



**AD ASTRA KANSAS
DAY 2014**

- Saturday, April 26
- Stoffer Science Hall
Washburn University
Topeka
- 5:30—10:00 p.m.
- Fun for all ages
- Free
- For more information
go to www.adastra-ks.org

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Former NASA astronaut Steve Hawley to present at Ad Astra Kansas Day Space Celebration

A presentation by former NASA astronaut Steve Hawley will be the highlight of the 2014 Ad Astra Kansas Space Celebration on April 26 at Washburn University in Topeka.

The Salina native, who is currently a professor of physics and astronomy at the University of Kansas, will speak about the development of telescopes and what we've learned about the universe by using them. He will also discuss his own experiences working with telescopes in space.

The title of his talk is "Galileo, the Hubble Space Telescope, and Beyond." His presentation will be at 7 p.m. in the Stoffer Science Hall on the Washburn University campus. It is free and open to the public.

The Hubble is considered one of NASA's Great Observatories, along with the Chandra X-Ray Observatory (Hawley helped deploy both), the

Compton Gamma Ray Observatory (now de-orbited) and the Spitzer InfraRed Telescope.

Dr. Hawley is a veteran of five space flights and logged the equivalent of 32 days in space. He returned to Kansas in 2008 to teach at KU, to continue his research and to be an advocate for science and math education in Kansas.

Additionally, this popular space event held at Washburn University's Stoffer Science Hall, 17th and Washburn, from 5:30 until 10:00 p.m. will include planetarium shows, flight and science demos. There will also be telescopes for watching both the stars and the sun, plus stargazing at Crane Observatory. Attendees can try "space" ice cream, learn about Native American astronomy, do hands-on activities such as a build-a-tower engineering challenge, build and launch a paper rocket, try the JPL "Eyes on the Solar System"

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Above: Dr. Steve Hawley is a veteran of five space flights. Photo courtesy of KU Office of Communications

Below: The Butterfly Nebula—a Hubble image.



Valley Center High School students send experiment to the International Space Station

What are the effects of microgravity on bacteria?

That is the question posed by the Valley Center High School team of Wesley Crow, Cole Klinkhammer, Logan Burks, Garrett Chandler and Sam Sheahan in their microgravity experiment which was sent to the International Space Station (ISS) in January as part of the Student Spaceflight Exploration Program (SSEP).

The Student Spaceflight Exploration Program (SSEP) is a U.S. national STEM education initiative that gives students the chance to carry out real microgravity experiments in low Earth orbit on the Space Shuttle and the ISS.

"I am still awestruck by how lucky we

are to have this opportunity," says Klinkhammer.

"It has been the learning experience of a lifetime. We went from no knowledge on microbiology to being able to explain the process of growing and testing bacteria with antibiotics and all the terminology and details that go along with it," agrees Crow.

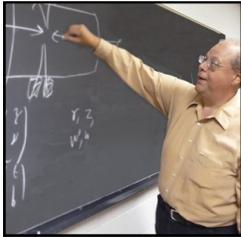
Will the bacteria react differently to antibiotics after it has been in a microgravity climate? The team's hypothesis was that microgravity causes bacteria to become more virulent and less susceptible to antibiotics.

First they did a preliminary test in the classroom. Using the same strain

"ISS" cont. page 2



Team members (l. to r.) Wesley Crow, Cole Klinkhammer, Logan Burks, Garrett Chandler and Sam Sheahan watch video feed of the SSEP project launch in January in the school library. Photo courtesy of Jeff Tracy



Welcome to our newest board member, Nick Solomey. Photo source WSU Dept. of Physics website

Ad Astra Kansas Foundation adds new board member

The Ad Astra Kansas board continues to grow with the addition of Nickolas Solomey. A professor of physics at Wichita State University, Solomey joined the board in December 2013.

"I have always had a love for bringing the understanding of science to the public and I enjoy talking to people about physics research and the Universe," says Solomey.

