Poster

CESAR: Cryogenic Electronics for Space Applications and Research

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Ultra-low temperature sensors provide unprecedented performances in X-ray and Far Infrared astronomy by taking advantage of physical properties of matter close to absolute zero. Nevertheless these developments are slowed down by the restricted amount of available power, in space conditions. The power budget is mainly consumed by the ever-growing number of wires, linking the cooled detectors to the distant warm electronics. CESAR is a FP7 funded project that gathers 6 European laboratories around the development of high performances cryogenic electronics. The goal of the CESAR project is to provide Far-IR and X-Ray sensors with signal processing capabilities at the heart of the detectors. We will present the three major steps that constitute the CESAR work: *a*) front-end electronics with intrinsic properties as good as the detector ones (AsGa HEMTs, Ge JFETs, SiGe based bipolar transistors). The work focuses on very low power consumption (around 100 μW at 4 K) and very low noise (around 1 nV/√Hz at 1 kHz). *b*) complex electronics circuits (amplifiers, filters, multiplexers, DACs and ADCs) working below 4K, in CMOS and SiGe technology. *c*) combination of both developments and end-to-end tests on large 2D arrays (multiplexed X-Ray microcalorimeters and Far-Infrared bolometers).