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NuStar scores a primary goal

By Mark Whalen

Mission measures spin of a supermassive black hole for the first time

Artist's concept illustrates a supermassive black hole at the center, surrounded by matter flowing onto the black hole in an accretion disk. This disk forms as the dust and gas in the galaxy falls onto the hole, attracted by its gravity.

In the more than eight months since its launch in June 2012, Caltech and JPL's black-hole hunter, the Nuclear Spectroscopic Telescope Array, or NuSTAR, is well on its way to achieving its primary goals.

The mission has thus far successfully studied the remnants of exploded stars, mapped the central regions of our Milky Way galaxy and surveyed extragalactic fields.

Announced in February was the first-ever unambiguous measurement of the spin rate of a supermassive black hole. NuSTAR observations were combined with those from the European Space Agency's XMM-Newton mission to acquire the first definitive measurements of a black hole's spin rate. The black hole studied has a mass 2 million times that of the sun and resides at the center of the nearby galaxy NGC 1365, also known as the "Great Barred Spiral Galaxy." XMM-Newton provided low-energy X-ray observations of NGC 1365, coordinated with simultaneous high-energy X-ray observations by NuSTAR.

"What's amazing in this observation is that we can see the warping and twisting of space time," said Caltech professor Fiona Harrison, the mission's principal investigator. "This distortion allows us to measure how fast the black hole is spinning. By partnering with XMM-Newton, we can now say that the features in the X-ray colors seen from massive black holes can definitely be used to measure the black hole's rotation, or spin.

"At no place on Earth or in our solar system can we directly witness the effects of Einstein's theory of strong gravity," she added. "But in this observation, an object 56 million light years from Earth enables us to see the effects of Einstein's theory of general relativity, in a small region of space just several times the radius of our sun."

NuSTAR, an Explorer-class mission launched in June 2012, is the first high-energy telescope that can focus, allowing it to create images that are 10 times crisper and 100 times more sensitive than anything that's been made in the high-energy X-ray regime before.

The mission's first official image release, in October, showed an outburst from the supermassive black hole Sagittarius A*, complementing coordinated infrared images obtained with the Keck telescopes, low-energy X-ray data obtained with NASA's Chandra X-ray Observatory, and very high-energy gamma-ray data obtained with the High-Energy Stereoscopic System. JPL Project Scientist Daniel Stern noted that besides Chandra, NuSTAR high-energy observations are often coordinated with those from lower-energy missions such as NASA's Swift satellite.

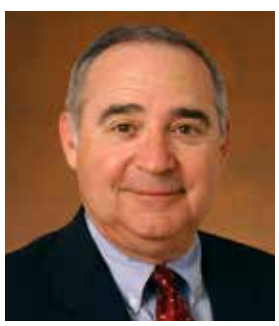
Stern said that final observations of the Milky Way's supernova remnant Cassiopeia A, about 11,000 light-years away, are being obtained the first week of March. These observations are important for studying the energetics of the supernova explosion and constitute one of the priority observations planned for NuSTAR since its inception, he said.

"One of NuSTAR's main science goals is to get a full census of black holes in the universe," Stern said. "We are off to a great start.

"The X-ray sky is highly variable," he added. "These coordinated observations provide us with the full X-ray spectra for the NuSTAR targets, as well as to monitor how sources have changed in brightness over time."

Stern said three JPL scientists are part of the worldwide, 140-member NuSTAR science team, which will convene in a mid-March meeting in Pasadena.

For more information on NuSTAR, visit *http://www.nasa.gov/NuSTAR*. For more information on the XMM-Newton mission, visit *http://go.nasa.gov/YUYpI6*.



Chameau to step down; Tattini to retire this year

Caltech President Jean-Lou Chameau has announced that he will step down from the campus later this year to take a position leading King Abdullah University of Science and Technology in Saudi Arabia.

JPL Deputy Director Gene Tattini will retire this summer. The retired U.S. Air Force lieutenant general has been with JPL since 2001. A search committee will recommend candidates for his replacement.

Key changes in leadership

Directors

Jan Chodas

Keyur Patel

Deputy Directors

Tim Larson

Les Deutsch

Dan Coulter

Richard Cook

Project & Deputy Managers

John McNamee

Matt Wallace

JPL Director Charles Elachi announced a series of senior management appointments that took effect Feb. 25.

