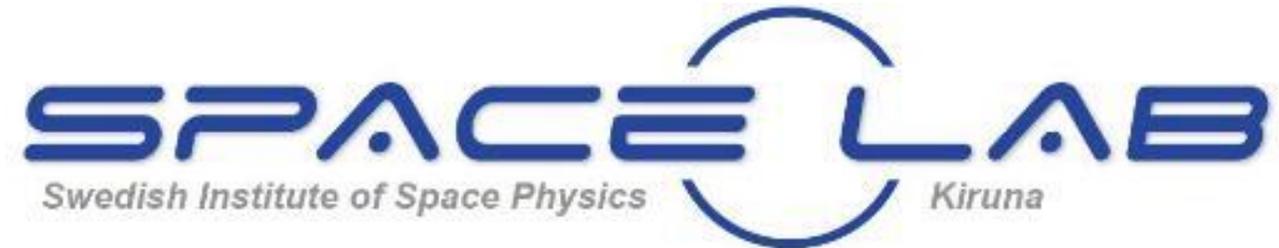




SWEDISH INSTITUTE  
OF SPACE PHYSICS

MATE KERENYI

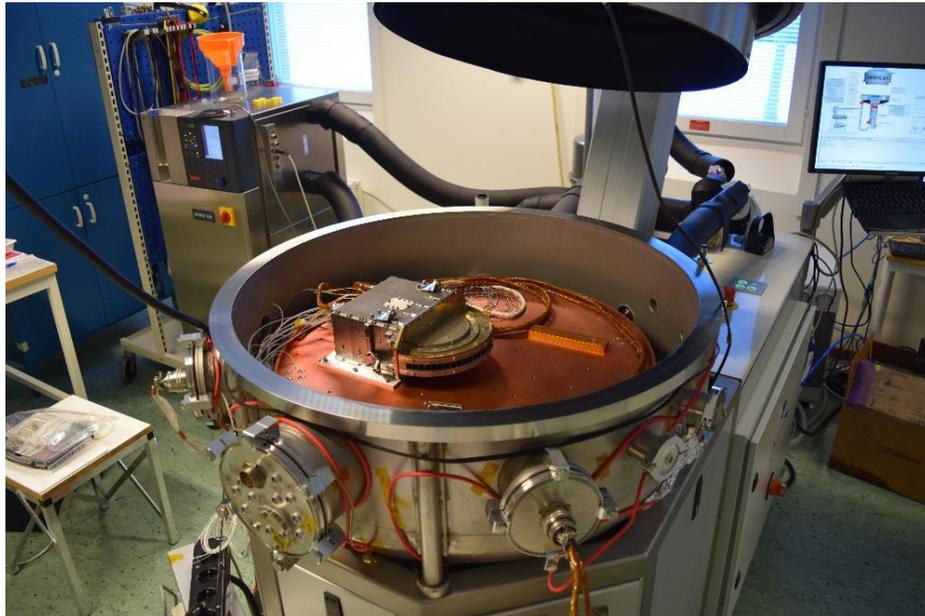


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TESTING AND CALIBRATION FACILITIES FOR  
SPACE HARDWARE IN KIRUNA

# TVAC SYSTEM

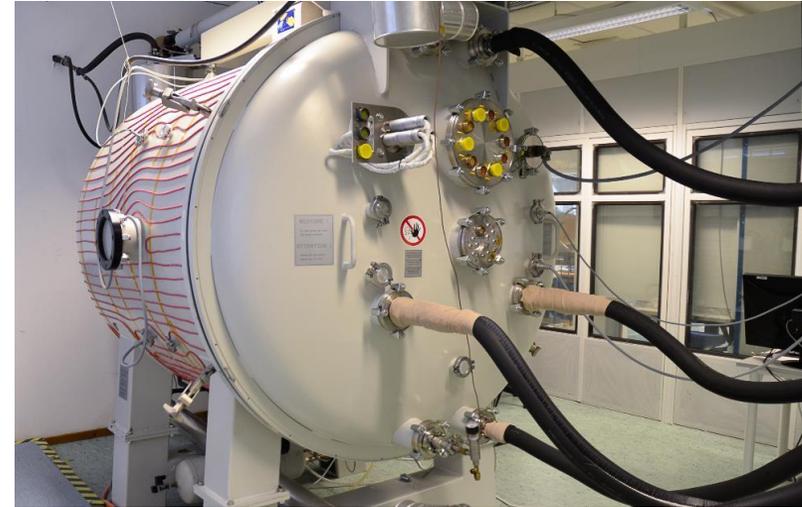
- Smaller chamber for components/small instruments
- Quick pumping time and temp. gradient
- Pre-programmable system, easy to access
- Chamber inside is covered with a black shroud



- NanoVac TVC 025 chamber
- Maximum object size: 40 x 40 x 40 cm
- Temperature range: -55°C to +125°C
- Pressure down to  $10^{-7}$  mbar (cryopump)

# SPACE SIMULATOR

- Larger tank for complete systems/payloads
- N<sub>2</sub> cooling with own plant (10l/h, 3.5m<sup>3</sup> storage)
- Solar simulator feature
- Cu table for conductive environment and black shrouds for radiative environment



- Dimensions:  $d = 1.23\text{m}$ ,  $l = 1.3\text{m}$
- Mounting table: Cu,  $0.7 \times 1.2 \text{ m}$
- Temp. range:  $-45^{\circ}\text{C}$  to  $+90^{\circ}\text{C}$  on the table ( $-160^{\circ}\text{C}$  for the shrouds)
- Pressure down to  $10^{-6} \text{ mbar}$  ( $10^{-5}$  after 1h)
- $0.4 \times 0.4 \text{ m}$  illuminated area:  $0\text{-}1350 \text{ W/m}^2$

# CALIBRATION TANK

- Large tank to simulate radiation environment
- Beam energy up to 5keV
- Turn table inside the tank (4 axes, 2 rot. + 2 transl.)
- Beam scanner and neutralizer
- No thermal control (room temperature)



- Dimensions:  $d = 1.8\text{m}$ ,  $l = 1.3\text{m}$
- Pressure down to  $10^{-7}$  mbar
- Ion energy range: keV - 5keV
- Neutral energy range: 10eV - 1 keV

# MECHANICAL TEST

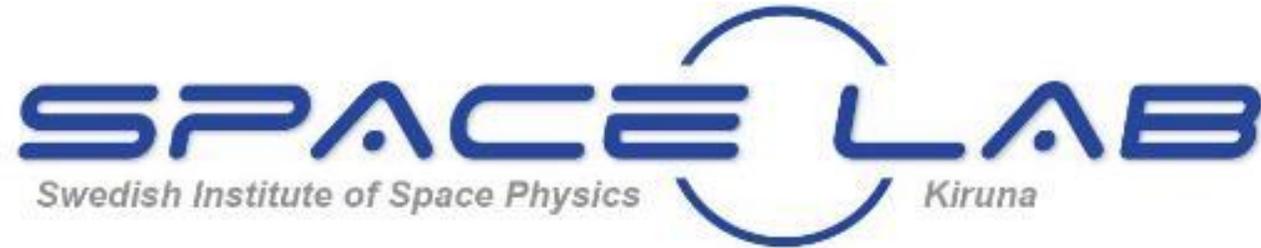
---

- Maximum weight of the device under test is about 700g
- Two axis sin sweep and random test (5 – 2000 Hz)
- Possibility for a shock spectrum.



# QUESTIONS

---



## Current facilities:

- Small vacuum systems
- Vacuum storage
- Mechanical workshop
- Soldering station
- Integration lab
- Chemistry lab

## Future facilities:

- New lab locale
- Additional TVAC system
- Large storage tank
- Upgraded cooling system
- Clean benches
- ...

[mate@irf.se](mailto:mate@irf.se)

A cosmic background featuring the Earth's horizon at the bottom, a bright arc of light on the left, and the Milky Way galaxy in the center. The text is centered in the upper half of the image.

**COMPOSITE SERVICE  
EUROPE AB**

**PETER NILSSON**



**Composite Service**  
**Europe AB**

---

- **Business areas**
  - **Automotive**
  - **Aerospace**
  - **Power Industry**

[www.compositeservice.com](http://www.compositeservice.com)

[www.flexprop.se](http://www.flexprop.se)



# Composite Service

## Europe AB

---



**Antennas & Casings**



# Composite Service

Europe AB



**Electrical insulation**



# Composite Service

Europe AB

---



**GEO-grippers**



# Composite Service

Europe AB



Our customers

[www.compositeservice.com](http://www.compositeservice.com)

[www.flexprop.se](http://www.flexprop.se)

A cosmic scene featuring the Earth's horizon at the bottom, a bright yellow and orange arc on the left side, and a starry background with the Milky Way galaxy. The text is centered in the upper half of the image.

**JIT MECH I  
ROBERTSFORS AB**

**PER LINDQVIST**

# JIT Mech

- Advanced production of mechanical components by;
  - Turning and milling
  - Helium leak testing and pressure testing
  - Welding
  - Assembling
  - Product development partner



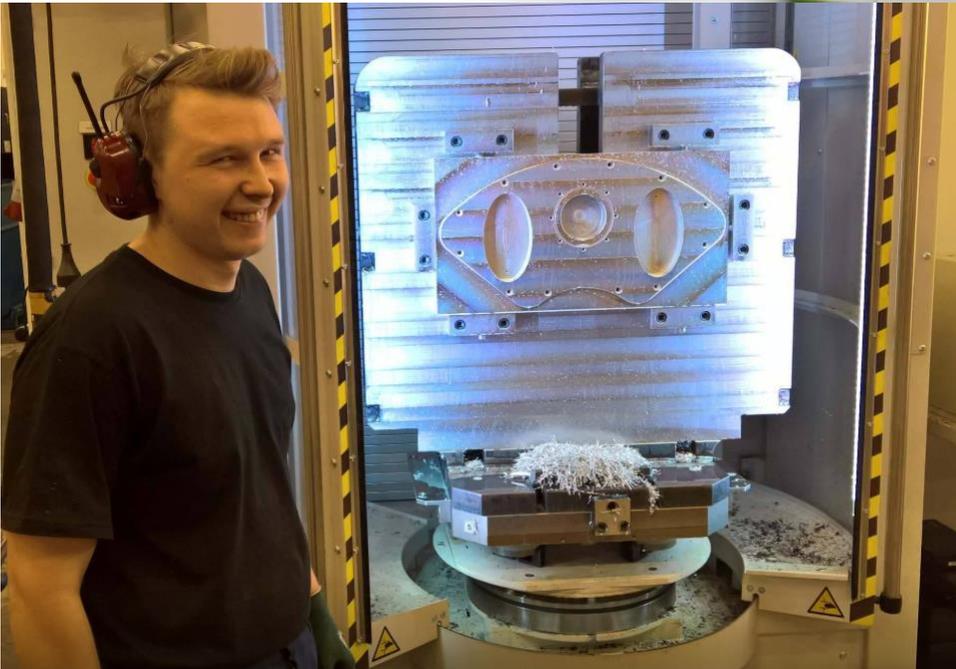


ABB transformers enable world record transmission link in China





PASQ

EMIL VINTERHAV



Independent Space Qualification  
Will Your Product Work in Space?

