
Experiment CEVROSAT2
CEVRO
UNIVERZITA

Experiment CEVROSAT-2

Goal:
A suite of scientific and technological experiments prepared by universities and companies from Czechia and Slovakia,

What is CEVROSAT-2:
A platform able to host different applications and experiments.

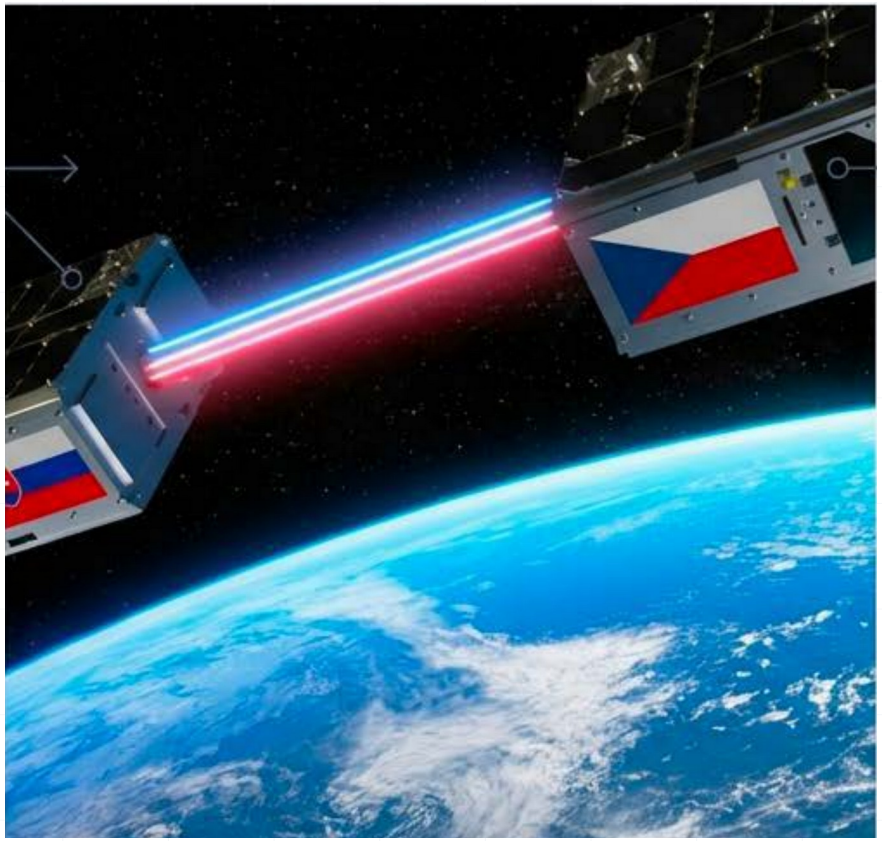
Mission objectives:
Test of new technologies in space environment.

Collaboration:
The largest Czech–Slovak space collaboration so far.

