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MARSHALL STAR

In This Week's Star ☐

- › [Marshall Center Takes Part in First National Network for Manufacturing Innovation Workshop](#)
- › [Marshall Center Director Patrick Scheuermann Speaks to AIAA Huntsville Section Luncheon](#)
- › [NASA Awards Space Launch System Advanced Development Grants](#)
- › [Marshall's Kristin Morgan Returning to 'Jeopardy!' for Tournament of Champions](#)
- › [New Chandra Movie Features Neutron Star Action](#)
- › [Technology Demonstration Mission Program Newsletter Debuts](#)
- › [Obituaries](#)

Marshall Center Takes Part in First National Network for Manufacturing Innovation Workshop

By Megan Davidson

NASA's Marshall Space Flight Center recently cosponsored a public workshop devoted to reviewing and refining the suggested design for a new National Network for Manufacturing Innovation, an initiative proposed by President Barack Obama.

Image right: Marshall Center Director Patrick Scheuermann welcomes more than 350 guests to the National Network for Manufacturing Innovation workshop, held Jan. 16 at the U.S. Space & Rocket Center's Davidson Center for Space Exploration. Marshall cosponsored the public workshop. (NASA/MSFC/Emmett Given)



The "Blueprint for Action" is a workshop series that provides a forum for the Advanced Manufacturing National Program Office to present the proposed design of the new initiative and its regional components, Institutes for Manufacturing Innovation. The workshops also give the public an opportunity to ask questions about the proposed design and overall initiative.

The initial "Blueprint for Action" workshop -- held Jan. 16 at the U.S. Space & Rocket Center's Davidson Center for Space Exploration in Huntsville -- included an update on the National Network for Manufacturing Innovation program; and public

release of the National Science and Technology Council's report, "National Network for Manufacturing Innovation: A Preliminary Design." It also included a review of public comments received by the Advanced Manufacturing National Program Office in response to a Request for Information on the proposed initiative; a review and discussion of the proposed design; and anticipated next steps. Attending were some 350 representatives from industry, academia, and economic development authorities, as well as local, state and regional governments. The U.S. Department of Defense hosted the workshop.

In welcoming remarks, Marshall Center Director Patrick Scheuermann said, "We are honored to participate in this event, and believe Huntsville is an ideal community to start reviewing and refining the design for the National Network for Manufacturing Innovation that was developed in earlier workshops," said Scheuermann. "This effort cuts across regions, state and local governments, small-to-large industry, and community colleges and large universities -- all of which you see represented in this community. The opportunities for NNMI to strengthen and rebuild our economy could not be greater."



"NASA is in the innovation business," he added. "From our earliest days, the challenges of using new materials and structures to build complex, high-performance systems to survive the harshest environments has required innovation -- not just in the design phase but also in manufacturing."

Image left: From left, John Vickers, assistant manager of Marshall's Materials & Processes Laboratory, and NASA's representative to the National Science and Technology Council Interagency Working Group on Advanced Manufacturing, talks with Dr. LaNetra C. Tate, Advanced Manufacturing lead/Game Changing Program principal investigator in the Space

Technology Mission Directorate at NASA Headquarters, and Marshall Center Director Patrick Scheuermann at the National Network for Manufacturing Innovation workshop. (NASA/MSFC/Emmett Given)

"Manufacturing innovation is important for ensuring space exploration is affordable, but it has incredible potential for many other industries that are represented here today. Innovative manufacturing capabilities and processes are essential for turning research discoveries, inventions and new ideas into better or novel products -- our nation's ability to innovate."

The National Network for Manufacturing Innovation will be managed by the interagency Advanced Manufacturing National Program Office. Current participating agencies include the departments of Commerce, Defense, Education and Energy; NASA; and the National Science Foundation.

NASA's Space Technology Mission Directorate leads NASA's involvement in the Advanced Manufacturing National Program Office. John Vickers, assistant manager of Marshall's Materials & Processes Laboratory, recently served as NASA's representative to the National Science and Technology Council Interagency Working Group on Advanced Manufacturing, supporting the design of the National Network for Manufacturing Innovation.

Davidson, an Analytical Services Inc. employee, supports the Office of Strategic Analysis & Communications.