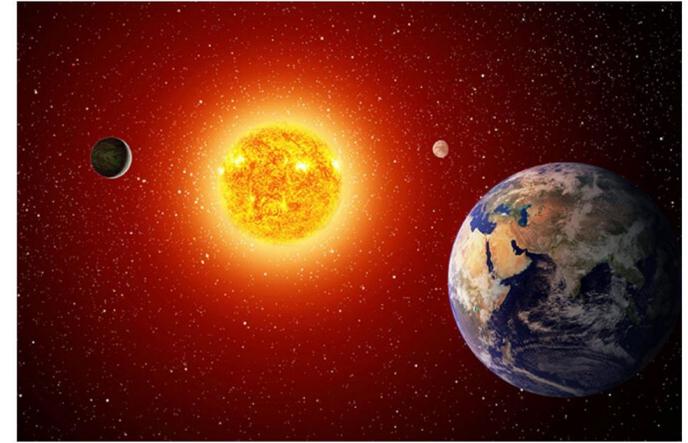
# Space is hostile



Radiation



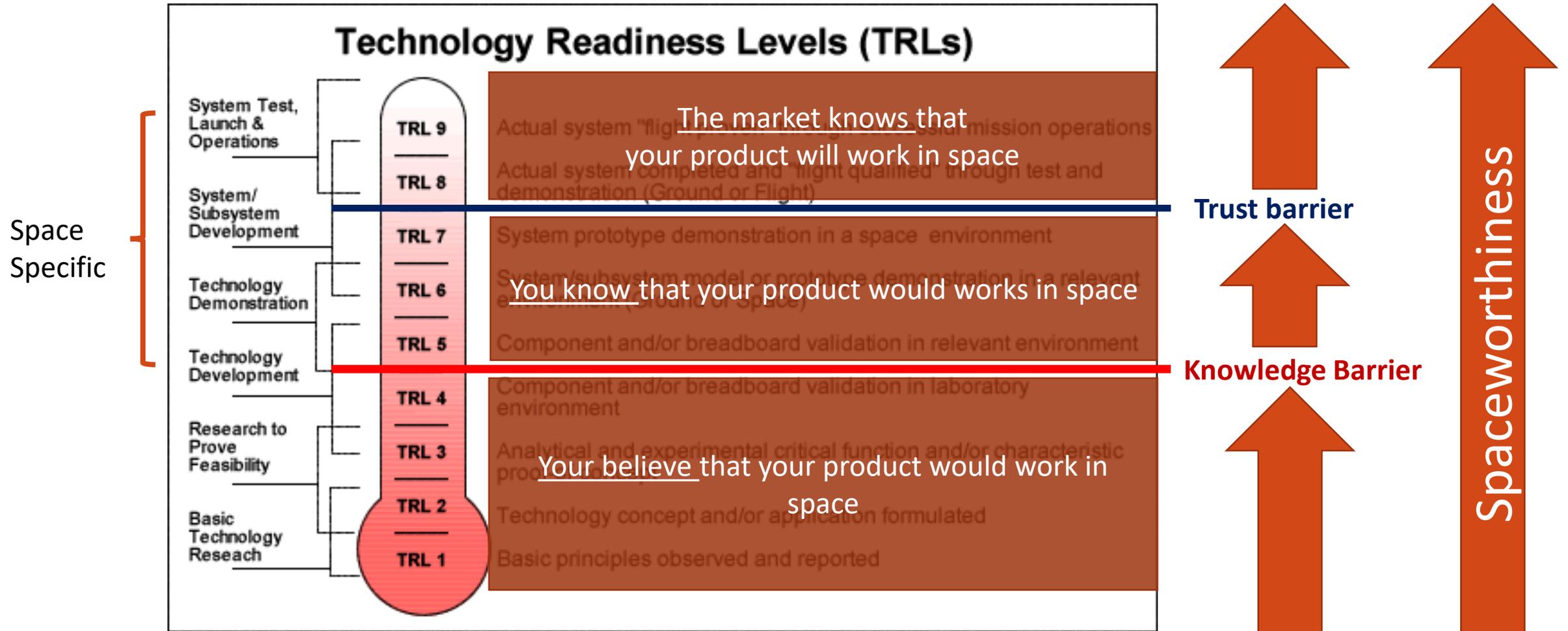
Vibration



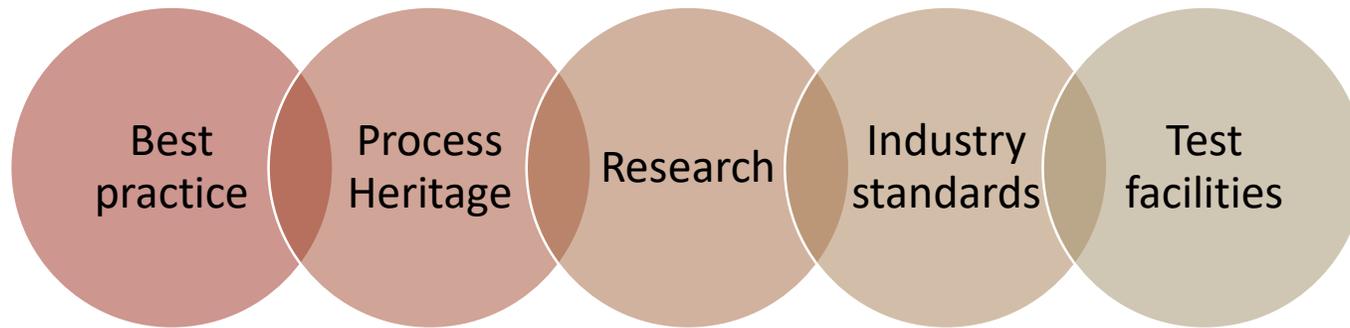
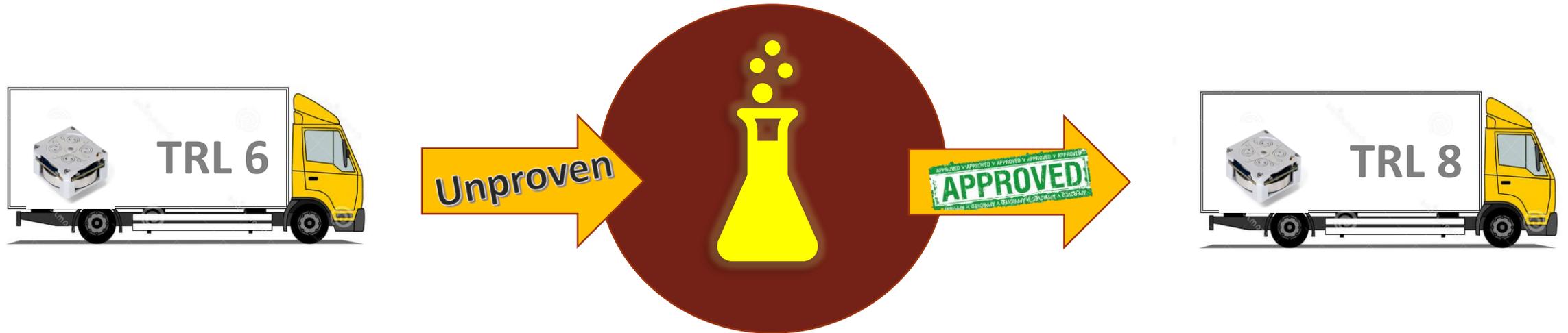
Thermal stress

# Two barriers

When you attempt to enter the space you will hit (at least) two barriers



# PASQ demonstrates that your product will work in space so you do not have to.



# Today - TID and SEE Radiation

- Relevant and adequate
  - Single Events - High Energy Protons
  - Total Ionizing Dose - Co-60
- Efficient
  - Agreements with radiation facilities
  - Pre-defined test plans and procedures
- Credible
  - ECSS and ESCC compliant
  - Independent



Tomorrow - Vibration, Shock, Thermal Vacuum

A cosmic background featuring a bright sun on the left, a thin blue and white horizon line of Earth, and a glowing orange arc in the dark blue starry sky. The Milky Way galaxy is visible in the background.

AALTO UNIVERSITY

JAAN PRAKS

**A!**

**Aalto University**

# Aalto University Campus: Otaniemi

Otaniemi is the biggest Technology Campus in Finland. The campus integrates Technology, Business and Art, tech institutes and countless technology companies nearby.

Aalto-yliopisto  
Aalto-universitetet  
Aalto University  
Oskari 1

# Aalto Space Science and Technology

*Major in Electronics and Nanoengineering*

## *Student missions*

Aalto satellite projects are integrated to Space Science and Technology curriculum.

Students get hands on design, integration, testing experience and operation.



A photograph showing two men in white lab coats working on a small, rectangular metal device, likely a CubeSat, on a blue workbench. The man in the foreground is wearing glasses and is focused on the device. The man in the background is also wearing glasses and is looking at the device. The workbench is cluttered with various tools and components. The background shows a laboratory setting with a glass partition and overhead lights.

