

MARSHALL STAR

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Capturing a Rare Phenomenon: Behind the Scenes of the Venus Transit

By Megan Davidson

On June 5, the world watched -- with protective eyewear, that is -- as Venus took a stellar, six-and-a-half-hour trip across the face of the sun. While the transit was the star of the show in the universe, here on Earth, a team of experts and support personnel from the Marshall Space Flight Center and other NASA field centers worked together behind the scenes to capture and share this rare phenomenon.

Image right: Dr. Jonathan Cirtain, front, and Mitzi Adams, both astrophysicists in Marshall's Science & Technology Office, use special equipment to view the Venus transit June 5. (NASA/MSFC/Janet Anderson)



A Web chat, live Ustream feed -- a one-stop shop for video, Facebook and Twitter updates -- and an employee viewing party were part of a host of activities Marshall used to commemorate this last-in-a-lifetime event, as the next transit won't happen until 2117.

Marshall Public Affairs Specialist Janet Anderson and Brooke Boen, a Schafer Corp. employee, both of Marshall's Public & Employee Communications Office, were part of the team that promoted and moderated the eight-and-a-half hour transit

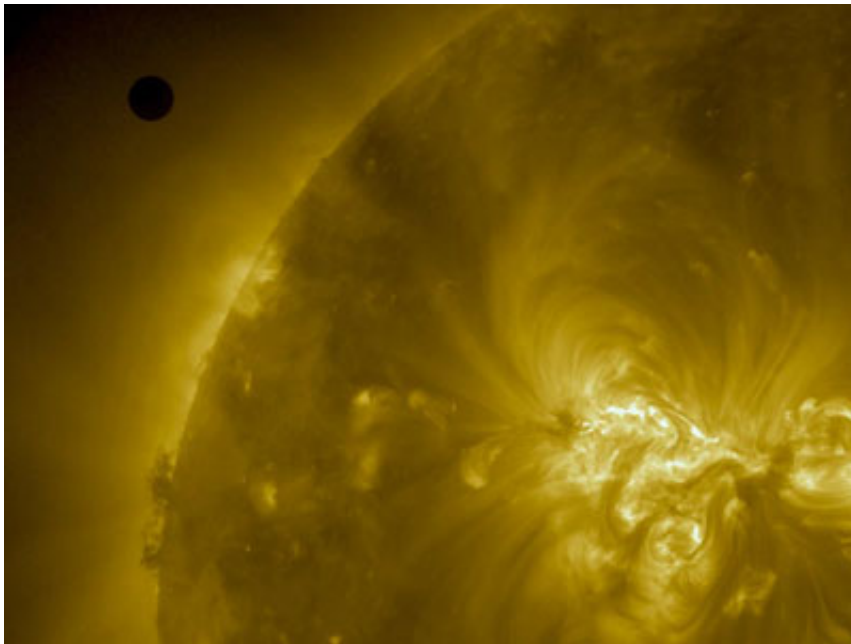
chat. Kris Rainey, an Ai Signal Research Inc. employee, and Lee Mohon, a Schafer Corp. employee, both supporting the Public & Employee Communications Office, also helped promote and provide Web support and transcription for the chat. (The Web chat transcript is available [here](#).)

Anderson also kept Marshall's Twitter and Facebook followers -- many who were watching the Ustream feed and participating in the Web chat -- up-to-date on the transit via images and posts. The Web chat [promo page](#) alone resulted in more than 6,000 Facebook "likes" and near 1,000 "tweets," which are 140-character, text-based posts on Twitter.

The transit chat drew questions and comments from more than 500 people -- a record-setting number for NASA Web chats. "Overall, this was the longest chat we've ever done, surpassing even our past up-all-night chats," said Boen. "This also was the first time we've combined multiple NASA centers in the same chat, and only the second time we've conducted a chat where the experts were remote from us. It was a very cost-effective way to reach anyone, anywhere."

Space enthusiasts from all over the world, including chat visitors from Australia, Brazil, Belgium and Iceland, joined in the conversation. Answering more than 450 questions from the public were experts from Marshall's Science & Technology Office, including Dr. Jonathan Cirtain, astrophysicist; Dr. Renee Weber, a planetary scientist; Dr. Melissa McGrath, senior science advisor; and Mitzi Adams, astrophysicist. Ames Research Center's Karen Kinemuchi and Tom Barclay also took part in the chat, fielding questions about the Kepler mission -- the first mission capable of detecting Earth-size and smaller planets in or near the habitable zone -- and the transit's significance to that mission.