[› Back to Top](#)

Marshall Center Director Patrick Scheuermann Speaks to AIAA Huntsville Section Luncheon

NASA's Marshall Space Flight Center Director Patrick Scheuermann spoke to the Greater Huntsville Section of the American Institute of Aeronautics and Astronautics, or AIAA, section luncheon meeting Jan. 16.

Scheuermann gave the group an update on several projects and programs, including NASA's Space Launch System, which he said has "a clear runway at this point" to meet its 2017 launch date. He also mentioned that Marshall employees are working in teams to conceptualize the center's long-term future.

The AIAA event was held at the University of Alabama in Huntsville's University Center.

[› Back to Top](#)

NASA Awards Space Launch System Advanced Development Grants

NASA News Release

NASA has awarded grants to nine universities for advanced development activities for the nation's next heavy-lift rocket, the Space Launch System, or SLS, which is managed at NASA's Marshall Space Flight Center.

The agency is providing approximately \$2.25 million that will be shared by all the proposals under this NASA Research Announcement to seek innovative and affordable solutions to evolve the launch vehicle from its initial lift capability to a larger, future version of the rocket, which will carry humans farther into deep space than ever before. NASA sought proposals in a variety of areas, including concept development, trades and analyses, propulsion, structures, materials, manufacturing, avionics and software.

"Partnering with academia on SLS advanced concepts brings new ideas and vitality to NASA and expands the SLS team of rocket scientists beyond just the agency," said William Gerstenmaier, associate administrator for Human Exploration and Operations at NASA Headquarters.

For a description of each of the proposals, visit: <http://go.nasa.gov/ULC5iT>.

"As we make tangible progress on the initial launch vehicle, our advanced development team is formulating concepts for an evolved version of the rocket," said Todd May, SLS Program manager at the Marshall Center. "The work being done today on SLS is a national and collaborative effort. With faculties and students engaged now, we look forward to creative, innovative and more affordable strategies to guide development of the next-generation heavy-lift launch vehicle."

The SLS is designed to be flexible for launching payloads and spacecraft, including NASA's Orion Multi-Purpose Crew Vehicle, which will take humans beyond low-Earth orbit. The rocket will enable the agency to achieve its deep-space exploration goals and create new possibilities for scientific discovery. The period of performance for these grants will be one year with as many as two one-year options.

The first flight test of NASA's SLS, which will feature a configuration for a 70-

The selected universities and their proposals are:

- "High Electric Density Device for Aerospace Applications," Auburn University in Auburn, Ala.
- "Challenges Towards Improved Friction Stir Welds Using On-line Sensing of Weld Quality," Louisiana State University in Baton Rouge
- "A New Modeling Approach for Rotating Cavitation Instabilities in Rocket Engine Turbopumps," Massachusetts Institute of Technology in Cambridge
- "Algorithmic Enhancements for High-Resolution Hybrid RANS-LES Using Loci-CHEM," Mississippi State University in Starkville
- "Characterization of Aluminum/Alumina/Carbon Interactions under Simulated Rocket Motor Conditions," Pennsylvania State University in College Park
- "Development of Subcritical Atomization Models in the Loci Framework for Liquid Rocket Injectors," University of Florida in Gainesville
- "Validation of Supersonic Film Cooling Numerical Simulations Using Detailed Measurements and Novel Diagnostics," University of Maryland in College Park
- "Advanced LES and Laser Diagnostics to Model Transient Combustion-Dynamical Processes in Rocket Engines: Prediction of Flame Stabilization and Combustion-

metric-ton (77-ton) lift capacity, is scheduled for 2017 from NASA's Kennedy Space Center.

Instabilities," University of Michigan in Ann Arbor
-- "Acoustic Emission-Based Health Monitoring of Space Launch System Structures," University of Utah in Salt Lake City

[› Back to Top](#)

Marshall's Kristin Morgan Returning to 'Jeopardy!' for Tournament of Champions

By Rick Smith

Marshall Space Flight Center team member Kristin Morgan's winning streak on the television quiz show "Jeopardy!" ended Jan. 16 when, in the closing moments of her sixth consecutive contest, she couldn't name the 2008 Academy Award Best Picture winner, "Slumdog Millionaire."