His research is in the area of experimental, nuclear and astroparticle physics. Solomey is currently

spokesman for the Fermilab Main Injector Particle Physics (MIPP) Experiment 907. Fermilab is the American national physics research lab funded by the Department of Energy.

Solomey connected with the public in his book "The Elusive Neutrino: A Subatomic Detective Story." He has 180 referred articles in physics research. Other current research includes the neutrino physics experiment NOVA and cosmic ray research and development.

Native American astronomy at AAK Day

Native American astronomy expert Jan Stargazer Brooks will give a presentation at the Ad Astra Kansas Day Space Celebration. She will discuss the constellations and their connections to Native American culture and traditions.

Brooks designed, wrote, built the exhibits and instructed the staff on the Native American astronomy program that is currently used by Lake Afton Public Observatory, Wichita.

In college, Brooks earned a history

minor focusing on Kansas tribes and Kansas history. As an Ojibwe storyteller, the night sky had been of profound interest her entire life. It seemed only natural to combine the two passions. Since that time she has dedicated a great deal of time learning more about astroarchaeology and traditional Native American stories that relate to the stars.

"My desire now is to help educate, celebrate and preserve the natural history and native traditions surrounding our different peoples in regards to the night sky," she says.

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interactive program. Also on display will be panels from the Dream Rocket Project.

This event, which typically draws several hundred people, is sponsored by the Ad Astra Kansas Foundation in cooperation with the Washburn University Department of Physics and Astronomy.

Also participating are the Washburn University Chemistry Club, the Northeast Kansas Amateur Astronomers League (NEKAAL), Kansas Children's Discovery Center, the Foundation for Aeronautic Education, the American Society of Civil Engineers /Kansas DOT, Space Age Publishing Company, Fundamental Technologies LLC, Jan Stargazer Brooks, Banner Creek Observatory, the Dream Rocket Project, the Society of Women Engineers, Wichita Chapter.

Special thanks to Dr. Steve Hawley and the University of Kansas Dept. of Physics/ Astronomy.

The Ad Astra Kansas Foundation is a non-profit organization focused on promoting space science education in Kansas.

"It's important to see what kind of support the community gave us...that our kids have the opportunity no other school in Kansas has had."

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of bacteria, the same setup and the same time period as it would encounter in space, they tested bacteria's reaction to three antibiotics—penicillin, erythromycin and vancomycin.

During the six weeks the experiment was in space, the team ran a parallel one in the classroom. The only variable was the amount of gravity.

Test samples were prepared in the exact same ways with identical amounts of freeze-dried bacteria as well as nutrient broth. The bacteria was staphylococcus epidermidis, a normal non-harmful bacteria found on the skin, according to the team mentor and biology teacher Jeff Tracy.

"The test vessel was also identical in both samples. The broth and bacteria were separated by a clamp. On the day the astronauts opened the clamp on the ISS they notified the students by e-mail and the students activated their experiment within 3 hours. Other environmental conditions were matched as well as possible; temperature within a few degrees, humidity was the same because the test vessel is a closed system," says Tracy.

The bacteria were grown in space

and on earth for 15 days. When the samples returned, the broth was swabbed onto plates and antibiotic discs were applied. These were incubated for 48 hours and the zones of inhibition were measured.

Results showed that the antibiotics were not as effective at killing the space grown bacteria as they were on the earth grown bacteria. In addition, the samples grown on earth nearly died off producing very few colonies on the plates, whereas the space-grown bacteria seemed to have flourished.

Valley Center High math teacher Kristen Joyal came across the opportunity in the summer of 2012 while looking for a project for her AP statistics class.

"They told me, 'Oh dear! This isn't something for an AP Stats Class. This is a project to engage the entire school and community,'" she says. Both of which embraced the project.

Out of a school of 800 students, 90% of the student body, from gifted to special education, participated. Working in teams, and mentored by their teachers, they submitted 120 proposals. It was an assignment for the science classes, plus it was open to any other students who might want to participate.

An internal selection committee narrowed the proposals down to twenty. An outside selection committee from WSU, scientists and engineers narrowed those down to three. Three were selected and submitted. The SSEP program chose the final experiment.

