

# Astronomers fret over Webb Telescope's future

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Congressional wrangling over the future of the overdue, over-budget James Webb Space Telescope has split astronomers in a struggle over billions in funding.

Astrophysicists worry that action in the U.S. House to eliminate funding for the Webb project would extinguish a century-long quest for knowledge about the origins of the universe, just as it seemed to be headed for new triumphs.

"The project is the core of astronomy; not only astrophysics, and not just in the U.S., but in the world," said [astrophysicist](#) Alan Dressler of the Carnegie Institution of Washington. Canceling the project, he said, would lead to "a 20-year setback in astrophysics."

"It's that serious," he said.

Planetary scientists, on the other hand, fret that an effort by NASA and Webb boosters to save the orbiting observatory with still more infusions of cash will siphon federal dollars away from their own programs, such as the [robotic exploration](#) of the planets.

The estimated total cost of the Webb project, from design through five years of orbital operations, has ballooned from \$1.6 billion as proposed in the 1990s, to \$8.7 billion in the latest estimate. About \$3.5 billion has been spent so far, 20 percent of it paid for by European and Canadian space agencies. The launch date has slipped seven years, to 2018.

Even after his House subcommittee "zeroed out" Webb funding in the House version of NASA's budget in July, Republican Rep. Frank R. Wolf of Virginia insisted it's never been his goal to scuttle the project.

"I don't want to kill James Webb," said Wolf, chairman of the subcommittee. "I think the James Webb is very important. ... I think it will be resolved."

But Wolf said his panel intended to send a message. He said he believed that NASA's top officials were "hiding" cost overruns and launch delays from his subcommittee, and that they still haven't said which programs they propose to cut, or "offset," to keep Webb afloat.

Wolf says his subcommittee has other agency budgets to worry about, such as the National Science Foundation and the FBI. Together, those agencies are allocated \$546 million less in the Senate version of the 2012 budget than in his House version, while Webb gets a \$41 million raise to \$530 million.

"I can't fund just James Webb and nothing else," he said. "We're waiting for answers from NASA."

Scientists have named the Webb telescope as the top priority in their last two "decadal surveys" - a "to do" list drawn up by consensus every 10 years. It would be bigger and 10 times more powerful than the 21-year-old Hubble Space Telescope, able to see more of the earliest stars and galaxies, in greater detail.

The American Astronomical Society warned in July that killing the Webb "would waste more taxpayer dollars than it saves, while simultaneously undercutting the critical effort to utilize American engineering and ingenuity to expand human knowledge."

The 6.8-ton observatory is designed to fly a million miles from Earth, unfold its 21-foot-diameter mirror, open a sunshade the size of a tennis court to cool its infrared sensors to minus-387 degrees Fahrenheit, and go to work.

Astronomers hope the Webb's giant mirror and its view of the universe in infrared wavelengths will reveal some of the first galaxies that formed after the Big Bang, perhaps Earth-like planets circling in the dusty disks around nearby stars, and much more.

By all accounts, the telescope itself is in good shape. Its optics are complete and ready for testing, said Eric P. Smith, deputy director of the Webb program at NASA headquarters. Its scientific instruments will arrive at Goddard next year for integration and testing. And a contractor in Huntsville, Ala., is testing a mock-up of the observatory's sunshade.

The Webb's woes are rooted, instead, in its budget and its management.

After Wolf's House Subcommittee for Commerce, Justice, Science and Related Agencies deleted ongoing Webb funding for 2012, the project found friends in the Senate's counterpart subcommittee. On Sept. 14, they provided \$530 million in the Senate version to keep Webb moving toward a launch. That was \$41 million more than it received in 2011, and about \$150 million more than the Obama administration had requested.

It was no surprise: Maryland Democratic Sen. Barbara Mikulski chairs the subcommittee. Hundreds of Maryland jobs are at stake, among roughly 1,200 people in all working on the project. Mikulski's Senate panel nevertheless voted to cut NASA's overall, \$16.8 billion budget for 2012 by \$509 million.

Mikulski was not blind to the Webb's problems. As her subcommittee

acted, she noted that "we have added stringent language, limiting development costs." And she asked for "a report from senior management, ensuring that NASA has gotten its act together in managing the telescope."

