

# Roaring to the Moon, Lunar Lion pays launch reservation fee

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The Lunar Lion, a Moon lander designed and built by the Penn State Lunar Lion team, the only university-led team in the Google Lunar XPRIZE competition, will be sent into space as part of a multiple spacecraft effort coordinated by a new player in the space industry, Team Phoenicia LLC, of Menlo Park, Calif.

The Lunar Lion team's fully refundable [launch](#) reservation fee has been paid to Phoenicia.

"Phoenicia has brought together a complementary set of payloads, filling a need in the industry," said Michael Paul, director of space systems initiatives at Penn State's Applied Research Lab.

Paul, who leads Penn State's team of researchers and students on the Lunar Lion mission, pointed out that this is a significant milestone for the project.

"This gives us the advantage of clear program planning and clear fundraising goals," he said. "It also means that the clock is ticking toward those goals."

Funding for the Lunar Lion mission, 90 percent of which must be derived from private sources according to competition rules, is coming through a mix of individual gifts and corporate support while leveraging existing assets at Penn State.

Phoenicia President William Baird said he spent many years seeking a launch opportunity as a secondary payload for his own team's entry into the Google Lunar XPRIZE. He realized secondary payloads were overly restricted and that today's payloads need more flexible options.

Those options were not yet available, so Phoenicia changed course, exiting the Google Lunar XPRIZE competition and choosing to fill this niche in the growing array of space launch services.

"The fundamental problem with launching to space is the cost of entry for new companies in the aerospace field," said Baird. "A small [launch vehicle](#) costs as much as \$10 million, and larger ones range from \$60 to \$120 million. Both these prices leave out additional processing costs which, when pulled together, represent a significant barrier to entry. Another model was and is needed. We believe, through aggregating payloads, we have found that model."

Under terms of an agreement between the parties, Phoenicia will contract with a launch vehicle provider and provide systems integration services for a launch to be shared by several [spacecraft](#), the largest of which being the Lunar Lion.

Additionally, Phoenicia is using a SHERPA, built by Spaceflight Inc., to accommodate additional secondary payloads to maximize the launch vehicle's full capacity. SHERPA, developed by Spaceflight's sister company, Andrews Space, accommodates payloads up to 660 pounds on each of five available ports, includes a propulsion system and links other subsystems to operate as both a hosted payload platform and an in-space maneuvering stage. Spaceflight will immediately make available ports on SHERPA to bring additional spacecraft to [low earth orbit](#) and a trans-lunar injection orbit.

"The cost saved by committing to this launch is considerable," said Paul.

"We initially used the listed cost of an entire launch vehicle in our fundraising targets and mission budget projections. Now we only have to target a fraction of that cost for launch and can apply our energy and funding to other areas of the mission."

Penn State is taking advantage of this unique opportunity to achieve a lunar trajectory without having to bear the full cost of the launch vehicle.

"While the Lunar Lion is the largest spacecraft on this launch, it will be accompanied by several mid-sized Earth satellites that will be placed in low Earth orbit," said Baird. "Once those customers' spacecraft have been released, the Lunar Lion will be pushed on to its lunar-intercept trajectory, accompanied by other payloads, including several CubeSats."

Those CubeSats, each about 2 pounds and 4 inches on a side, are built jointly by Tyvak Nano-Satellite Systems LLC and California Polytechnic State University - San Luis Obispo. The Tyvak-Cal-Poly CubeSats will be deployed from the launch vehicle using the Phoenicia Lunar Payload Delivery Rack.

The Google Lunar XPRIZE will be awarded to the first privately funded team to land a spacecraft on the Moon, move it 500 meters, and send back video, images and data before the end of 2015. No spacecraft has landed on the Moon since the Soviet Union's Luna 24 landed Aug. 22, 1976. To date, only spacecraft built by the Soviet Union and the United States have landed on the Moon, 19 in total between 1966 and 1976. The winner of the Google Lunar XPRIZE will be the first privately funded spacecraft to land on the Moon.

Provided by Pennsylvania State University

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