

# Advanced Lunar Environment Simulator System (ALESS™)

## Introduction of Advanced Lunar Environment Simulator System (ALESS™)

The ALESS™ is a unique simulator facility that is able to simulate the major environmental factors present on the Moon, i.e. lunar dust conditions, vacuum, temperature, UV radiation, and darkness. Figure 1 is the general view of ALESS™ and Figure 2 shows the its main configuration.

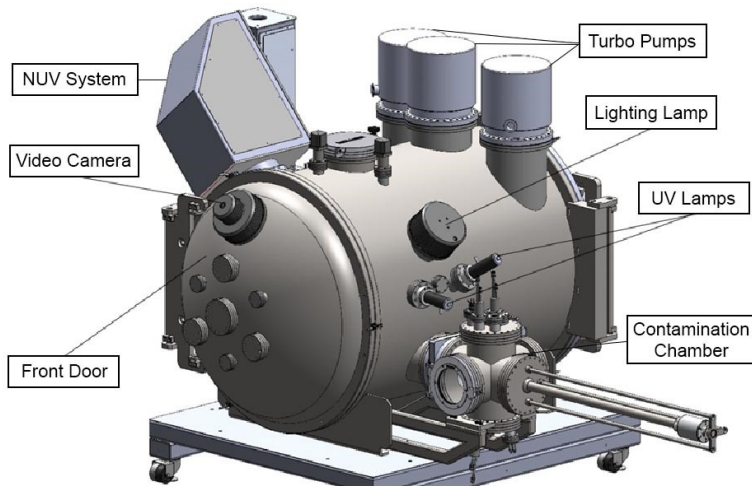


Figure 2: General view of the Main Configuration of ALESS™

The vacuum system of the main chamber consists of ultra-high vacuum turbo pumps and scroll pumps. Dust Particle Source includes Dust Preparation (Pre-Treatment) Module and Dust Sprinkling Mechanism Module (seen in Figure 3). Contamination Test Chamber is dedicated to studying deposition of molecular contaminations onto materials and surfaces.

Figure 4 shows the several identical VUV Radiation Sources providing a continuum spectral output equipped with allow it to achieve electrostatic charging of dust particles.

The data acquisition system seen in Figure 5 is able to perform real-time, *in situ* measurement of the vacuum pressure in the vacuum chamber, heat sink (cold shroud) temperature, intensity of UV radiation, basic lunar dust properties, etc.

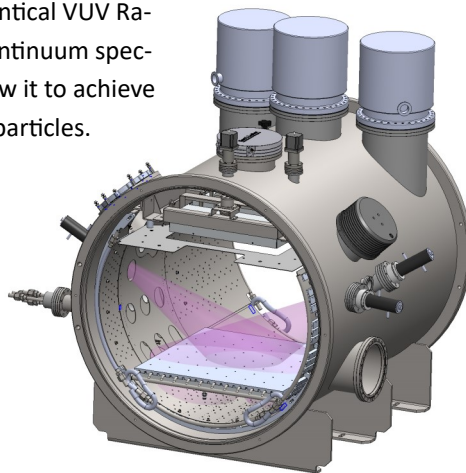


Figure 4: VUV sources and beams for Dust Charging



Figure 1: ALESS™ with computer control software

## Main Configuration of ALESS™

- Main Vacuum Chamber
- Vacuum Pumping System
- Lunar Dust Filtering System
- Heating/Cooling Thermal Platform
- Dust Particle Source
- VUV/NUV/Vis/IR Radiation Sources
- Contamination Test Chamber
- Data acquisition system

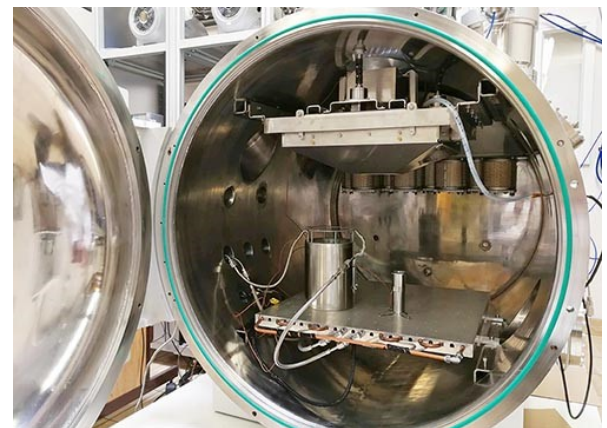


Figure 3: Internal view of ALESS™ with Dust Particle Source (Top) and Heating/Cooling Platform (Bottom)

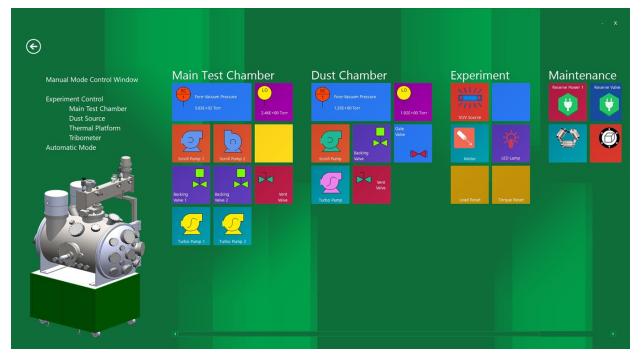


Figure 5: Main Window of Control Software of the ALESS.