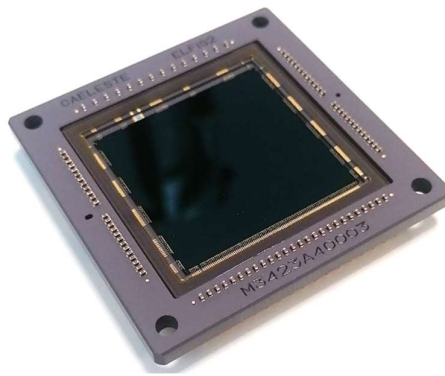


## Proposal for Master Thesis

### NEXT GENERATION ASTRONOMY IMAGE SENSOR

We invite students to do their internship and master thesis at Caeleste, working in the team involved in designing space-based or ground-based image sensors for astronomy.



We are currently preparing the design of the ELFIS3 (European Low Flux Image Sensor, generation 3). The original ELFIS was the first image sensor ever combining: wafer scale size, true high dynamic range, global shutter, backside illumination for near 100% quantum efficiency and full radiation hard design.

For astronomical image sensors, the capability to sense light below the quantum limit, i.e. sensing individual photons, ELFIS3 homes in on ultra-low read noise. Using extreme oversampling and non-destructive readout, we have recently demonstrated read noise as low as 0.14 electrons<sub>RMS</sub> on single pixels. A prototype small array of ELFIS3 pixels is in design. Silicon is expected in early 2026.

The purpose of this master thesis project is to improve all aspects of the sensor and its test/camera system. There are many parts involved in this development, matching the students' interest and expertise:

- IC design, electro-optical design and design verification, pushing the noise far below the 1 electron limit.
- Radiation tolerant design and radiation damage study, verification or measurements.
- Electro-optical measurements, qualification testing, pushing the performance limitations.
- Study of the astronomical requirements and specifications. Interaction with telescope builders and scientific staff.
- Building of the hardware system, consisting of PCBs, FPGAs, packaging, firmware, interfacing to computer systems.
- Software on the data-handling computer: GUI, real-time interfacing, image processing, calibration, demonstration of the whole system in-house and at interested parties and institutions.

The thesis work includes a prior internship; the total duration of the thesis is more than 6 months. Candidates must have sufficient expertise in electronics.

For further information or applications contact [jobs@caeleste.be](mailto:jobs@caeleste.be).