Organized & led by:
CEVRO University, Prague

Integrator & Launch
CVC Electronic

Experiments & application coordination
Egsespace s.r.o

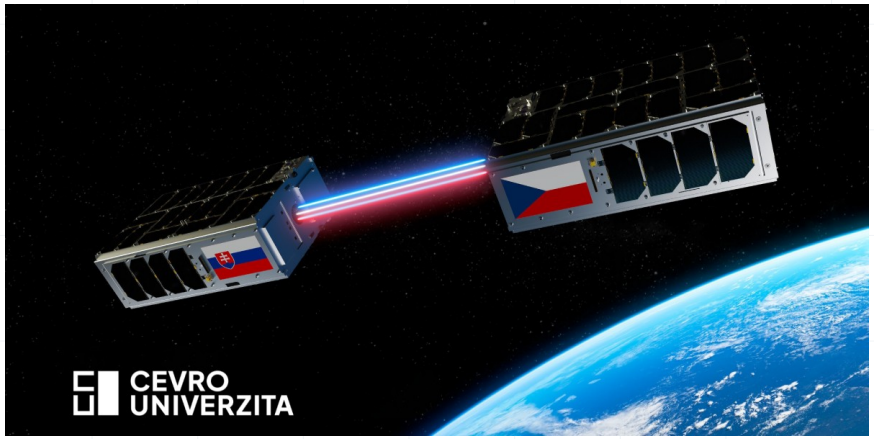


CEVROSAT-2

ČVC Electronic CEVRO UNIVERSITY

Czech–Slovak technology-demonstration mission led by CEVRO University: two identical 8U CubeSats (one for Czechia, one for Slovakia) launched together, carrying a shared platform and multiple IOD/IOV payloads from universities and companies of both countries.

- Two identical satellites — one for Czechia and one for Slovakia — flying as a tandem on a shared frequency.
- Launched together on mid-2027 (project milestone: August 2027).
- Platform based on the EnduroSat 8U bus; hosts academic and industrial experiments.
- Free IOD/IOV hosting of non-commercial payloads on board — offer from Czech Space Portal & ČVC Electronic.
- Focus: space weather, radiation monitoring, onboard data processing and radiation effects on electronics.
- Budget up to CZK 120 M; ČVC Electronic invests ≈ CZK 20 M (administration + launch).
- Builds on the flight-proven CEVROSAT-1 (2025) & CEVROSAT 1B.



IOD: In-Orbit Demonstration
IOV: In-Orbit Validation

CEVROSAT-1

ČVC Electronic CEVRO UNIVERSITY

Czech mission microsatellite — flight-verified platform for future CVCSAT

BUILDERS

CEVRO University · ČVC Electronic · Brno University of Technology · Mendel University in Brno

LAUNCH / STATUS

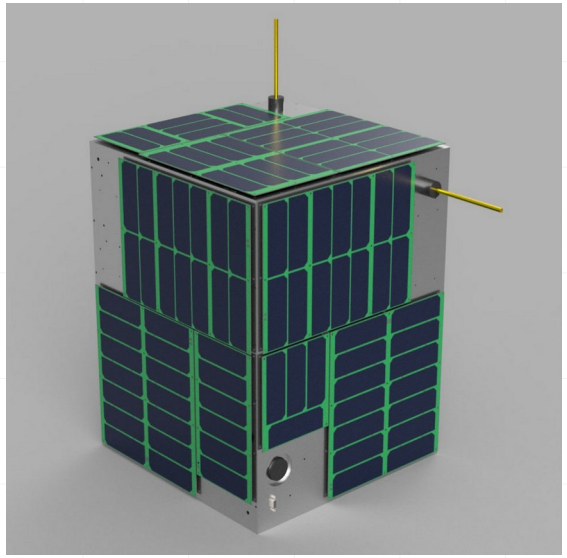
2 Nov 2025 · Falcon 9 (Bandwagon-4) · LEO 500–600 km, 45° | still in orbit, last telemetry 9 Nov 2025

SIZE

48 kg · 50 × 45 × 45 cm

EXPERIMENTS

- Space weather (Geiger): monitoring solar activity and radiation in orbit.
- Earth imaging: two onboard 4K cameras, classic and spectrometric views of Earth.
- Amateur radio: worldwide digipeater with public telemetry and experiment data.
- Radiation effects: verifying how onboard electronics survive and behave in space.
- Platform verification: flight-proven design and ground segment for CEVROSAT-2.



CEVROSAT-1B

ČVC Electronic CEVRO UNIVERSITY

Czech mission microsatellite — flight-verified predecessor of the CEVROSAT-2 platform. Developed based on experience form CEVROSAT-1

