

CMOS Monolithic Active Pixel Sensors (MAPS) for scientific applications

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CMOS image sensors, also known as CMOS Active Pixel Sensors (APS) or Monolithic Active Pixel Sensors (MAPS), are today the dominant imaging devices. They are omnipresent in our daily life, as image sensors in cellular phones, web cams, digital cameras, ... In these applications a key parameter is the number of pixels, which is in turn driving towards small pixels and small sensors in order to be cost-effective. Different driving parameters apply to scientific applications, for example in terms of radiation hardness, noise or speed. The sensors are required to be sensitive to a broad spectrum of radiation: photons from the silicon cut-off in the IR down to UV and X- and gamma-rays through the visible spectrum as well as charged particles. In applications like particle or X-ray detection, sensors need to be large, and, as a consequence, pixels tend to be large as well. At the Rutherford Appleton Laboratory, we have been developing MAPS for scientific applications since the early days of this technology and today these sensors are finding their place in these demanding applications. This talk will review the use of MAPS in science and analyse the specific challenges in the design and manufacturing of these sensors, in particular in view of their use in particle physics or photon science.