A 4k-Pixel CTIA Readout for Far IR Photodetector Arrays

TechnoScience Corporation

Technical Abstract
We propose to design a low noise, two-side buttable, 64x64 readout multiplexer with the following key design features: 1- By far the largest readout array developed for far IR detectors to date. Four of these readout can be butted together to form a >16k-pixel mosaic array satisfying the need of the next generation of astronomical instruments. 2- Optimized for use with far infrared detectors requiring low bias levels. The unit-cell design will maintain constant bias across the detector during the integration eliminating non-linearity and detector debiasing. The design will also minimize pixel-to-pixel DC variations which improves the bias uniformity across all pixels of the array. 3- Capable of operation at cryogenic temperatures at least as low as 1.6K. Advanced monolithic cryo-CMOS technology will guarantee deep cryogenic operation with minimal impact on noise performance. 4- Offers the potential of being directly hybridized to IR detector arrays using planar bump-bond technology. This technology has been identified by NASA as well as the science and astronomy community as key for future far IR astronomy. It fits well within the scope of the SBIR Subtopic S1.04 and will be a benefit to many large and small NASA missions including SAFIR/CALISTO and SOFIA.

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2010 Phase II
Proposal S1.04-8656

Mobile Greenhouse Gas Flux Analyzer for Unmanned Aerial Vehicles

Los Gatos Research

Technical Abstract
Los Gatos Research (LGR) proposes to develop highly-accurate, lightweight, low-power gas analyzers for measurements of carbon dioxide (CO2) and water vapor (H2O) aboard NASAs Sensor Integrated Environmental Remote Research Aircraft (SIERRA) unmanned aerial system (UAS). These analyzers, which will exploit both conventional mid and near-infrared tunable diode laser spectrometry and LGR's patented Off-Axis ICOS technology, will be capable of meeting the stringent weight, power, and environmental requirements for UAS deployments. At the conclusion of the Phase II effort, LGR will deliver and deploy two complete systems. The first analyzer will make extremely rapid (> 20 Hz) airborne eddy flux covariance measurements of CO2 and H2O. The second instrument will measure CO2 isotopes aboard SIERRA, allowing a better understanding of the chemistry, transport, and exchange of carbon between the atmosphere, anthropogenic sources, and natural carbon sinks and sources in the terrestrial biosphere. Airborne measurements enable regional-scale investigations of carbon sources and sinks as well as measurements where conventional tower flux deployments are infeasible. These data will complement current satellite observations by providing higher horizontal resolution and vertical profiling, enabling better quantification of carbon sources and sinks. Such deployments are critically important to NASA's Earth Science Division, because they enable more efficient and cost-effective Earth observations.

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