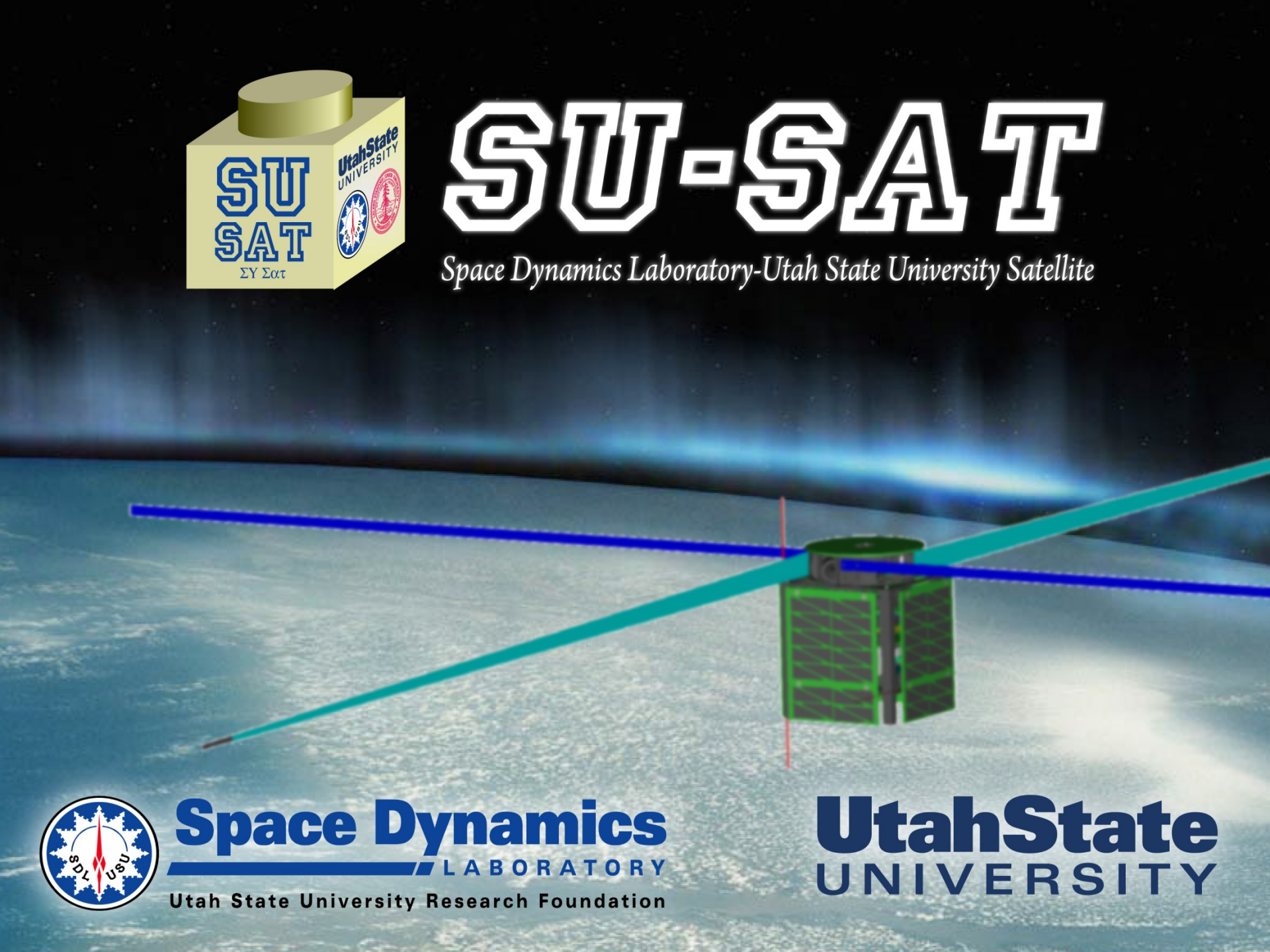
SU
SAT
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UtahState
UNIVERSITY
SU-SAT
Space Dynamics Laboratory-Utah State University Satellite
Space Dynamics
LABORATORY
Utah State University Research Foundation
UtahState
UNIVERSITY

SU-Sat Team

Utah State University

- Dr. Don Thompson, Principal Investigator
- Dr. Jan Sojka, Co- Investigator
- Microgravity Research Team

Space Dynamics Laboratory

- Chad Fish, Program Manager
- Mark Wilkinson, Systems Engineer
- Bryan Bingham, Mission Design Engineer
- Robert Burt, Electrical Engineer
- Joel Nelsen, Communication Engineer
- Mike Watson, Structural Engineer
- Wayne Sanderson, Electrical Engineer

SDL and Utah State

- Space Dynamics Laboratory
  - SDL is a not for profit corporation owned by Utah State University
  - Cooperative relationship with Utah State faculty
  - UARC – University Affiliated Research Center
  - Employs about 60 students in technical fields
- Utah State University
  - Located in Logan, Utah
  - Has flown more experiments in space than any other university

Mission Objectives

Engineering

Develop and demonstrate technologies for future CubeSat science missions. Provide mission experience for university students.