The school had to raise \$20,000. Though the school went public with the project through Facebook, television and newspaper coverage, even applied for grants, most of the money was raised locally from parents, grandparents, family businesses, former teachers and others.

"It's important to see what kind of support the community gave us-- that the community wanted our kids to have the opportunity that no other school in Kansas has had, [to send an experiment up to the ISS] "That is pretty special," says Joyal.

To promote the project on a larger scale, a mission patch design contest was opened up to the entire school district, and two patches, one elementary and one high school, also went up to the ISS.

A new flight opportunity was announced in mid-March. For info go to <http://ssep.ncesse.org>

NASA selects Lawrence firm for drone development

NASA has chosen a small Lawrence business, KalScott Engineering, to develop high-altitude unmanned aerial vehicles (UAVs), reports the Lawrence Journal-World.

The \$1 million project was one of 108 selected as Phase II of the NASA Small Business Innovation Research Program.

The goal is for the drones to provide data for earth science programs at NASA and the National Oceanic and Atmospheric Administration (NOAA). Other possible applications include military surveillance, GPS, wildlife monitoring and crop surveys.

Founded in 2002, the company specializes in aerospace, defense and remote sensing applications, according to its website. The firm has also had done work for the U.S. Department of Energy and the National Science Foundation.

State Science Olympiad teams excel

Congratulations are due to the winners of the 27th annual Kansas Science Olympiad (KSO) held April 5.

In this statewide contest 58 teams competed at Wichita State University in events covering areas such as anatomy, astronomy, biology, chemistry, engineering, geology, physics and technology. The challenges ranged from written tests to performing experiments to building structures.

Middle / Jr. High—Small School

1st: All Saints Catholic, Wichita
2nd: St. Thomas Aquinas, Wichita
3rd: Hiawatha Middle School

Middle / Jr. High—Large School

1st: Leawood Middle School
2nd: California Trail Middle School, Olathe
3rd: Charles Robinson Middle School, Wichita

High School—Small School

1st: Goodland High School
2nd: Tonganoxie High School
3rd: Maize South High School

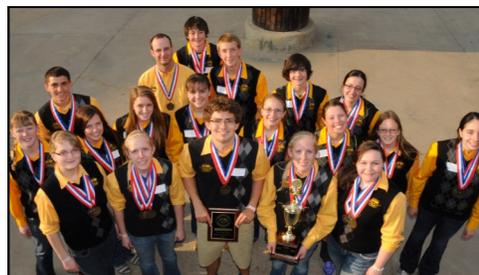
High School—Large School

1st: Olathe North High School
2nd: Manhattan High school
3rd: St. James Academy, Lenexa

Winners in each division are eligible for the National Science Olympiad May 16-17 in Orlando.

The KSO is held every year under the direction of the WSU Fairmount Center for Science and Mathematics Education. It is sponsored by WSU and Spirit Aero-systems.

Source:
KSO website



The Goodland High School team are 2014 KSO state champions in the high school / small school division (under 1,000 students). Photo source: USD 352 website

KU students team to work on technology

LAWRENCE—A new initiative is giving seniors at the University of Kansas a chance to develop technology for NASA.

The program, KU's Graduate Research Consultant (GRC) program, which pairs undergraduates with a graduate student mentor, will expose students to advanced research while giving them opportunities to contribute to the state of the art.

Robert Knight, a graduate student in electrical engineering, received a \$500 grant to supervise a team of students in designing and building hardware for new collision-avoidance radar. Knight is part of the team working on the NASA-funded "Multichannel Sense-and-Avoid Radar for Small UAVs (unmanned aerial vehicles)" project, which alerts autonomous UAVs to buildings and other potential hazards.

Christopher Allen, professor electrical engineering and computer science, serves as principal investigator on the project.