Image right: Marshall Strategic Analyst Kristin Morgan, appearing on "Jeopardy!" (NASA)



She departed smiling, however. Not only did she win more than \$69,000 during her five-game streak, but those wins also guaranteed her a slot in the show's upcoming "Tournament of Champions."

Morgan, a strategic analyst in Marshall's Office of Strategic Analysis & Communications, won each episode that aired Jan. 9-11 and Jan. 14-15. Every "Jeopardy!" victor with five or more consecutive wins automatically earns a place in the annual Tournament of Champions -- a matchup of the very best of the program's previous contestants.

The tournament, taped in mid-January, is scheduled to begin airing Feb. 13. Morgan is tentatively scheduled to enter the fray Feb. 18. She said the tournament was even more exciting than her first five games.

"It's amazing," she said. "I went out there hoping I'd win one game, maybe three. Winning five wasn't even on the radar, so playing in the tournament is a dream come true."

After being chosen for the show thanks to a solid performance on [an online quiz](#) last summer, Morgan flew to Los Angeles in October 2012 to tape her initial appearances. (Read [all about Morgan's experience](#) here.)

Morgan lives in Huntsville with her husband Kevin and two dogs. She joined NASA as a materials engineer in 2007. She has been a strategic analyst since 2010, and enjoys working with Marshall leaders to assess long-term business strategies that will help the center meet future national aerospace, science and engineering needs.

"Jeopardy," now in its 29th season of television syndication, airs on Huntsville's WAAY-TV. Check local listings for broadcast times.

Smith, an Analytical Services Inc. employee, supports the Office of Strategic Analysis & Communications.

[› Back to Top](#)

New Chandra Movie Features Neutron Star Action



Unlike with some blockbuster films, the sequel to a movie from NASA's Chandra X-ray Observatory is better than the first. This latest movie features a deeper look at a fast-moving jet of particles produced by a rapidly rotating neutron star, and may provide new insight into the nature of some of the densest matter in the universe.

Image left: The Vela pulsar, a neutron star that was formed when a massive star collapsed. (X-ray: NASA/CXC/University of Toronto/M.Durant et al; Optical: DSS/Davide De Martin)

The hero of this Chandra movie is the Vela pulsar, a neutron star that was formed when a massive star collapsed. The Vela pulsar is about 1,000 light-years from Earth, about 12 miles in diameter, and makes a complete rotation in 89 milliseconds -- faster than a helicopter rotor.

As the pulsar whips around, it spews out a jet of charged particles that race along the pulsar's rotation axis at about 70 percent of the speed of light. The new Chandra data, which was obtained from June to September 2010, suggest the pulsar may be slowly wobbling, or precessing, as it spins. The period of the precession, which is analogous to the slow wobble of a spinning top, is estimated to be about 120 days.

"We think the Vela pulsar is like a rotating garden sprinkler -- except with the water blasting out at over half the speed of light," said Martin Durant of the University of Toronto in Canada, who is the first author of the paper describing these results.

One possible cause of precession for a spinning neutron star is it has become slightly distorted and is no longer a perfect sphere. This distortion might be caused by the combined action of the fast rotation and "glitches," sudden increases of the pulsar's rotational speed due to the interaction of the superfluid core of the neutron star with its crust.

Watch the movie here: http://www.nasa.gov/multimedia/videogallery/index.html?media_id=158178731



"The deviation from a perfect sphere may only be equivalent to about one part in 100 million," said co-author Oleg Kargaltsev of George Washington University in Washington, who presented these results Jan. 7 at the 221st American Astronomical Society meeting in Long Beach, Calif. "Neutron stars are so dense that even a tiny distortion like this would have a big effect."

If the evidence for precession of the Vela pulsar is confirmed, it would be the first time a neutron star has been found to be this way. The shape and the motion of the Vela jet look strikingly like a rotating helix, a shape that is naturally explained by precession.

Another possibility is the strong magnetic fields around the pulsar are influencing the shape of the jet. For example, if the jet develops a small bend caused by precession, the magnetic field's lines on the inside of the bend will become more closely spaced. This pushes particles toward the outside of the bend, increasing the effect.