"Historically, transits were very difficult to see, required much planning and could be viewed only by a limited number of people," said Adams. "Today, millions of people can go online and view a transit in real time or near-real time -- no matter where they live and no matter what the weather forecast.



"Events, like the Web chat," she said, "allow us to share with the public the wonder of the sky and will hopefully inspire young people to pursue science, technology, engineering and math careers. I was proud to be able to participate in the chat and to have the opportunity to answer so many interesting questions from so many people from around the world."

Image left: Venus as it nears the disk of the sun, captured by NASA's Solar Dynamics Observatory. (NASA/SDO/AIA)

Along with the Web chat, more than 7,500 viewers tuned in to the NASA Marshall Ustream feed -- set up and managed by a crew from

Marshall Television, which included Dusty Hood, Tyson Eason and Lee Erickson, all of Dynetics Corp.

Three telescopes -- attached with special cameras and covers -- were set up at the Automated Lunar and Meteor Observatory, known as the "ALaMO," behind the Marshall Medical Center. The TV crew ran a feed from those cameras to the Marshall Ustream site. Eason and Dr. Robert Suggs, head of Marshall's Space Environments Team, manned the telescopes, providing people with different views of the transit for more than six hours.

Once the sun dipped behind the trees, the crew quickly switched to NASA Edge's coverage of the transit from the top of Mauna Kea in Hawaii. NASA Edge is a video podcast which explores different missions, technologies and projects

developed by NASA. The crew also worked with NASA Headquarters to set up and run several NASA Ustream feeds covering the transit, and was available to troubleshoot any connection issues with Ustream or the Web chat.

"The Marshall TV crew was the 'magic behind the curtain' for the Ustream feed," said Anderson. "Everything went flawlessly."

And for Marshall team members who wanted to see the event live rather than on the Internet, a viewing party was set up at Building 4600 by Marshall's Meteoroid Environments Office. Hundreds of people came out to get a bird's-eye view of the transit through two telescopes set up on the lawn. Bill Cooke, head of the Meteoroid Environments Office, was available at the event to answer questions from the crowd.

"Through all of these events, I think people felt like they were seeing history live with NASA," said Boen.

Images, video and more information about the 2012 Venus transit can be found on nasa.gov.

Davidson, an AI Signal Research Inc. employee, supports the Office of Strategic Analysis & Communications.

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Smoke & Fire: Another Successful J-2X Test

NASA conducted a 260-second J-2X engine test at the Stennis Space Center on June 13 marking another step in developing the Space Launch System, the next-generation rocket that will carry humans deeper into space than ever before. The Marshall Space Flight Center manages the J-2X project as part of the Space Launch System Program Office. (NASA/SSC)



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Composite Crew Module Encounters Space Vacuum at the Marshall Center

By Kim Newton



This week, engineers at the Marshall Space Flight Center moved a Composite Crew Module into the Environmental Test Facility vacuum chamber to gauge how well a space structure fabricated with composite materials will react in a simulated space environment. Data gained during this test series will aid in the design and development of future in-space composite habitable structures.

Image left: The Composite Crew Module is rolled into the vacuum chamber at Marshall's Environmental Test Facility. The test will continue through the end of the summer. (NASA/MSFC/Emmett Given)

During the vacuum test, the chamber is sealed and purged to a level a vehicle would encounter on orbit to evaluate the composite material's integrity. The crew module is filled with helium gas to allow engineers to detect any leaks that may occur as pressure increases. Vacuum testing will yield a leak rate for the entire structure, then the team works to repair small leaks that may arise to improve the hardware's performance.

The test team includes members from the Marshall Center, Langley Research Center, Goddard Space Flight Center, Kennedy Space Center and the Boeing Company in Huntsville. To date, the team has completed 10 tests and will continue testing through the end of the summer.

The crew module was designed to test new materials and fabrication techniques that may be used in future space structures, which will be constructed of both metals and composites. The Composite Crew Module Project is led by NASA's Engineering and Safety Center at Langley.