BUILDERS

CEVRO University · ČVC Electronic · University of Hradec Kralove-TUKE Kosice

LAUNCH / STATUS

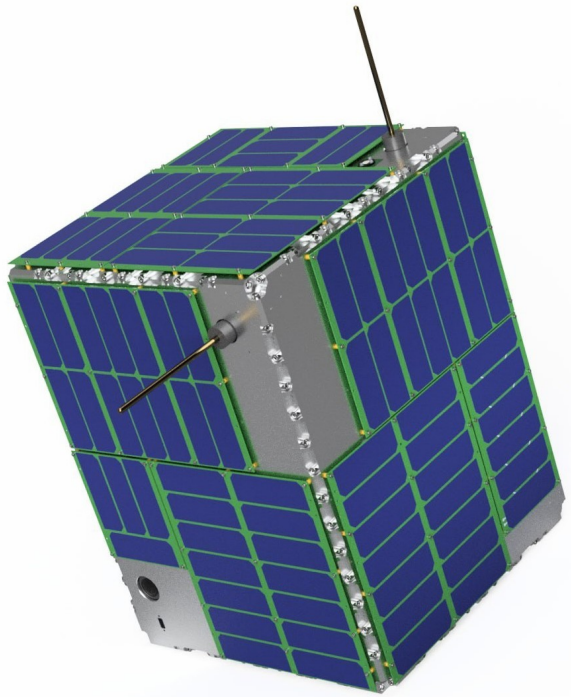
March 2027 · Relativity · LEO 500–600 km · In preparation – AIT phase running

SIZE

36kg · 60 × 47 × 47 cm

EXPERIMENTS

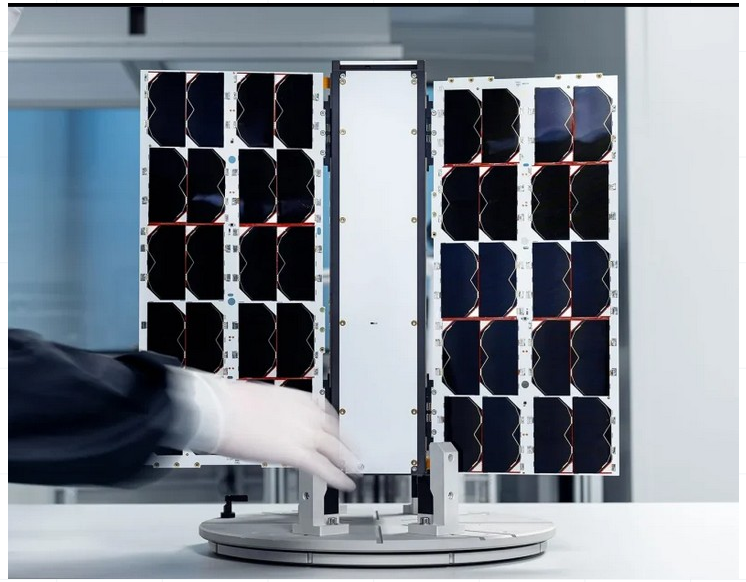
- Space weather (Geiger): monitoring solar activity and radiation in orbit.
- Student-oriented science subsystem measuring three quantities:
    - Broadband reflected solar radiation from Earth — spectral.
    - Thermal response of three surface finishes in orbit.
    - Earth's magnetic field.
- Earth imaging: two onboard 4K cameras, classic and spectrometric views of Earth.



CEVROSAT-2

ČVC Electronic CEVRO UNIVERSITY

Czech mission microsatellite — heritage from CEVROSAT1 and CEVROSAT1B



BUILDERS

CEVRO University · ČVC Electronic · Brno University of Technology · Mendel University in Brno