Interplanetary Network Director John McNamee is the new project manager for the 2020 Mars Science Rover mission. Matthew Wallace, flight system manager for Mars Science Laboratory, is deputy project manager.

McNamee joined JPL in 1989 as navigation team chief for Magellan's Venus orbit insertion. He later served as Mars Pathfinder mission design manager/mission engineer, Mars '98 project manager, Europa Orbiter/X2000 Advanced Avionics Development project manager, deputy director for Solar System Exploration and for Mars Exploration, and project manager for Deep Impact and Dawn.

Wallace joined JPL in 1991. He managed the assembly, test and launch operations team for the Mars Exploration Rovers Spirit and Opportunity, and worked as surface mission manager for the Opportunity rover after it landed on Mars in 2004.

Jan Chodas is the new director for the Office of Safety and Mission Success, previously serving as deputy director. Tim Larson, former manager of the Epoxi and Stardust NExT missions, is the office's new deputy director.

Chodas has been at JPL since 1980. Prior to her leadership roles in 5X, she was project manager for the Juno mission, which will arrive at Jupiter in 2016. She was also technical manager for the Galileo attitude and articulation control subsystem and project element manager for the same subsystem on Cassini. Previously, she managed the Systems and Software Division and Mission Software Systems Section.

Larson, who joined JPL in 1993, previously was deputy manager of the Reliability Engineering Office and mission assurance manager for Dawn, Juno, Deep Impact and Herschel/Planck.

Keyur Patel, deputy director for Solar System Exploration since 2009, is the new Interplanetary Network director. Leslie Deutsch was appointed as his deputy.

Patel, with JPL since 1986, had served as project manager for Dawn, deputy project manager and chief engineer for Deep Impact and deputy director for the Office of Safety and Mission Success. He also was technical group supervisor and principal engineer for the Avionic Systems Engineering Section.

Deutsch has served in numerous technical and leadership roles since joining JPL in 1986. Most recently, he was architecture manager for the Strategic Planning and System Engineering Office in the Interplanetary Network Directorate, as well as the organization's chief technologist.

Mars Science Laboratory Project Manager Richard Cook is the new deputy director for Solar System Exploration (4X). He will continue to lead the Curiosity mission until the end of April when a new project manager will be appointed.

Cook, with JPL since 1989, led flight system development for the Mars Exploration Rovers mission and was the project manager after the landings in January 2004. He served as the Mars Surveyor Operations project manager during the Mars Global Surveyor and Mars '98 missions, and was the project system engineer and mission manager for Mars Pathfinder.

Daniel Coulter is the new deputy director for Astronomy, Physics and Space Technology. Previously the manager of the Advanced Optical Systems Program Office, he joined JPL in 1980 as a senior scientist in the Materials Research and Technology Section. He later supervised the Optical Materials Technology Group and managed the Interferometry Systems and Technology Section.

Matthew Landano, who has served as director for the Office of Safety and Mission Success since 2002, was appointed as special assistant to the associate director for Flight Projects and Mission Success, Chris Jones. Landano started at JPL in 1969. He is the initial author of the JPL Design Verification/Validation and Operations Principles for Flight Systems, which set the standard for all development projects at JPL.

Pete Theisinger was appointed as special assistant to JPL Director Charles Elachi, focusing on reimbursable activities. Theisinger is former project manager for Mars Science Lab and the Mars Exploration Rovers. He also managed the Engineering and Science Directorate.

Technology can be a risky business

By Mark Whalen

Chief Technologist Jonas Zmuidzinas is JPL's adviser on institutional investments in technology. He discusses current challenges and opportunities.

YOU FORMERLY HEADED JPL'S MICRODEVICES LAB. IS IT STILL AS RELEVANT TODAY AS WHEN YOU STARTED?

I joined Caltech as an assistant professor in 1990. One of the draws for me to come to Caltech was the chance to work with the people at the Microdevices Lab. I have a deep appreciation for the very high quality of the researchers there and high quality of the work they do.

The Microdevices Lab works in selected areas of microtechnology and nanotechnology; it's diverse but it's limited by our size. We have six or seven research groups and, more often than not, they are either at the top or very close to the top in their fields internationally.

