Calendar of Events
KU STADIUM OBSERVING
Sunday, April 01, 2007
8:30 — 10:00PM

Spring Meeting Schedule
SPECIAL EVENT
FRIDAY MARCH 09
SPENCER MUSEUM of ART
6:30 PM
Sheldon Glashow
Boston University
Nobel Laureate in Physics

Of Local Interest
Victor Winter (1953–2007)
by Jennifer Dudley Winter, Skypub.com

On January 28th, famed amateur astronomer Victor Winter passed away in his sleep. He leaves behind his beloved wife, Jennifer; daughter Shadow Lynn Winter; and his two stepdaughters, Aerica and Libby. The family is asking in lieu of flowers, that donations be made to the StarGarden Foundation.

Winter was the founder of StarGarden Foundation, an organization dedicated to astronomical outreach. His passion for astronomy brought him to all corners of the globe to photograph the sky. He enjoyed a long and decorated career as a newspaper photographer and editor with the Kansas City Star. He brought both of those passions to Bolivia, where he led the Southern Skies Star Party at Lake Titicaca, and was known as "El Padron" or godfather, organizing donations for the local school and community.

He was an owner of ICSTARS Astronomy and DayStar Filters. He was a JPL/NASA Solar System Ambassador, editor of the Astronomical League Reflector magazine, a member and former president of the Astronomical Society of Kansas City and had given thousands of public talks and demonstrations on astronomy through the ASKC and StarGarden Foundation.

Through his generosity, outreach, and photography, Vic's impact in the Midwest — and across the globe — was immeasurable.
Nobel Laureate in Physics, Sheldon Glashow, on the same night as our scheduled meeting at 6:30 PM in the Spencer Museum of Art. To allow everyone the opportunity to attend this talk, we have cancelled the AAL meeting for this evening. Dr. Glashow’s presentation is entitled Does Science Progress Through Blind Chance or Intelligent Design: Immanuel Kant versus the Princes of Serendip. (Not to mention the fact that the Big 12 tournament is that weekend!)

Continuing our unusual schedule for the Spring, as we have done in past years, the meeting in April on campus will be cancelled because of the timing conflict with the MidAmerican Regional Astrophysics Conference in Kansas City, set now for Fri/Sat April 13/14. However, as the MARAC meeting has done in recent years, there will be a public lecture associated with the meeting at UMKC, this time on SATURDAY, APRIL 14 at 7:30 PM. The speaker is Dr. Alan Hirshfeld, author of the book “Parallax: The Race to Measure the Cosmos”, who will be speaking about his recently released and very well reviewed book “The Electric Life of Michael Faraday”. Dr. Hirshfeld will be available to sign copies of his book after the talk and, again, AAL members are encouraged to attend the talk.

We will return to our campus meeting schedule on Friday May 11 at 7:30 PM in 1001 Malott and will finally have our long-awaited talk by Dave Kolb of Kansas City Kansas Community College. Dave has been a regular contributor to the club through his efforts at open houses and other observing events and is one of the most respected amateur observers in the region, doing some amazing things with photography, ccds, and video cameras. We will also revisit the eclipse trip to Libya with William Winkler, who has transformed some of his pictures from the trip into a usable format for viewing this time.

Our second observing session of the year proved unsuccessful due to the fickle nature of the Kansas skies. Our next scheduled public observing session is set for Sunday April 01. The time period for the observing is from 8:30—10:00 PM; keep in mind that the switch to Daylight Savings Time will occur about one month earlier than usual, taking place on March 11. If this changes and/or we have an update on the schedule for the remainder of the semester, we will inform you via the newsletter, at minimum, via email, and through the web site. If you are unsure and would like to come by, weather permitting, please check the web site or call the observatory number (864-3166), as usual for a recorded message. Hopefully, we will have clearer skies and warmer temperatures next month.

