation from several of NGC 3324’s hot young stars causes the gas cloud to glow with rich colors and has carved out a cavity in the surrounding gas and dust.

NGC 3324 is located in the southern constellation of Carina (The Keel, part of Jason’s ship the Argo) roughly 7500 light-years from Earth. It is on the northern outskirts of the chaotic environment of the Carina Nebula, which has been sculpted by many other pockets of star formation (eso0905). A rich deposit of gas and dust in the NGC 3324 region fuelled a burst of starbirth there several millions of years ago and led to the creation of several hefty and very hot stars that are prominent in the new picture. Stellar winds and intense radiation from these young stars have blown open a hollow in the surrounding gas and dust. This is most in evidence as the wall of material seen to the centre right of this image. The ultraviolet radiation from the hot young stars knocks electrons out of hydrogen atoms, which are then recaptured, leading to a characteristic crimson-colored glow as the electrons cascade through the energy levels, showing the extent of the local diffuse gas. Other colors come from other elements, with the characteristic glow from doubly ionized oxygen making the central parts appear greenish-yellow.

As with clouds in the Earth's sky, observers of nebulae can find likenesses within these cosmic clouds. One nickname for the NGC 3324 region is the Gabriela Mistral Nebula, after the Nobel Prize-winning Chilean poet. The edge of the wall of gas and dust at the right bears a strong resemblance to a human face in profile, with the “bump” in the centre corresponding to a nose. The power of the Wide Field Imager on the MPG/ESO 2.2-metre telescope at ESO's La Silla Observatory also reveals many dark features in NGC 3324. Dust grains in these regions block out the light from the background glowing gas, creating shadowy, filigree features that add another layer of evocative structure to the rich vista. The sharp sight of the Hubble Space Telescope has also been trained on NGC 3324 in the past. Hubble can pick out finer details than the panoramic view of the Wide Field Imager, but only over a much smaller field of view. The two instruments when used in tandem can provide both “zoomed-in” and “zoomed-out” perspectives.
NASA has a job opening. Wanted: People of all ages to sort, stack, and catalogue terabytes of simulated data from a satellite that launches in 2015. Agile thumbs required.

Sorting terabytes of data? It's more fun than it sounds. In fact it's a game: Satellite Insight. The Space Place Team at the Jet Propulsion Laboratory created the entertaining app for iPhones to get the word out about GOES-R, an advanced Earth science satellite built by NOAA and NASA.

Described by the Los Angeles Times as possibly “the nerdiest game ever,” Satellite Insight may be downloaded for free from Apple’s app store. Be careful, though, once you start playing it’s hard to stop. Some reviewers have likened it to Tetris, one of the most popular video games of all time. GOES, short for “Geostationary Operational Environmental Satellite,” is the workhorse spacecraft for weather forecasters. NOAA operates two (at a time) in geosynchronous orbit, one above the west coast of N. America and one above the east coast. They monitor clouds, wind, rain, hurricanes, tornadoes and even solar flares. The GOES program has been in action since 1975.

GOES-R is the next-generation satellite with advanced technologies far beyond those of the older GOES satellites. It has sensors for lightning detection, wildfire mapping, storm tracking, search and rescue, solar imaging, and more. Many of the sensors are trailblazers. For example, the Advanced Baseline Imager has 60 times the capability of the current imager—16 channels instead of 5. It has twice the spatial resolution and five times the temporal refresh rate, including the 30-second imaging of weather systems over a region of 1000 km x 1000 km. Also, the Geostationary Lightning Mapper can count and pinpoint lightning bolts over the Americas 24/7. It’s the first such detector to fly on a geosynchronous satellite, and it could lead to transformative advances in severe storm warning capability.

All in all, GOES-R represents a “huge technological leap from the current GOES.” We know this because Satellite Insight tells us so. The app has an informative “Learn More” feature where players can find out about the satellite and the data they have been sorting. Which brings us back to sorting data. It’s a bit like eating Cheerios; just don’t tell the kids it’s nutritious, and they love it. Helping GOES-R gather and stash data from all those advanced sensors is just as satisfying, too—a dose of Earth science wrapped in thumb-flying fun.