Science

To observe and resolve magnetosphere-ionosphere-thermosphere global electric field forcing, coupling dynamics and evolution over a wide range of spatial and temporal scales.

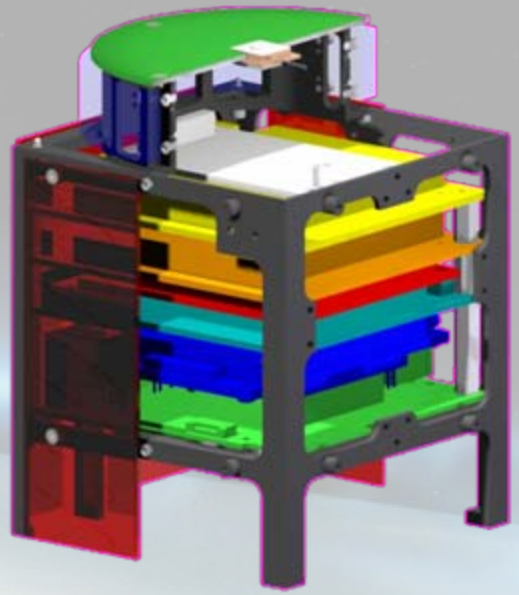
SU-Sat Mission Objective

SU-Sat will validate several CubeSat technologies, including:

- An instrumentation suite for measuring space dynamics
- Miniaturized attitude determination sensors
- Magnetorquer-based attitude control system
- Deployment mechanisms
- Communication software and hardware

SU-Sat Characteristics

- LEO, polar orbit, spin-stabilized science satellite
- SU-Sat is a standards-compliant 1.5U CubeSat
- Utilizes COTS components where possible
- Designed to deploy from P-POD
- Will utilize amateur radio communications (store and forward methodology)



SU-Sat Subsystems

A: Mechanisms Driver

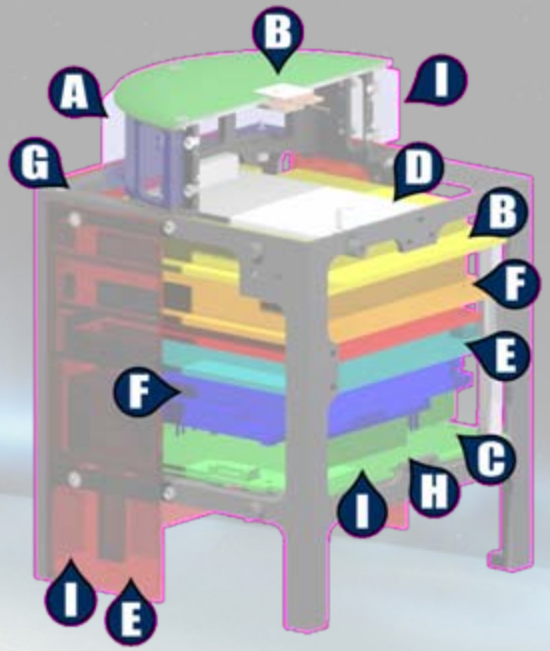
- VHF Antenna and Science Sensor Booms on Mandrel
- UHF Antenna Deployment

B: Navigation

- NovAtel GPS Receiver
- Honeywell 3-axis Magnetometer

C: Command & Data Handling

- Pumpkin FM430 Flight Module
- SDL/USU Command and Data Handling Software



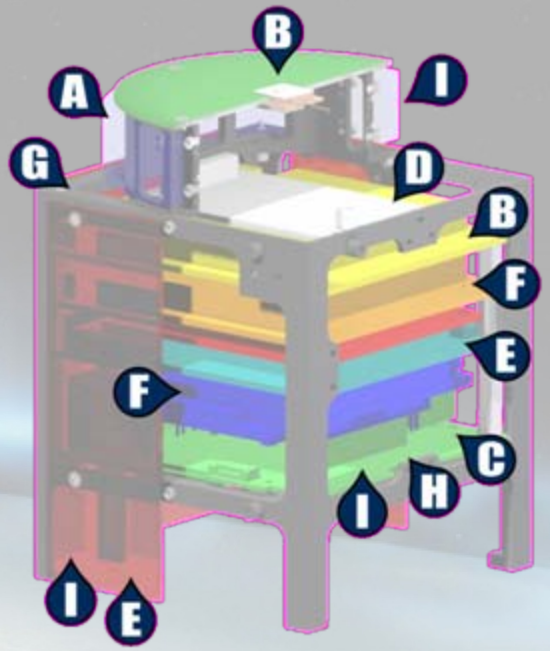
SU-Sat Subsystems

D: Science Sensors

- Electric Field Passive Sensor Electronics
- DC Probe

E: Electric Power

- Clyde Space Power Control Card
- Clyde Space GaAs Solar Cells
- Clyde Space Lithium Polymer Battery



