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Subject for Master Thesis & Internship

Ultrasensitive pixels

The ultimate sensitivity of an imaging system (CCD, CMOS, film, the eye) require the simultaneous optimum of

- → Quantum efficiency: how many electrons-hole pairs are excited per photon. The ideal number is 100%
- → Fill factor: how much % of the pixels area is photosensitive; the ideal number is 100%
- → How large is the inaccuracy of the measurement of the amount of photo-electrons and thus photons? This quantity is also called "noise". The ideal noise figure is 0.

For reference, today's most accurate astronomical telescope focal place imagers have for the above number 90%, 100% and less than 1. There is still room for improvement, especially in the noise figure.

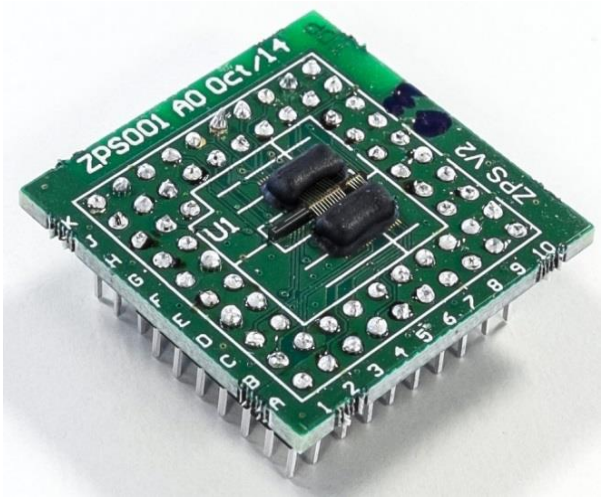

Figure 1 ZPS prototype device reaching 0.34 noise electrons$_{RMS}$

Caeleste has published CMOS pixels having a noise figure below 0.34 electrons$_{RMS}$, and not published as low as 0.21. As the operation of the imager at these extreme performance limits is very challenging, new concepts have to be invented and optimized for low noise design, low noise operation, image processing, cooling, ADC and oversampling concepts.
An enthusiastic MS student (in electronics engineering or physics) is very welcome in our R&D team. The possible tasks vary from conceptual simulations, electrical simulations, schematic and layout design, measurements and interpretation.

For further information or applications contact jobs@caeleste.be

The thesis work includes a prior internship; the total duration of the thesis exceeds 6 man months.