Advanced Detectors Development Workshop

May 22, 2002

The workshop on advanced detector development was well attended, with 45 people present. Eight speakers made presentations on pixellated detectors, spectroscopy detectors and other advanced detector developments.

BNL physicist Pavel Rehak presented his ideas and initial results from a 2-D detector built using Complementary Metal-Oxide Semiconductor (CMOS) readout circuits formed directly on a detector-grade silicon. Rehak's ideas could be used to construct efficient direct-detection devices with rapid (about one millisecond) readout.

Physicist Paul Seller, of Rutherford Appleton Laboratory, in Chilton, U.K., gave a summary of European efforts in the design and construction of pixellated detectors. He described several projects in various stages of completeness, and left a definite impression that the European synchrotron community may have been quicker to realize the need for advanced detectors than their American colleagues.

Biophysicist Mark Tate, of Cornell University in Ithaca, New York, described the construction and applications of a high-speed (microsecond) pixellated-integrating detector for real-time imaging, and showed some fascinating data from radiography of vehicle fuel injectors in action.

BNL's Instrumentation Division scientist Gianluigi De Geronimo described the design and initial tests of a 384-element spectroscopy detector for use in Extended X-ray Absorption Fine Structure (EXAFS) experiments of dilute systems.

This theme was continued by engineer Chris Cox, from Princeton Gamma-Tech - a leading supplier of microanalysis systems for x-ray and gamma ray spectroscopy - of experiments to study incomplete charge collection effects in lithium-silicon detectors when used in the soft x-ray range.

Physicist Stephan Friedrich, of the University of California, Davis, described a new class of detectors based on cryogenics. He showed data from experiments using superconducting tunneling junction detectors in the soft x-ray region, demonstrating extraordinarily good energy resolution, in the range 5-10 eV at a few hundred eV.

Physicist Dan Fischer, from the National Institute of Standards and Technology (NIST) in Gaithersburg, Maryland, described his application of efficient multilayer-based dispersive optics to the problem of extracting a weak fluorescent signal from a large background of other radiation, without requiring an ultra-high resolution detector.

The final talk of the workshop was given by BNL physicist Graham Smith, who described a range of new ways to perform electron amplification using micropatterned electrodes. This new technology should allow optimizing new devices for synchrotron facilities.

-Peter Siddons

Workshop Participants