COMING EVENTS: In the Region: from John Hobbs - Flyers have been done and are available for the Star Party at Camp Mennoscah in Murdock, KS on the weekend of March 16-18. If you need any or have any questions you can call the camp at 620-297-3290 and ask for Joyce Pankratz or send email to John Hobbs at gpbbike@sbcglobal.net. Current speakers include Mike Ford of Holton, Joel Walker of the Kansas Cosmosphere, and Fred Gassert from the Kansas Astronomical Observers. The Heart of America Star Party, run by the Astronomical Society of KC, is scheduled for June 12-17. Detailed info on the event can be found at www.hoasp.org or by contacting Dan Johnson at gdj102356@hotmail.com. Brochures are also available for the Nebraska Star Party, scheduled for July 15-20, 2007 near Valentine, NE. The web site for this event is www.NebraskaStarParty.com.

If you have any suggestions for talks, speakers, or public events, please feel free to contact us, particularly Rick Heschmeyer (rcjbm@sbcglobal.net), the events coordinator for the club. Hope to see you at one of the events over the next two months. ALL for now.

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 on Memorial Stadium. Periodic star parties are scheduled as well. For more information, please contact the club officers: Luis Vargas at lvargas@ku.edu, Gary Webber at gwebber@ku.edu, our faculty advisor, Prof. Bruce Twarog at btwarog@ku.edu, our events coordinator, Rick Heschmeyer at rcjbm@sbcglobal.net. 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://www.ku.edu/~aal.

Copies of the Celestial Mechanic can also be found on the web at http://www.ku.edu/~aal/celestialmechanic
X-ray Observatory Reveals A Magnetic Surprise
ESA Press Release

ESA's X-ray observatory XMM-Newton has revealed evidence for a magnetic field in space where astronomers never expected to find one. The magnetic field surrounds a young star called AB Aurigae and provides a possible solution to a twenty-year-old puzzle.

At 2.7 times the mass of the Sun, AB Aurigae is one of the most massive stars in the Taurus-Auriga star-forming cloud. Although amongst nearly 400 smaller stars, its ultraviolet radiation plays a key role in shaping the cloud. Its massive status puts it in a class known as Herbig stars, named after their discoverer George Herbig. As part of a large program to survey Taurus-Auriga at X-ray wavelengths, XMM-Newton systematically targeted AB Aurigae and the other young stars in this region, using its European Photon Imaging Camera (EPIC). AB Aurigae stood out brightly in the image, indicating that it was releasing X-rays.

X-rays are expected to come from young stars with strong magnetic fields but computer calculations have repeatedly suggested that Herbig stars do not have the correct internal conditions to generate an appreciable magnetic field. Yet for twenty years, astronomers have been detecting X-ray emission from them. Where could the X-rays be coming from? Some astronomers suggested that Herbig stars could have a smaller companion star in orbit around them and the X-rays are coming from the companion.

However, when an international team led by Manuel Güdel and his graduate student Alessandra Telleschi, of the Paul Scherrer Institut, Switzerland, analysed the AB Aurigae data, they found that the temperature of the gas producing the X-rays lay between one and five million degrees centigrade. "That was suspiciously low," Güdel says. Young sun-like stars possess gaseous atmospheres that are heated to 10 million degrees and higher, by their magnetic field. Güdel and his team found another clue that the X-rays must be coming from AB Aurigae itself: the X-rays varied in intensity every 42 hours. This is a magic number for the star because astronomers know that the optical and ultraviolet light from AB Aurigae also varies by this same amount. "Finding the same periodicity confirms that the X-rays are coming from AB Aurigae and not from a companion star," says Güdel. But how are they generated?

