

SPACE AT THE TOP

Women have long been an integral part of NASA's history and heritage. **Meet four** who are helping to propel the agency into the future.

By Stephanie Anderson Witmer

TIFFANEY MILLER ALEXANDER

POSITION: Lead quality engineer
LOCATION: Kennedy Space Center (KSC), Cape Canaveral, Fla.
EDUCATION: B.S., electrical engineering; M.S., industrial engineering; Ph.D. candidate, industrial engineering, all from University of Central Florida
Has worked at KSC since 1999 and NASA since 2007

For as long as she can remember, Tiffany Miller Alexander has been fascinated by electricity and figuring out how things work. Growing up in Florida, she often took apart electronic devices and put them back together. "I loved music, and I would just look at the radio and want to know how it was working," she said. "I wasn't satisfied with just seeing the surface."

By age 11, that natural curiosity turned into a fully realized career path when a family friend explained to her what engineers did for a living. The woman told her engineers not only built and repaired things but also designed them. "I said, 'Oh, that's what I want to do then. I want to be an engineer,'" Alexander said.

She began her career at Kennedy Space Center in 1999 working as a payload electrical systems engineer for Boeing. For eight years, she tested International Space Station (ISS) payloads by using various ground support equipment to ensure electrical power remained stable throughout all integrated and standalone payload systems. During her time with the company, she

was nominated for the Boeing Florida Space Coast Operations Engineer of the Year award — the youngest and first female engineer to be a top-10 finalist.

In 2007, she was hired by NASA as a quality engineer for the space shuttle program. Three years later, she served in a safety mission assurance management position for the shuttle's final mission, STS-135, where she led the safety director's effort to ensure the resolution of all critical safety and quality issues affecting the space shuttle vehicle prior to flight.

When the shuttle program ended, Alexander transitioned into a different job: Safety and Mission Assurance Manager for Shuttle Transition and Retirement, coordinating and ensuring the safe transport of all decommissioned space vehicles to their final locations.

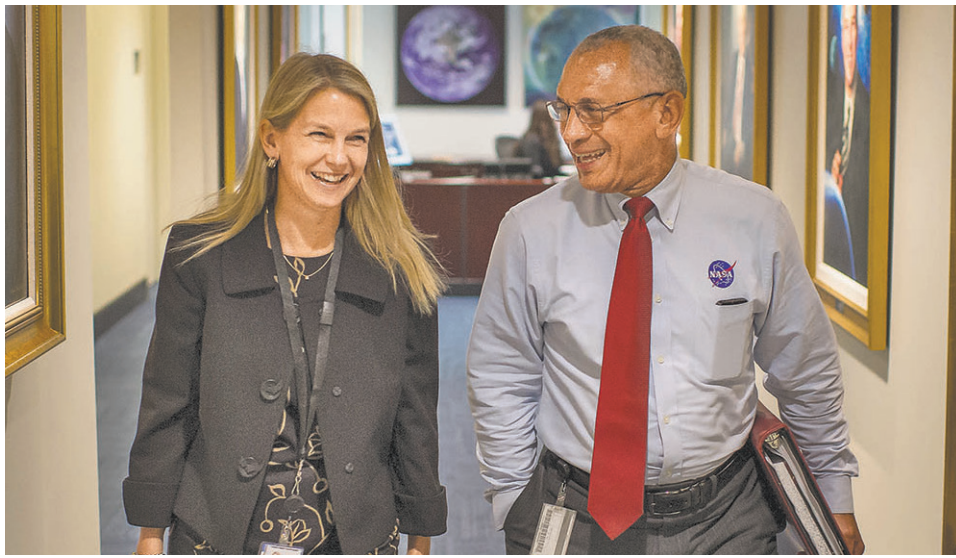
Currently, she is a NASA safety and mission assurance lead quality engineer for the Ground Systems Development & Operations (GSDO) Program, working with the Space Launch System and Orion spacecraft missions.

Though she loves building, repairing and designing equipment for space exploration, one of her favorite parts of the job is serving as a member of the Kennedy Space Center's speakers bureau, which allows her to visit schools and talk to kids about space and STEM.

"I try to encourage young people to go into engineering if they love math and science and to not be afraid of it," she said. "While I'm out there, I try to give an extra push for girls to let them know, 'You can do it. Don't be intimidated because you have a lot of guys in engineering. It's for girls, too. We can do it, too.'"

As a lead quality engineer at NASA, Tiffany Miller Alexander has supported multiple shuttle launches.