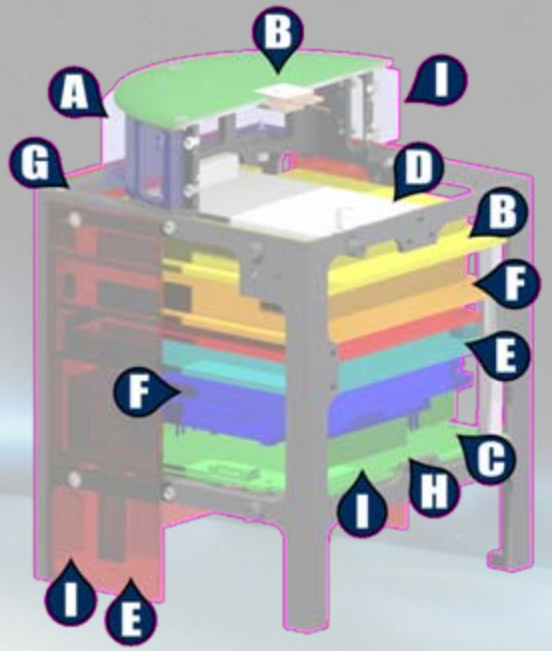
SU-Sat Subsystems

F: Communications

- Stanford Transceiver: UHF Transmit, VHF Receiver
- Amateur Frequencies with AX.25 Protocol

G: Structure

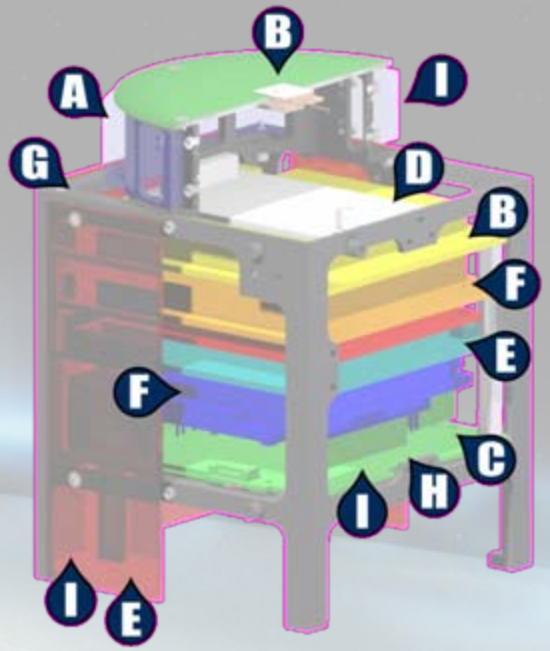
- Pumpkin chassis body
- SDL/USU mandrel
- Passive Thermal Control



SU-Sat Subsystems

H: Flight Software
- Salvo RTOS
- SDL/USU Mission-specific Software

I: Attitude Determination and Control
- AeroAstro Sun Sensor
- Honeywell 3-axis Magnetometer
- Gyroscopic Rate Sensors
- Horizon Crossing Indicator
- Solar Panel Embedded Magnetorquers
- SDL/USU Control Algorithms



Technology Demonstrations

- Deployment Mechanisms
  - Mandrel design
  - Resistive heater monofilament cutter
  - VHF antennas, E-field sensor, DC probe
- Science Sensors
  - E-field sensor, DC probe
  - Sensor electronics
- Attitude Sensors
  - Miniaturized Sun Sensor
  - Miniaturized Horizon Crossing Indicator
- Attitude Control Algorithm
  - Spin stabilized, magnetorquer controlled
  - Additional attitude sensors on SU-Sat will provide high fidelity understanding of control law for future missions.

Summary

- SU-Sat provides opportunities for Utah State students to participate in a satellite mission program.
- A future satellite constellation is being designed to obtain data on the Magnetosphere-Ionosphere-Thermosphere global electric field forcing, coupling dynamics, and evolution.
- The SU-Sat mission will validate technologies for future missions.

Questions?