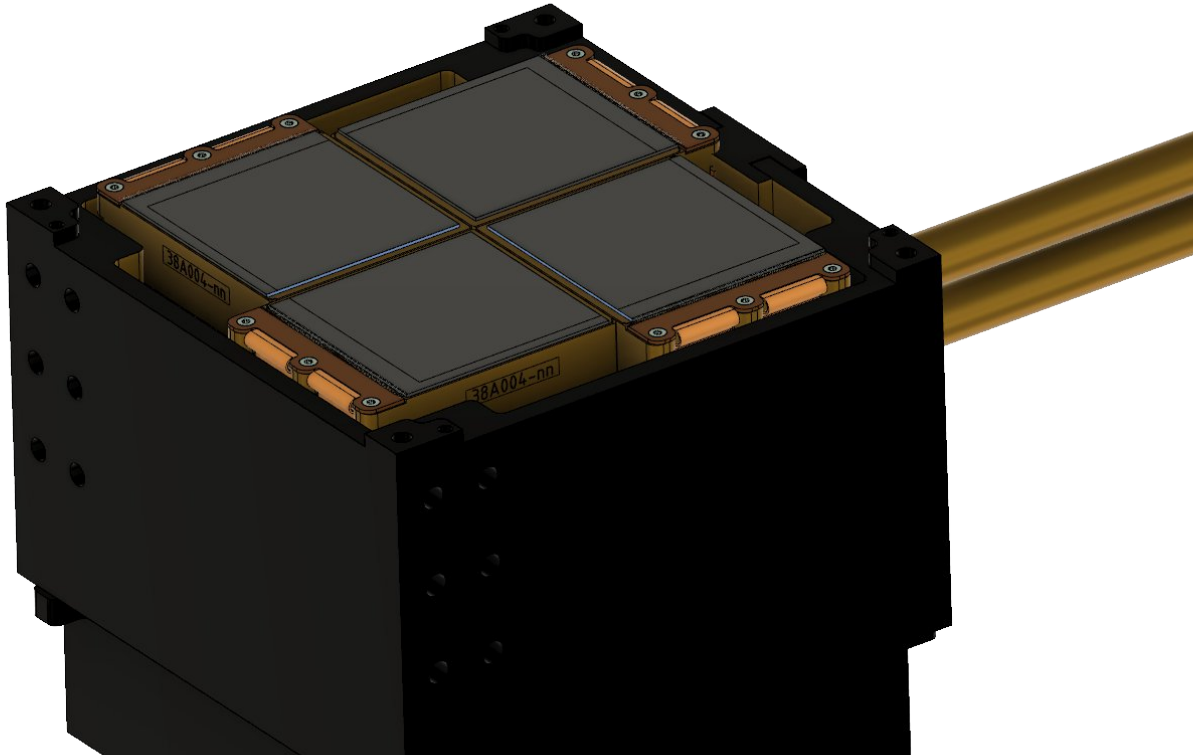
ULTRASAT

Status and overview



Rolf Bühler for the ULTRASAT camera team

Gamma meeting 19th of February 2021

HELMHOLTZ RESEARCH FOR GRAND CHALLENGES

Science and mission.

Ultraviolet Transient Astronomy Satellite

Project details

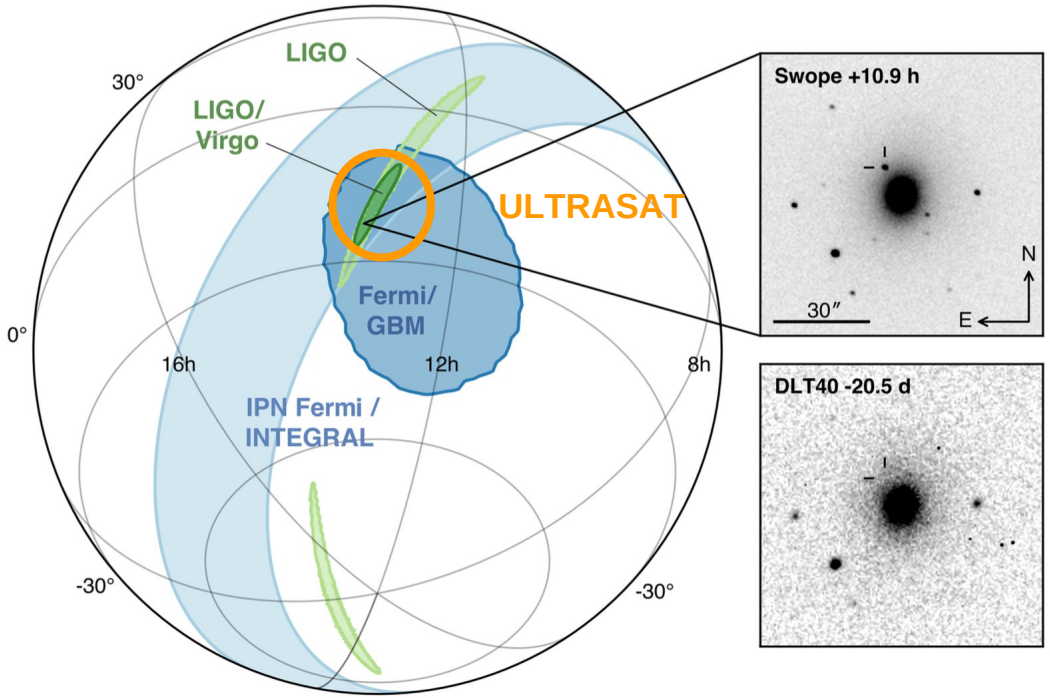
- Astronomy space mission carrying a wide-field UV telescope
- Led by the Weizmann Institute of Science and the Israeli Space Agency
- Spacecraft and telescope are built by Israel based Industry
- DESY will provide the UV camera
- Kick-off ceremony was held on the 28th of October, 2019
- Group established beginning of 2020
- Expecting launch in 2024

