The annual Ad Astra Kansas Space Celebration has a new date this year—October 15—but it will still be at the same great location—Stoffer Science Hall on Topeka’s Washburn University campus.

The celebration will also be coordinating with VISIT TOPEKA!’s first ever Science & Tech Festival—both October 15. However, we will still have our own designated time and place.—From 5 p.m. to 8 p.m. How else can you star-gaze except for after dark?

“We are excited to join forces and work with Ad Astra because it [the space celebration] is science related which is important for kids [to see],” said Science & Technical Festival director Rosa Cavazos, who had the idea for their event to ignite kids’ interest in science and encourage them to stay in school. That festival will run from 10 a.m. to 3 p.m. on the 700 block of Kansas.

The featured presentation at Ad Astra’s space event will be “Planetary Exploration 2016—Mars, Jupiter and Pluto” given by two-time NASA intern, KU physics grad student and Cosmosphere staff educator Caleb Gimar.

Also new this year will be laser, fiber optics and other light demos. Also, attendees will find out about what astronaut training is like and learn about the total eclipse which is coming in 2017.

“Teachers do make a difference,” said Dr. Penny Warren as she began a presentation on her work with the NASA Kepler Space Telescope at Ad Astra Kansas’ 2016 Galaxy Forum August 13 at the Kansas Cosmosphere and Space Center.

Warren had wanted to be a scientist since age 8. And made special reference to her physics teacher at Winfield High, Kerry Beach, who encouraged her to study physics at Kansas State University.

With additional degrees from Purdue and a stint at the Naval Research Lab in D.C., Warren’s hard work led her to Ball Aerospace and Technologies, Corp., in Boulder, Colo., in 2002. There she was one of the engineers working on Kepler, which launched in 2009.

“It’s a weird feeling when several years of your life’s work are packed into the nose cone on top a 14-story rocket to be launched into space,” she said.

The discovery of new planets outside the solar system in the 1990s ushered in a fervor to discover what was out there and, most interestingly, where there any in the “Goldilocks Zone”—not too hot, not too cold (actually a technical term).

According to Warren, Kepler is not an imaging telescope, but a photometer. It measures the amount of light exuded by a star and then the amount the light dims when a planet transits (passes in front of it). A regular pattern of these dips confirm a planet.

Of course, it’s not as simple.

Cont. “KEPLER ” page 2

NASA put out a series of “ExoPlanet Travel Bureau” posters to publicize some of Kepler’s discoveries. Find them at http://exoplanets.nasa.gov/alien-worlds/exoplanet-travel-bureau
with two suns—reminiscent of the fictional planet Tatooine in Star Wars movies. One of them, Kepler 16b is 200 light years from Earth. In 2014, the first Earth-sized planet in a Goldilocks zone—Kepler 186f—was found 500 light years from Earth. It is on the edge of a five planet system—named Kepler 186—and every 130 days revolves around a star about 1/2 the size and mass of our Sun.

As of now 21 planets orbiting stars in habitable zones have been found. The nearest is eleven light years away. Over 3600 exoplanets have been found—most by Kepler. Kepler now has a new mission—K2—which is to observe the dynamics of the small bodies of our own solar system.

Today, Warren leads a team of 35 detector engineers at Ball Aerospace. They design package, test and assemble focal plane arrays for tactical applications both on earth (aircraft, ships, tanks) and in space.

CORRECTION: In the Spring 2016 newsletter, it was reported in an article about the Honeywell Leadership Challenge Academy that a simulated moon walk was done at 1/16th gravity. That is incorrect. The gravity harness simulated 1/6th gravity.
Astronaut Scholarship awarded to two KU seniors

LAWRENCE—Two University of Kansas students were selected to receive the 2016 Astronaut Scholarship from the Astronaut Scholarship Foundation (ASF).

Seniors Annie Lynn and Emily Smith were honored Sept. 23 during a special Aerospace Engineering Colloquium at KU featuring NASA astronaut Sam Gemar.

Lynn, of Overland Park, is majoring in chemical engineering. Her research involves using advanced X-ray crystallography techniques to analyze complex biochemical protein assembly mechanisms in viruses at the atomic level.

Smith, a graduate of Olathe Northwest High School, is majoring in physics and interdisciplinary computing. She has been involved in research at CERN (The European Organization for Nuclear Research) in Geneva, Switzerland. She is focusing on the search for the theoretical top-prime particle in relation to the recently-discovered Higgs boson.

Established by the six surviving members of the Mercury 7 mission, the ASF now includes astronauts from many other missions. It has awarded more than $4 million in scholarships to over 400 of the country’s top scholars in STEM fields. It provides up to $10,000 for a student’s junior or senior year.

