



## NASA STTR 2017 Phase I Solicitation

### T1.01 Affordable Nano/Micro Launch Propulsion Stages

Lead Center: MSFC

Participating Center(s): AFRC, KSC

Technology Area: TA1 Launch Propulsion Systems

There has been recent significant growth in both the Quantity and Quality of Nano and Micro Satellite Missions:

- The number of missions has outpaced available ride share opportunities.
- Dedicated access to space increases small sat mission capability & allows new & emerging low-cost technologies to be flight qualified.

Stage concepts are sought that can be demonstrated within the scope & budget of a Phase II STTR project:

- MSFC is actively pursuing multiple technologies to significantly reduce orbital access cost.
- The scale of many Nano and Micro Launch vehicles allows stages to be completed within the scope and budget of a Phase II proposals.
- Accepted proposals will be limited to stages that plug and play into existing or proposed architectures for orbital launch vehicles with payload capabilities from 5-50 kg. A flight test is expected in Phase II.
- The university/small business partnership is ideal to provide the correct technology combination allowing for this affordable access to space.

#### State of the Art

Small launch vehicles are targeting a total launch cost of ~\$1-2M. Proposed stages must demonstrate significant cost savings over state of the art.

What is the compelling need for this subtopic?

- This subtopic is necessary because there are currently no available rides for experimental propulsive stages.
- Technological advancements like additive mfg. must be demonstrated to produce aerospace quality parts at low fixed cost. These technologies must be validated for use in propulsive stages.
- The correct combination of new technologies and approaches will enable affordable, dedicated, on-demand access to space.
- Technologies that are demonstrated and validated at the nano/micro scale can be robustly infused into large launch vehicles where loads and vibrations are not as severe.
- The success of Nano/Micro Launch vehicles benefit every NASA center by enabling unprecedented

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experimental access to space.

- Commercial development opportunities abound since the small satellite market is robust and growing.

STMD/NASA/NARP/National-Affordable access to space is a key objective for NASA. The Nano/Micro Launch scale is an affordable avenue that will enable the development and validation of key technologies and approaches to reduce fixed cost, recurring costs and range costs.