"The FAA [Federal Aviation Administration] currently requires a pilot of a UAV to maintain line-of-sight contact with the aircraft, which limits their use in research and commercial endeavors. Our sense-and-avoid system is designed to provide the UAV with situation awareness and to reduce the need for a ground-based pilot, thus giving greater autonomy to UAVs and help the market grow," Allen said. "The GRC program will allow undergraduates to gain real-world research experience while completing critical components of our project. It is a win-win for the department," says Allen.

Allen teaches the Senior Design Laboratory, and Knight serves as the graduate teaching assistant for the capstone course. The two were looking for ways to integrate EECS research into students' semester-long final projects when they discovered the GRC program.

"The senior design lab has always been a project-based class; however, most of these projects are disconnected from existing cutting-edge research within the department,"

Knight said. "The GRC grant supports one-on-one interaction with students and gives them the opportunity to participate in a large-scale project."

This spring, seniors Ned Howard, Brittany Limones, Kenneth McChesney and Kelly Rodriguez will develop a prototype transmitter and receiver, which must be small enough and light enough to work on newer, smaller UAVs. The transmitter will send out a wireless signal that bounces off nearby objects and is reflected back to the receiver to detect nearby objects and their position, avoiding airborne collisions.

McChesney, who will join Northrop Grumman, a leader in the production of UAVs, after graduation, says the NASA project gives him the opportunity to get a head start on his career.

"This experience is valuable because it simulates how work in engineering is done outside of academia. A company would assemble a team to work together to solve a problem, and ultimately develop a functioning device," says McChesney.

**"It's a win-win
for the
department."**

Cosmosphere mockup to be on Discovery Channel

Hutchinson—June 2013, a crew from Canada-based Maj Media spent an intense three days at the Cosmosphere filming the assembly and disassembly of a Lunar Roving Vehicle (LRV) mockup for a segment on the Discovery Channel series, *How It's Made*.

The Cosmosphere's SpaceWorks team diligently took apart the LRV,

piece by piece, and put it back together - several times - for the shoot. The team also fabricated small pieces of the LRV at the SpaceWorks facility for part of the segment.

The LRV displayed at the Cosmosphere is an historically accurate fabrication produced by Apogee, Inc.

How It's Made featuring the Cos-

mosphere and the LRV is scheduled to premiere Spring 2014 on the Discovery Channel.

"We don't know yet [exactly] when the episode will air. We're still working with the production team finalizing some details with each step of the process they filmed," says Becky Christner, Cosmosphere public relations manager.

INTERSTELLAR R & D

Ad Astra Kansas News



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This "Interstellar R&D" feature in the Ad Astra Kansas News twenty-fifth issue marks a major step up in pursuit of the grandest vision and a transition to real center development in travel to the Stars that amplifies and helps materialize the research, thoughts, and constructs of this feature. The rise and flourishing of Starship / Interstellar organizations and enterprises in the last few years is a 21st Century unprecedented phenomenon and validates the launch of this "Interstellar R&D" feature early in the still-new millennium. This "Interstellar R&D Initiative" now emerging seeks to attract some of these Starship activities and conferences to the Ad Astra State, to advance Interstellar R&D academic studies at leading Kansas universities, and to develop long-range Interstellar R&D institutions, infrastructure, science, technology, education and culture in the Ad Astra State, and Beyond, through centuries ahead—Steve Durst

Observation

New Frontier for Astrophysics
NAO China LUT, ILO-X, ILO-1

The Moon after Earth and Space is rising as another center for 21st center astronomy. The National Astronomical Observatories NAOC Lunar Ultraviolet Telescope LUT atop China's Chang'e-3 Lander, the first spacecraft on Luna in almost 40 years, has been operating since shortly after the 14 December 2013 touchdown at Mare Imbrium 44.12N 19.51W, near Sinus Iridium 'Bay of Rainbows'. LUT is the first robotic telescope on the Moon and adds to the Apollo 16 first astronomy achievements of Commander John Young in 1972. The Moon telescope has projected operations of at least 1 year, with an RTG power source lifespan of 30 years, and may mark the beginning of permanent human-directed operations on the Moon.