# CubeSat development

# A?

Aalto University  
School of Electrical  
Engineering



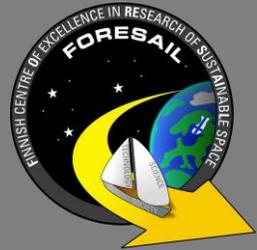
**Aalto-1**  
**Aalto-2**  
**Aalto-3**



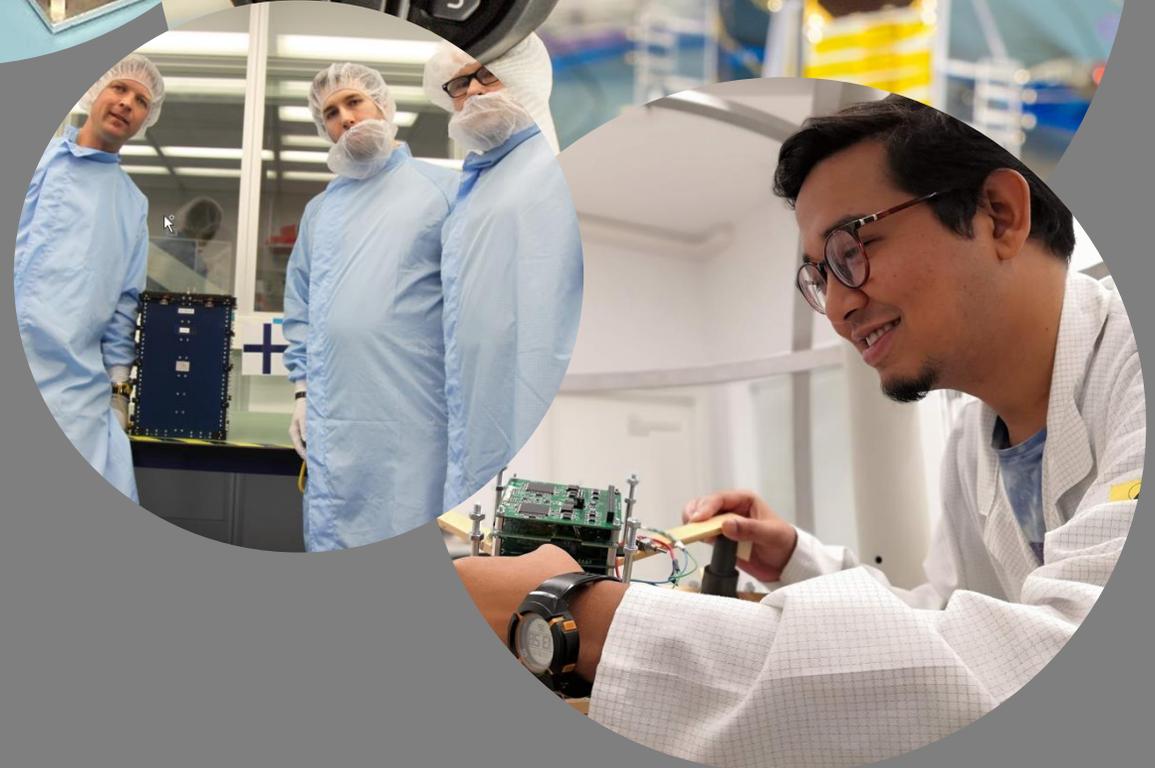
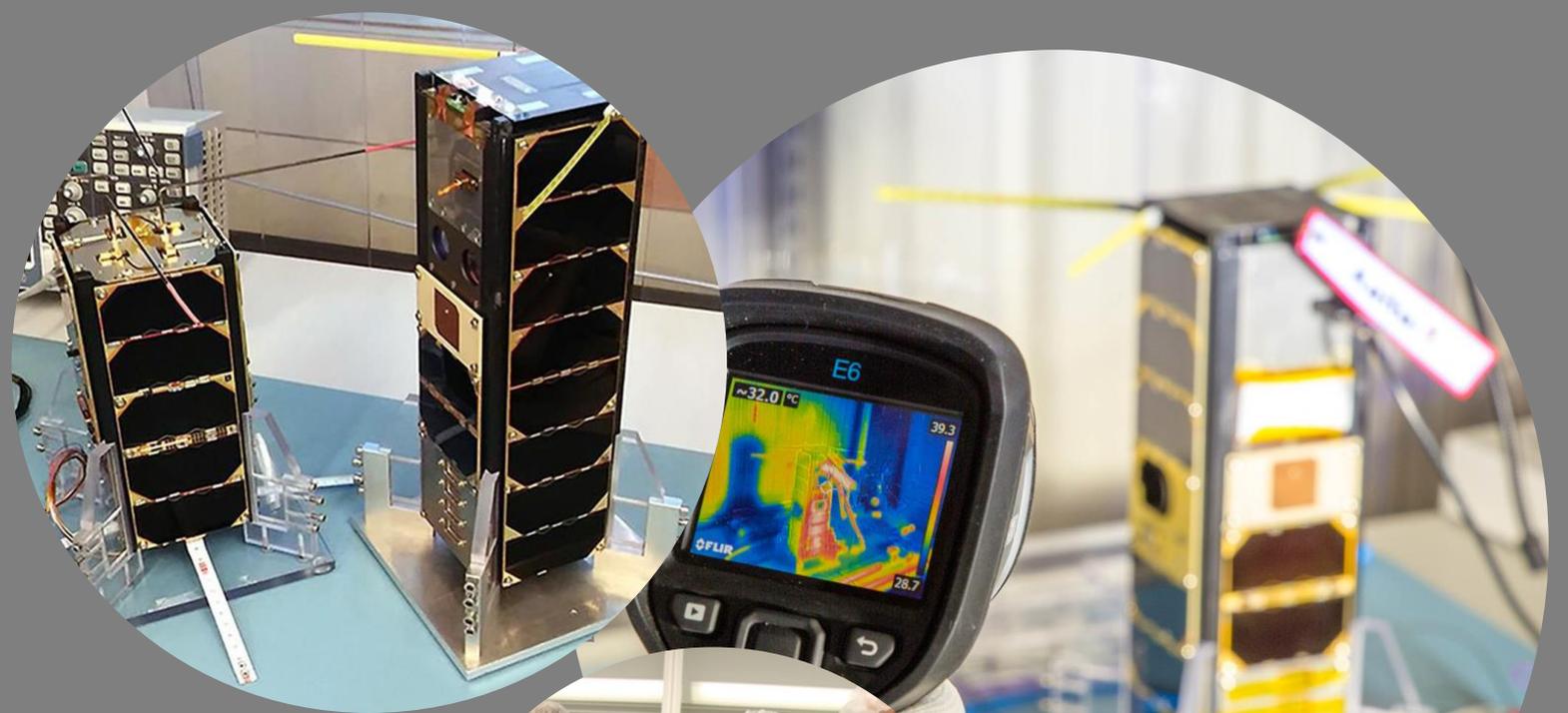
**SUOMI100**  
SATELLIITTI



Kvarken Space Center

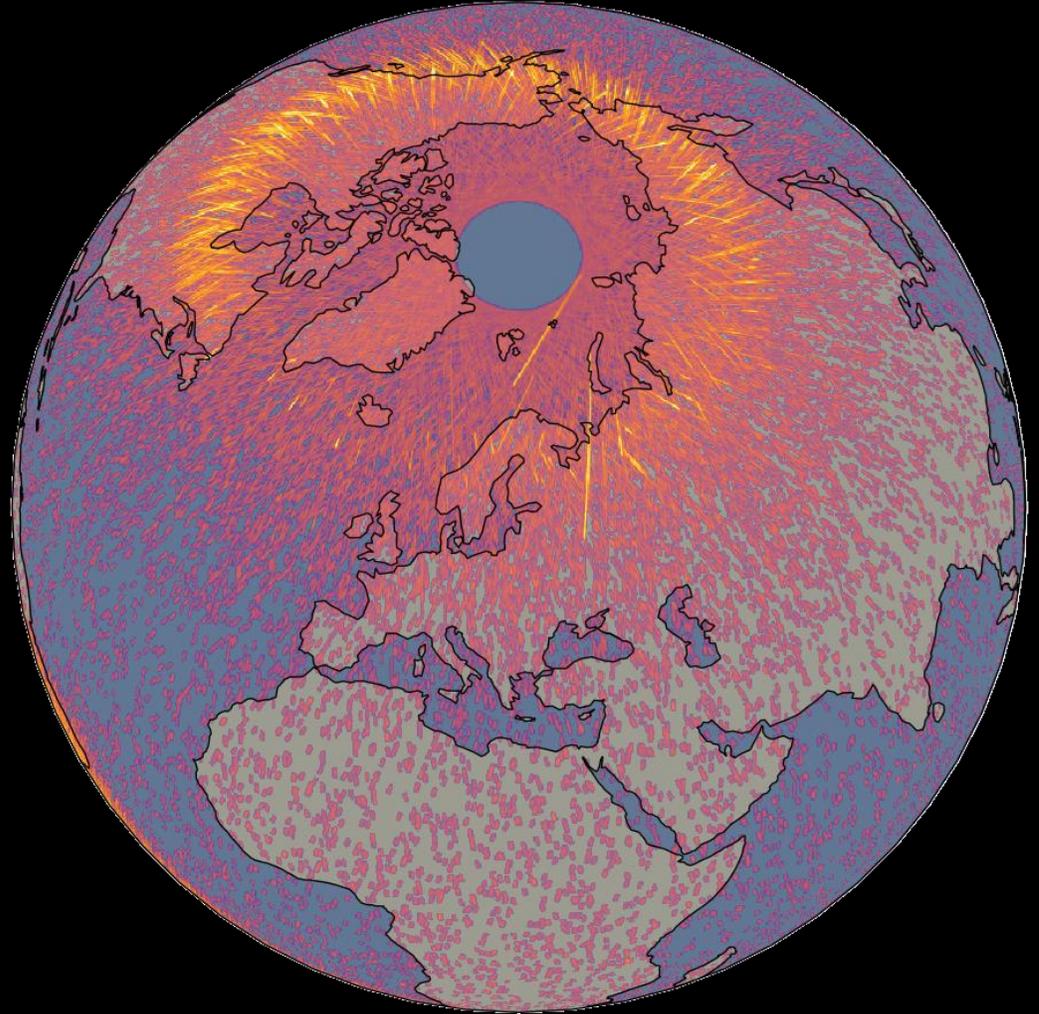
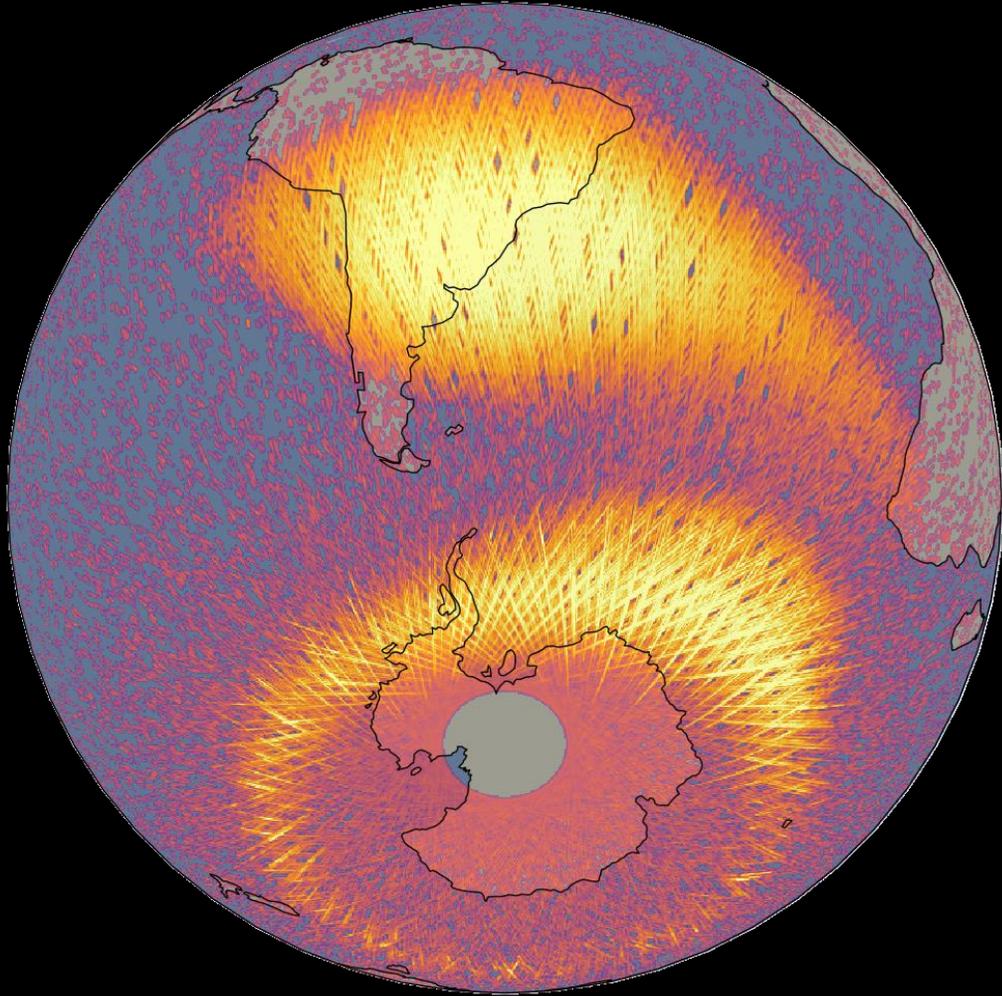


