

# AURORA



**50,000 ft** target apogee | **11 kN** peak thrust | 0-60 mph in **0.27 s** | Mach **2.2**

**AURORA** is a liquid bipropellant rocket that runs on ethanol and nitrous oxide. It has a fully SRAD composite airframe, custom electronics, dual-deployment parachute system, active controls, and a payload housing a Fourier-transform spectrometer.

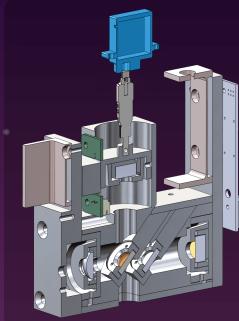
## AIRFRAME

- Conical nosecone optimized for supersonic speeds
- SRAD composite airframe manufactured via Vacuum Assisted Resin Transfer Molding
- Metal 3D-printed longerons for thrust load transfer & removable carbon fiber fairings
- Freely-rotating fin can mounted on ball bearings to reduce roll during flight

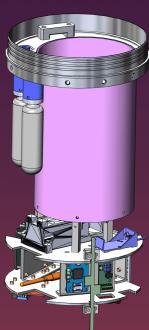


## PAYOUT

- Deployable payload with a flat spin free fall descent until 5000 ft
- Fourier-transform spectrometer measures infrared light intensity to identify and quantify greenhouse gases in the troposphere



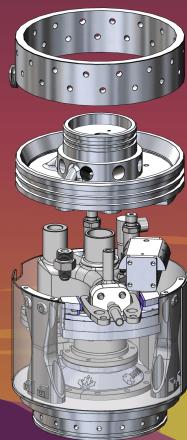
## RECOVERY



- Single-sep dual-deploy parachute system for reliable recovery
- SRAD conical ribbon parachute for high-speed descent
- Integrated camera captures the drogue and main parachute
- CNC bulkhead with o-ring seal and electronics passthroughs

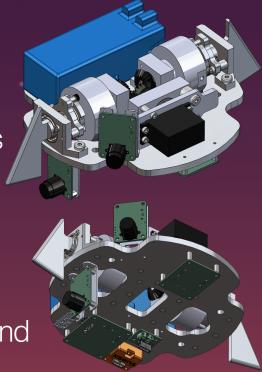
## FEEDSYSTEM

- Metal 3D printed like-on-like impinging injectors with integral face cooling channels, achieves 96.5% C\* efficiency
- Concentric tanks with a low-friction piston, utilises nitrous blowout
- SRAD valve body with coaxial injector valves and poppet-style fill valve
- SRAD QD valve, pneumatic vent valve, and pyrotechnic vent valve



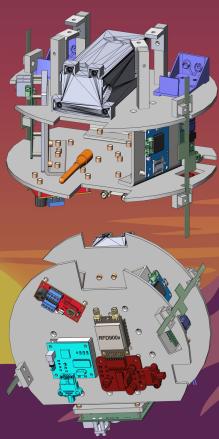
## CONTROLS

- Active roll control via two steered canards
- Fail-safe motor board drives 5 Nm servo
- Control cycle runs on a STM32H7 processor with real-time OS using Movella MTi630 and ST LSM IMUs
- Scheduled LQR controller and EKF state estimation

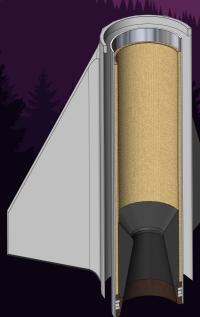


## AVIONICS

- 12 unique and interconnected SRAD avionics boards
- 30 fps, 720p flight footage from OV5640-based camera board
- Unique remote arming board activates altimeters and safely fails in an armed state
- 12V and 5V supply lines for power and a 1Mb/s CAN 2.0B bus for communication
- SRAD antennas for live telemetry transmission



## COMBUSTION CHAMBER



- Aluminum pressure vessel lined with an SRAD carbon fiber phenolic ablative
- RNX ignition puck with dual embedded Nichrome wires
- Graphite and phenolic nozzle exit machined to a 15-degree angle

## RLCS

- SRAD Remote Launch Control System (RLCS) communicates over ethernet radio link, controlling fill, launch, and abort operations
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