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New Directions in Detector Development at MIT Lincoln Laboratory

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The Advanced Imager Technology group at MIT Lincoln Laboratory designs and fabricates detectors and readout circuits for imaging applications in support of National Security and scientific exploration. The group has a long history of supplying silicon charge-coupled devices (CCDs) for the astronomy community, including detectors for the Transiting Exoplanet Survey Satellite (TESS), the Advanced CCD Imaging Spectrometer (ACIS) on Chandra, and the 1.3 gigapixel array for Pan-STARRS at the University of Hawaii. Our CCD imagers are designed in-house, and fabrication is done in the Microelectronics Laboratory (ML), an ISO-9001 certified, 90-nm node semiconductor fabrication facility at the laboratory. In addition to continuously improving the capabilities of our silicon CCDs, our group has recently begun exploring other imager materials and devices, taking advantage of the advanced prototyping capabilities offered by the ML, with the ultimate goal of providing breakthrough imaging devices to enable new scientific observations. In this talk, we outline our progress in two of these new directions: fabricating imaging devices, both CCDs and hybrid active-pixel sensors, with germanium absorbers; and developing superconductor-based detectors for photon and particle detection.

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