BILL INGALLS/NASA

NASA Deputy Administrator Dava Newman joins NASA Administrator Charles Bolden Jr. in helping to lead the 57-year-old space agency.

DAVA NEWMAN

POSITION: Deputy administrator of NASA

LOCATION: NASA headquarters, Washington, D.C.

EDUCATION: B.S., aerospace engineering, University of Notre Dame; M.S., aerospace engineering; M.S., technology and policy; Ph.D., aerospace biomedical engineering, Massachusetts Institute of Technology

Has worked at NASA since May 2015

Dava Newman has always been an explorer at heart, fascinated with travel by land, sea and air. As a child, she roamed the wide-open spaces of her native Montana and was amazed by the Apollo 11 mission she watched at age 5.

"It told me everything was possible: exploration, space travel, Americans landing on the moon," she said. "It was very influential in opening up my eyes and my mindset to say anything is possible."

She left Big Sky Country to study what lay beyond the sky, embarking on a career in aerospace engineering and teaching. Just prior to assuming the role as deputy administrator of NASA ("The shorter title is 'No. 2,'" she joked), she served as the Apollo Program Professor of Astronautics at MIT — a position named for the very mission that first captured her imagination and inspired her career in space. "It's one of those wonderful full-circle things," she said.

Although Newman is a relatively new NASA employee, she's no stranger to the

agency. She's spent her career conducting spaceflight experiments, with four flown in space since 1992.

The first, on shuttle mission STS-42, investigated how microgravity affects astronauts' short-term memory and physical body.

The next two experiments used smart sensors embedded into handhelds and foot restraints (on STS-62 and on NASA-Mir missions) to measure the reaction load of astronauts and their motor control strategies as they moved around the payload bay. The research gauged how long it took astronauts to fully adapt to the microgravity environment. Another one of her projects, the Gravity-Loading Countermeasure Skinsuit, is slated to fly in September on the ISS.

Though her appointment ends when President Obama leaves office in 2017, Newman has her gaze fixed on Mars.

"I'm specifically concentrating on technology and innovation (related to the journey to Mars)," she said. "I'm equally passionate about education and outreach and inspiring and engaging the next generation of engineers and scientists, designers and artists."

In fact, Newman does

a lot of education, speaking to groups and schools regularly about NASA and the journey to Mars. She often shares one of her favorite quotations, by Eleanor Roosevelt: "The future belongs to those who believe in the beauty of their dreams."

The line is meant to not only inspire others — especially young people — to follow their dreams, but also to encourage us to reflect on what happens when we do: "It kind of summarizes where I'm at, and what I get to do on a daily basis," she said.

"(The Apollo Mission) was very influential in opening ... my mindset to say anything is possible."

Kidney stones kept Ginger Kerrick from becoming an astronaut, but not from helping her direct missions from Earth.



NASA

GINGER KERRICK

POSITION: Flight operations directorate assistant director for International Space Station

LOCATION: Johnson Space Center, Houston

EDUCATION: B.S., physics; M.S., physics, Texas Tech University; pursuing M.B.A. from University of Houston–Clear Lake

Has worked at NASA since 1991

Ginger Kerrick was 5 when she decided she wanted to be an astronaut. It was during the era of Skylab, NASA's first space station, and she was awestruck by the astronauts' work and dedication aboard the craft.

The fascination continued: She collected astronaut Snoopy figurines and stopped in the local library every Friday to check out the same book about astronomy and astronauts.

And while her friends received cars as high school graduation gifts, she got a trip to visit Johnson, Kennedy and Marshall space centers. It was then she determined she wanted to work at Johnson, in her home state of Texas.

Kerrick realized that dream in 1991 when she began working as a paid intern/co-op just after graduating from Texas Tech University. But the goal to become an astronaut — the plan Kerrick had so carefully crafted for herself from the time she was a child — didn't pan out the way she'd hoped.

In 1995, Kerrick made it through the astronaut application and interview process, but a medical exam found kidney stones, which she didn't know she had.

She was immediately disqualified from ever being an astronaut because of it. The disappointment, she said, was "tragic."

Impressed by Kerrick, the head of the astronaut selection office helped her figure out a way to turn a temporary position, in which she instructed astronauts about environmental control and life-support systems aboard the ISS, into a permanent one.

"That's what sealed the deal for me," Kerrick said. "Even if I couldn't be an astronaut, at least teaching them (made me feel) like I was contributing to their success."

