

19th SYMPOSIUM ON SMALL SATELLITE MISSIONS (B4)  
Hitchhiking to the Moon (8)

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AN AFFORDABLE PARADIGM OF HITCHHIKER LUNAR AND PLANETARY SPACECRAFT FOR  
EXPLORATION AND COMMERCE

**Abstract**

A number of groups and teams world-wide are defining a new paradigm of low cost spacecraft missions which “hitchhike” to their cislunar and translunar objectives on launch vehicles heading to LEO, GTO, GEO or lunar trajectory and which use a variety of approaches for affordable exploration. These save considerably on the launch costs of such secondary missions. Significantly lower prices can in turn make more frequent exploration and commercial missions possible beginning in cislunar space. For more than a decade new concepts like the cube satellite standard have revolutionized aerospace engineering education by providing affordable opportunities for students developing short duration missions in LEO. These small hitchhikers however are low cost because of their use of less expensive commercial off the shelf components rather than space qualified hardware – proven for shorter mission durations lasting from just a few weeks to months or even a few years. Groups or teams wanting to pioneer low cost approaches to reach farther out to the Moon or even deep space have envisioned a number of additional mission approaches and technologies to limit their mass budgets.

The paper will discuss such paradigm shifting topics in fields like mission concepts and design, navigation, communication, chemical, electric and unconventional propulsion, microelectronics, software and miniaturized components, as well as education and outreach activities and flight opportunity programs like the Google Lunar X-PRIZE.