

Planetary Society hopes tiny satellite sets sail above Earth

July 30 2014, by Chad Garland, Los Angeles Times

Satellites about the size of a loaf of bread may one day explore space, propelled across the vast expanse by an unfurled sail.

That's the vision of the Planetary Society, a Pasadena, Calif., group that has been leading the development of an experimental spacecraft that could sail into Earth orbit as early as 2016.

If successful, the sailing satellite, dubbed LightSail, could open the door to a new class of [space exploration](#), project manager Doug Stetson said. He said sails could be used to push tiny, relatively inexpensive satellites beyond Earth orbit or even into interstellar space to beam back what they discover.

Unlike most spacecraft, which are powered by [rocket engines](#) and cost hundreds of millions of dollars, these tiny satellites are expected to cost a few million dollars each and use the sun's energy to push them across space, where there's no wind.

"Light actually has momentum that can be transferred to an object," said Jason Davis, a spokesman for the Planetary Society, a nonprofit group that supports space exploration initiatives. "The benefit of the solar sail is you have unlimited energy from the sun to push it around."

The first of its kind, LightSail would be lifted into orbit aboard the SpaceX Falcon Heavy, a massive commercial rocket built by Hawthorne company Space Exploration Technologies Corp. that is expected to

launch in early 2016. Bill Nye, chief executive of the Planetary Society and the host of the former TV show "Bill Nye the Science Guy," confirmed this month that LightSail had been added to the rocket's manifest.

LightSail would hitch a ride on a larger satellite, Prox-1, which would demonstrate a method of inspecting objects in space up close. Hundreds of miles above the Earth, Prox-1 would eject LightSail, then get close enough to observe its sails being deployed.

The sail, once unfurled, would have the span of a boxing ring. LightSail will be a proof-of-concept vehicle to test the design and whether the technology would work to send future satellites to explore space.

The tiny satellite is in a class of so-called CubeSats, a standard developed at Cal Poly San Luis Obispo for building low-cost spacecraft from off-the-shelf parts. Each CubeSat is about the size of a small cube-shaped tissue box, and LightSail would comprise three cubes stacked together.

Because of their size, CubeSats can piggyback on larger, conventional missions launched by Russian firms, NASA and others. Rocket engines and fuel are often risky or impractical on nanosatellites, limiting what researchers can do with them.

CubeSats could be used to gather more data about the moon or Mars on the cheap, Davis said, but they need propulsion to get there. Sails made of reflective Mylar could be a low-cost, low-risk solution, he said.

The Planetary Society's first attempt to demonstrate solar sailing, known as Cosmos 1, was thwarted in June 2005 when the launch vehicle failed, plunging the \$4-million, 220-pound satellite into the Barents Sea.

In 2010, the Japan Aerospace Exploration Agency successfully launched

its nearly 700-pound solar-sailing Ikaros satellite to prove the technology, at least on a larger scale. It is currently circling the sun.

LightSail's demonstration mission is expected to last two months, but the satellite could stay in orbit for several years, depending on how high researchers are able to fly it.

Collaborating with the Planetary Society on LightSail are Cal Poly San Luis Obispo and California firms Ecliptic Enterprises Corp., Boreal Space and Stellar Exploration Inc. The project is expected to cost around \$4 million to complete - about one-fourth what Japan's Ikaros cost in 2010.

"This is very cheap for a spacecraft," Stetson said. "Anything in the single digit of millions is very cheap."

Much of that funding has come from donations from society members and space enthusiasts giving a little at a time, Davis said.

The Planetary Society envisions a day when university undergraduate students could build CubeSats that sail to the moon and beyond, as space exploration becomes more accessible and affordable.

"That's one of the goals of the Planetary Society," Stetson said, "to really bring space down to everyone."

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