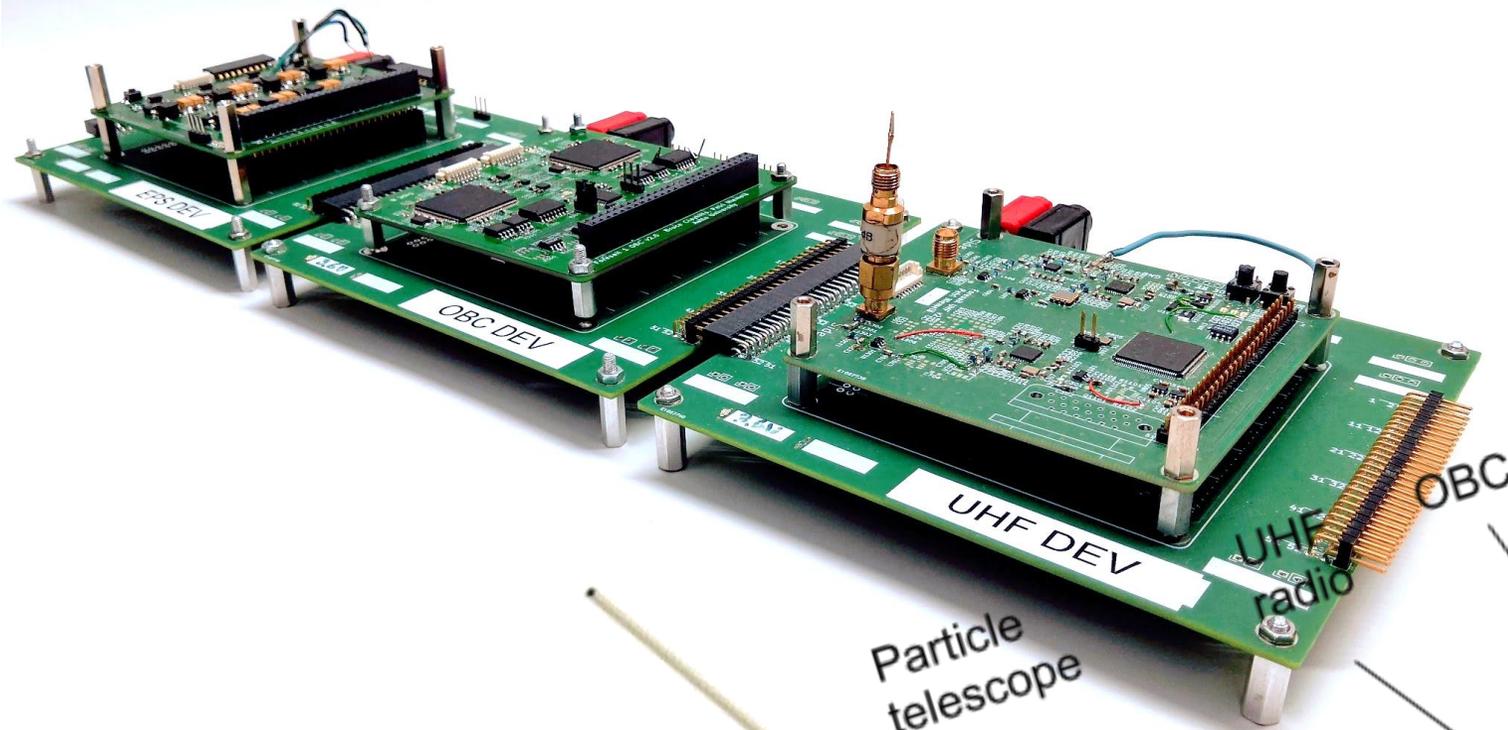
**Foresail 1**  
**Foresail 2**



# Aalto Satellites



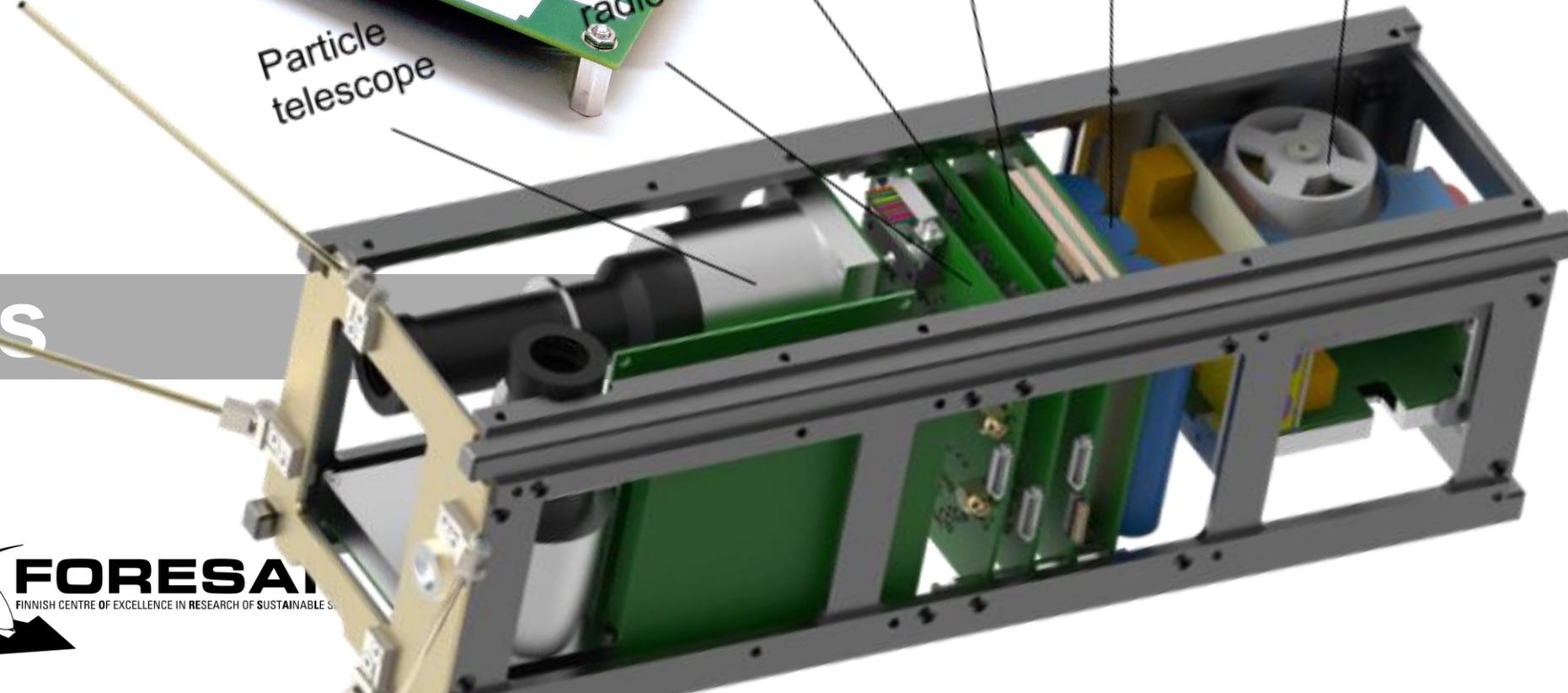




EPS  
Battery board  
Plasma brake

UHF radio  
OBC  
Particle telescope

# Satellites





# Radio communication

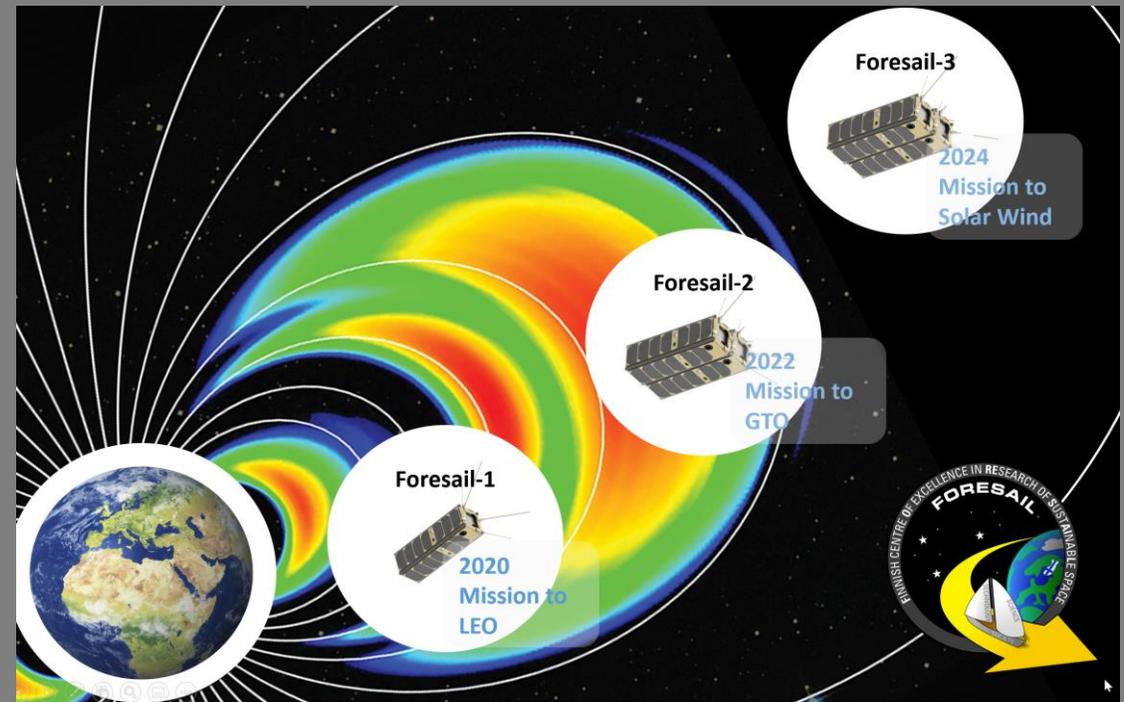
# Satellite operations and GS





# FORESAIL

FINNISH CENTRE OF EXCELLENCE IN RESEARCH OF SUSTAINABLE SPACE



UNIVERSITY  
OF TURKU



SUOMEN AKATEMIA  
FINLANDS AKADEMI  
ACADEMY OF FINLAND



Reaktor  
Space Lab

AURORA  
PROPULSION TECHNOLOGIES

Kitsat

ICEYE



Aalto Space spin-off companies

A!

Aalto University





ICEYE

**Now one of the biggest  
space companies in Finland**



**ICEYE**

# ICEYE

## SATELLITE SPECIFICATIONS

### ICEYE-X2 SAR Baseline Configuration

FEATURE	ICEYE-X2
Unit mass	85 kg
Imaging and polarization	X-band SAR, VV polarization
Resolution	20x20 / 3x3 / 1.5x1.5 / 1x1 meters
Dynamic range	16 bit
Imaging mode	Stripmap
Imaging modes under development	Spotlight, Stripmap High, ScanSAR
Communications (downlink)	X-band radio, 100Mbps/s optical
Product formats	SLC, GRD, GeoTIFF
Routine operations	24/7
Chirp bandwidth	Up to 300MHz
Geolocation	Under 50 meters
ADCS	Reaction wheels, magnetorquers, star trackers
Propulsion	Ion engines





A photograph of two men in a cleanroom environment. They are wearing white lab coats and hairnets. The man on the left is smiling and holding a large, rectangular metal component with a grid of circular holes. The man on the right is also smiling and looking at the camera. The background shows a cleanroom with a bright light fixture and a window.