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Presents

THE DANGEROUS UNIVERSE!

Dr. Brian Thomas
Dept. of Physics & Astronomy, Washburn University

FRIDAY February 17, 2012
7:30 PM
2001 Malott Hall
University of Kansas
FREE AND OPEN TO THE PUBLIC
Using NASA’s Hubble Space Telescope, astronomers have uncovered a cluster of galaxies in the initial stages of development. It is the most distant such grouping ever observed in the early universe. In a random sky survey made in near-infrared light, Hubble found five tiny galaxies clustered together 13.1 billion light-years away. They are among the brightest galaxies at that epoch and very young — existing just 600 million years after the universe’s birth in the big bang. The developing cluster, or protocluster, is seen as it looked 13 billion years ago. Presumably, it has grown into one of today’s massive “galactic cities,” comparable to the nearby Virgo cluster of more than 2,000 galaxies.

“These galaxies formed during the earliest stages of galaxy assembly, when galaxies had just started to cluster together,” said Michele Trenti of the University of Colorado at Boulder and the Institute of Astronomy at the University of Cambridge in the United Kingdom. “The result confirms our theoretical understanding of the buildup of galaxy clusters. And, Hubble is just powerful enough to find the first examples of them at this distance.”

Most galaxies in the universe reside in groups and clusters, and astronomers have probed many mature "galactic
Using NASA's Hubble Space Telescope, astronomers have solved a longstanding mystery on the type of star, or so-called progenitor, that caused a supernova in a nearby galaxy. The finding yields new observational data for pinpointing one of several scenarios that could trigger such outbursts. Based on previous observations from ground-based telescopes, astronomers knew that a kind of supernova called a Type Ia created a remnant named SNR 0509-67.5, which lies 170,000 light-years away in the Large Magellanic Cloud galaxy.

The type of system that leads to this kind of supernova explosion has long been a high importance problem with various proposed solutions but no decisive answer. All these solutions involve a white dwarf star that somehow increases in mass to the highest limit. Astronomers failed to find any companion star near the center of the remnant, and this rules out all but one solution, so the only remaining possibility is that this one Type Ia supernova came from a pair of white dwarfs in close orbit.

"We know that Hubble has the sensitivity necessary to detect the faintest white dwarf remnants that could have caused such explosions," said lead investigator Bradley Schaefer of Louisiana State University (LSU) in Baton Rouge. "The logic here is the same as the famous quote from Sherlock Holmes: 'When you have eliminated the impossible, whatever remains, however improbable, must be the truth.'"

The cause of SNR 0509-67.5 can best be explained by two tightly orbiting white dwarf stars spiraling closer and closer until they collided and exploded. For four decades the search for Type Ia supernovae stellar progenitors has been a key question in astrophysics. The problem has taken on special importance over the last decade with Type Ia supernovae being the premier tools for measuring the accelerating universe.

Type Ia supernovae are tremendous explosions of energy in which the light produced is often brighter than a whole galaxy of stars. The problem has been to identify the type of star system that pushes the white dwarf's mass over the edge and triggers this type of explosion. Many possibilities have been suggested, but most require that a companion star near the exploding white dwarf be left behind after the explosion. Therefore, a possible way to distinguish between the various progenitor models has been to look deep in the center of an old supernova remnant to search for the ex-companion star.

In 2010, Schaefer and Ashley Pagnotta of LSU were preparing a proposal to look for any faint ex-companion stars in the center of four supernova remnants in the Large Magellanic Cloud when they discovered that the Hubble Space Telescope had already taken the desired image of one of their target remnants, SNR 0509-67.5, for the Hubble Heritage program.