Fabricated at Alliant Techsystems in Iuka, Miss., the Composite Crew Module was constructed in two parts using a hand layup technique, which combines carbon fiber epoxy and an aluminum honeycomb core. The two parts were joined together and then bonded in a unique process developed at the Marshall Center for the crew module. The project team is a partnership between NASA and industry and includes design, manufacturing, testing, inspection and tooling expertise.

Newton is a public affairs officer in the Office of Strategic Analysis & Communications.

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Marshall Acting Director Gene Goldman Praises Michoud Team For Their Work During All-Hands Meeting June 14

Marshall Space Flight Center Acting Director Gene Goldman held an all-hands meeting June 14 with team members at the Michoud Assembly Facility. Goldman lauded the team for their work and ongoing efforts to support NASA's mission. Michoud employees recently completed work on the Orion Exploration Flight Test One Crew Module and are currently preparing the facility to manufacture components of the new Space Launch System. Michoud, managed by the Marshall Center, is a world-class manufacturing facility that has participated in NASA's human spaceflight programs since Apollo. Also at Michoud, a Space Flight Awareness award was presented



to the Orion Exploration Flight Test 1, or EFT-1, Crew Module Welding Team on June 14 during the team celebration event for the module completion. Certificates were presented for exceptional teamwork and commitment to the Orion Program resulting in the fabrication via friction stir welding of the EFT-1 Crew Module pressure vessel, further supporting critical milestones for the assembly and integration of the first Orion Command Module flight test article. Marshall Space Flight Center/Michoud team members in the group photograph receiving certificates include Robert Gravolet, Kelley Easley, Peter Shurko, Colin Lust and Cheryl Redmon. (Photo courtesy)

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Principal Investigator Scott Bolton to Speak About NASA's Juno Mission on June 21 at USSRC

Dr. Scott Bolton, the principal investigator for NASA's Juno mission, will give a presentation about the mission's design and science goals from 5:30-6:30 p.m., June 21, at the U.S. Space & Rocket Center's Davidson Center for Space Exploration 3D theater.

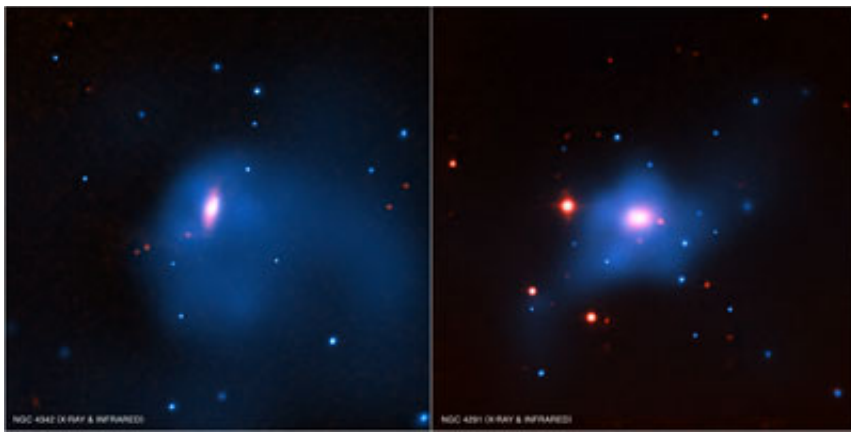
Juno -- the second mission in NASA's New Frontiers Program -- launched for Jupiter in August 2011. The spacecraft is expected to arrive at the giant planet in 2016 to conduct an in-depth study for a one-year prime mission. Jupiter is the largest planet and holds secrets to the primary processes in which the solar system was formed. This mission will provide critical knowledge for understanding Jupiter's creation as well as the extra-solar planetary systems now being discovered around other stars.

Bolton's presentation is part of the Space & Rocket Center's Pass the Torch Inspiration Lecture Series. The event is free and open to the public.

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Black Hole Growth Found to Be Out of Sync

NASA news release



New evidence from NASA's Chandra X-ray Observatory challenges prevailing ideas about how black holes grow in the centers of galaxies. Astronomers long have thought that a supermassive black hole and the bulge of stars at the center of its host galaxy grow at the same rate -- the bigger the bulge, the bigger the black hole. However, a new study of Chandra data has revealed two nearby galaxies with supermassive black holes that are growing faster than the galaxies themselves.