Hello World  
SNIR spectrometer

**Reaktor  
Space Lab**

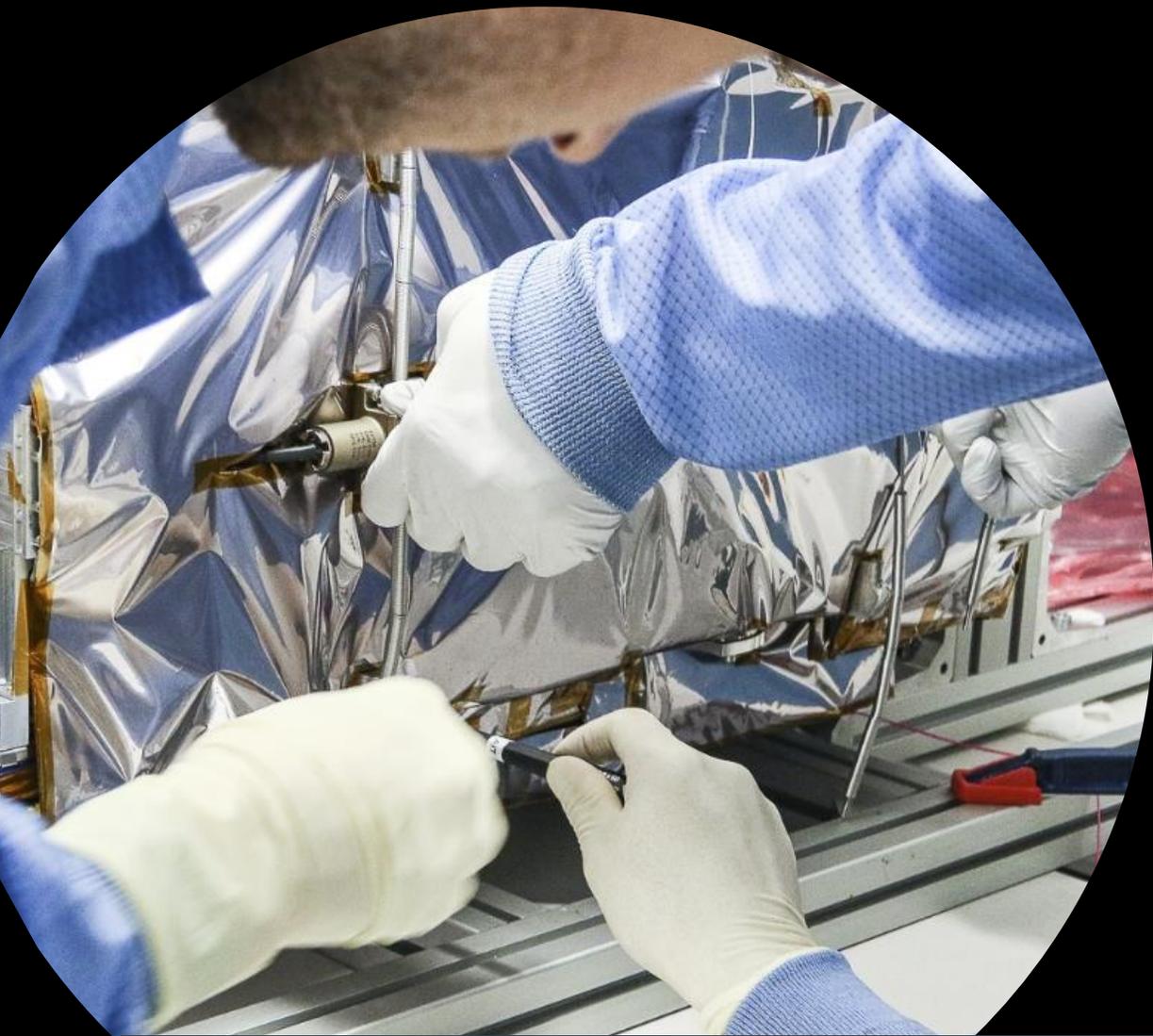


1. Kitsat is a CubeSat





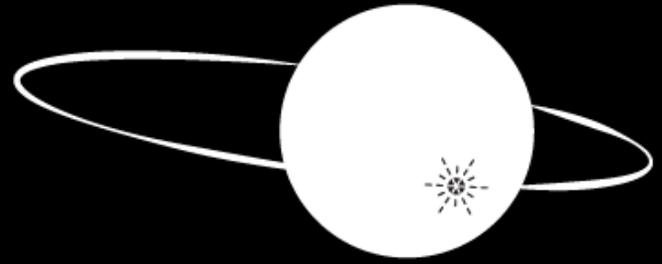
kitsat



BUSINESS  
FINLAND

**FORESAIL**  
FINNISH CENTRE OF EXCELLENCE IN RESEARCH OF SUSTAINABLE SPACE

**A?**  
Aalto University  
School of Electrical  
Engineering



# Finnish Satellite Workshop 2020

[www.spaceworkshop.fi](http://www.spaceworkshop.fi)

ICEYE  
Your Special Delivery Service

BALTIC SAT APPS  
Kvarken Space Center

ISIS

EXO LAUNCH

SSF

VTT

CGI

SYKE

Reaktor Space Lab RSL

Nanovac AB

DA GROUP

FMI

NLS FINNISH GEOSPATIAL RESEARCH INSTITUTE FGI

JYVASKYLÄN YLIOPISTO UNIVERSITY OF JYVASKYLÄ

harp technologies

SPACE INVENTOR

BITCOMP

AURORA PROPULSION TECHNOLOGIES

ILA BERLIN INNOVATION AND LEADERSHIP IN AEROSPACE

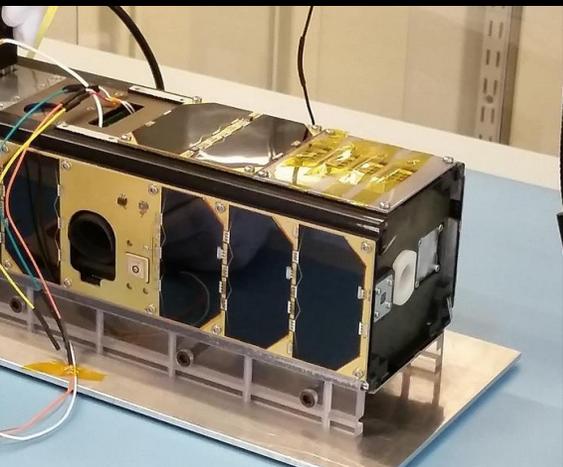
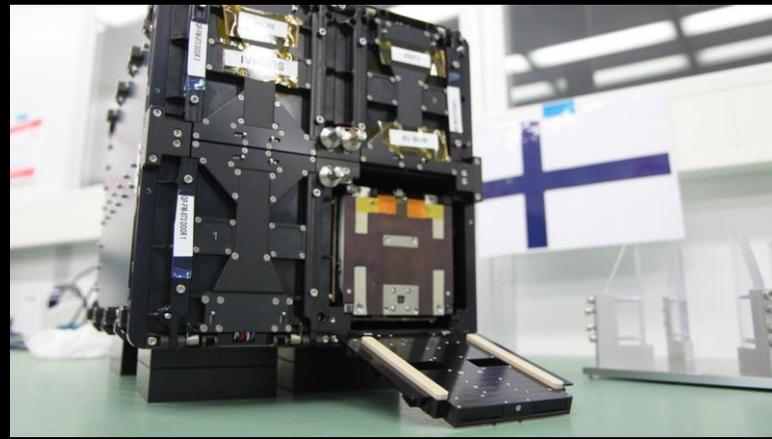
PASQ SPACE QUALIFICATION

esa business incubation centre Finland

Together ahead. RUAG



**Welcome to collaborate with  
Finnish Space Community!**

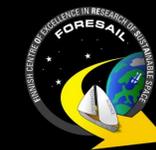
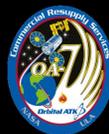


