STATUS OF SCIENCE DETECTORS DEVELOPMENT AT LYNRED AND CEA

A. Lamoure (author)[1], B. Fieque[1], G. Badano[2], O. Gravrand [2], O. Boulade[3]

Introduction

Astronomy and universe observation missions are increasingly important and scientifically more ambitious. In this context, scientific imaging and in particular large format infrared imaging has become essential. To answer those needs, a French community started to work on this topic about ten years ago.

Lynred (formerly Sofradir) has long been involved in the development and manufacturing of infrared detectors for space applications through many studies and programs that comprise operational missions for earth imaging, meteorology and a variety of scientific missions. In parallel, CEA-LETI and Lynred have carried out a collaborative effort to make HgCdTe focal plane arrays for astronomy. Near infrared detectors have recently been manufactured and characterized as part of several ESA studies, with the aim to develop a 2Kx2K large format low flux low noise FPA. Making them requires precise control of the manufacturing process and a suitable process chain.

Discussion

The goal of the first development phases ([1] [2] [3]) was to demonstrate the very demanding level of performance (i.e. the dark current and quantum efficiency) required in low flux scientific applications. This goal was achieved in 2015. The following challenge is to scale up the technology to get to the standard array formats used for astronomy applications, at least 2k x 2k. That implies several difficulties:

- to manufacture HgCdTe material with the same level of performance as for the smaller arrays and to maintain a good operability;
- to produce a large format low flux low noise readout circuit ;
- to manufacture a reliable hybridized structure.

The first 2Kx2K detector prototypes, named ALFA (Astronomy Large Format Array), have been realized jointly between CEA-LETI and LYNRED and are currently being characterized by CEA-IRFU. This paper will give a status on these performance measurements.

Conclusion

After reminding the context of this development effort, we focus on large area detector array development at CEA and LYNRED. In particular we present the first performance assessment of the ALFA detectors. This work is a first step towards a new generation of scientific detectors, with the objective to address future mission needs, both on Earth and in space. The first application targeted is the F-GFT telescope used in the scope of SVOM mission.

Bibliography

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(1) LYNRED
(2) CEA-LETI
(3) CEA-IRFU