## **ICRC 2025 - The Astroparticle Physics Conference**



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## GAPS Detector Cooling System: Results from Antarctic Ground Tests

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The General Anti-Particle Spectrometer (GAPS) experiment aims to elucidate the nature of dark matter by detecting antiparticles using a long-duration scientific balloon over Antarctica. The GAPS detector consists of a tracker made of lithium-drifted silicon detectors, surrounded by two layers of Time-of-Flight (ToF) plastic scintillators. To achieve an energy resolution of 4 keV FWHM in the 20–100 keV range, the silicon detectors are cooled to -40°C using Multi-loop Capillary Heat Pipes (MCHPs), specifically developed for GAPS. The MCHPs transport heat from the detectors to a radiator attached to the payload's sidewall. On the ground, the radiator is directly cooled by the Ground Cooling System (GCS) during detector testing. The GCS consists of a chiller, a cold plate and an insulating foam.

GAPS has completed all necessary preparations during the Antarctic summer season of 2024/25. During this period, we conducted cooling tests to investigate the detector performance using the GCS. In this talk, I will present the results of the ground tests conducted during the 2024/25 season, with a particular focus on the performance of the cooling system.

## **Collaboration(s)**

the GAPS collaboration

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