# Thank you!

**Aalto-2**

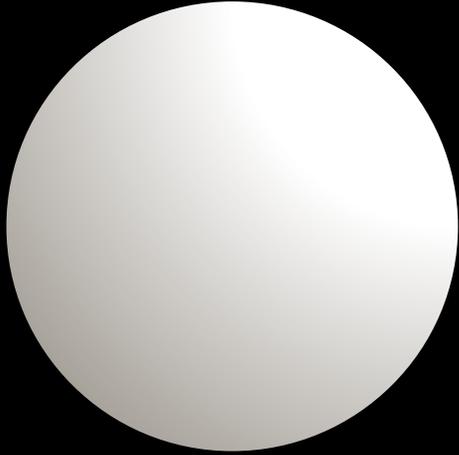
**Aalto-3 Kitsat**

**Aalto-1**



# A?

Aalto University  
School of Electrical  
Engineering



**Aalto-1**  
2017



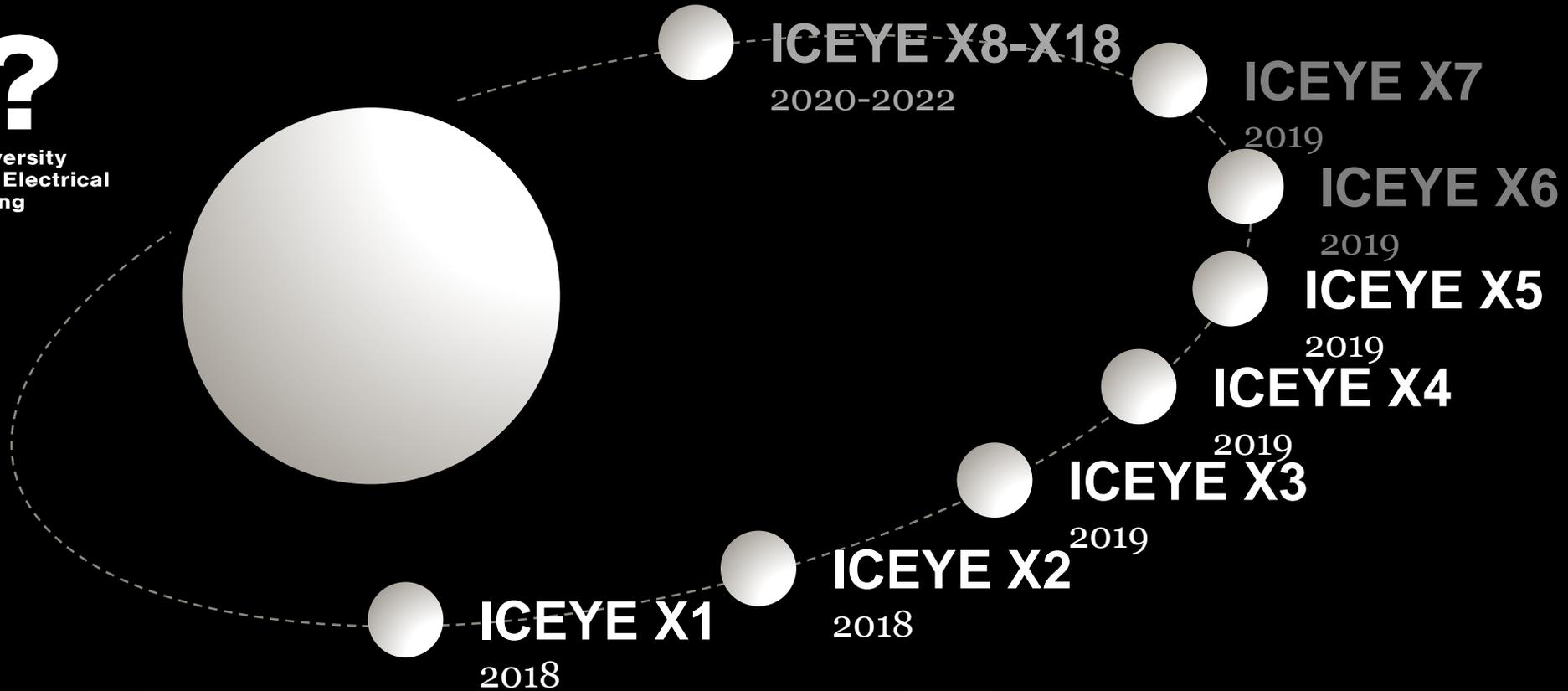
**Hello World**  
2018

# Optical EO

*Technology demonstration missions*

# A?

Aalto University  
School of Electrical  
Engineering

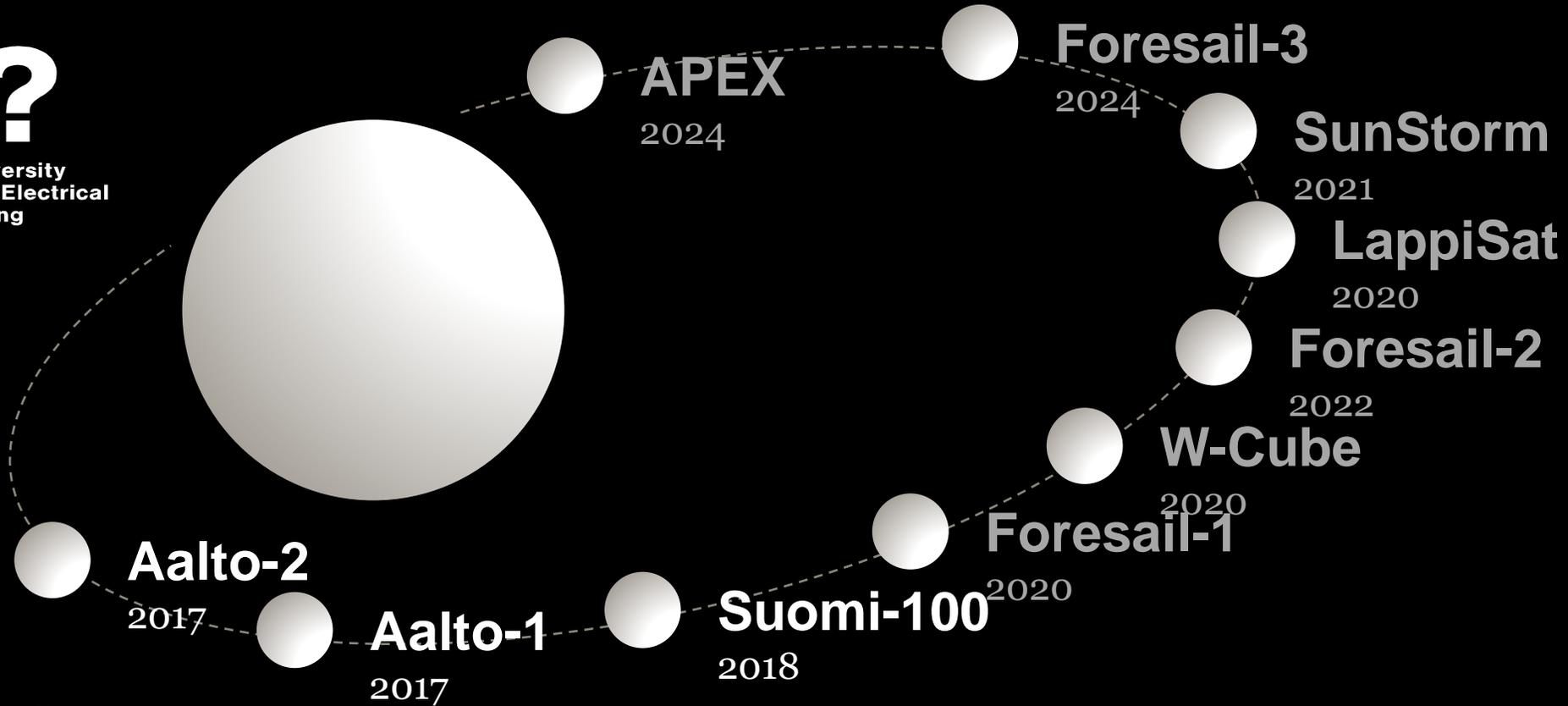


# Microwave EO

*EO SAR Microsatellite Constellation*

# A?

Aalto University  
School of Electrical  
Engineering

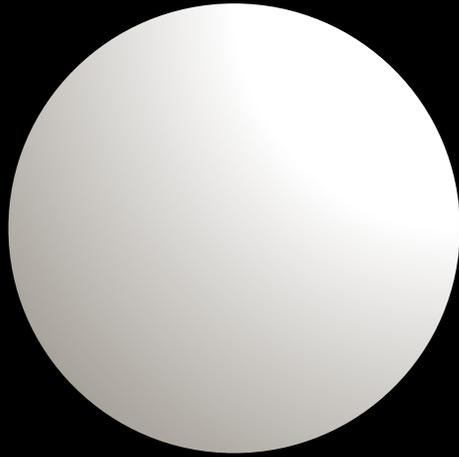


# Science Missions

*EO SAR Microsatellite Constellation*

# A?

Aalto University  
School of Electrical  
Engineering



**KvarkenSat**  
2021

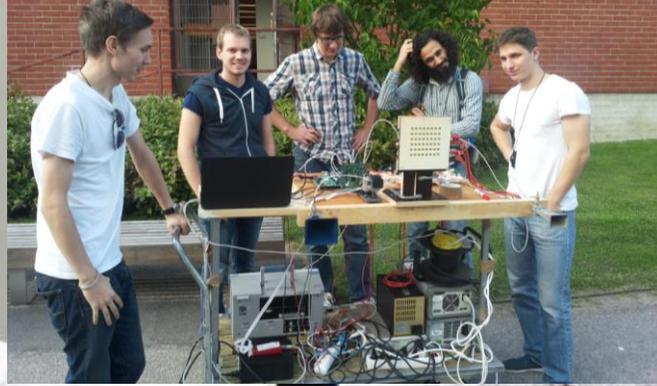
**Aalto-3**  
2020

**Suomi-100**  
2018

**Aalto-1**  
2017

# Educational Satellites

*Educating New Space Generation*



*Made in Aalto University*



RISE

KENNETH STRAND

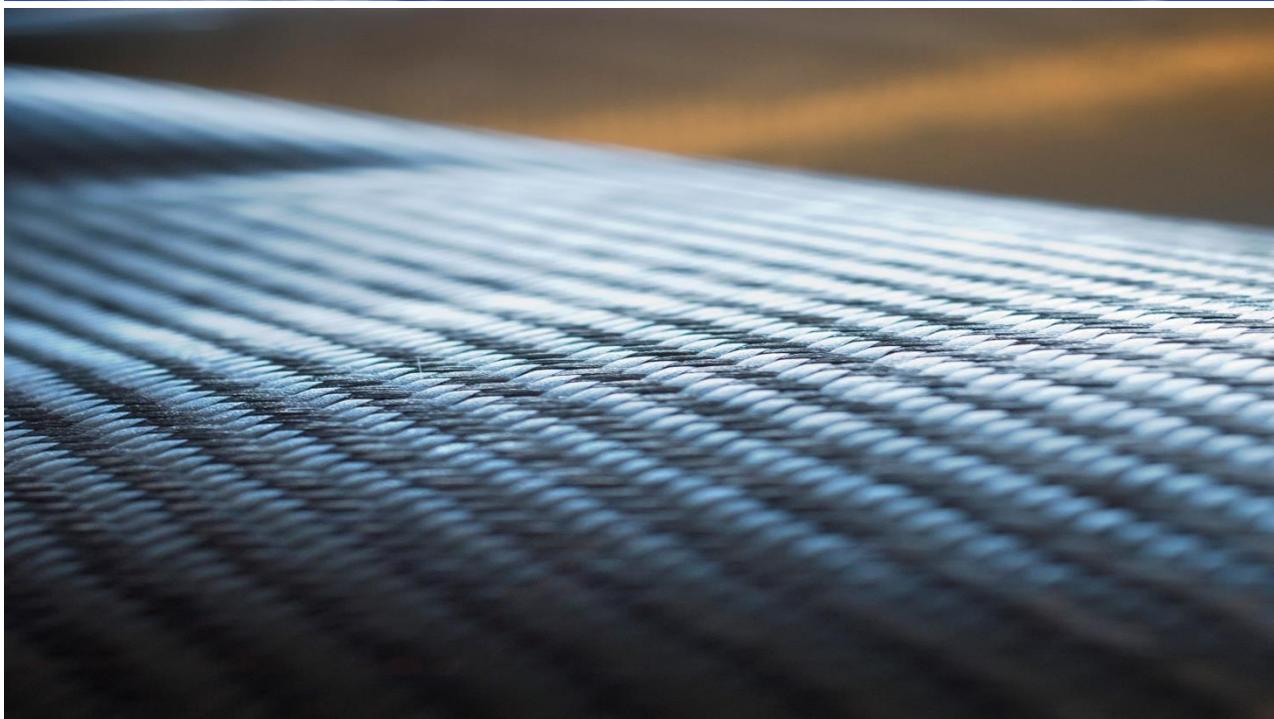


# EXAMPLES OF ACTIVITIES WITHIN SPACE AND AERONAUTICS AT RISE SICOMP

Magnus Edin & Kenneth Strand

March 2020

Research Institutes of Sweden  
Material and production  
RISE SICOMP



# Short about RISE

## ■ RISE

- Represented all over Sweden in different areas
- 2 800 employees

## ■ RISE, Polymer materials and composites

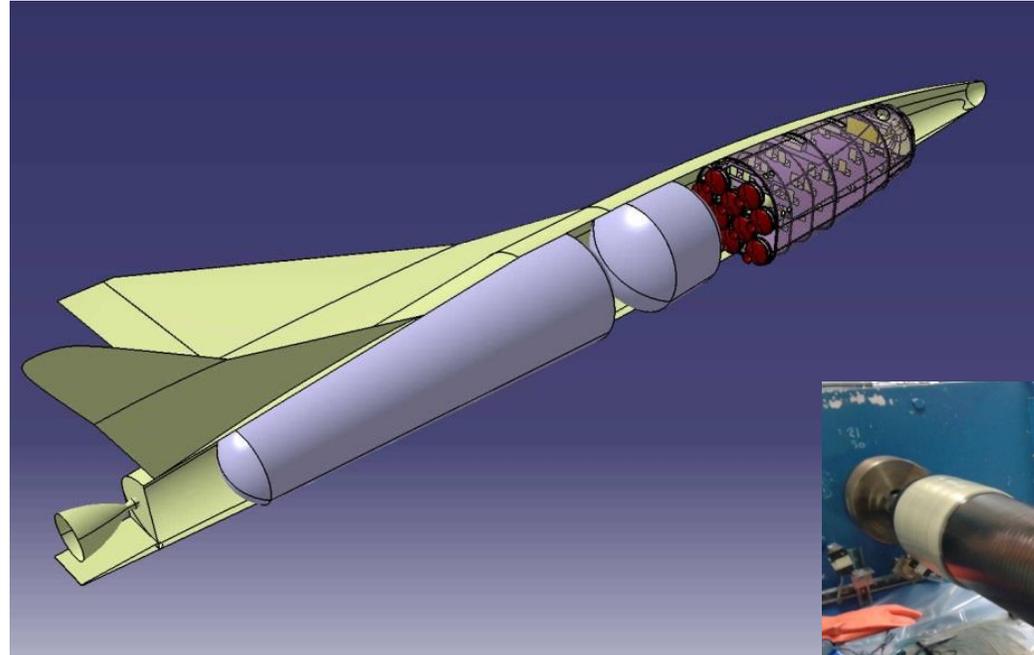
- Expertise regarding composite materials, manufacturing and testing
- Location: Piteå

