NASA SBIR 2005 Phase I Solicitation

S4.01 Infrared & Sub-mm Sensors and Detectors

Lead Center: JPL

Participating Center(s): MSFC

NASA astrophysics missions currently under development, such as Sofia, Herschel, and Planck (http://science.hq.nasa.gov/missions/phase.html) have been enabled by improvements in sensors and detectors. Beyond 2007, expected advances in detectors, readout electronics, and other technologies, particularly those enabling polarimetry and large format imaging arrays for the far IR/submm and spectroscopy with unprecedented sensitivity. These advances may enable future mission concepts such as the Single Aperture Far Infrared (SAFIR) Observatory (http://safir.jpl.nasa.gov/technologies.shtml), SPICA (http://www.ir.isas.ac.jp/SPICA/), and CMBPOL.

Space science sensor and detector technology innovations are sought in the following areas:

**Mid/Infrared, Far Infrared and Submillimeter**
Future space-based observatories in the 10-40 micron spectral regime will be passively cooled to about 30 K. They will make use of large, sensitive detector arrays with low-power dissipation array readout electronics. Improvements in sensitivity, stability, array size, and power consumption are sought. In particular, novel doping approaches to extend wavelength response, lower dark current and readout noise, novel energy discrimination approaches, and low noise superconducting electronics are applicable areas. Future space observatories in the 40 micron to 1 mm spectral regime will be cooled to even lower temperatures, frequently

**Space Very Long Baseline Interferometry (VLBI)**
The next generations of VLBI missions in space will demand greatly improved sensitivity over current missions. These new missions will also operate at much higher frequencies (at first to 86 GHz and eventually to 600 GHz). These thrusts will require development of improved space-borne, low-power, ultra-low-noise amplifiers and mixers to serve as primary receiving instruments.