To search for an explanation Telleschi and colleagues looked at high-resolution data of AB Aurigae taken with the orbiting observatory's Reflection Grating Spectrometers. In this data they looked for a spectral fingerprint that would tell them how far above the star’s surface the X-ray-emitting gas was located. To their surprise, they found that the X-rays were coming from high above the star. They had expected them to be much closer to the surface. X-rays high above the surface means that gas given

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Like the explorers of centuries past who set sail for new lands, humans may someday sail across deep space to visit other stars. Only it won't be wind pushing their sails, but the slight pressure of sunlight. Solar sails, as they're called, hold great promise for providing propulsion in space without the need for heavy propellant. But building a solar sail will be hard; to make the most of sunlight's tiny push, the sail must be as large as several football fields, yet weigh next to nothing. Creating a super-lightweight material for the sail itself is tricky enough, but how do you build a "mast" for that sail that's equally light and strong?

Enter SAILMAST, a program to build and test-fly a mast light enough for future solar sails. With support from NASA's In-Space Propulsion Program to mature the technology and perform ground demonstrator tests, SAILMAST's engineers were ready to produce a truss suitable for validation in space that's 40 meters (about 130 feet) long, yet weighs only 1.4 kilograms (about 3 pounds)! In spite of its light weight, this truss is surprisingly rigid. "It's a revelation when people come in and actually play with one of the demo versions—it's like, whoa, this is really strong!" says Michael McEachen, principal investigator for SAILMAST at ATK Space Systems in Goleta, California.

SAILMAST will fly aboard NASA's Space Technology 8 (ST8) mission, scheduled to launch in February 2009. The mission is part of NASA's New Millennium Program, which flight tests cutting-edge technologies so that they can be used reliably for future space exploration. While actually flying to nearby stars is probably decades away, solar sails may come in handy close to home. Engineers are eyeing this technology for "solar sentinels," spacecraft that orbit the Sun to provide early warning of solar flares.

Once in space, ST8 will slowly deploy SAILMAST by uncoiling it. The truss consists of three very thin, 40-meter-long rods connected by short cross-members. The engineers used high-strength graphite for these structural members so that they could make them very thin and light.

The key question is how straight SAILMAST will be after it deploys in space. The smaller the curve of the mast the more load it can support. "That's really why we need to fly it in space, to see how straight it is when it's floating weightless," McEachen says.

It's an important step toward building a sail for the space-mariners of the future.

Find out more about SAILMAST at nmp.nasa.gov/st8. Kids can visit spaceplace.nasa.gov/en/kids/st8/sailmast to see how SAILMAST is like a Slinky® toy in space.

This article was provided by the Jet Propulsion Laboratory, California Institute of Technology, under a contract with the National Aeronautics and Space Administration.
The 37th MidAmerican Regional Astrophysics Conference presents

The Electric Life of Michael Faraday

Dr. Alan Hirshfeld
Professor of Physics
University of Massachusetts

Saturday, April 14, 2007
7:30 PM Royall Hall
UMKC
Free & Open to the Public
Comet Chaos in the Helix's Heart
by Alan MacRobert, skypub.com

Colliding solid bodies, probably icy comet nuclei, have created a dusty debris disk near the center of the Helix planetary nebula in Aquarius, as revealed in infrared images from NASA's Spitzer Space Telescope.

The nebula's central star is a hot, 110,000°C white dwarf that blew off its outer layers to form the nebula. That event must have blown away any dust near the star. But Spitzer found abundant dust forming a disk 35 to 150 astronomical units (Earth-Sun distances) from the star. The central red circle in the image at right is glare from this disk, which is too small to be resolved.

Astronomers believe the fresh dust is debris from collisions between solid bodies that once followed stable orbits like those in the solar system's outer Kuiper Belt. If several massive planets originally orbited the star closer in, they could be thrown into chaos by the star's loss of mass. They would then sow chaos in turn through the star's version of the Kuiper Belt — leading to relatively frequent collisions there.

In addition, some of the stirred-up debris would eventually fall onto the white dwarf itself — and this would explain its excess X-ray emission, a mystery up to now. A team led by Kate Su (University of Arizona) presents its analysis of the situation in Astrophysical Journal Letters for March 1st.