# CHATT, FP7

## Cryogenic Hypersonic Advanced Tank Technologies

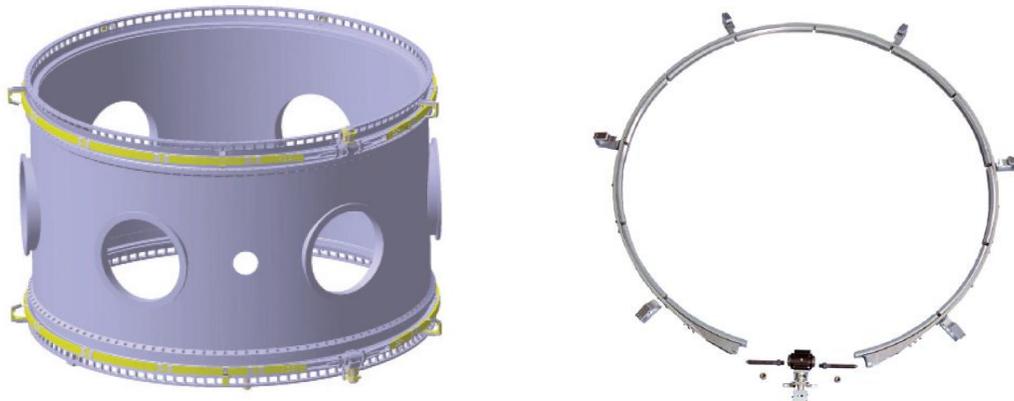
Within the CHATT project, liner-less fuel tanks were developed for the concept vehicle "SpaceLiner"

Prototype manufactured and tested mechanically and for leakage with LN<sub>2</sub> at RISE at -150°C



# Carbon fibre makes satellites lighter (NRFP)

- RUAG Space develops and manufactures advanced technology for aerospace applications
  - Separation system that connects satellites with rockets
  - As light as possible since it is not part of the payload
- RUAG Space has together with RISE SICOMP developed and built prototypes of a carbon fiber separation system and evaluated both production methods and performance



**HicTac**, RISE SICOMP, Nexam AB, Rolls Royce PLC

High performance composites for demanding high temperature applications

**SHEFAE**, RISE SICOMP, GKN Aerospace, Rolls Royce PLC, INEGI

Surface Heat Exchangers for Aero-Engines

- Surface heat exchanger for an aeroengine made of carbon fibre and polyimide



Photograph of polymer composite components manufactured by RTM using NEXIMID<sup>®</sup> MHT-R as resin to obtain T<sub>g</sub> around 370°C (Photo by Håkan Johansson, Jävre)

A cosmic scene featuring the Earth's horizon from space. A bright sun is on the left, creating a lens flare. A thin blue and white atmospheric layer is visible above the horizon. A bright orange arc, possibly a comet or meteor, curves across the top of the frame. The background is a dark blue space filled with stars and the Milky Way galaxy.

**ACTAS KONSULT AB**

**JOSEFIN NILSSON VALENCIA**

A cosmic background featuring the Earth's horizon at the bottom, a bright sun on the left, and the Milky Way galaxy stretching across the dark blue and black space. A thin, glowing orange arc is visible in the upper portion of the frame.

MIDROC AUTOMATION AB

MAGNUS WIDELL

# MIDROC AUTOMATION

**Employees:** 230  
**Turnover:** 800 MSEK  
**Head quarter:** Stockholm

We deliver systems and services within:

- Traditional Automation      Assembly
- Process Control              Low- and high voltage
- Production Control          Power distribution
- Industrial IT                    Electrical Installation
- Midroc Automation is part of the Midroc Electro Group. Together with Midroc Electro, Sweden's leading electrical installation company, we are represented in 58 locations in Sweden with more than 2300 employees.



# BUSINESS SEGMENTS

Midroc Automation is active in all industry sectors; from traditional basic industries to infrastructure. We help our customers improve the utilization of resources and increase competitiveness. With personal safety and production in focus, we meet high standards of regulation, control and optimization

**MINING**

**METAL**

**INFRA**

**AUTOMOTIVE**

**ENERGY**

**MANU-  
FACTURING**

**FOOD AND  
PHARMA**

**SPACE**

# TOGETHER TO GET THERE

## CONTACT INFORMATION

**Magnus Widell**

Department Manager,  
Kiruna

### Phone:

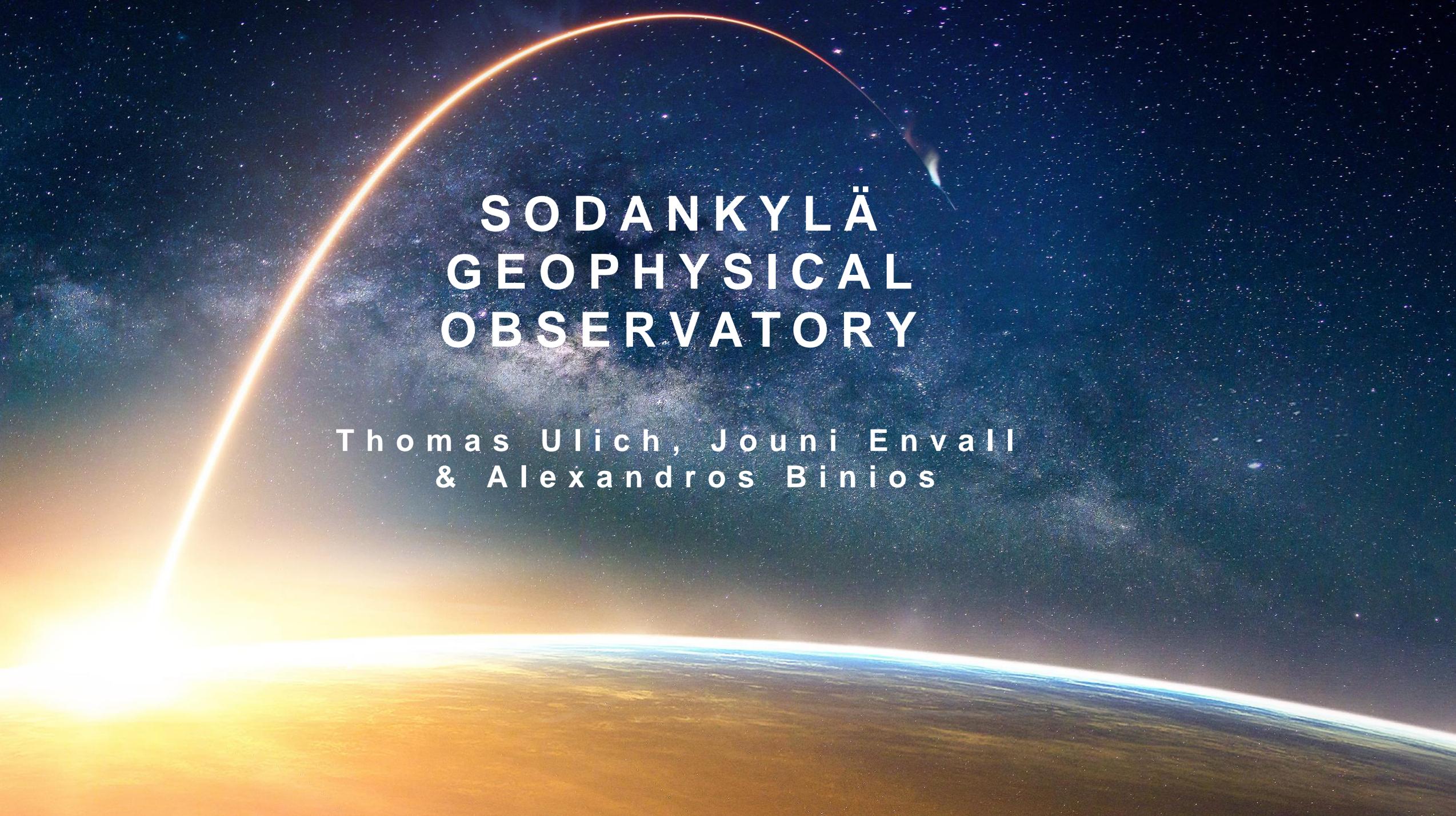
+46 (0)10-470 72 66

+46 (0)70-325 62 60

### E-mail:

[magnus.widell@midroc.se](mailto:magnus.widell@midroc.se)



A view of Earth from space, showing the curvature of the planet and the atmosphere. A bright sun is visible on the left, creating a large lens flare. A meteor streaks across the sky in the upper right. The background is filled with stars and the Milky Way galaxy.

# SODANKYLÄ GEOPHYSICAL OBSERVATORY

Thomas Ulich, Jouni Envall  
& Alexandros Binios

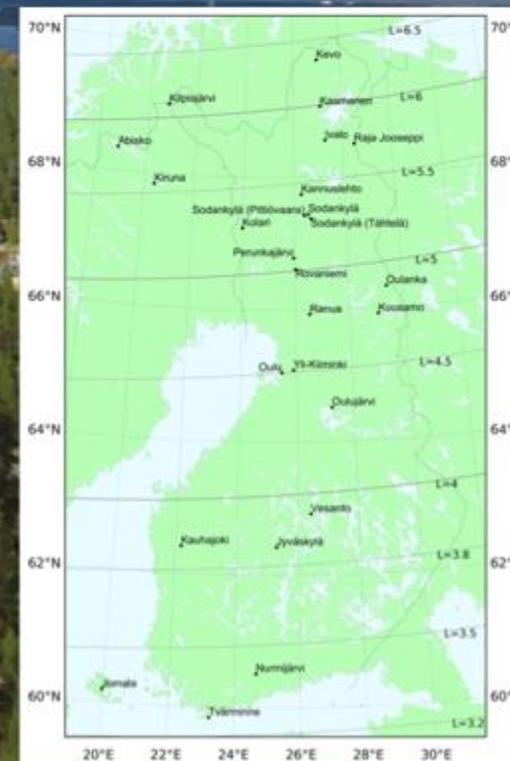


SGO

WWW.SGO.FI

# SODANKYLÄ GEOPHYSICAL OBSERVATORY

72 Instruments, 27 Locations, 400+ Data Products





# LappiSat Satellite Centre – Special Expertise and Technical Execution for Space Activities, Science and Technology

- **LappiSat-1**
  - 1st satellite in northern Finland
  - 1st member of a family of **LappiSat** satellites to be
- **We are seeking national and international collaboration**
  - Payloads
  - Shared missions
  - Launch opportunities
  - Balloon launches
- **Bringing SGO's 100+ year heritage to orbits**
  - Aurora research
  - Magnetic measurements
  - Ionospheric measurements
  - EISCAT

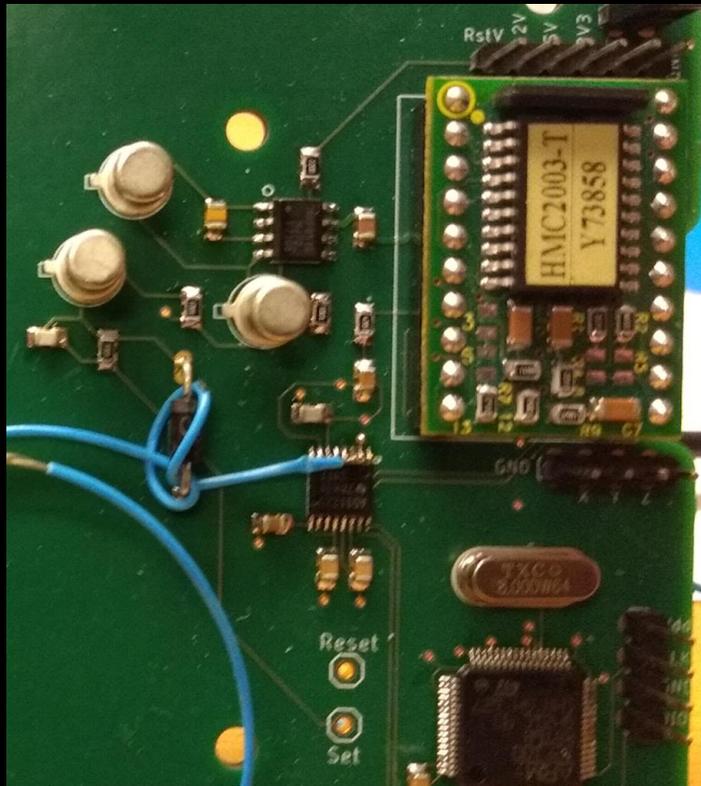


Photo Alexandros Binios

Photo Jouni Envall

A cosmic background featuring the Earth's horizon at the bottom, a bright sun on the left, and the Milky Way galaxy stretching across the dark sky. A thin, glowing arc of light curves across the upper portion of the image.

