NASA SBIR 2008 Phase I Solicitation

S1.04 Sensor and Detector Technology for Visible, IR, Far IR and Submillimeter

Lead Center: JPL

Participating Center(s): ARC, GSFC, LaRC

NASA is seeking new technologies or improvements to existing technologies to meet the detector needs of future missions, as described in the most recent decadal surveys for Earth science (http://www.nap.edu/catalog/11820.html), planetary science (http://www.nap.edu/catalog/10432.html), and astronomy & astrophysics (http://www.nap.edu/books/0309070317/html/).

The following technologies are of interest for Earth and planetary science instrument concepts such as Scanning Microwave Limb Sounder (http://mls.jpl.nasa.gov/index-cameo.php) on the Global Atmospheric Chemistry Mission, Climate Absolute Radiance and Refractivity Observatory (http://science.hq.nasa.gov/earth-sun/docs/Volz4_CLARREO.pdf), Methane Trace Gas Sounder, and Lunar Atmosphere Dust Environment Explorer:

- New or improved technologies leading to measurement of trace atmospheric species (e.g., CO, CH4, N_2O) from geostationary and low-Earth orbital platforms. Of particular interest are new techniques in gas filter correlation spectroscopy, Fabry-Perot spectroscopy, or improved component technologies.
- Uncooled or passively cooled detectors with specific detectivity (D*) â‰¥ 10^{10} cm $Hz^{1/2}$/W in the operating wavelength ranges 6-14 Î¼m and 10-100 Î¼m.
- Efficient, flight qualifiable, spur free, local oscillators for SIS mixers operating in low Earth orbit. Two bands: (1) tunable from 200 to 250 GHz, and (2) tunable from 610 to 650 GHz, phase-locked to or derived from an ultra-stable 5 MHz reference.
- Technologies for calibrating millimeter wave spectrometers for spaceborne missions, including low power, flight qualifiable comb generators for gain, linearity, and sideband calibration of microwave spectrometers covering the bands from 180 to 270 GHz and from 600 to 660 GHz; flight qualifiable low noise diodes for the bands from 180 to 270 and 600 to 660 GHz; very low return loss (70 dB or better) calibration targets and techniques for quantifying and calibrating out the impact of standing waves in broadband heterodyne submillimeter spectrometers.
- Low power, stable, linear, spectrometers capable of measuring the band from 6-18 GHz with ~120 100 MHz wide channels.
- Digital spectrometers with ~4 GHz bandwidth and 10 MHz resolution. Components for these digital spectrometers including high speed digitizers, efficient spectrometer firmware, and ASIC implementations.

Detector technologies for future astrophysics mission concepts, such as the Single Aperture Far Infrared (SAFIR) Observatory (http://safir.jpl.nasa.gov/technologies.shtml), the Space Infrared Telescope for Cosmology and

Astrophysics (SPICA) (http://www.ir.isas.ac.jp/SPICA/), and Inflation Probe (cosmic microwave background, http://universe.nasa.gov/program/probes/inflation.html).

- Innovative detector designs, readout electronics, or new sensor materials (e.g. novel dopants for extrinsic Si detectors) are of interest, as is development of a photo-definable version of parylene to aid the fabrication of thermally isolated structures of bolometers (and x-ray microcalorimeters).
- Spatial Filter Array (SFA) consisting of a monolithic array of up to 1200 coherent, polarization preserving, single mode fibers that operate over a large fraction of the spectral range from 0.4 - 1.0 microns and such that each input and output lenslet is mapped to a single fiber. Uniformity of output intensity and high throughput is desired and fiber-to-fiber placement accuracies of < 2.0 microns are required with < 1.0 microns desired.Ã‚Â Applications include active and passive wavefront and amplitude control, and relevant missions include Terrestial Planet Finder (http://planetquest.jpl.nasa.gov/TPF/tpf_index.cfm) and Stellar Imager (http://hires.gsfc.nasa.gov/si/).

Proposals should show an understanding of one or more relevant science needs, and present a feasible plan to fully develop a technology and infuse it into a NASA program.