NASA SBIR 2008 Phase I Solicitation

S1.05 Detector Technologies for UV, X-Ray, Gamma-Ray and Cosmic-Ray Instruments

Lead Center: GSFC

Participating Center(s): JPL, MSFC

This subtopic covers detector requirements for a broad range of wavelengths from UV through to gamma ray. As would be expected, requirements across the board are for greater numbers of readout pixels, lower power, faster readout rates, greater quantum efficiency, and enhanced energy resolution. Typical semiconductor devices in this energy range are based on silicon or germanium. However, proposals for other detector materials are welcomed if a compelling case is made.

The proposed efforts must be directly linked to a requirement for a NASA mission. Details of these can be found at the following URLs:

- General Information on Future NASA Missions: http://nasascience.nasa.gov/missions
- Specific Mission pages:
  - ConX: http://constellation.gsfc.nasa.gov
  - LBTI: http://planetquest.jpl.nasa.gov/lbti/lbti_index.cfm
- Future Mars Programs: http://marsprogram.jpl.nasa.gov/missions/future/futureMissions.html
- Solar Probes: http://science.hq.nasa.gov/missions/sun.html

Specific technologies are listed below. Highly desirable are developments that satisfy multiple requested parameters:

- Large-format focal plane detectors for use in UV and X-ray imaging and spectrometry:
  - UV-sensitive CCD and active pixel sensors with large formats: to 6k x 6k abuttable; extended UV response below 0.2 nm;
  - X-ray-sensitive CCD and active pixel sensors: up to 4k x 4k formats, 4-side abuttable; power levels of 0.1 W / megapixel; resolutions less than 120 eV; readout rates of at least 30 Hz; extended x-ray response above 6 keV.

Very-large-area X-ray detectors for survey instruments: square-meter area capability; response from 3-30 keV; ultra-low power (10 microW/channel).

- Significant improvements in wide band gap materials, individual detectors, and detector arrays for UV and X-ray applications.
- Photon counting detectors with capability to resolve single photon arrival for use in space applications.
- Mega-to-giga-channel analogue electronic systems for very-large-area X- and gamma-ray detectors as

follows: up to 108 channel capability; less than 10 microW/channel power requirement; less than 100 electron rms noise level with interconnects.
- Technology to accomplish X-ray and gamma-ray imaging spectroscopy and polarimetry at the arcsecond level in the energy range from 1 keV to 20 MeV.

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.