

## **Operation Plan for CubeSat Columbia:**

The CubeSat Columbia will be ejected from the International Space Station (ISS) on or around April 1, 2017. After 30 minutes after ejection, Columbia will deploy drag panels that will increase the frontal area of the CubeSat by a factor of 4, limiting the lifetime of the CubeSat to approximately 4-5 months. Simultaneously, the radio antenna will be deployed. The initial altitude of Columbia will be 400 km with an inclination of 52°, identical to the ISS.

Once the deployment has been verified by the on-board computer using a photodiode, Columbia will start to beacon at 437.055 MHz using GMSK at 9,600 kbps. The beacons will be every 60 seconds and will last for less than 1s for each beacon. The beacon data will contain information about the state of health of the CubeSat. The beacons will continue until commanded to stop or until the CubeSat re-enters the atmosphere. This beacon data can be decoded by anyone with the right equipment.

We have a ground station in Ann Arbor, Michigan that will be used to communicate with the CubeSat. Twice per day, the ground station will send a signal to the CubeSat to command Columbia to transmit data. Columbia will then begin transmitting science data at 437.055 MHz using GMSK at 9,600 kbps for approximately 5-8 minutes, depending on the pass length. Columbia will then return to beaconing as described above. The science data will be packetized and will be depacketized at the University of Michigan and made available to the general public.

The downloading of data to the ground station at the University of Michigan will continue twice per day until the CubeSat re-enters the atmosphere. It is fully expected that Columbia will burn up in the atmosphere, due to the lack of any large or dense components.