

MCT and APD detector developments for astronomy and environmental monitoring at CEA-LETI

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CEA-LETI, in collaboration with Lynred, develops second-generation cooled infrared focal plane array (FPA) technologies for high-performance imagers, targeting defense, Earth observation from space, and astronomy. This presentation will cover past and recent MCT technology developments and associated electro-optical characterization, focusing on environmental monitoring and science applications. These past activities cover a wide range of spectral bands and applications, from Short-Wave InfraRed (SWIR) with the ALFA detector, a 2Kx2K focal plane array designed for the detection of low flux in astronomy, to Very Long Wave InfraRed (VLWIR, 15 μ m cutoff) detectors for Earth observation in the Meteo Third Generation (MTG) satellites. Recent efforts on P/N photodiode process flow optimization address process-induced defect reduction, high stability for high flux applications, low dark current, and low persistence across the entire SWIR to VLWIR spectral range. These technological developments are jointly supported by state-of-the-art electro-optical characterization means and expertise, enabling a deeper understanding of detector performance and guiding the optimization of infrared imaging technologies for demanding applications.

Moreover, CEA-LETI has been at the forefront of the development of MCT eAPDs for adaptive optics, with the RAPID detector installed on the PIONIER VLTi instrument in Paranal. Today, the APD technology development targets single-element photodiodes for free-space communication, LIDAR, or quantum optics, supporting the creation of the startup Moons Photonics.