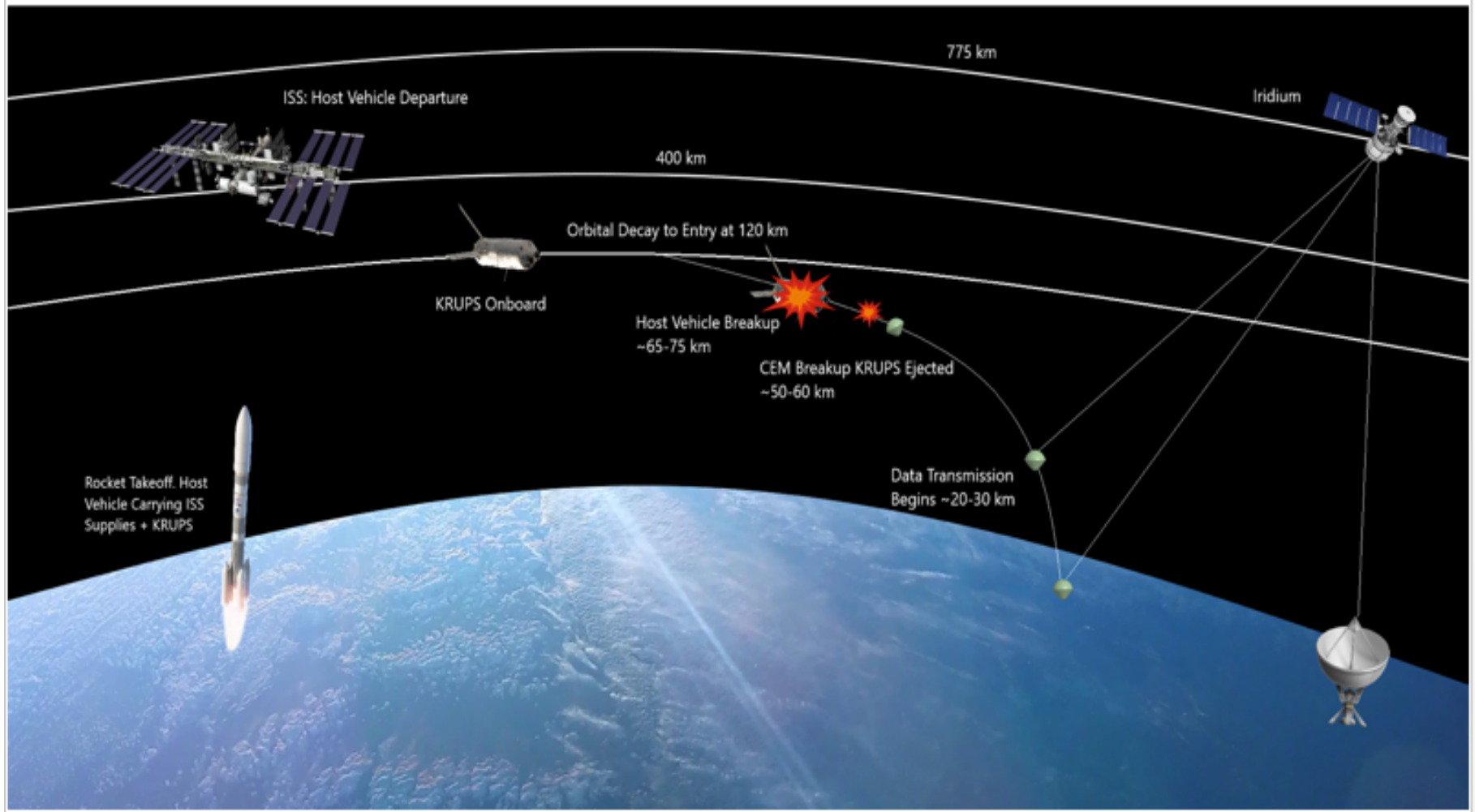


## KENTUCKY RE-ENTRY PROBE EXPERIMENT (KREPE)

# Technical Description

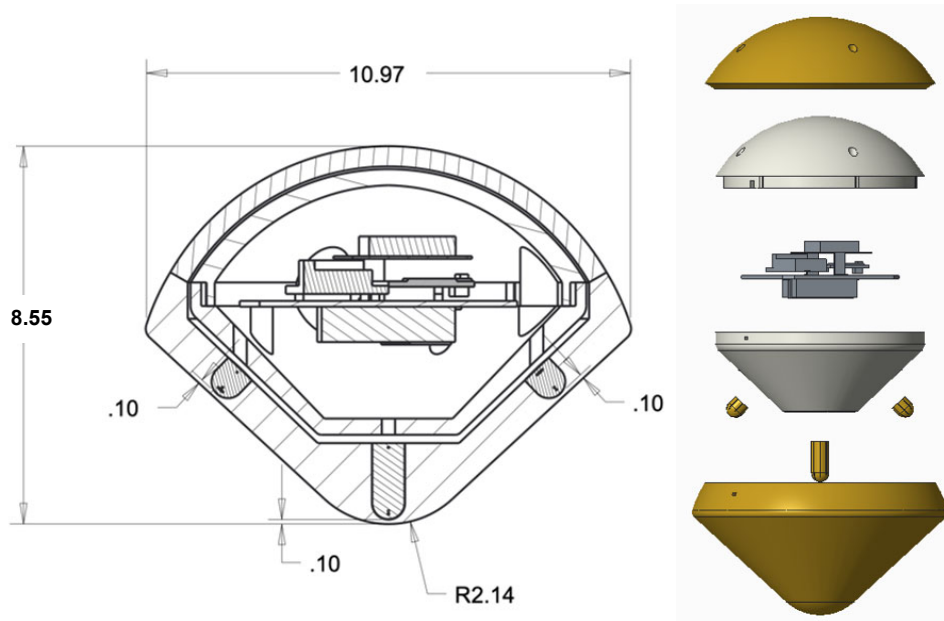
The Kentucky Re-Entry Probe Experiment (KREPE) is a research project developed by the University of Kentucky. The project is supported by various NASA centers. The goals for the mission payload are to: 1) provide an affordable technology testbed for atmospheric re-entry experiments; and 2) collect material response data for Thermal Protection Systems (TPS) in order to allow validation of computational models. The intention for the KREPE project is to be a “One Time Flier” experiment.

The concept of operations is shown graphically in Figure 1.



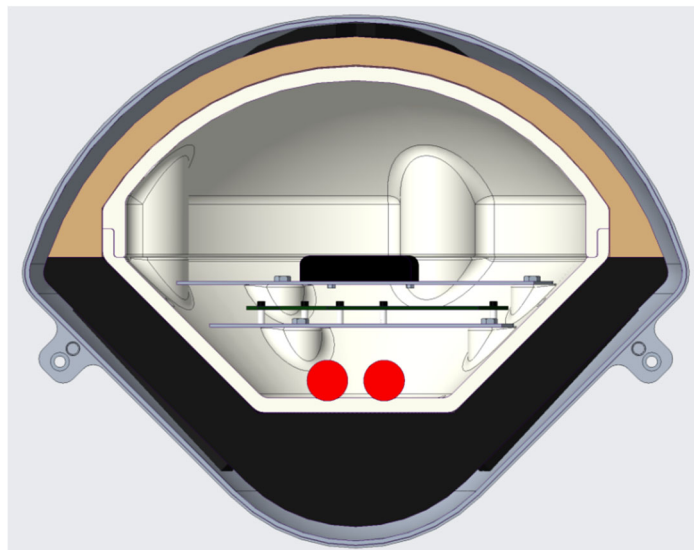
**Figure 2.** KREPE Concept of Operations

KREPE is a self-contained payload, consisting of three capsules with identical electronics. Each KREPE capsule contains batteries, an Iridium modem, antenna, embedded controller, sensors, and associated wiring. Figure 2 shows details of the size and make up of a capsule.



**Figure 2.** KREPE Capsule Showing Internal Structural Housing with TPS Attached. The units are inches.

Each of the capsules will be transported to the International Space Station (ISS) via a visiting vehicle. While in transport, KREPE will be housed in an RF-shielded housing. Figure 3 shows a capsule inside the KREPE Release Mechanism (KREM) housing.



**Figure 3.** KREPE full configuration showing KREPE capsule installed in KREM housing.

The KREPE capsules require no communications while in transport to the ISS and will be stored in a dormant mode. The capsules will remain in the dormant mode while on the ISS and during loading into the return vehicle. Crew involvement for loading into the return vehicle consists of installing the capsules in the return vehicle and activating the capsules, enabling power to the embedded controllers. The controllers will begin monitoring sensors but power is inhibited to the Iridium modems, preventing accidental RF transmissions.

The visiting vehicle will be released from the ISS and de-orbited. The KREPE capsules are designed to survive the return vehicle break up as it re-enters the atmosphere. The KREPE embedded control system is designed such that data transmission to the Iridium satellite network will not occur until breakup of the return vehicle is detected using sensors. The capsules will be ejected from the visiting vehicle at an altitude of approximately 50 – 60 km and the KREM RF shield will be released. At an altitude of approximately 20 km, the KREPE capsules will begin transmission through the Iridium satellite network to retrieve sensor material response data for the TPS.