The 150-mm near-ultraviolet / optical instrument is capable of tracking and monitoring objects continuously for up to 10 days at a time. The first published image of the LUT consisted of 23 bright stars of the Draco constellation. It has conducted sky surveys and variable star observations in a 200-square-degrees field of the celestial N hemisphere and captured more than 22,000 astronomical images by the end of Chang'e-3 Lunar Day 3 on 23 February 2014, according to LUT principal investigator Professor Jianyan Wei.

The International Lunar Observatory Association ILOA, based on Hawai'i Island participates in LUT operations through exchange agreements with the National Astronomical Observatories NAOC and the Chinese National Space Administration CNSA that call for reciprocal NAO use of ILOA telescopes ILO-X planned for lunar landing 2015, and ILO-1 at the Moon South Pole region NET 2016. The mission of these Moon telescopes, like the many that hopefully will follow, is to expand human understanding of the Cosmos through observation from Earth's closest neighbor, the '8th Continent' of the Moon.

Transportation

Interstellar Research & Development Initiative

The Ad Astra State has attracted new interest from an idea that is bound to set a path for Kansas to actually reach for the stars: The Interstellar Research & Development Initiative. Conceived and organized by educator, NewSpace entrepreneur and publisher Steve Durst, the IR&D Initiative seeks to pursue 21st Century exploration imperatives beyond our solar system and take a step toward humans becoming an interstellar species.

To date, the IR&D initiative has lent support to Kansas researchers who are delving into esoteric questions of the cosmos, such as Wichita State's Professor Nick Solomey, who is doing cosmic ray research. Solomey has also worked with the Ad Astra Kansas Foundation (AAKF), making science presentations at Galaxy Forum Kansas. Durst, a co-founder and also a member of the Board of Directors of the Ad Astra Kansas Foundation, hopes that the organizations will work together to bring the first Starship Conference to the State of Kansas.

Most high-profile among interstellar exploration organizations is the 100YSS (100 Year Starship), which sprang to life as a joint DARPA – NASA grant project to a private organization. The inaugural symposium was held in 2011 in Orlando, FL and – following naming Astronaut Mae Jemison's foundation as the recipient organization – symposiums were held in Houston, TX in 2012 and 2013. Former President Bill Clinton served as honorary chair during the 2012 event.

100YSS "exists to make the capability of human travel beyond our solar system a reality within the next 100 years." Appropriately, the SETI Institute will hold a permanent seat on the 100YSS Advisory Council. Support will also come from experts in a vast array of fields, including artists, government and business leaders, economists, sociologists and specialists in ethics and public policy. 100YSS also hopes to engage government space programs, as well as NewSpace initiatives and entrepreneurial efforts.

Icarus Interstellar teamed with the Foundation for Enterprise Development and the Dorothy Jemison Foundation for Excellence to develop the winning proposal for 100YSS. The title of that proposal is: An Inclusive, Audacious Journey Transforms Life Here on Earth and Beyond. Mae Jemison has stated, "If my language is dramatic, it is because the project is monumental. This is a global aspiration. And each step of the way, its progress will benefit life here on Earth."

Rising from Project Daedalus of the 1970s, a new international group called Icarus Interstellar, incorporated as a nonprofit organization in 2011. Their mission is to "realize interstellar flight before 2100" and they have already voiced some commitment to fusion-based propulsion. Co-founders Drs. Richard Obousy and Andreas Tziolas serve as president and vice-president. Affiliates include the British Interplanetary Society, Institute for Interstellar Studies, Tau Zero Foundation, Global Starship Alliance and Star Voyager.

Icarus Interstellar holds a Starship Congress on alternate years, with the next congress taking place in 2015. The Starship Congress of 2013 was organized by timelines, with priorities for the next 20 years examined during the first day of the event, under the title of "Interstellar Now." The second day was titled "Interstellar This Lifetime" and covered the span from 20-50 years, and the third, called "Interstellar Future" examined advances appropriate beyond 50 years in the future.

It is a big universe out there, and...difficult or not...everyone is invited to reach for the stars.

We're on the web!
www.adastra-ks.org