It must have sounded like an echo to many. In 2005, the program's projected costs had grown from \$1.6 billion to \$3.5 billion, with a launch date in 2013. A "shocked" Mikulski demanded "nothing less than a thorough and independent review to get to the bottom of these problems, and fix them," she said.

A year later, the Government Accountability Office rapped NASA's management of the program. And in November 2010, an independent cost review panel initiated by Mikulski reported that the Webb's ultimate costs had grown to \$6.5 billion and the launch date had slipped to 2015.

A year later, NASA is estimating the Webb's ultimate cost at \$8.7 billion, with launch no earlier than 2018.

Cancellation would be a huge blow to astrophysics. John Mather, the senior project scientist on the Webb and a 2006 Nobel laureate in physics, said it will reveal things beyond the reach of the Hubble Space Telescope - the beginnings of the universe, secrets of "dark energy" and "dark matter," the earliest galaxies.

Dressler, of the Carnegie Institution, said the observatory needed to be completed and launched. Nearly a century after astronomers discovered that galaxies are vast "cities" of stars far beyond our own Milky Way galaxy, he said, "we are about to take our first data on the births of galaxies. ... And all of a sudden we stumble?"

He recalls that colleagues questioned how NASA could build the Webb at the cost the agency initially projected, but he said they did not feel

qualified to challenge the number. "I still think about that: How could we have said, 'This doesn't sound plausible?' "

Meanwhile, planetary scientists worry that saving the Webb will suck cash from NASA's budget for their much smaller, unmanned missions to the planets, asteroids and other objects in the solar system.

In a recent statement, the Planetary Science division of the American Astronomical Society reminded Congress of the "scientific bounty reaped by planetary missions in the last decade," including unmanned voyages to Mars, Saturn, Mercury, the moon and the asteroid Vesta.

The division asked that in forthcoming budget discussions, "the clear priorities of the planetary science community be kept in mind and prudent investments continue to be made to support America's scientific future."

It's not clear how that will shake out.

The [space agency](#) has proposed to make up about \$80 million of the Webb's cost overruns for 2012 by taking money from three NASA science divisions. Another \$80 million would come from infrastructure and management budgets at NASA centers. Officials say the details of program cuts haven't been worked out.

Jonathan Lunine, a Cornell University astronomer who serves on the Webb Science Working Group, argues that the Webb will also have "a tremendous ability to look at our own solar system, and at planets around other stars."

"One expects that a large amount of telescope time on [James Webb Space Telescope](#) will go to planetary topics inside and outside our solar system," Lunine said.

Still others worry about the appearance of a split in their ranks.

"We're all scientists here," said Sara Seager, an astronomer at the Massachusetts Institute of Technology who studies planets circling nearby stars. "I would hope that planetary scientists and the astrophysics community would have a common statement (on the Webb), and we don't have that."

Roger Launius, chairman of the Division of Space History at the National Air and Space Museum, said Webb's cost overruns are really no surprise.

"It's not uncommon to see cost overruns on things we fully understand," he said. He cited Boston's "Big Dig." That project, to bury a network of elevated downtown highways, went nine years and \$6 billion over budget.

"It's not just a NASA problem. ... Corporations run into the same thing. Look at any movie being produced," Launius said.

Why? "It's a real good question. Perhaps it's an optimism we have that we can make this happen, and we won't run into problems."

Add cutting-edge technology - Webb required the invention of 10 technologies - and the complexity, problems and delays only multiply. Managers must then weigh whether to throw in more money or pull the plug.

Outright cancellation is "pretty rare," Launius said. But it happens. The Super-conducting Supercollider was a big U.S. particle accelerator project, launched under the Reagan administration. It was scrapped in 1993 after costs soared from \$4.4 billion to \$12 billion.

During the same period, the Hubble Space Telescope flew at quadruple its original budget, with a mirror flaw that threatened to cripple its scientific potential. Yet [NASA](#) spent billions more to install a fix in 1993, and astronauts flew four more servicing missions to repair and upgrade the observatory.

Launius said, "Ask virtually anybody on the street and they'd tell you what a stunning success it's been, and they've either forgotten, or never knew, we had all those problems with it."

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