

PLANCK CRYOGENIC TESTING IN CSL PREMISES, HELIUM PARTIAL PRESSURE MANAGEMENT.

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1. ABSTRACT

Both satellite Planck and Herschel are cryogenic ones, the first one having a cold point around 0.1 [K], the second one around 0.3 [K]. Not only the detectors are cooled, but also major subsystems and systems of the spacecrafts.

The Centre Spatial de Liège (CSL) is involved in the testing of several parts of these spacecrafts, starting from optical tests on the mirrors or on the telescope, via cryogenic vibration testing of scientific focal plane instruments, ending with the full Planck spacecraft testing. Each test requires temperature lower than 20 [K], in volumes ranging from 1 [m³] to 60 [m³], cooling several kilograms to more than one ton, and withstanding heat load up to 150 [W] in stabilisation.

The overall Planck spacecraft test challenge is very high, as it is the only way to measure the end-to-end cooling chain of the spacecraft. The space conditions reproduction must be as perfect as possible to avoid the test set-up influence on the spacecraft performances, especially linked to radiative cooling, mechanical perturbations and Helium residual pressure.

Different challenges are presented, and the related CSL solutions are described, highlighting the Helium partial pressure problem, the related computations and trapping system by large sorption panel.

Keywords : cryogenics, thermo-optical testing, sorption.

Topic: Vacuum Science and Technique