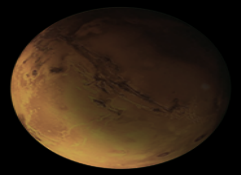
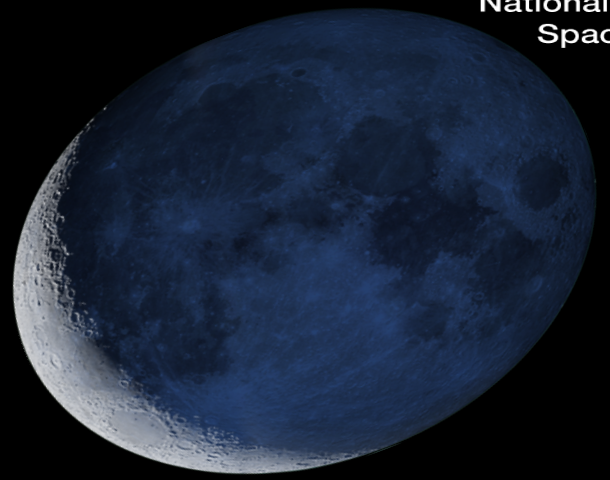
EXPLORE SCIENCE

National Aeronautics and Space Administration





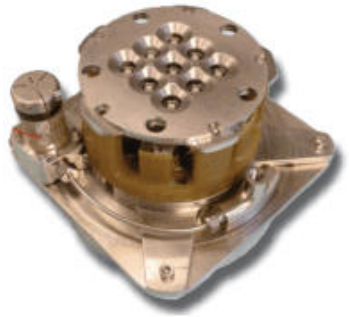
# 2021 NASA Small Spacecraft Forum


*NASA Glenn Research Center (GRC)*
*Space Science Project Office*
*Deputy Chief, Carl E. Sandifer II*

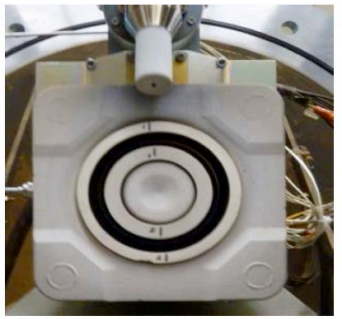

*March 25, 2021*

# NASA GRC Small Spacecraft Capabilities

- NASA GRC is seeking opportunities to develop and test small spacecraft, while fostering commercial partnerships to help satisfy NASA exploration and science mission requirements.
- GRC maintains an array of test/vacuum facilities (VF) along with production and assembly capabilities
  - VF-3 (pulsed plasma thruster testbed), VF-8 (low power EP testbed), VF-11 (ion propulsion testbed)
    - **Conducive for small spacecraft testing/development**
- Recent and noteworthy IV&V/development activities
  - Enpulsion
  - Busek electrospray & Busek BHT-600 thruster
  - Alameda
  - Upcoming Announcement of Collaboration Opportunity (ACO) with Phase Four LLC.



Busek ST-7 Electrospray



Busek BHT-600

VF-3

# Small Spacecraft Electric Propulsion (SSEP)

- The NASA Glenn Research Center (GRC) has expertise in SSEP.
  - NASA's SSEP project is developing technologies critical to expanding spacecraft capabilities and enabling ambitious new missions into deep space. (e.g., High Thrust – SSEP Hall thruster; H71M)
- Benefits of Electric Propulsion (EP)
  - Utilizes propellant to produce thrust (specific impulse) 1 to 2 orders of magnitude more effectively than chemical/thermal propulsion, thus enabling:
    - Reduction in the amount of propellant required for a specific mission, thus decreasing mass of the overall spacecraft
    - Increase in the payload mass for a specific mission
    - Increase overall mission velocity capability ($\Delta V$)
  - The low-thrust and highly tailorable in-space trajectories enabled by EP offers additional benefits:
    - Broadens launch windows and provides more flexibility in mission planning
    - Multiple rendezvous with small planetary bodies
    - Better control of arrival conditions
    - Reduce number of mission critical events

# Points of Contact

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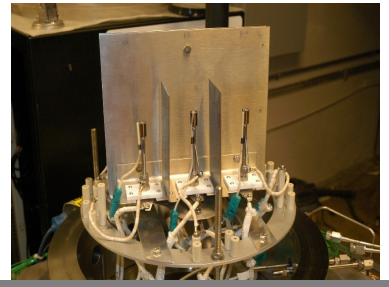
- David Jacobson, Chief, GRC Electric Propulsion Systems Branch; david.t.jacobson@nasa.gov
- Gabriel Benavides, SME, GRC Electric Propulsion Systems Branch; gabriel.f.benavides@nasa.gov

Conceptual rendering of Pathfinder Technology Demonstrator CubeSat

Northrop Grumman
Mission Extension Pod (MEP)



Low Power Cathode Heater Test