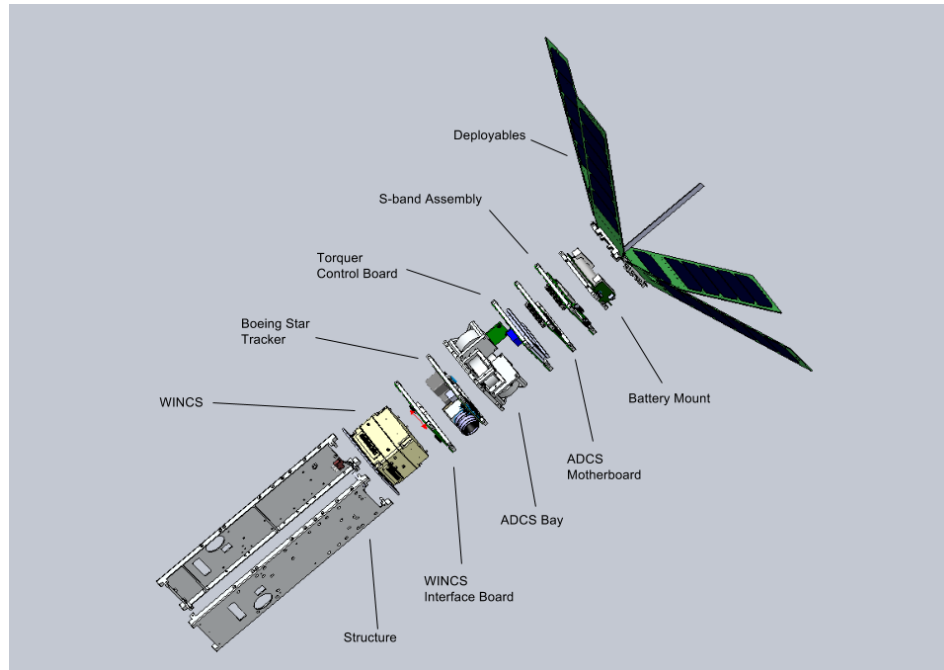


## CADRE CubeSat Description University of Michigan – 3U



CADRE will test the Winds Ions Neutrals Composition suite (WINCS), developed by the Navy Research Laboratory. WINCS consists of four electrostatic analyzers and two mass spectrometers; it will measure the density, temperature and composition of the ionosphere. Four deployed solar panels and bus will fly in a dart configuration using a star tracker, IMUs, photodiodes and reaction wheels.

Upon deployment from the P-POD, CADRE will power up and start counting down timers. At 30 minutes, the antennas will be deployed and a UHF beacon will be activated shortly thereafter. After approximately 120 minutes antenna deployment will be confirmed. At about 200 minutes four solar panels will be deployed using a thermal resistive inhibit release. After about 300 minutes, solar panel deployment and autonomous activation of magnetorquers will be confirmed. For the first few passes the ground station operators will attempt communications to perform checkouts of the spacecraft. After core checkout CADRE will begin ADCS calibration and S-band checkout. After 15 days WINCS commissioning will begin followed by nominal operations.

The CubeSat structure is made of Aluminum 6061-T6. It contains mostly standard commercial off the shelf (COTS) materials, electrical components, PCBs and solar cells.

There are no pressure vessels, hazardous or exotic materials.

The electrical power storage system consists of two Panasonic lithium-ion batteries (18650) with over-charge/current protection circuitry.