Superconducting Detectors and Electronics Workshop at CNM

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Since superconductivity is based on loosely bound Cooper pairs of electrons, superconducting detectors and electronics are much more sensitive and responsive than typical semiconductor detectors. The applications for these developing technologies are very broad and have a high potential for innovation and novel uses. Some examples include superconducting Transition Edge Sensors (TES) that have energy resolutions of a few eV, and the faster Superconducting Tunnel Junction (STJ) having a resolution around 10 eV. Magnetic field detection is also achieved using Josephson Junctions in Single Quantum Interferometer Devices. The superconducting Single Nanowire Strips technology produces single photon detectors with efficiencies above 90 % at photon wavelengths of 1550 nm with excellent timing resolution. Such detectors can also be used for time of flight mass spectrometry of large molecules. Many of these new technologies have direct applications for X-ray measurements at the APS and nanophotonics measurements at the CNM.

We are proposing a workshop on superconducting detectors and electronics. Such a workshop will be of interest to users who are looking for very high energy or timing resolution measurements. A lot of R&D collaboration opportunities are available including improving detection efficiency and timing, readout electronics, and investigation of operational performance under various conditions like high radiation and magnetic field environments. Development of manufacturing techniques, in particular, towards high density detector arrays is an important area for collaboration among users and would be very beneficial as the technology matures. Typical detectors are of the scale of 100s of nanometers to micrometers requiring a lot of elements to cover a larger surface. Therefore integrated superconducting electronics are a natural extension to superconducting detectors to take full advantage of the speed, radiation hardness, and to simplify the interfacing of the detectors to the outside world by processing the informations as much as possible close to the detector. Superconducting electronics technologies will also be presented along with the progress on detector R&D efforts.

1 Proposed invited speakers

- Francesko Marsili , NASA JPL
- Joel Ullom , NIST
- Sae Woo Nam , NIST
- Clarence Chang , Argonne
- Eric Dauler , Lincoln Lab
- Michael Siegel , Karlsruhe
- Peter Day , NASA JPL
- Samuel Moseley , NASA Goddard
- Andrey Elagin , U. Chicago
- Deepnaryan Gupta , HYPRES
- John Musson , JLab
- Alec Sandy , Argonne