Image left: Galaxies NGC 4342 and NGC 4291. (X-ray: NASA/CXC/SAO/A.Bogdan et al; Infrared: 2MASS/UMass/IPAC-Caltech/ NASA/NSF)

The mass of a giant black hole at the center of a galaxy typically is a tiny fraction -- about 0.2 percent -- of the mass contained in the bulge, or region of densely packed stars, surrounding it. The targets of the latest Chandra study, galaxies NGC 4342 and NGC 4291, have black holes 10 times to 35 times more massive than they should be compared to their bulges. The new observations with Chandra show the halos, or massive envelopes of dark matter in which these galaxies reside, also are overweight.

This study suggests the two supermassive black holes and their evolution are tied to their dark matter halos and did not grow in tandem with the galactic bulges. In this view, the black holes and dark matter halos are not overweight, but the total mass in the galaxies is too low.

"This gives us more evidence of a link between two of the most mysterious and darkest phenomena in astrophysics -- black holes and dark matter -- in these galaxies," said Akos Bogdan of the Harvard-Smithsonian Center for Astrophysics in Cambridge, Mass., who led the new study.

NGC 4342 and NGC 4291 are close to Earth in cosmic terms, at distances of 75 million and 85 million light years. Astronomers had known from previous observations that these galaxies host black holes with relatively large masses, but are not certain what is responsible for the disparity. Based on the new Chandra observations, however, they are able to rule out a phenomenon known as tidal stripping.

Tidal stripping occurs when some of a galaxy's stars are stripped away by gravity during a close encounter with another galaxy. If such tidal stripping had taken place, the halos mostly would have been missing. Because dark matter extends farther away from the galaxies, it is more loosely tied to them than the stars and more likely to be pulled away.

To rule out tidal stripping, astronomers used Chandra to look for evidence of hot, X-ray-emitting gas around the two galaxies. Because the pressure of hot gas -- estimated from X-ray images -- balances the gravitational pull of all the matter in the galaxy, the new Chandra data can provide information about the dark matter halos. The hot gas was found to be distributed widely around NGC 4342 and NGC 4291, implying that each galaxy has an unusually massive dark matter halo and that tidal stripping is unlikely.

"This is the clearest evidence we have, in the nearby universe, for black holes growing faster than their host galaxy," said co-author Bill Forman, also of the Harvard-Smithsonian Center for Astrophysics. "It's not that the galaxies have been compromised by close encounters, but instead they had some sort of arrested development."

How can the mass of a black hole grow faster than the stellar mass of its host galaxy? The study's authors suggest a large concentration of gas spinning slowly in the galactic center is what the black hole consumes very early in its history. It grows

quickly, and as it grows, the amount of gas it can accrete, or swallow, increases along with the energy output from the accretion. After the black hole reaches a critical mass, outbursts powered by the continued consumption of gas prevent cooling and limit the production of new stars.

"It's possible that the supermassive black hole reached a hefty size before there were many stars at all in the galaxy," said Bogdan. "That is a significant change in our way of thinking about how galaxies and black holes evolve together."

The results were presented June 11 at the 220th meeting of the American Astronomical Society in Anchorage, Alaska. The study also has been accepted for publication in *The Astrophysical Journal*.

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

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

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

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Huntsville Area Rocketry Association, Music City Missile Club to Host Southern Thunder 2012 on June 23-24

The Music City Missile Club and the Huntsville Area Rocketry Association are hosting Southern Thunder 2012 on June 23-24 in Manchester, Tenn.

The public is invited to witness the rocketry event that Sport Rocketry Magazine claims is "The greatest rocket launch in the Southeastern United States, and ranks in the top 10 regional launches [in the country]."

Those who are interested in flying must register the day of the launch. There will be onsite vendors for all of your rocketry needs. For pricing, visit [here](#). Children under 12 fly free.

Tickets are available for two raffles to be held for SpaceX Falcon 9 flying model rocket kits autographed by founder Elon Musk.

Concessions will be available for purchase, courtesy of the Boy Scouts of America.

For times and field locations, or for rules and more information, visit [here](#).

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