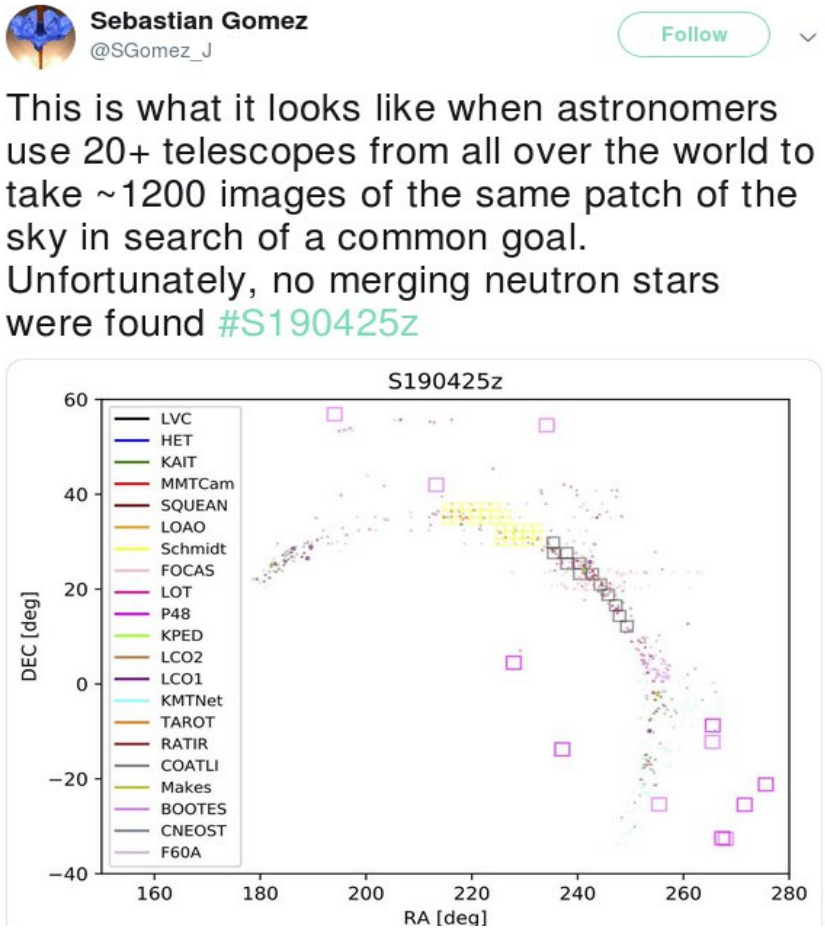
Observing the UV-sky

Gravitational Wave counterparts

Observation modes:

- Survey
- ToO's (> 50% of the sky in < 10 min)





Many other, Supernovae, AGN, planets, stars, etc.

