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Development of a thinned back-illuminated CMOS Active Pixel Sensor for Extreme Ultra Violet Spectroscopy and Imaging in Space Science

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We describe our programme to develop a large-format, science-grade, monolithic CMOS active pixel sensor for future space science missions, and in particular an extreme ultra-violet spectrograph for solar physics studies on ESA's Solar Orbiter. Our route to EUV sensitivity relies on adapting the back-thinning and rear-llumination techniques first developed for CCD sensors. Our first large-format sensor consists of 4kx3k 5μm pixels fabricated on a 0.25 μm CMOS imager process. Wafer samples of these sensors have been thinned by e2v technologies with the aim of obtaining good sensitivity at EUV wavelengths. We present results from both front and back-illuminated versions of this sensor.

We also present our plans to develop a new sensor of 2kx2k 10 μm pixels which will be fabricated on a 0.35 μm CMOS process. In progress towards this goal, we have designed a test-structure consisting of six arrays of 512x512 10 μm pixels. Each of the arrays has been given a different pixel design to allow verification of our models, and our progress towards optimizing a design for minimal system readout noise and maximum dynamic range. These sensors will also be back-thinned for characterization at EUV wavelengths.

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