At the Microdevices Lab you start very early from the basic concepts to try to develop a device. To eventually get it into a flight mission it's an extremely treacherous and difficult path because of the long timescale and the high level of maturity needed to fly a new technology. Yet we manage to do this.

There are unknowns, but you have to try it; that's the only way you're going to make progress on the idea. It's that process of figuring out what's wrong, and learning from it, that leads to the next thing. Eventually, you'll hit upon an idea that doesn't have a fatal flaw, that actually works, that's going to succeed and make a difference.

But that's to be expected. If you don't do that, if you don't run into some dead ends, it's a sign you're not taking any risks, actually not doing your job.

SO TO PUSH THE ENVELOPE IN TECHNOLOGY, RISKS ARE INHERENT?

My personal opinion is that, at the moment, we have become too risk-averse. We need to be taking more technological risk. I would like to see the agency push a little closer to the edge.

I think the risk aversion may very well be founded in the flagship missions, where you might spend $1 billion or more. But when you get down to smaller projects, spending a few million dollars, then at that level you can afford to take risks.

HOW WELL EQUIPPED IS JPL TO DEAL WITH A FUTURE OF MAINLY SMALLER PROJECTS AND A SCARCITY OF FLAGSHIPS?

One example is JPL's work in cubesats, the nanosatellites weighing about three pounds. It's especially interesting to me as an experiment to see how the JPL system deals with small projects at this level.

For JPL to do a mission that only has a few million dollars in funds, we simply cannot do those projects in the same way we do the bigger projects. How we adapt the way we do projects at such a small scale and make them thrive in the JPL environment is the challenge.

IS JPL RECOGNIZED AS A WORLD LEADER IN SPACE TECHNOLOGY? IS THAT A GOAL? HOW MIGHT WE GET THERE?

The answer to that has to be yes, for a number of reasons. First, if JPL does not lead in areas of space technology, we'll have a hard time continuing to develop and execute innovative space missions for NASA.

In order for JPL to continue to thrive, we need to continue attracting the most talented scientists and engineers from around the nation. What they get excited about is being on the cutting edge, doing new things. Talented people don't want to repeat the same old thing people have been doing for decades. They want to be breaking new ground.

My biggest pleasure in this position is the contact with the really remarkably talented people who work here at JPL. My job is less to tell them what to do and more to understand what it is that can help them accomplish their goals.

WHAT ARE THE MAIN FOCUSES OF JPL'S TECHNOLOGY PROGRAM?

We make investments all across the board. Within the Research and Technology Development Program there are strategic initiatives, largely driven by the program offices—astrophysics, Earth science, planetary, Mars, Interplanetary Network—which seed areas they feel are important for their strategies, for their future.

Another program is the topical R&TD grants, which typically fund single investigators—a "bottom up" kind of approach instead of more of a top-down flavor we get in the strategic proposals, where it's the program offices, the management looking to see what they need.

WHAT OTHER RESOURCES ARE AVAILABLE?

The Center Innovation Fund, which we get from the technology program at NASA Headquarters, allows us to support technology development projects identified with the help of the division technologists. We also support a series of one-day workshops for JPLers that are focused on a specific technology or science/technology question. This gives scientists and technologists a chance to discuss a particular area of strategy for JPL. It helps us determine some of the interesting things we can be working on and can lead to proposals for the development of some of our programs, proposals to NASA, even to other agencies.

It's a way of stirring the pot, a way of fostering communication.

HOW MUCH OF JPL'S TECHNOLOGY WORK IS FOR ITS OWN MISSIONS? WHAT ABOUT ELSEWHERE IN NASA, OR DEFENSE/COMMERCIAL?

We do work on all of those. To oversimplify, there are two ways to think about technology: a "pull," where you're trying to solve a problem, execute a mission, so you need a widget that does X, but you don't have it, so you look for someone who can provide it.

The other way is a "push"—an idea comes to a bright person one morning in the shower. So you've got a solution, but now you need to know what the problem is, where this idea fits in the scheme of things. Will it go on a rover to Mars or stay closer to home and observe Earth?

At JPL we want to be doing both, but we especially want to have an environment where problems and solutions come together—to have a way of broadcasting to JPLers some of the more challenging problems and some of the clever ideas we've come up with, and how they might be built into the missions and instruments.