The ULTRASAT mission

And payload parameters

- Operated in **GEO** (35,800 km)
- Satellite mass: **900 kg**
- Mission duration: **3.5 years**
- **Schmitt design** telescope
- Field of view: **15 degrees** diameter
- Wavelength: **220 to 280 nm**
- Exposure time: 3 x **300 s**

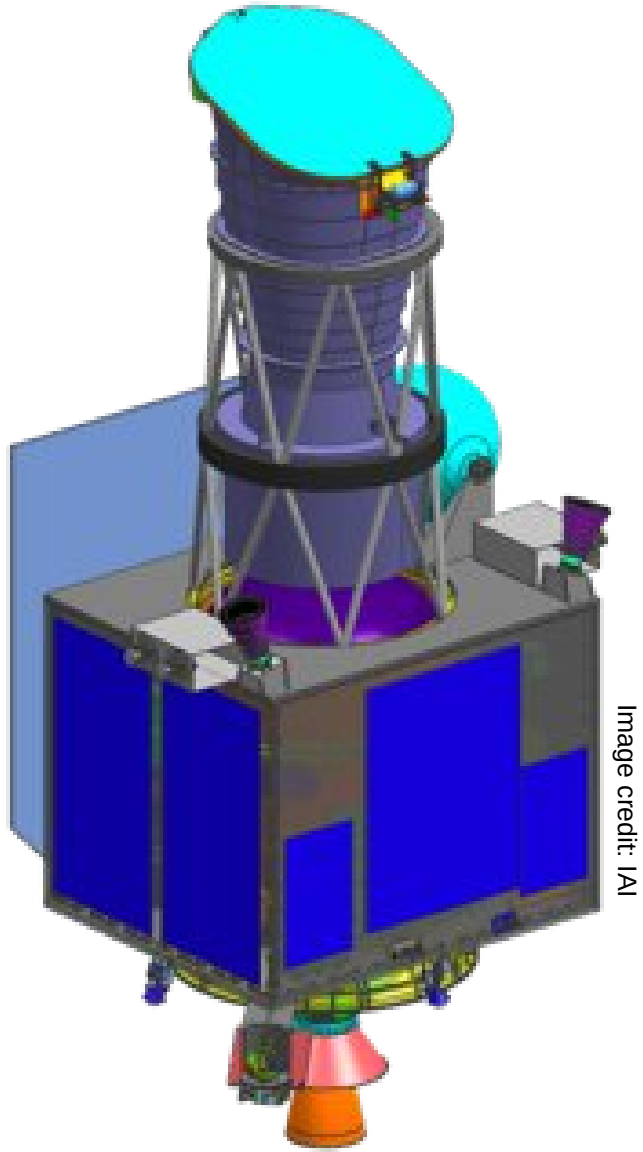


Image credit: IAI

Timeline

Collection of milestones

- **09/2019:** Kickoff
- **01/2020:** System Requirements Review
- **03/2020:** System Design Review
- **12/2020:** Preliminary Design Review
- **08/2022:** Flight model delivery
- **2024:** Launch ready

Image credit: SpaceX

Camera design.

Camera general overview

And its location in the spacecraft

Detector assembly (DA)

- **90M pixel UV** sensor
- Cooled to **200 ± 5 K** by two heat pipes
- Heated to **75°C** for decontamination
- **Position accuracy** along optical axis **< 50 µm**
- FF lens **400 µm** above **sensors‘ surface**
- Very **stringent cleanliness requirements**
- Power conditioning for the sensor

Remote electronics (RE)

