National Aeronautics and Space Administration

SPACE TECHNOLOGY MISSION DIRECTORATE

Game Changing Development Program

Sub-Kilowatt Electric Propulsion (SKEP) Project

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Technology Goal

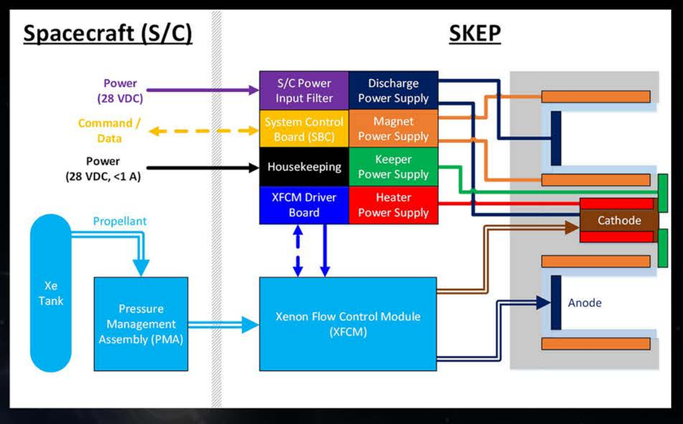
SKEP will develop and qualify a long-life, sub-kilowatt integrated propulsion system based on recent advances in Hall-Effect Thruster (HET) technology that will support exploration missions and enable high-value science and commercial applications within the constraints of an ESPA-class spacecraft.

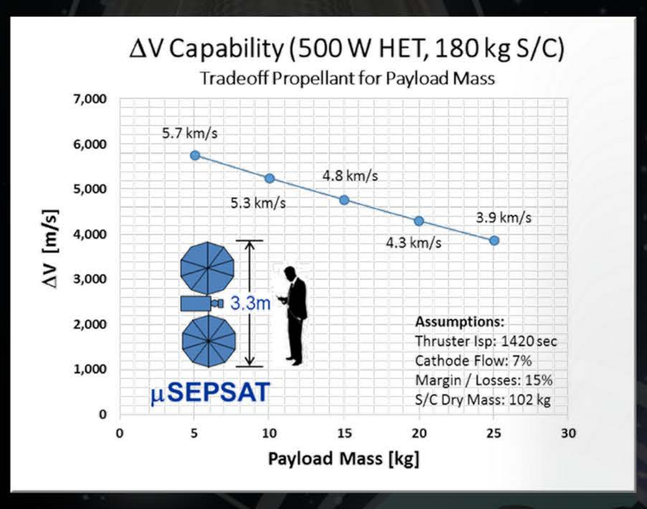
- Enable double to triple the delta-v propulsive capability currently available to secondary spacecraft, thus making ESPA-class spacecraft compelling for NASA exploration and science missions as well as many commercial applications.

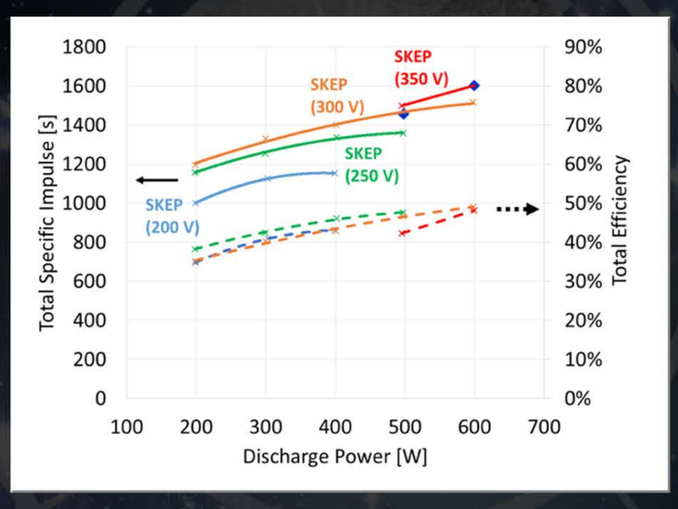
Project Objectives

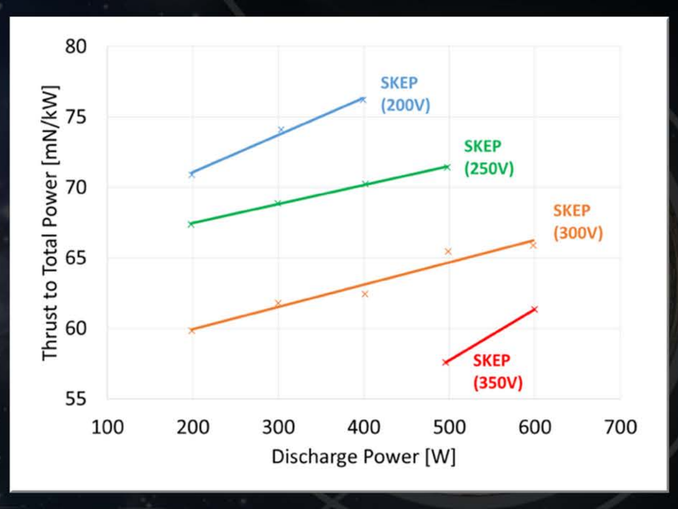
1. Design, develop, and perform qualification testing on a long-life, sub-kilowatt integrated propulsion system based on recent advances in HET technology.
2. Implement a development strategy that maximizes future availability of the SKEP system for NASA and commercial needs, while reducing the likelihood of significant future nonrecurring engineering (NRE) and requalification.

Key Performance Parameter [Unit]	SOA (SPT-70)	Threshold	Goal
Total impulse [MN-sec]	0.35	0.5	>1
Life time [hours]	2,500	5,000	>10,000
On/off Cycles	1,500	2,500	5,000
Propellant throughput [kg] (Delta-V 300 kg Sat [km/s])	30 (~1.5)	45 (~2.4)	>90 (>5.3)
Integrated system mass [kg]	7	10	<7









SKEP will leverage prior NASA electric propulsion (EP) investments in multi-kilowatt electric propulsion systems, but simplifying and miniaturizing for a sub-kilowatt scale consistent with the power, volume, and mass limitations of an ESPA-class spacecraft.

By simultaneously developing all major components of the SKEP system (thruster, cathode, power processing unit, and feed system), the project will optimize for reliability, lifetime, and cost.

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