That, I think, is our biggest challenge: learning how to do that well.

News Briefs

Jeff Plaut

JPL will lead icy experiment

NASA has selected key contributions to a 2022 European Space Agency mission that will study Jupiter and three of its largest moons in unprecedented detail.

NASA will contribute one U.S.-led science instrument—to be led by JPL—and hardware for two European instruments to fly on ESA's Jupiter Icy Moons Explorer mission. Jeff Plaut of the Planetary Science Section will be the U.S. lead for the Radar for Icy Moon Exploration experiment. The principal investigator is Lorenzo Bruzzone of Universita degli Studi di Trento in Italy.

Under the lead of Bruzzone and the Italian Space Agency, JPL will provide the transmitter and receiver hardware for a radar sounder designed to penetrate the icy crust of Jupiter's moons Europa, Ganymede and Callisto to a depth of about five miles (nine kilometers). This will allow scientists to see for the first time the underground structure of these tectonically complex and unique icy worlds.

The mission will carry 11 experiments developed by scientific teams from 15 European countries, the United States and Japan.

The spacecraft is scheduled to orbit Jupiter for three years and travel past Callisto and Europa multiple times, then orbit Ganymede, a moon larger than the planet Mercury. The spacecraft is scheduled to arrive at the Jupiter system in 2030.

Three awards for Curiosity

The National Space Club will honor JPL's Curiosity/Mars Science Laboratory team with three awards, including the prestigious Dr. Robert H. Goddard Memorial Trophy.

The Goddard Trophy recognizes the team for significant contributions to developing the most capable deep-space mission ever and initiating the most ambitious science mission ever conducted on the surface of another planet.

The team will also receive the organization's Nelson P. Jackson Aerospace Award for its significant role in successfully landing on and exploring the Martian surface.

In addition, Mars Science Lab Project Manager Richard Cook will receive the Astronautics Engineer Award for his personal engineering leadership as both the mission's flight systems manager and project manager.

The awards, offered to recognize significant achievements in space science and enterprise, will be presented at a ceremony in Washington, D.C. on March 22. The award recipients are selected by panels of experts from across the aerospace and defense industry.

JPL social media success noted

Veronica McGregor, manager of JPL's Media Relations Office, will receive the 2013 Space Communicator Award from the Space Center Rotary Club of Houston's Rotary National Award for Space Achievement Foundation.

Using platforms such as Twitter, Facebook, You Tube and Ustream.tv, she has led JPL's social media team in delivering NASA content to wider audiences than ever before, including @MarsPhoenix on Twitter in 2008 and NASA's first "tweetup" at JPL in 2009. Also that year at JPL was NASA's first Ustream.tv channel that enabled viewers to ask questions directly during live events.

Veronica McGregor

The Space Communicator Award was created in honor of Houston space reporter Stephen Gauvain, who died in 1996, and is presented to an individual or team that makes exceptional contributions to public appreciation of space exploration.

McGregor, a former producer for CNN, in 2010 earned a NASA Honor Award for Social Media Development and the NASA Exceptional Achievement Medal. Also in 2010, Forbes.com listed her as one of the "20 Inspiring Women to Follow on Twitter."

She will receive the Rotary award April 26 in Houston.

Oberhettinger will chair engineering symposium

David Oberhettinger, manager of the Engineering Standards Office, in January was selected as the general chair of the 60th annual Reliability and Maintainability Symposium, to be held in Colorado Springs, Colo., in January 2014.

Oberhettinger is the JPL acting chief knowledge officer. He also serves as manager of the JPL Engineering Standards Office, chair of the JPL Lessons Learned Committee and program manager for JPL engineering research sponsored by the NASA Office of the Chief Engineer.

David Oberhettinger

JPLers earn fellow designation

Michel Ingham (organization 313), John M. Carson III (344), Thomas Cwik (770) and Jeffery L. Hall (347) were among the aerospace professionals honored as new Associate Fellows of the American Institute of Aeronautics and Astronautics.

Ingham (left) and Carson received the award at the January Aerospace Sciences Meeting in Grapevine, Texas.

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Passings

Kermit Pederson, 82, retired from the Spacecraft Telecommunications Equipment Section, died Dec. 20.

