NASA SBIR Select 2014 Phase I Solicitation

Z20.01 Deep Space Cubesat Technology

Lead Center: ARC

Although many small satellites have been developed and flown in low Earth orbit, significant technology challenges exist for their operation in the deep space environment. Small spacecraft, on the cubesat scale, could potentially perform science and exploration missions of great interest to NASA at a very low cost. Small spacecraft in deep space might also provide support services for other spacecraft and operations such as communications relays or space weather sensors.

NASA expects that there will be opportunities to fly several 6U cubesat spacecraft as secondary payloads on launch vehicles that could deploy these payloads on Earth escape trajectories that would take them past the Moon. One specific possibility for such an opportunity for small secondary spacecraft deployments is the first test flight of the Space Launch System (EM-1). EM-1 or similar missions would provide an excellent opportunity for testing innovative spacecraft technologies in the deep space environment.

Proposals are sought for integrated spacecraft bus technologies such as guidance, navigation, control, power, propulsion, communications, thermal control, and radiation protection to enable a technology flight demonstration mission in deep space. The integrated design should enable a flight demonstration of one or more of these technologies on a cubesat (6U or smaller) in the 2017 timeframe. The flight demonstration should include mission objectives that are relevant to a deep space mission such as remote sensing or in situ science data collection activities. The development of an appropriate propulsion system to enable maneuvers such as lunar orbit insertion is also of interest. In order to minimize development cost and schedule, the design of this deep space cubesat technology demonstrator should employ mature components where possible along with the necessary new technology to allow for this very small spacecraft to survive and operate effectively in the deep space environment and communicate with Earth from the distance of the Moon and beyond.

Phase I projects should focus on the definition and initial development of the needed technologies for a deep space cubesat technology demonstrator. In Phase II, the technologies should be further developed and demonstrated in relevant laboratory environments such as thermal-vacuum chambers. Projects showing sufficient merit will be considered for subsequent Phase II-E or II-X and Phase III funding to support development and qualification of a flight unit for a deep space technology demonstration mission.