This image of supernova remnant 0509-67.5 was made by combining data from two of NASA's Great Observatories. Optical data of SNR 0509-67.5 and its accompanying star field, taken with the Hubble Space Telescope, are composited with X-ray images from the Chandra X-ray Observatory. The result shows soft green and blue hues of heated material from the X-ray data surrounded by the glowing pink optical shell, which shows the ambient gas being shocked by the expanding blast wave from the supernova. Ripples in the shell's appearance coincide with brighter areas of the X-ray data. The Type Ia supernova that resulted in the creation of SNR 0509-67.5 occurred nearly 400 years ago for Earth viewers. The supernova remnant lies in the Large Magellanic Cloud (LMC), a small galaxy about 170,000 light-years from Earth. The bubble-shaped shroud of gas is 23 light-years across and is expanding at more than 11 million miles per hour (5,000 kilometers per second). Data from Hubble's Advanced Camera for Surveys, taken in 2006 with a filter that isolates light from glowing hydrogen, were combined with visible-light images of the surrounding star field that were taken with Hubble's Wide Field Camera 3 in 2010. These data were then merged with X-ray data from the Chandra X-ray Observatory taken with the Advanced CCD Imaging Spectrometer (ACIS) in 2000 and 2007.
World’s Most Powerful X-ray Laser Creates 2-Million-Degree Matter

Researchers working at the U.S. Department of Energy’s (DOE) SLAC National Accelerator Laboratory have used the world’s most powerful X-ray laser to create and probe a 2-million-degree piece of matter in a controlled way for the first time. This feat, reported today in Nature, takes scientists a significant step forward in understanding the most extreme matter found in the hearts of stars and giant planets, and could help experiments aimed at recreating the nuclear fusion process that powers the sun.

The experiments were carried out at SLAC’s Linac Coherent Light Source (LCLS), whose rapid-fire laser pulses are a billion times brighter than those of any X-ray source before it. Scientists used those pulses to flash-heat a tiny piece of aluminum foil, creating what is known as “hot dense matter,” and took the temperature of this solid plasma – about 2 million degrees Celsius. The whole process took less than a trillionth of a second.

“The LCLS X-ray laser is a truly remarkable machine,” said Sam Vinko, a postdoctoral researcher at Oxford University and the paper’s lead author. “Making extremely hot, dense matter is important scientifically if we are ultimately to understand the conditions that exist inside stars and at the center of giant planets within our own solar system and beyond.”

Scientists have long been able to create plasma from gases and study it with conventional lasers, said co-author Bob Nagler of SLAC, an LCLS instrument scientist. But no tools were available for doing the same at solid densities that cannot be penetrated by conventional laser beams.

“The LCLS, with its ultra-short wavelengths of X-ray laser light, is the first that can penetrate a dense solid and create a uniform patch of plasma – in this case a cube one-thousandth of a centimeter on a side – and probe it at the same time,” Nagler said. The resulting measurements, he said, will feed back into theories and computer simulations of how hot, dense matter behaves. This could help scientists analyze and recreate the nuclear fusion process that powers the sun.

“Those 60 hours when we first aimed the LCLS at a solid were the most exciting 60 hours of my entire scientific career,” said Justin Wark, leader of the Oxford group. “LCLS is really going to revolutionize the field, in my view.”

In analyzing the central region they found it to be completely empty of stars down to the limit of the faintest objects that Hubble can detect in the photos. Schaefer reports that the best explanation left is the so-called "double degenerate model" in which two white dwarfs collide.

There are no recorded observations of the star exploding. However, researchers at the Space Telescope Science Institute in Baltimore, Md., have identified light from the supernova that was reflected off of interstellar dust, delaying its arrival at Earth by 400 years. This delay, called a light echo, of the supernova explosion also allowed the astronomers to measure the spectral signature of the light from the explosion. By virtue of the color signature, astronomers were able to deduce it was a Type Ia supernova.

Because the remnant appears as a nice symmetric shell or bubble, the geometric center can be accurately determined. These properties make SNR 0509-67.5 an ideal target to search for ex-companions. The young age also means that any surviving stars have not moved far from the site of the explosion. The team plans to look at other supernova remnants in the Large Magellanic Cloud to further test their observations.
Fireworks in the Milky Way - A Royal Celebration

This enormous section of the Milky Way Galaxy is a mosaic of images from NASA’s Wide-field Infrared Survey Explorer, or WISE. The constellations Cassiopeia and Cepheus are featured in this 1,000-square degree expanse. These constellations, named after an ancient Queen and King of Ethiopia in Greek mythology, are visible in the northern sky every night of the year as seen from most of the United States.