Pederson worked at JPL from 1981 to 2002. He is survived by his wife, Vivian; daughters Jill and Jody; six grandchildren and one great-grandson.

Bob Farrell

Retiree **Bob Farrell**, 86, died Jan. 24.

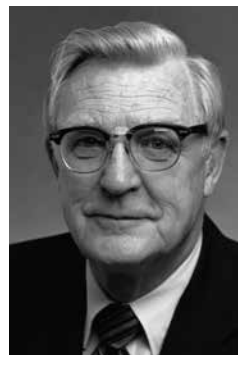
Farrell started at JPL in 1949 as an engineering technician and fabricator, by the 1960s became a section administrator, and ended his career as the business administration manager for the Observational Systems Division. He retired in 1991.

Farrell is survived by children Sue, Gary and Kathy, and four grandchildren.

Thomas Laney, 89, a retired mechanical engineering supervisor, died Jan. 25.

Laney worked at JPL from 1968 to 1990. He contributed to JPL missions including Ranger 6 through 9, Mariner 9 and 10, Viking, Voyager 1 and 2, and the Infrared Astronomical Satellite.

He is survived by his wife, Evelyn; sons John, David and Tim; daughters-in-law Peggy, Marca and Kim; and eight grandchildren.



Robert Steinbacher

Robert Steinbacher, 85, retired project scientist for the Mariner Mars 71 project, died Feb. 6.

After joining JPL in 1952, Steinbacher was initially involved in wind tunnel studies, and later worked in instrument development. In 1972 he earned the NASA Exceptional Scientific Achievement Medal. He retired in 1994.

Steinbacher is survived by his wife, JoAnne, nine of his 10 children, 21 grandchildren, and 12 great-grandchildren. Memorial services were held at Sacred Heart Church in Altadena.

Letters

To all my friends, colleagues and co-workers at JPL, my wife, Mary, who fought cancer for nine, long years, enduring countless chemos and surgeries, passed away peacefully on Jan. 15. Thanks to JPL, the Finance Division, the General Accounting Group, the Cost Accounting Group and the Financial Planning Group for the cards, gifts, plants, remembrances and sympathies. All this outpouring of support has made everything just a little bit easier for the entire family. Thank you all so much.

Rob Miller

I would like to thank my co-workers in the Chief Engineer's Office for the beautiful plant that was sent to me on the passing of my father, Hugh McGrath. Thank you also to those at JPL with their kindness shown to me in thought, word and deed. It is very much appreciated during this difficult time and will be forever remembered. My father and I spoke a lot in his last few months about JPL, space, time and passing. Now, he's in the stars instead of just looking at them.

Maeve McGrath

Many thanks to JPL for the beautiful lemon lime dracaena plant. Every time I look at its vibrant colorful leaves, I am reminded of my sister Shelly's beautiful and bright spirit. I would like to extend a very big thank you to my JPL family, specifically my group in Cost Accounting and the wonderful people of Payroll and Labor Accounting, Financial Accounting and Cash Management, and Financial Accounting and Analysis groups. From the beautiful cards, to the fragrant flowers, to the personalization of an exquisite silver engraved picture frame, your thoughtfulness is so touching. Everyone has been so loving and supportive in helping me through this difficult time and it is greatly appreciated. Although I know she is no longer in pain, our pain is somewhat more bearable knowing she is now with Mom and Dad and our oldest sister Linda. With gratitude,

Natalie M. Sucher

Retirees

The following employees retired in February: **William Harris**, 55 years, Section 383; **Robert Mitchell**, 48 years, Section 450; **Stuart Imai**, 45 years, Section 268; **Joseph Beerer**, 43 years, Section 490; **Leslie Zoltan**, 39 years, Section 3464; **Alfred Ziegler**, 35 years, Section 160; **Paulett Liewer**, 33 years, Section 326; **Mark Milman**, 33 years, Section 3443; **Charles Simon**, 31 years, Section 252D; **William Rafferty**, 28 years, Section 900; **Rebecca Klages**, 23 years, Section 2144; **Linda Herrell**, 22 years, Section 335; **Charmaine Mayes**, 21 years, Section 702; **Ann Sweetnam**, 20 years, Section 200.