

Interactive Presentations (IP)
Topic 6 - Interactive Presentations (6)

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LAPLAS (LASER ABLATION PROPULSION LAUNCH SYSTEM) – A NEW PARADIGM FOR
ACCESSING LEO SAFELY, ON-DEMAND, SSTO AND LOW-COST.

Abstract

The current technological paradigm of launching payloads to Earth's orbit is fully based on the chemical rocket propulsion. Due to the unfortunate combination of the inherently modest specific impulse (≈ 4500 s) and small payload fraction ($\approx 5\%$)

According to the reputable studies, the high cost of access to space is the major obstacle to free commercial development and space exploration. The launch-to-LEO market elasticity would well establish itself at the payload specific cost in LEO around \$2'200 per kg, which is a threshold for second generation launch systems. At the specific cost of less than \$370 per kg, a sufficient return on investment, and subsequent development of the self-sustaining, even profitable commercial launch architectures will become possible (third generation launch systems). This threshold also serves as a criterion of where the free-market space economy comfort zone begins.

The current first generation launch systems have the specific cost of launch to LEO above \$10,000 per kg on average and much higher in case of the very small payloads dedicated launch. The third generation launch system performance is out of reach for chemical rocket propulsion altogether. The chemical rocket propulsion, while being currently the only way to provide access to space, is a dead-end path with regard to the development of the low-cost access to space.

Within the array of possible technological alternatives to chemical rocket propulsion, in the context of launching payloads to LEO, the laser ablation propulsion (LAP) stands out as the most meaningful, both technologically and economically. The prominent LAP experts agree that \$300 per kg is a plausible estimation of the LAP launch-to-LEO specific cost. This value squarely positions the prospective laser ablation propulsion launch system (LAPLaS) as a third generation launch system capable of enabling the free-market space economy well beyond the currently existing space markets, which are entirely focused and limited to the data transmission/collection services (broadcasting, GPS, earth observation, meteorological data, etc.).

LAPLaS is to become the first and preeminent third generation launch system, which embodies the technological solution for overcoming the Earth's gravity in a SSTO, safe, dedicated and low-cost manner, especially, for nano- and micro-sattelites.