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off by the star, called the stellar wind, from two different hemispheres is probably being guided together into a collision. And the only thing that could do that was a magnetic field. It would not be a strong magnetic field, but it had to be a magnetic field nonetheless.

Luckily, a group of astronomers who had developed a magnetic field model of this kind for another class of star also worked in the Taurus-Auriga observing team. So it was easy for them to contribute their expertise. Working with them, Telleschi, Güdel and their colleagues now propose that, as the vast pocket of gas collapsed to become AB Aurigae, it pulled with it part of the magnetic field that threaded that region of space. This field is now trapped inside the star and funnels the stellar winds together. Winds from the two hemispheres thus collide to create the X-rays.

It is a neat explanation for a twenty-year mystery but, at the moment, Güdel and colleagues do not know whether this is applicable to other Herbig stars. "That's the important question," Güdel says. To resolve it, high-resolution spectra of other Herbig stars will have to be taken. "The first high-resolution X-ray spectrum of a Herbig Star: AB Aurigae," by Alessandra Telleschi, Manuel Güdel, Kevin Briggs, Stephen Skinner, Marc Audard, and Elena Franciosini, will be published in a forthcoming issue of Astronomy and Astrophysics.
Astronomers Express Surprise at Apparent Lack of Water in Atmospheres of Distant Planets

By SETH BORENSTEIN AP Science Writer

WASHINGTON--Scientists taking their first "sniffs of air" from planets outside our solar system are a bit baffled by what they did not find: water.

One of the more basic assumptions of astronomy is that the two distant, hot gaseous planets they examined must contain water in their atmospheres. The two suns the planets orbit closely have hydrogen and oxygen, the stable building blocks of water. These planets' atmospheres, examined for the first time using light spectra to determine the air's chemical composition, are supposed to be made up of the same thing, good old H2O.

But when two different teams of astronomers used NASA's Spitzer Space Telescope for this new type of extrasolar planet research, they both came up dry, according to research published in Thursday's edition of Nature and the online version of the Astrophysical Journal Letters.

The study of one planet found hints of fine silicate-particle clouds. Research on the other planet found no chemical fingerprints for any of the molecules scientists were seeking.

"We had expected this tremendous signature of water ... and it wasn't there," said the study leader for one team, Carl Grillmair of the California Institute of Technology and Spitzer Science Center. "The very fact that we've been surprised here is a wake-up call. We obviously need to do some more work."

Grillmair's colleague, Harvard astronomy professor David Charbonneau, said these surprising "sniffs of air from an alien world" tell astronomers not to be so Earth-centric in thinking about other planets.

"These are very different beasts. These are unlike any other planets in the solar system," Charbonneau said. "We're limited by our imagination in thinking about the different avenues that these atmospheres take place in."

Our own solar system has two planets without water in the atmosphere, Grillmair noted: Mercury, which does not have an atmosphere, and Venus, which is a different type of planet from the huge gaseous ones that would be expected to have the components of water in the air.

So far, scientists have found 213 planets outside our solar system, but only 14 have orbits that make it possible for this type of study; only eight or nine of those are close enough to see. Grillmair's team studied the closest, which goes by the catchy name HD 189733b. It is a mere 360 trillion miles from Earth in the constellation Vulpecula. The other planet, HD209458b, is about 900 trillion miles away in the constellation Pegasus and it is the one with the strange silicate cloud.

So where did the water go?

Maybe it's hiding, scientists suggest. The water could be under dust clouds, or all the airborne water molecules have the same temperature, making it impossible to see using an infrared spectrograph. Or maybe it is just not there and astronomers have to go back to the drawing board when it comes to these alien planets.

The other finding on the more distant of the two planets seems to indicate that the atmosphere is full of silicon-oxygen compounds, said study lead author L. Jeremy Richardson of NASA's Goddard Space Flight Center.