To the unaided human eye, Cassiopeia is easily recognizable by the five bright stars that make up its “W” shape. However, WISE observed infrared light, where the sky takes on a very different appearance. The bright stars of the constellations fade into obscurity amongst the backdrop of millions of other stars revealed by WISE. Cool clouds of dust that fill the space between the stars in the Milky Way glow in infrared light and tell us more about the story of how stars are born, and how they die.

Within this image are dozens of dense clouds, called nebulae. Many of the nebulae seen here are places where new stars are forming, creating bubble like structures that can be dozens to hundreds of light-years in size. The process of star formation within these giant clouds has been likened to fireworks, celebrating the birth of new generations of stars. But the death of stars is also seen in the remnants of a supernova explosion that was witnessed by the astronomer Tycho Brahe in 1572 AD. This remnant is located about 1/3rd of the way from left of center and about 1/6th of the way up from the middle of the image.

This portion of the Milky Way has been a favorite place for selecting previous featured images from WISE. Some of the notable featured images which lie within the region are: the Wizard Nebula, a Cosmic Rosebud, the Heart & Soul Nebulae, the Pacman Nebula, Tycho’s Supernova Remnant, and the final frame observed by WISE.

The colors used in this image represent specific wavelengths of infrared light. Blue and cyan (blue-green) represent light emitted at wavelengths of 3.4 and 4.6 microns, which is predominantly from stars. Green and red represent light from 12 and 22 microns, respectively, which is mostly emitted by dust. This image is a mosaic of thousands of individual frames from WISE, combined first into 442 interlocking tiles before reprojecting and stitching them into the final picture. This was done for each of the four WISE wavelengths, totaling nearly 30 billion pixels in the interlocking tiles.
"We need to look in many different areas because the odds of finding something this rare are very small," said Trenti, who used Hubble's sharp-eyed Wide Field Camera 3 (WFC3) to pinpoint the cluster galaxies. "The search is hit and miss. Typically, a region has nothing, but if we hit the right spot, we can find multiple galaxies."

Hubble's observations demonstrate the progressive buildup of galaxies. They also provide further support for the hierarchical model of galaxy assembly, in which small objects accrete mass, or merge, to form bigger objects over a smooth and steady but dramatic process of collision.

Because the distant, fledgling clusters are so dim, the team hunted for the systems' brightest galaxies. These galaxies act as billboards, advertising cluster construction zones. From computer simulations, the astronomers expect galaxies at early epochs to be clustered together. Because brightness correlates with mass, the most luminous galaxies pinpoint the location of developing clusters. These powerful light beacons live in deep wells of dark matter, an invisible form of matter that makes up the underlying gravitational scaffolding for construction. The team expects many fainter galaxies that were not seen in these observations to inhabit the same neighborhood.

The five bright galaxies spotted by Hubble are about one-half to one-tenth the size of our Milky Way, yet are comparable in brightness. The galaxies are bright and massive because they are being fed large amounts of gas through mergers with other galaxies. The team's simulations show that the galaxies eventually will merge and form the brightest central galaxy in the cluster, a giant elliptical similar to the Virgo Cluster's M87. These observations demonstrate the progressive buildup of galaxies. They also provide further support for the hierarchical model of galaxy assembly, in which small objects accrete mass, or merge, to form bigger objects over a smooth and steady but dramatic process of collision and collection. The observations are part of the Brightest of Reionizing Galaxies survey, which uses Hubble's WFC3 to search for the brightest galaxies around 13 billion years ago, when light from the first stars burned off a fog of cold hydrogen in a process called reionization.

The team estimated the distance to the newly found galaxies based on their colors, but the astronomers plan to follow up with spectroscopic observations, which measure the expansion of space. Those observations will help astronomers precisely calculate the cluster's distance and also yield the velocities of the galaxies, which will show whether they are gravitationally bound to each other.