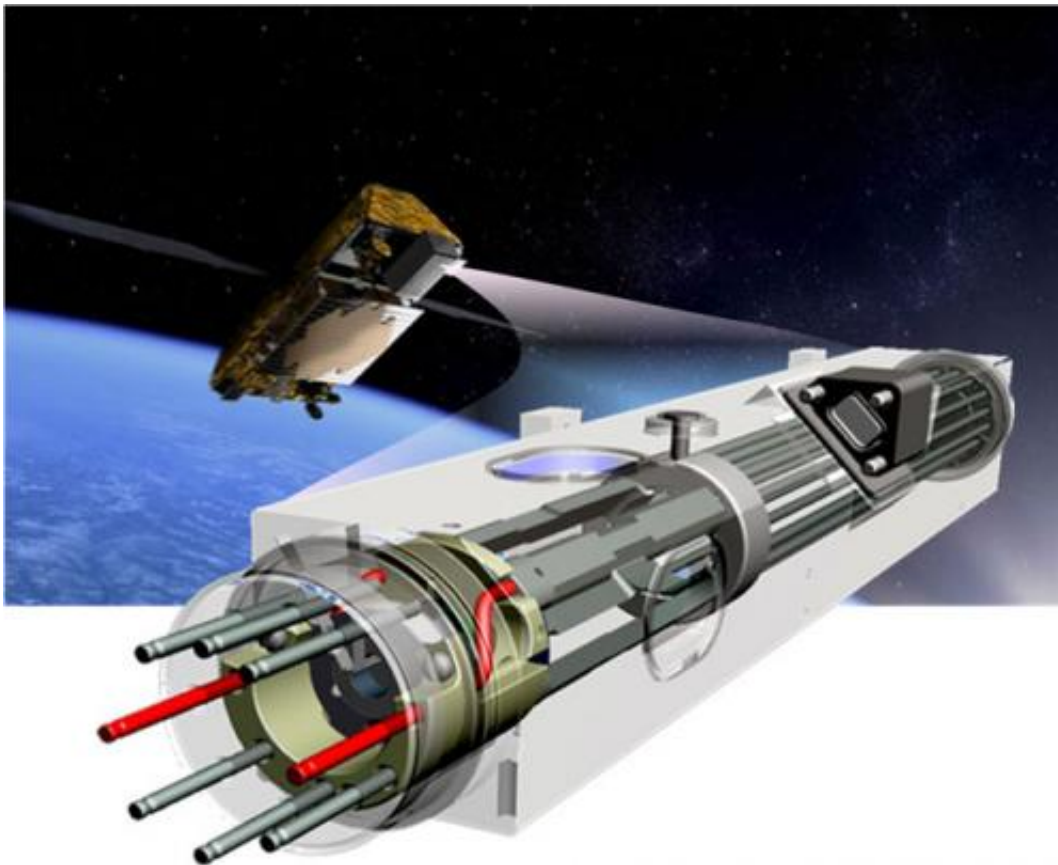


# NASA picks three proposals for flight demonstration

August 23 2011, By Priscilla Vega, Jane Platt and David E. Steitz

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The device 'swooshing' into a satellite is the vacuum tube, one of the main components of an atomic clock that will undergo a technology flight demonstration.

NASA has selected three proposals, including one from NASA's Jet Propulsion Laboratory in Pasadena, Calif., as Technology Demonstration

Missions to transform space communications, deep space navigation and in-space propulsion capabilities. The projects will develop and fly a space solar sail, deep space atomic clock, and space-based optical communications system.

These crosscutting flight demonstrations were selected because of their potential to provide tangible, near-term products and infuse high-impact capabilities into NASA's future space operations missions. By investing in high payoff, disruptive technology that industry does not have today, NASA matures the technology required for its future missions while proving the capabilities and lowering the cost of government and commercial space activities.

"These [technology demonstration](#) missions will improve our communications, navigation and in-space propulsion capabilities, enable future missions that could not otherwise be performed, and build the technological capability of America's space industry," said NASA Chief Technologist Bobby Braun at NASA Headquarters in Washington.

"Optical communication will enable rapid return of the voluminous data associated with sending spacecraft and humans to new frontiers. High-performance atomic clocks enable a level of spacecraft navigation precision and autonomous operations in [deep space](#) never before achieved, and solar sails enable new [space missions](#) through highly efficient station-keeping or propellant-less main propulsion capabilities for spacecraft."

The proposals selected for demonstration missions are:

- Laser Communications Relay Demonstration, David J. Israel, principal investigator at NASA's Goddard Space Flight Center in Greenbelt, Md.
- Deep Space [Atomic Clock](#), Todd Ely, principal investigator at the California Institute of Technology/NASA's Jet Propulsion Laboratory in Pasadena, Calif.

-- Beyond the Plum Brook Chamber; An In-Space Demonstration of a Mission-Capable Solar Sail, Nathan Barnes, principal investigator at L'Garde Inc., of Tustin, Calif.

Technology Demonstration Missions are a vital element in NASA's space technology maturation pipeline. They prove feasibility in the environment of space and help advance innovations from concept to flight and use in missions. The advances anticipated from communications, navigation and in-space propulsion technology will allow future NASA missions to pursue bolder and more sophisticated science, enable human missions beyond low Earth orbit, and enable entirely new approaches to U.S. space operations.

The Laser Communications Relay demonstration mission will fly and validate a reliable, capable, and cost-effective optical communications technology. Optical communications technology provides data rates up to 100 times higher than today's systems, which will be needed for future human and robotic space missions. The technology is directly applicable to the next generation of NASA's space communications network. After the demonstration, the developed space and ground assets will be qualified for use by near-Earth and deep space missions requiring high bandwidth and a small ground station reception area.

The Deep Space Atomic Clock demonstration mission will fly and validate a miniaturized mercury-ion atomic clock that is 10-times more accurate than today's systems. This project will demonstrate ultra-precision timing in space and its benefits for one-way radio navigation. The investigation will fly as a hosted payload on an Iridium spacecraft and make use of GPS signals to demonstrate precision orbit determination and confirm the clock's performance. Precision timing and navigation is critical to the performance of a wide range of deep space exploration missions.

The Solar Sail demonstration mission will deploy and operate a sail area 7 times larger than ever flown in space. It is potentially applicable to a wide range of future space missions, including an advanced space weather warning system to provide more timely and accurate notice of solar flare activity. This technology also could be applied to economical orbital debris removal and propellant-less deep space exploration missions. The National Oceanic and Atmospheric Administration is collaborating with NASA and L'Garde Inc. on the demonstration.

The clock and solar sail will be ready for flight in three years. The optical communications team anticipates it will take four years to mature the technology for flight. NASA's Office of the Chief Technologist plans to make a total investment in these three missions of approximately \$175 million, contingent on future appropriations. Each of the selected teams also will receive funding from partners who plan on using the technologies as part of future space missions.

Projects include all elements of the flight test demonstration including test planning, flight hardware, launch, ground operations, and post-testing assessment and reporting. Each team has proposed between one and two years of spaceflight operations and data analysis. To reduce cost, the technology demonstrations will ride to [space](#) with other payloads aboard commercially provided launch vehicles. Launches are anticipated in 2015 and 2016.

The Technology Demonstration Missions program is managed by NASA's Office of the Chief Technologist. For more information about the program, visit: [www.nasa.gov/oct](http://www.nasa.gov/oct) .

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