- **FPGAs** for camera readout
- Control of the **focus mechanism (FME)**

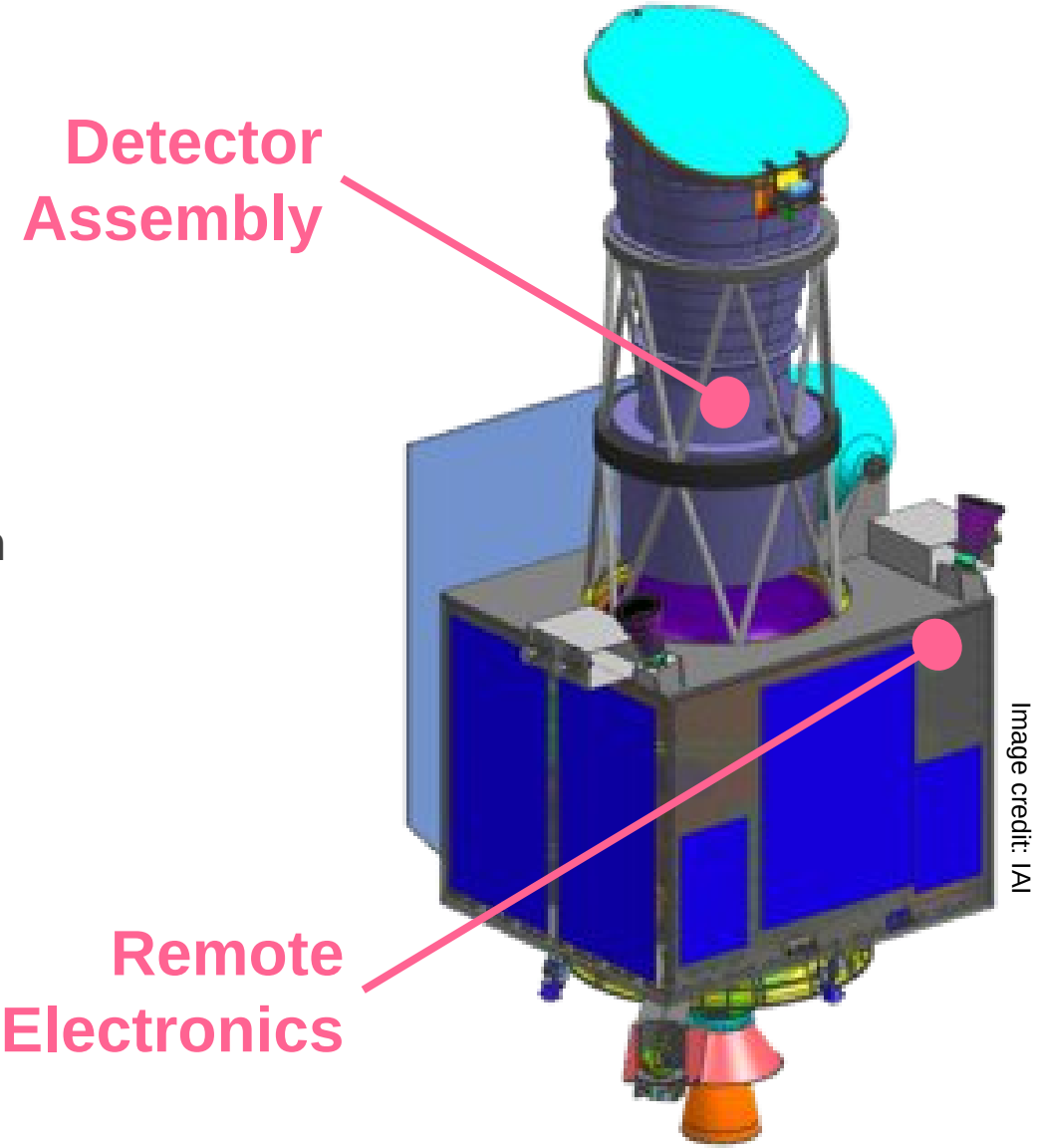


Image credit: IAI

