

Team EARS

Principal Investigators

Name	Qualification	Institute
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Scientific Objective

EARS – Electrostatics Active Radiation Shield – is aimed at demonstrating that the basic principle of electrostatic deflection of charged particles can be employed to create a shield around a spacecraft or a lunar habitat for protection against cosmic radiation.

Specifications

Dimensions: $\Phi 80\text{mm} \times 126\text{ mm}$

Mass: 62 grams

Power: 3W

Operating Voltage: 5V

Operating Temperature: -40°C to $+60^{\circ}\text{C}$

Storage Temperature: -40°C to $+80^{\circ}\text{C}$

Data Interface: RS-485

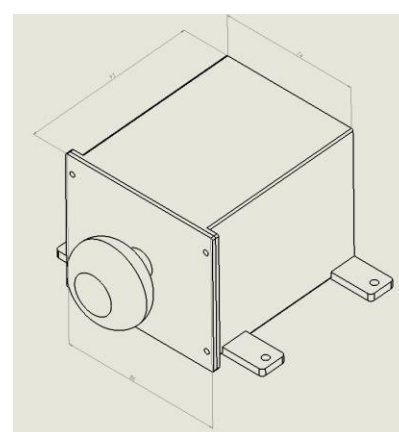
Specimen: N/A

Capability: Shielding from charged particles in solar radiation.

Mission Description

The experiment is based on the fundamental principle of repulsion of like charges in an electrostatic field, creating a force field around a space habitat or a spacecraft for protection from cosmic and solar radiations. The experiment aims at testing the electrostatic field on ionizing radiation. The charged particles viz. electrons, protons and helium nuclei in cosmic radiation raining from space will be repelled by the field. The intensity of the radiation will be monitored by radiation sensors placed inside the electric field.

Figure 1: Lab2Moon EARS



Mission Operations

The payload is located on the West, above the Sorato deck. Sensor readings will be taken once every hour on Day 4, 12, 13 and 14. The Van de Graaff generator will run only after the rest of the operations are satisfactorily completed and the 3-break safety is switched on. The payload prefers to be exposed to the radiation incident from the sun.

Heritage Experiments

Reference Mission Name	Reference Mission Specifics	Lab2Moon Payload Specifics
KOSMOS 605	Spaceflight proved the feasibility of electrostatic radiation shielding in Low Earth Orbit	EARS is taking the same concept to the next level by testing it on the moon, where there is a lack of atmosphere. It will also create a strong magnetic field.
ASRC Aerospace Corporation	Concentrates only on theoretical research; experiments need to be performed to test the high voltage generation mechanism.	Practical application of theoretical research on the surface of the moon, to find results against galactic cosmic rays.

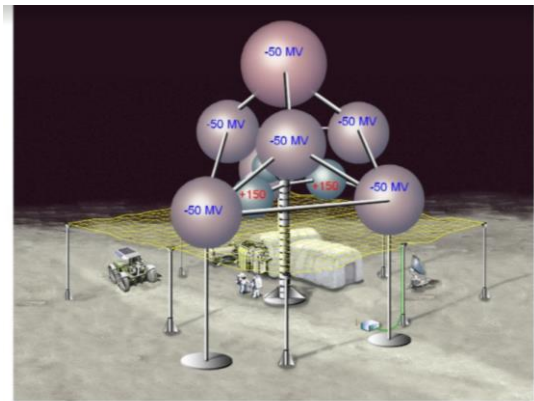


Figure 1. Artist's concept of a sphere tree, consisting of positively charged inner spheres and negatively charged outer spheres. The screen net is connected to ground potential (at infinity).

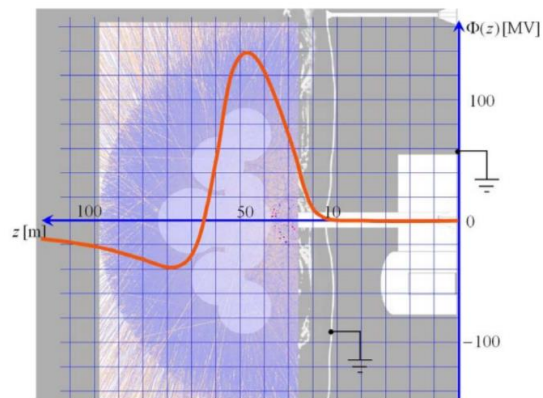


Figure 2. Electric field potential profile along the vertical axis of symmetry (z -axis) for the sphere configuration shown in Figure 1.