From there, her star rose quickly. She accumulated a list of groundbreaking "firsts." Handpicked by Capt. William Shepherd, commander of the ISS Expedition-1 crew, Kerrick filled a brand-new position training the first crew of Russian cosmonauts and American astronauts about the life-support systems aboard ISS.

In 2001, Kerrick was selected as the first non-astronaut to serve as the capsule communicator at mission (CAPCOM) control.

Later, she thought she'd also like to try her hand at being a flight director. "I applied, and I got in," she said. "Not only was I the first CAPCOM to do that, but I was also the first female Hispanic flight director."

Eventually, she added another Snoopy to her longtime collection: the prized NASA Silver Snoopy award, which is given to NASA employees by astronauts in recognition of outstanding achievement related to mission success or human flight safety.

Kerrick said she is most proud of this award. "I thought, 'Whoa, this is a sign I'm really supposed to be here,'" she said. "They give away Snoopys!"

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NASA/DOMINIC HART

As a principal investigator at NASA Ames Research Center in California, Sharmila Bhattacharya studies fruit flies and yeast cells to better understand how spaceflight and changes in gravity may alter human biological systems.

SHARMILA BHATTACHARYA

POSITION: Senior discipline scientist and principal investigator

LOCATION: NASA Ames Research Center, Moffett Field, Calif.

EDUCATION: B.S., biological chemistry, Wellesley College; M.S., and Ph.D., molecular biology, Princeton University; post-doctoral research in neurobiology and molecular biology, Stanford University

Has worked at NASA since 1999

To most people, fruit flies are nothing more than annoying little bugs that turn up when the bananas on the kitchen counter get too ripe. But for Sharmila Bhattacharya, those tiny insects are important vessels of information about the human body and what happens to it during spaceflight.

You might even say she owes her career to the critters. Bhattacharya's doctoral and post-doctoral research revolved around yeast cells and fruit flies, respectively. One day, while browsing job ads in the news-

paper, she found a listing for a molecular biologist who had experience working with yeast cells and fruit flies. The employer? NASA Ames. "I couldn't believe it," she said. "It was really specific. I almost thought to myself, 'How do they know I'm reading this?'"

At NASA Ames, Bhattacharya runs two laboratories where she and her colleagues use fruit flies and yeast cells to understand how the spaceflight environment and altered gravity affect a human being's immune, cardiovascular and other biological systems. Why those organisms? Fruit flies, Bhattacharya said, may not resemble humans, but their genomic profile is actually an almost 77 percent match to a mammal's. Plus, they're lightweight and super-small, so a sample of thousands can fly to space in a tiny box that takes up very little room on the spacecraft.

Yeast, too, has a similar cell structure to a human's, and it has the advantage of being able to be kept dry for long periods of time.

"Sometimes if you send it on a rocket and it's going around the sun or going into deep space, you won't get the power to turn it on for four to six months before you can do your experiment," she said. "Most other biological systems are not hardy enough to tolerate that."

Bhattacharya credits her high school biology teacher in India for her interest in the field. "She was a wonderful teacher,

and she clearly loved the subject herself and infected us with that enthusiasm when she taught," she said, "so much so that I can even remember graphics from my high school biology textbook that showed how the human inner ear works. I remember just being amazed at the complexity of biological systems." Bhattacharya's own enthusiasm for science is apparently just as catching. "I have one daughter, who's 17," she said. "I started working at NASA when she was 1 year old. She's interested in biology as well, so I'm excited." ●

"I remember just being amazed at the complexity of biological systems."

WHAT'S YOUR BEST ADVICE TO YOUNG WOMEN WHO HAVE AN INTEREST IN SPACE?



"Find someone who's living your dream. Find out what they did so you can do the same things.

Even find out the mistakes they made so you can try to avoid those mistakes. When you see someone already living your dream, it inspires you and encourages you that you can do it."

— Tiffaney Miller Alexander



"Go for it. I get to talk to a lot of children and try to make sure they dream big and they know that NASA exploration and what we do on a daily basis is for them."

— Dava Newman



"Most people associate NASA with (the saying) 'Failure is not an option.' Failure actually is an option and,

frankly, it's inevitable. But if you're going to be a good leader of yourself and other people, it's how you respond to that failure that determines your fate and whether or not people will want to continue to follow you."

— Ginger Kerrick



"Work hard. Research and read about topics that interest you. Look for internships and get

real-world experience when you can. Be patient when things don't go the way you want them to go. Know that obstacles are part of every journey, so don't let them get you down. Most of all, remember that science is really fun. It's never dull or boring."

— Sharmila Bhattacharya