Sam Gemar, ASF representative, was selected as an astronaut candidate in 1985. He flew three shuttle missions, logging over 580 hours in space, with his final shuttle mission in 1994 as a mission specialist aboard STS-62 Columbia. Retiring from NASA in 1998, his honors have included three NASA Space Flight medals and two National Defense Service Medals. Currently, he is a principal of Vintage Fliers Inc. near Wichita.
INTERSTELLAR R & D

Ad Astra Kansas News

This “Interstellar R&D” thirtieth feature in the Ad Astra Kansas News these past 15 years continues an enterprise to research and gather information on important developments preparatory to humanity’s greatest adventure—voyaging to the stars. Now, at the millennium’s turn, is an appropriate time for grand vision and forward thinking, and there are strong signs of a renaissance in interstellar travel thought and activity. This feature and newsletter, thus, now set forth to develop a national / international /global clearing center and storehouse of knowledge and know-how for travel to the stars: Ad Astra—Steve Durst

Observation

The Exoplanet Revolution and Hawai’i Astronomy

The exponential acceleration of the exoplanet revolution (Ad Astra Kansas News, Fall 2010) totals 3,532 exoplanets, as of 1 October 2016 and since 1988, in 2,694 planetary systems and 595 multiple planetary systems, as listed in the Exoplanets Planets Encyclopedia (not including ‘rogue’ planets which may number in the billions, or more, in our Galaxy). First speculated by 16th-century philosopher Giordano Bruno and then by Isaac Newton in the 18th, exoplanets are the prime objective of Kepler’s space telescope mission (2009) and follow-on K2 (2014) with over 2,000 confirmations and thousands more candidate planets.

This accelerating discovery of exoplanets is intensifying the search for life on other worlds and the question of planetary habitability, where habitable or “Goldilocks zone” location (relative to the parent star), and liquid surface water, radiant heat and protein substance are among prerequisites for extraterrestrial life. Kepler has determined about 20% of Sun-like stars have an Earth-sized planet in the habitable zone, or about 10-40 billion potentially habitable Earth-sized planets in our Milky Way. The recent confirmation that the nearest known extrasolar planet, Proxima-b, is about Earth-sized and orbits Proxima Centauri’s habitable zone, has placed Proxima-b at the top of the list of prospects in the Breakthrough Watch project being considered to search for life beyond the Solar System.

According to Breakthrough director Pete Worden, more Proxima-b information is likely to come from the large Gemini and Keck observatories atop Mauna Kea, Hawai’i, which has long pioneered in exoplanet discovery. The July 2016 Exoplanet Mauna Kea Inventory compiled by ILOA student intern Rishabh Gupta of Scarsdale High School, NY, notes Canada-France-Hawai’i Telescope exoplanet instruments ESPaDOnS and SPIRou, Subaru Telescope instruments HICIAO and SEEDS, Gemini North survey GPIES to image Hot Jupiters around 600 stars, and Keck I and II spectrometer HIRES all have all enabled the newest frontier in this science: Using a next generation of large telescopes such as the Extremely Large Telescope in Chile, JWST and the proposed 74-meter Colossus Telescope to characterize extrasolar planets’ atmospheres.

Communication

Breakthrough Listen, announced in 2015 by Stephen Hawking, Yuri Milner and others is focused on searching for extraterrestrial alien radio communications in the Universe. The project will search for alien communications in the form of artificial radio and / or optical signals that may come from the nearest stars at the center of our galaxy, or from the 100 nearest galaxies.

To find alien radio signals, Breakthrough Listen will analyze thousand of hours of data collected every year by two large steerable radio telescopes: Green Bank Observatory in West Virginia and Parkes Observatory in Australia. To discover alien optical signals, the project will analyze data collected by the Lick Observatory Automated Planet Finder. Astronomer Frank Drake, SETI Institute founder, arranged for SETI to analyze Listen Project data with a team of scientists from UC Berkeley headed by Andrew Siemion, Director, Berkeley SETI Research Center.

The initial results of Project Listen were made publicly available on Breakthrough Initiative’s website in April, 2016. The Open-Source results are for data from most of the stars that are 16 light years away and a sample of the stars that are 16 to 160 light years away: including data from Alpha Centauri (4 light years away) and Giselle (15.8 light years away). For more about this project or to view results, go to http://breakthroughinitiatives.org

To send signals to alien civilizations in space, Breakthrough will fund a smaller project ‘Breakthrough Message’ which will give $1 million in prizes to the best designs of a digital messaging system than can transmit radio or optical messages from Earth to the nearest stars. Developing a message that can be understood by alien cultures is an exciting project, requiring insight into mathematics, art, linguistics, psychology and culture. The competition is open to all. Competition details are expected to be announced by 2017.

Transportation

Pete Worden, chairman of the Breakthrough Prize Foundation and former director of NASA Ames Research Center will manage the new $100 million Breakthrough Starshot project to develop a proof-of-concept that gigawatt lasers can be used to propel gram scale robots / nanocraft to travel in space at 20% of the speed of light. If this technology is proven, small robots could be beamed into space and would be able to transmit images of possible planets and other scientific data in our closest star system, Alpha Centauri which is 40 trillion km (4.37 light years) away from Earth. With today’s technology, it would take 30,000 years reach Alpha Centauri: Breakthrough Starshot laser-propelled nanocrafts would reach it in about 20 years.

Breakthrough Starshot’s board consists of Stephen Hawking, Yuri Milner, Mark Zuckerberg. Scientists on the project include Dr. Kevin Parkin who invented the Microwave Thermal Rocket, Pete Klupar, former director of engineering, NASA Ames, and Jim Benford, professor of Microwave Sciences as well as two Nobel Laureates, Saul Perlmutter from UC Berkeley and Steve Chu from Stanford University.

Starshot has received mixed reviews. While many scientists believe it will help propel space travel through the 21st century, other have raised concerns which include: (1) Lack of funding, (2) using powerful 100 gigawatt lasers to send tiny nanocraft into space could destroy satellites and other objects in the lasers’ path and (3) maintenance and data transmission of robots that are light years away still need to be worked out.