"It's like having an unsecured fire hose and a flow of water at high pressure," said co-author George Pavlov, principal investigator of the Chandra proposal at Pennsylvania State University in University Park. "All you need is a small bend in the hose and violent motion can result."

This is the second Chandra movie of the Vela pulsar. The original was released in 2003 by Pavlov and co-authors. The first Vela movie contained shorter, unevenly spaced observations so that the changes in the jet were less pronounced and the researchers did not argue that precession was occurring. However, based on the same data, Avinash Deshpande of Arecibo Observatory in Puerto Rico and the Raman Research Institute in Bangalore, India, and the late Venkatraman Radhakrishnan, argued in a 2007 paper the Vela pulsar might be precessing.

Astronomers have returned to observing Vela because it offers an excellent chance to study how a pulsar and its jet work. The 0.7 light-year-long jet in Vela is similar to those produced by accreting supermassive black holes in other galaxies, but on a much smaller scale. Because Vela's jet changes dramatically over a period of months and is relatively close, it can be studied in great detail, unlike jets from black holes that change over much longer timescales.

If precession is confirmed and the Vela pulsar is indeed a distorted neutron star, it should be a persistent source of gravitational waves, and would be a prime target for the next generation of gravitational wave detectors designed to test Einstein's theory of general relativity.

A paper describing these results was published in the Jan. 10 issue of [The Astrophysical Journal](#). Other co-authors of the

paper were Julia Kropotina and Kseniya Levenfish from St. Petersburg State Polytechnical University in St. Petersburg, Russia.

NASA's Marshall Space Flight Center manages the Chandra program for NASA's Science Mission Directorate in Washington. The Smithsonian Astrophysical Observatory controls Chandra's science and flight operations from Cambridge, Mass.

For Chandra images, multimedia and related materials, visit: <http://www.nasa.gov/chandra>.

For an additional interactive image, podcast, and video on the finding, visit: <http://chandra.si.edu>.

[› Back to Top](#)

Technology Demonstration Mission Program Newsletter Debuts

The Technology Demonstration Mission Program, or TDM, recently issued its inaugural issue of the bimonthly newsletter "The Bridge."

TDM, managed for the agency by NASA's Marshall Space Flight Center, was launched in October 2011. It includes nine projects, led by NASA centers and partner organizations around the nation, which bridge the gap between groundbreaking technological advancements and infusion of those new technologies into near-term NASA missions.

Among the projects featured in the first newsletter were the [Green Propellant Infusion Mission; Mars Science Laboratory Entry, Descent and Landing Instrumentation](#), or MEDLI; the [Low-Density Supersonic Decelerator](#) project; and the [Materials International Space Station Experiment](#), better known as MISSE-X. Rounding out the program, and set to appear in upcoming issues of "The Bridge," are the [Cryogenic Propellant Storage and Transfer](#) project; [Deep Space Atomic Clock](#); [Human Exploration Telerobotics](#) project; [Laser Communications Relay Demonstration](#); and [Solar Sail Demonstration](#).

Read the first issue of "The Bridge" [here](#).

[› Back to Top](#)

Obituaries

Edward Ernest Billingham Jr., 84, of Huntsville died Dec. 17. He retired from the Marshall Center in 2003 as an experimental manufacturing technician.

Mary F. Smith, 74, of Huntsville died Jan. 10. She retired from the Marshall Center in 2005 as a management support assistant.

George W. Sturdivant Jr., 83, of Huntsville died Jan. 11. He retired from the Marshall Center in 1985 as a procurement analyst. He is survived by his wife, Minnie Sturdivant.

Charles Max Akridge, 78, of Huntsville died Jan. 15. He retired from the Marshall Center in 1988 as an aerospace engineer.

James Travis Stull, 93, of Kentucky died Jan. 16. He retired from the Marshall Center in 1977 as an aerospace engineer. He is survived by his wife, Martha Stull.

John Monroe Gould Sr., 78, of Huntsville died Jan. 17. He retired from the Marshall Center in 1982 as an aerospace

engineer.

Find this article at:

<http://www.nasa.gov/centers/marshall/about/star/index.html>