PROPELLED SMALL  
SATELLITE STARTUP

PAU MOLAS ROCA



**GREPIT AB**

**ANNA COSTALONGA**

# OVERVIEW

# GREPIT



## 30+ EMPLOYEES

Highly diversified and talented team

## DEVELOPMENT

Software, Hardware, Signal processing

## 974% GROWTH

FY 2018, 20% EBT

## LAB

In-house capability to build and test

## 4 OFFICES

Luleå, Palo Alto, Stockholm, and Linköping.

## CUSTOMERS

Automotive, Industry 4.0, Smart Living

# GREPIT

## OUR CAPABILITIES



### SOFTWARE

FPGA, HIGH SPEED DATA PROCESSING, RUST



### HARDWARE

PCB DESIGN, ASIC PROTOTYPING, TESTING



### IN-HOUSE LAB

BUILD (ASSEMBLY & BONDING) AND TEST

PROJECT EXAMPLES



ESVE  
CHARGER



GeoCore X10  
MINERAL ANALYSIS



GemPen  
GEMSTONE ANALYSIS



A cosmic scene featuring the Earth's horizon at the bottom, the Milky Way galaxy in the center, and a bright, glowing arc on the left side. The background is filled with stars.

**OHB SWEDEN**

**PER BODIN**

*Space Innovation Forum*

2020-03-12

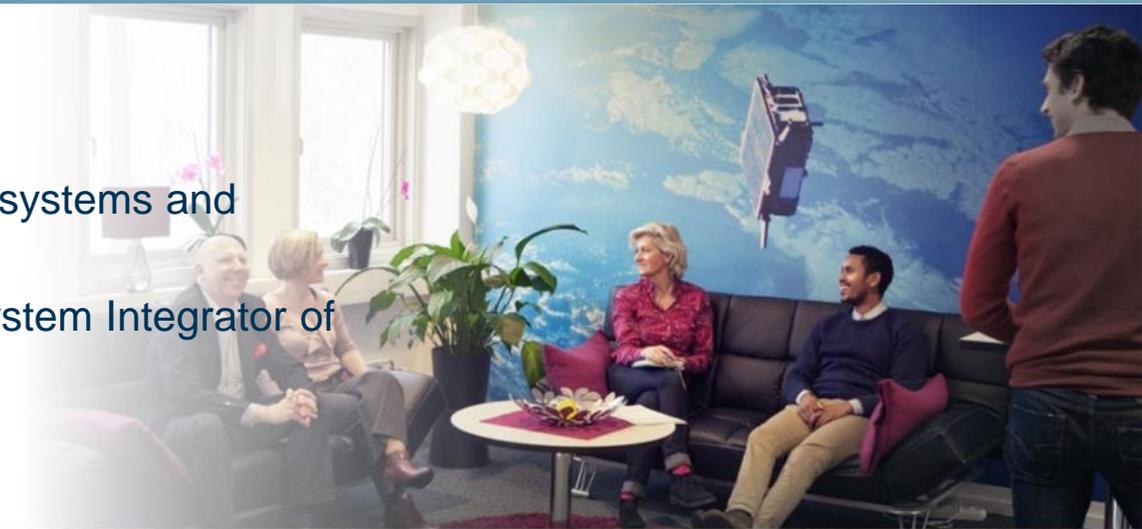


SATELLITE SYSTEMS

**OH B Sweden**

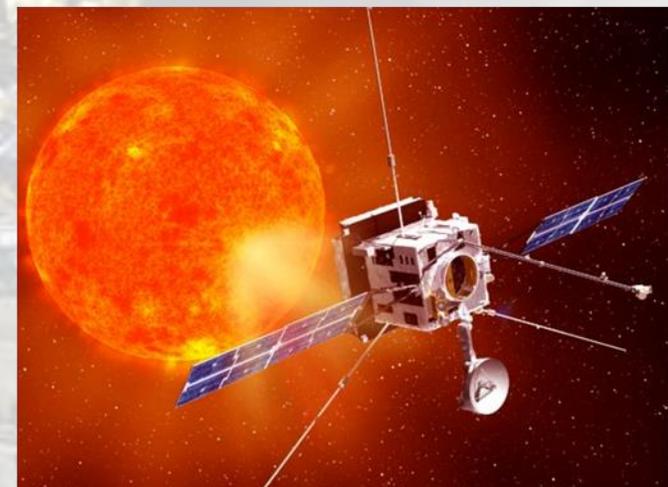
## OHBSweden AB

- Swedish center of competence for space systems and satellites, ~90 employees
- Experienced Small Satellite Prime and System Integrator of satellites up to ~400 kg
- Subsystem supplier to larger satellites
  - AOCS
  - Propulsion
- Core competence areas
  - *Mission Architecture and Analysis*
  - *Spacecraft System Engineering*
  - AOCS
  - Propulsion
  - *Assembly, Integration, and Test*
  - *Check-out and Ground Control Systems*
- Facilities
  - *Development, process and manufacturing area*
  - *Cleanroom integration and testing capabilities*
  - *Satellite control centre for in-house developed satellite systems*



## OHBSweden Recent and On-Going Projects

- EDRS-C AOCS
- Solar Orbiter Propulsion and AOCS
- InnoSat MATS
- Electra Propulsion and AOCS





MIRROR

MARTIN SPEGEL

**< mirror />**

# Mirror

IT company based in Norrbotten

Founded 1991 as a family business

Current owners all active within the company

We believe in building a future here, together

The background of the slide features a night sky with a vibrant green aurora borealis. The aurora is a horizontal band of light that glows in shades of green and yellow, stretching across the middle of the frame. Below the aurora, the dark silhouettes of several tall, coniferous trees are visible against the dark sky. The overall scene is serene and atmospheric.

# What

Create – Digital Communication

Handle – Business Applications

Operate – Cloud & Hybrid Cloud



Why

We are driven by the **desire**  
to help people spend their precious **time**  
on things they really **love**.

# Some of our customers

**SVEASKOG**

**ALVSBYHUS**

**MIDROC**

**MAX**

**bravida**

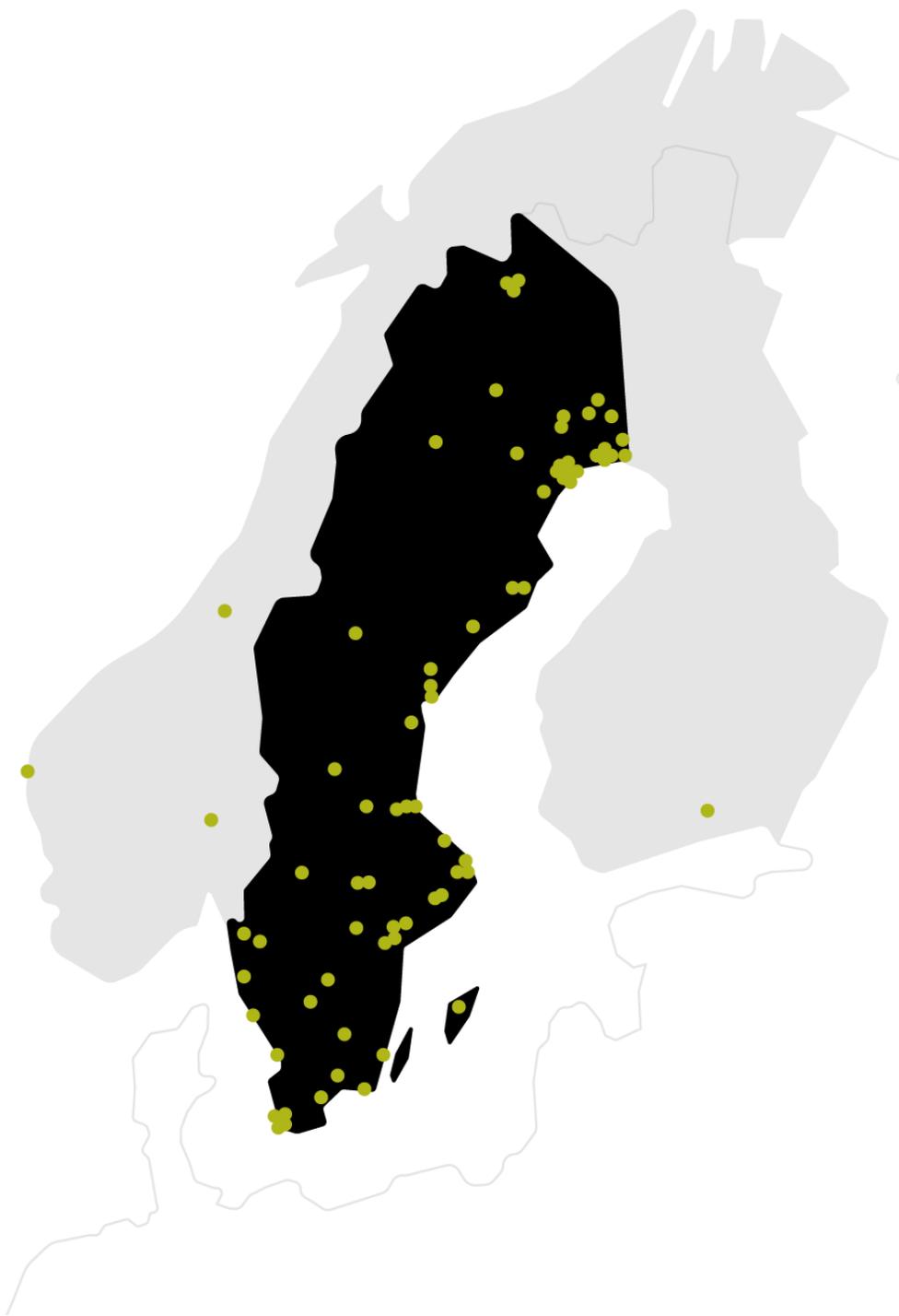
**doro**

**ANVA**

**XL BYGG**

**Caverion**

**TESAB**



...so what?

I don't know =>

Let's find out!

[martin@mirror.se](mailto:martin@mirror.se)

A cosmic background featuring the Earth's horizon at the bottom, a bright orange and yellow arc on the left side, and a starry space with the Milky Way galaxy visible in the center.

**CGI SWEDEN**

**Robert Ylitalo**

**Vice President  
Business Development  
& Clients Relations**