Telescope

Design and camera position

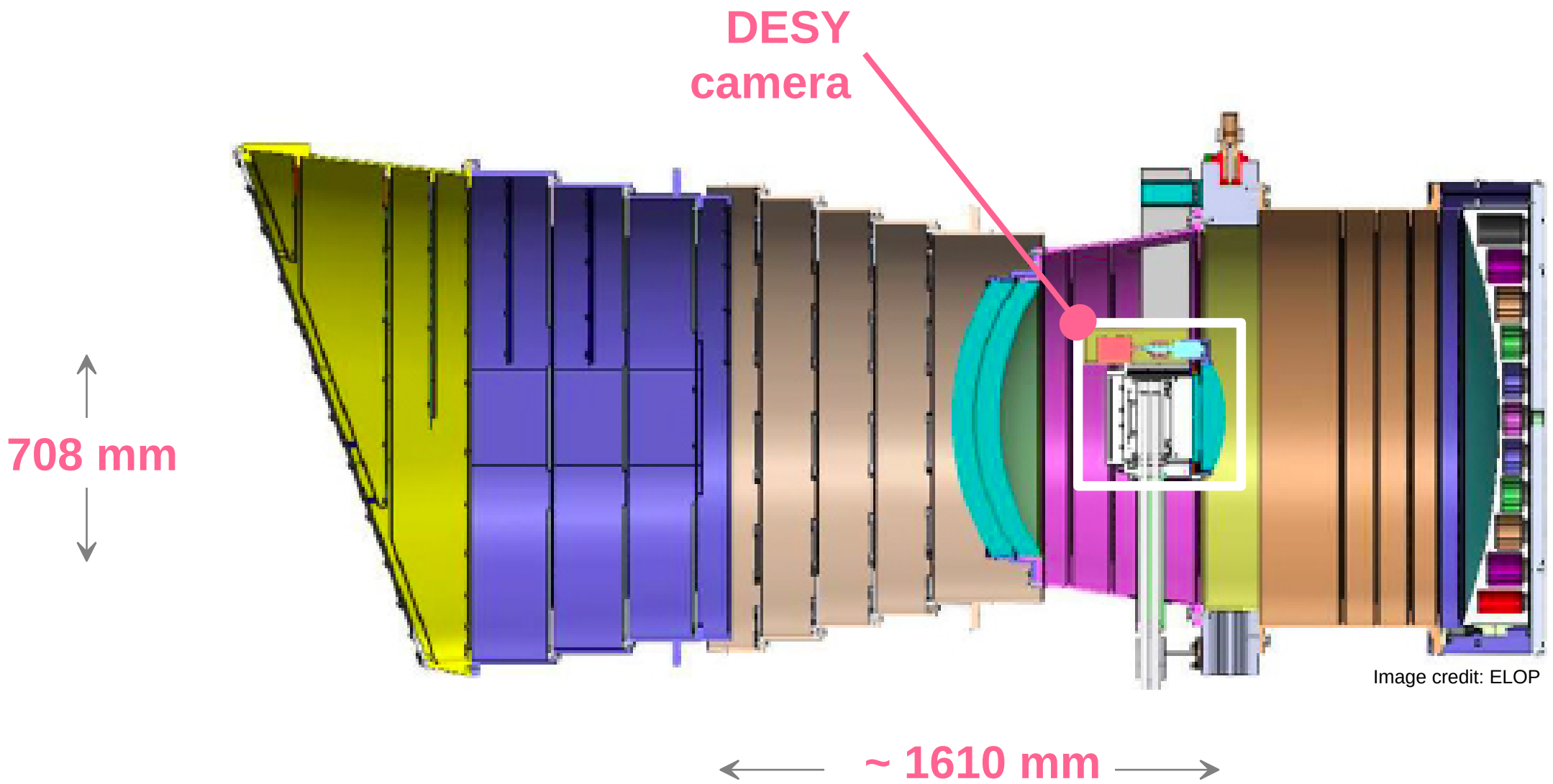
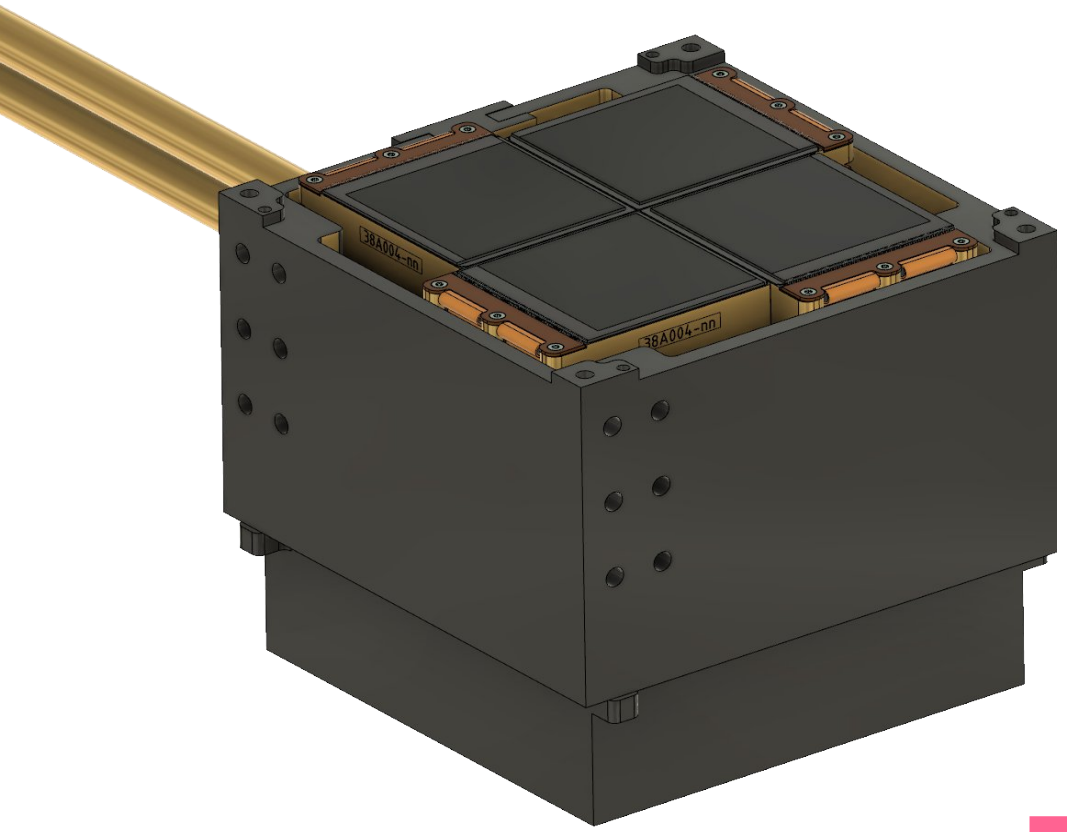


