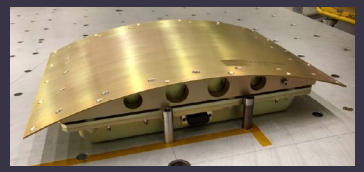
Biological and Physical Sciences Division, SMD

National Aeronautics and Space Administration

- BPS spans a broad range of biological and physical sciences
  - Utilizes a wide variety of platforms for “laboratories in space”
- Near-term focus includes development of platform agnostic hardware for biological experiments in many different environments
  - No SmallSat solicitations are planned prior to receiving the 2023 Decadal Survey
- Long-term to be shaped by the Decadal Survey
  - Includes “Keystone Capabilities or Missions” which could involve CubeSats and SmallSats
  - science.nasa.gov/biological-physical/decadal-survey

Past CubeSat Missions

- **SporeSat**
- 3 U; fern spore single cell Ca^{++} flux ug to 2-*g*
- **EcAMSaT**
- 6 U; *E. coli* (wild type and mutant) antibiotic resistance
- **PowerCell**
- 6 kg (in DLR Eu:CROPIS); *B. subtilis* growth and genetic transformation at µg, 1/6-*g*, 3/8-*g*



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Lunar Explorer Instrument for Space Biology Applications (LEIA)

- Goal: Understand of the biological effects of the combined environment stressors beyond LEO
- Capability goal: platform agnostic instrumentation that can be deployed on ground, sub-orbital, ISS, small satellite, Gateway, Commercial Lunar Payload Services (CLPS)
- LEIA is based on the Biosentinel Small Sat (NASA AES) being developed at NASA Ames Research Center for the Artemis 1 launch
- Unicellular organisms (yeast) for lunar surface research on CLPS
- Research proposals are under review
- Future capability for multi-cellular animals and plants
- Likely through open competition

Points of Contact

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Biosentinel