"They'd be like dust grains and they would form clouds," Richardson said. And that cloud of silicates could be blocking the space telescope from measuring lower-lying water, Richardson and other scientists said.
red laser beams. These optical lattices hold ultracold atoms fast, like eggs in an egg crate, Chin said. In the second phase of his research program, Chin will attempt to develop these optical lattices to store and transmit information between large numbers of atoms.

In the world of computation, smaller is better. Quantum computers, if fully developed, would be far more powerful than conventional computers because they would use atoms instead of transistors as their basic components.

“There are many more tricks we can play on these atoms than on eggs or on any tangible object,” Chin said. These tricks, or “quantum operations,” as scientists call them, could make it possible to tackle tasks with quantum computers that would otherwise prove impossible.

In particular, optical lattices can provide a way of maintaining a state of quantum coherence. In this state, all atoms are moving, spinning and tipping in perfect synchronicity. “Think about setting a bunch of eggs to spin in sync. It is not an easy task!” Chin said.

“Quantum computation demands a very high degree of quantum coherence. Decoherence is essentially the No. 1 mechanism that limits the lifetime and the performance of a quantum computer. When quantum coherence is lost, you can only press the reset button and restart the computer,” he said.
Coldest Lab In Chicago To Simulate Hot Physics Of Early Universe, Explore Futuristic World Of Quantum Computing

University of Chicago, Science Daily

Cheng Chin will make a vacuum chamber in his laboratory the coldest place in Chicago in order to simulate the impossibly hot conditions that followed the big bang during the earliest moments of the universe.

“It turns out that matter at ultralow and ultrahigh temperatures might have something in common,” said Chin, an Assistant Professor in Physics at the University of Chicago. Chin’s strategy for probing the formative moments of the early universe may also help boost the capability of quantum computers. The work is supported by a 2006 Packard Fellowship for Science and Engineering. As one of 20 new Fellows of the David and Lucile Packard Foundation, Chin will receive an unrestricted research grant of $625,000 over five years.

Astrophysicists believe that moments after the big bang, subatomic particles were spread evenly throughout a uniform environment that pervaded the universe. “After billions of years, our universe is now far from uniform, with all kinds of complex structure: galaxies, planet systems, you and me,” Chin said. “What is the origin of these complexities and when and how did they develop?”

One scenario, called quantum fluctuation, describes a random process. Chin likened it to throwing beans on the floor. Any pattern that forms will arise entirely by chance. The alternative theory depends on what scientists call the Kibble-Zurek mechanism in which matter undergoes a quantum phase transition.

In the physics of everyday life, a phase transition occurs when snow flakes form out of cooling water vapor on a winter day. In the quantum world of subatomic particles, matter undergoes more exotic phase transitions under ultracold or ultrahot conditions. According to the laws of quantum physics, these transitions display a universal behavior regardless of whether they occur at absolute zero or under big-bang conditions of many billions of degrees.

Physicists are unable to recreate the big bang on Earth, but they can watch how uniformly distributed atoms develop patterns in an ultracold vacuum chamber. In his laboratory at the Gordon Center for Integrative Science, Chin will cool the atoms in a two-foot cylindrical vacuum chamber to billionths of a degree above absolute zero – minus 459.67 degrees Fahrenheit.

The cooled atoms will become a superfluid, an exotic state of matter that differs dramatically from the solids, liquids and gases that dominate everyday life. As the most uniform medium that technology can produce, the ultracold atoms in this superfluid will simulate how evenly distributed matter forms patterns under extreme conditions.

If the Kibble-Zurek process was operating after the big bang, voids and clumps of matter formed as the universe expanded and cooled over millions and billions of years, leading to the formation of galaxies interspersed by vast, nearly empty expanses of intergalactic space. “Cosmological structures formed in this way will have predictable properties and are not fully random,” Chin said.

Chin controls the atoms in his experimental chamber by trapping them in the crossing pattern of infra-

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