Image credit: ELOP

Camera units

Detector Assembly and Remote Electronics



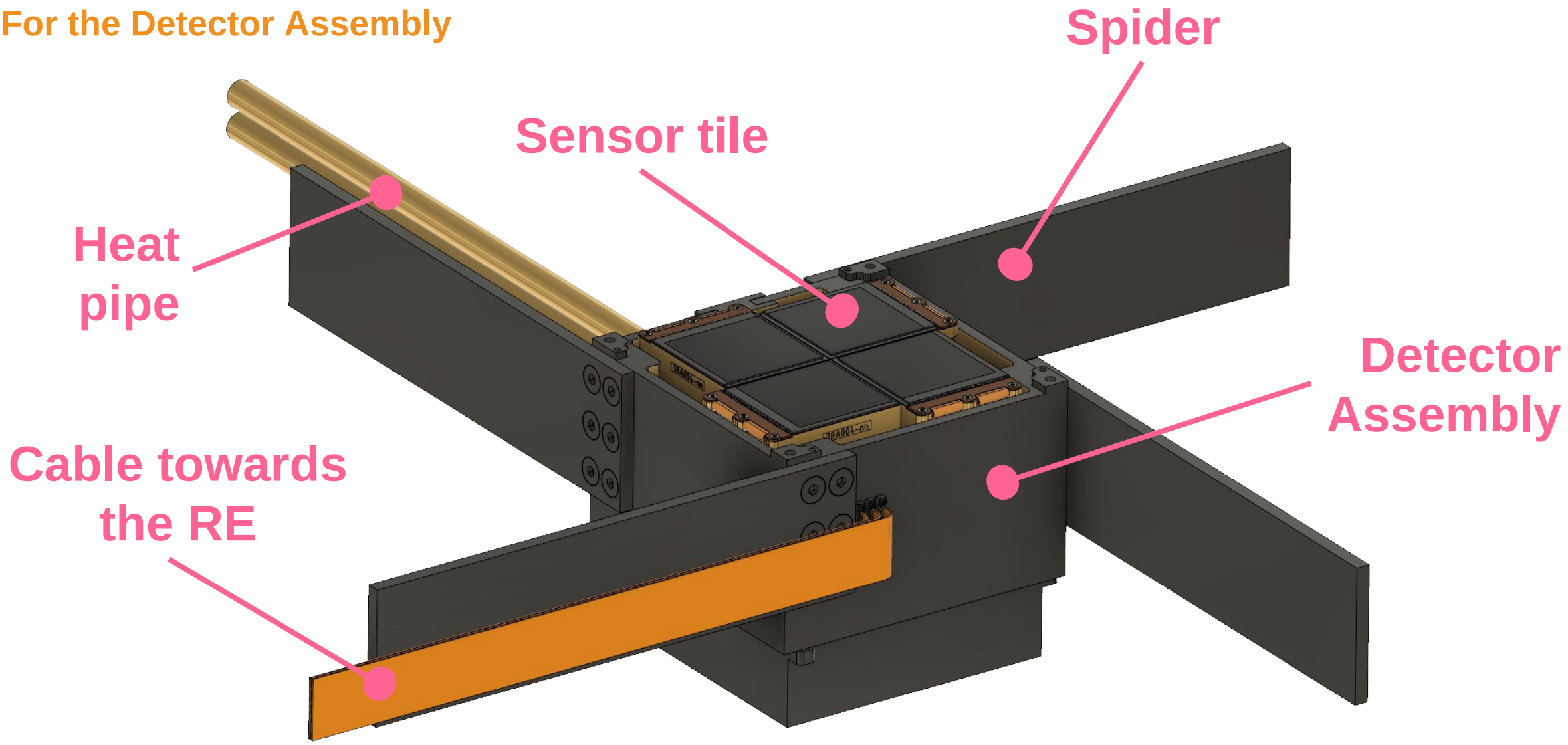
DA and **RE**

135 x 135 120 mm^3

49 x 153 264 mm^3

Naming of parts and elements

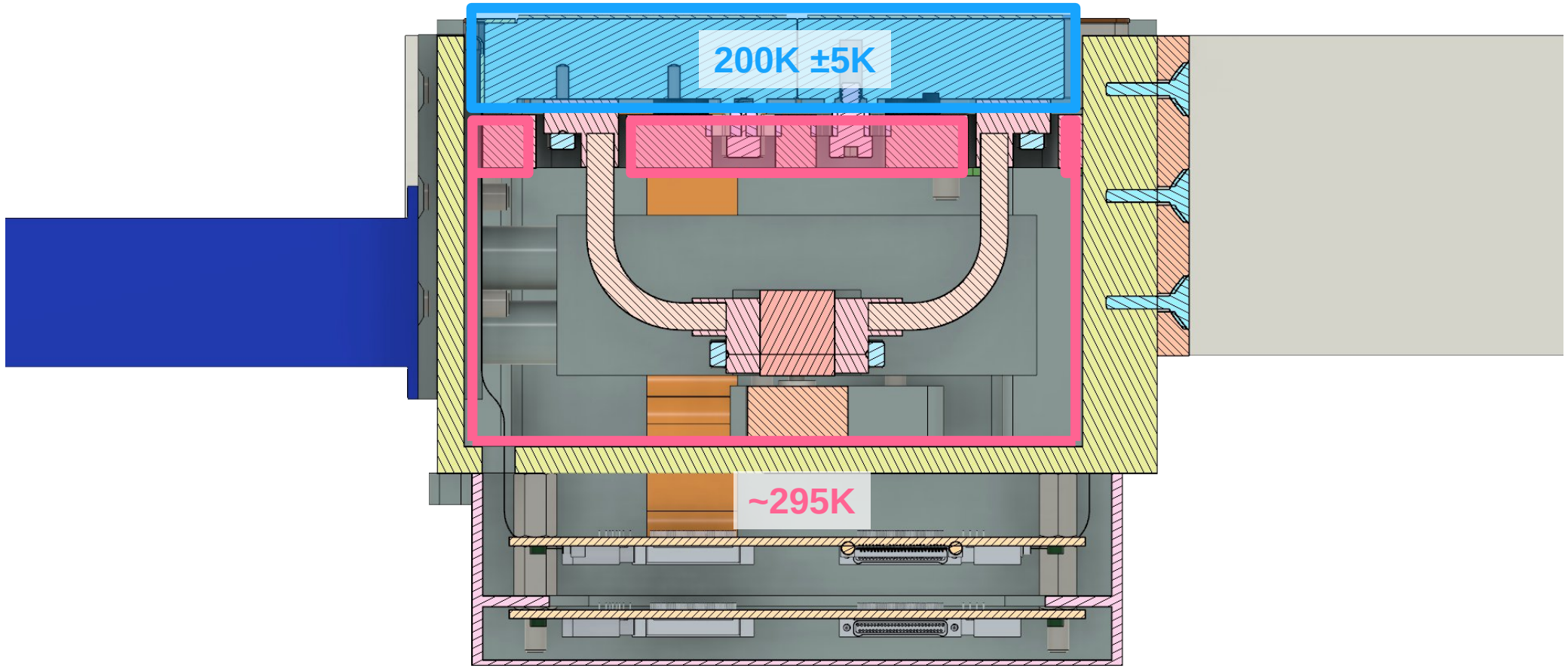
For the Detector Assembly

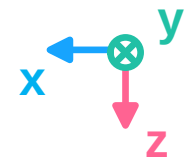


Two temperature domains

Within the detector assembly

295K telescope temperature





Sensor

Basic parameters

Property	Specification
Pixel size	9.5 µm × 9.5 µm
Pixels	4738 × 4738
Sensitive area	45011 µm × 45011 µm
Wavelength	220 to 280 nm
Quantum Efficiency	> 60%
Readout time	< 10 s
Peak power	< 1.25 W
Dark current	< 0.002 e-/sec
Flatness (entire mosaic)	20 µm

Group.

Group

Spring of 2021

Group
Spring of 2021

David Berge
Project PI

Marek Kowalski

Steve Worm

Management

Arooj Asif

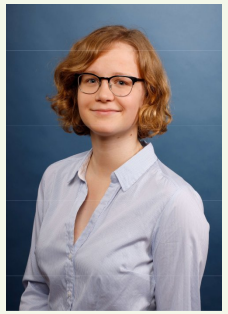
Nicola de Simone

Jason Watson

Vlad Berlea

Firmware and Software

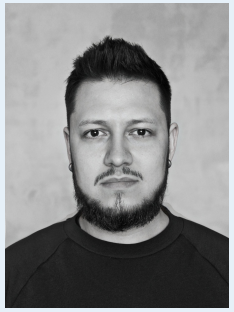
Juan Crespo



Louise Dittmar

Sebastian Philipp

Mechanical and thermal



Mikhail Vasilev

Francesco Zappon

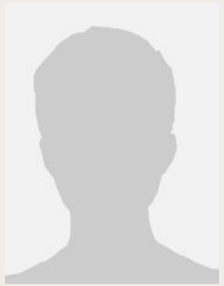
Holger Leich

Electronics

Merlin Barschke
System engineer

Rolf Bühler
Project Manager

Shrinivasrao R. Kulkarni
Quality assurance

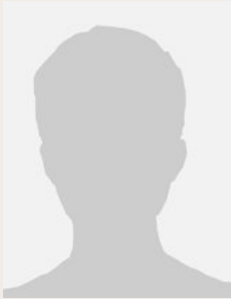


Benjamin Bastian

Gianluca Giavitto

Nirmal Kaipachery

Julian Schliwinski



Daniel Küsters

Verification

Facilities.

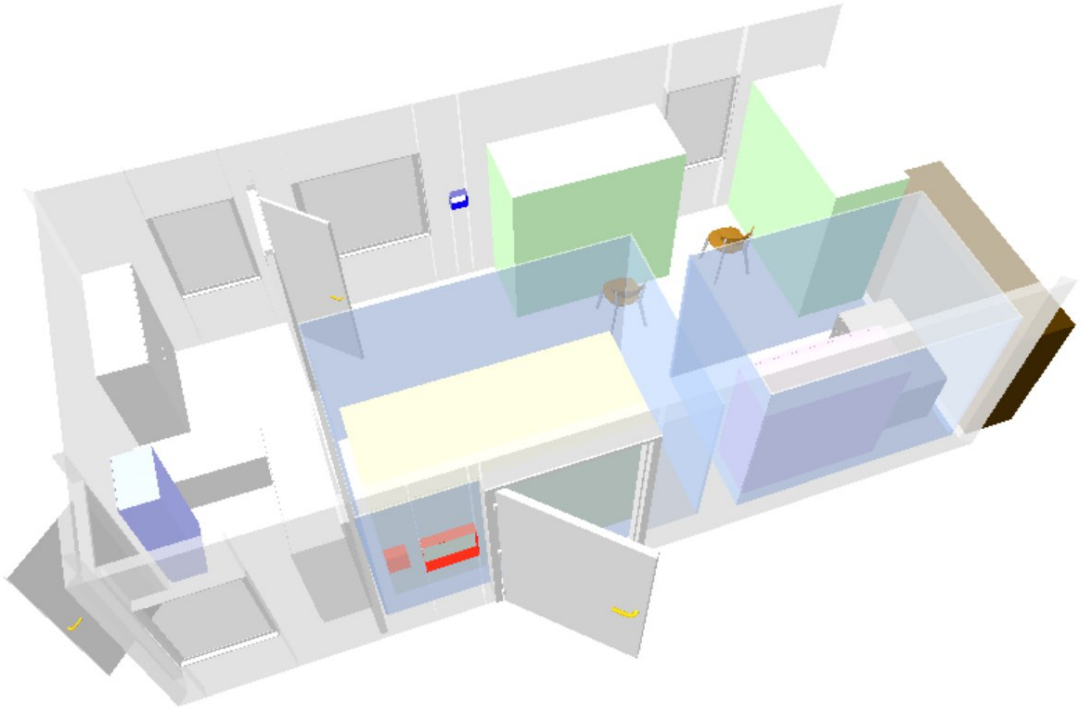
Laboratory

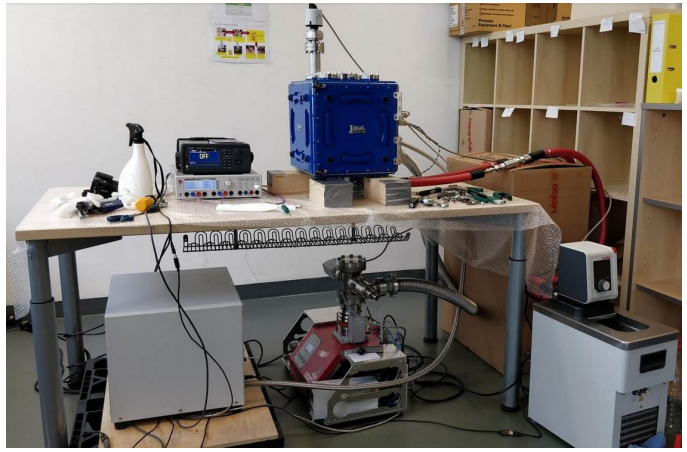
In the "hall"

Contracts made for:

- One ISO 7 laboratory with ISO 5 areas of 35m² .
- Large 170 L TVAC.

Building will start around April and finish in November 2021.





Questions?