LAUNCH / STATUS

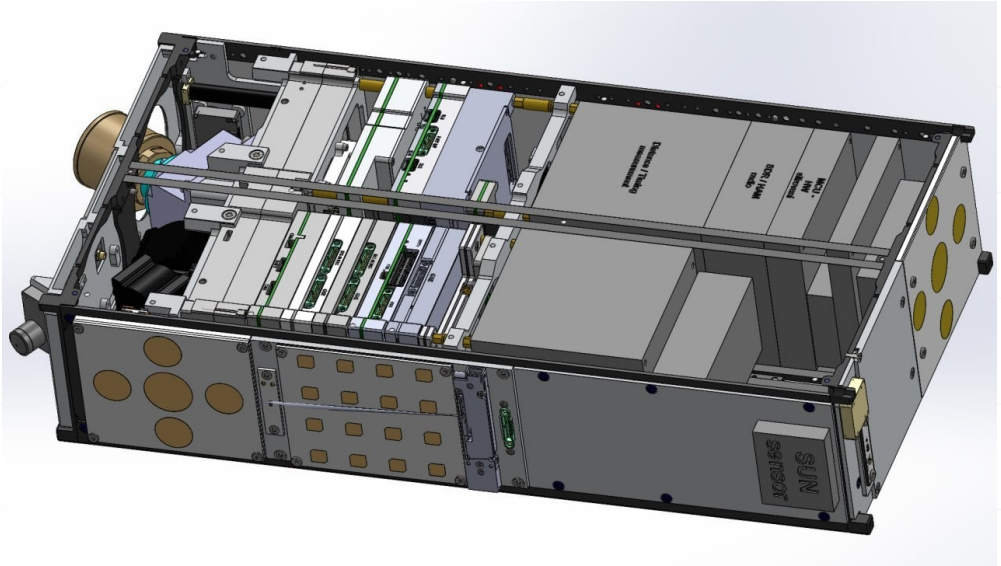
August 2027 · Relativity/Falcon 9 · LEO 500–600 km, inclination ?

SIZE

18 kg · 40 × 20 × 10 cm – without solar array wings

EXPERIMENTS

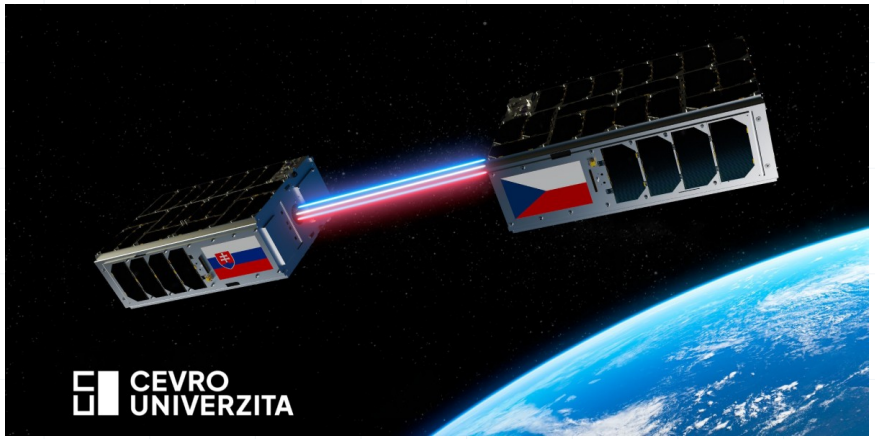
- Navigation experiment & earth mag field mapping
- Space weather (Geiger): monitoring solar activity and radiation in orbit.
- Earth imaging: two onboard 4K cameras, classic and spectrometric views of Earth.
- Amateur radio: worldwide digipeater with public telemetry and experiment data.
- Radiation effects: verifying how onboard electronics survive and behave in space.



INTRODUCTION: RESEARCH ONBOARD CEVROSAT-2

CZECH–SLOVAK COLLABORATION

One satellite for Czechia and one for Slovakia, launched together and operated as a tandem multi-satellite constellation.



EXPERIMENT PROVIDERS

CTU Prague (positioning, timing), ESC Aerospace (UV camera), BUT Brno (optical camera, sun sensor), VŠB-TUO (NVIDIA chip, magnetometer), UWB Pilsen (SDR radio), SkyUpdate/i46 (secure updates), TUKE Košice (shielding).

SHARED PLATFORM

All experiments use common power, data, command and operating rules; results serve academia, industry and the state.

BENEFITS

Benefits: one integration platform lowers the cost and risk of each further mission, develops talent and transfers results into practice.

ADS-B FOR AIR TRAFFIC

The spacecraft will also carry an ADS-B receiver for air-traffic monitoring, providing data to the Air Navigation Services of the Czech Republic.

1. RELIABLE NAVIGATION

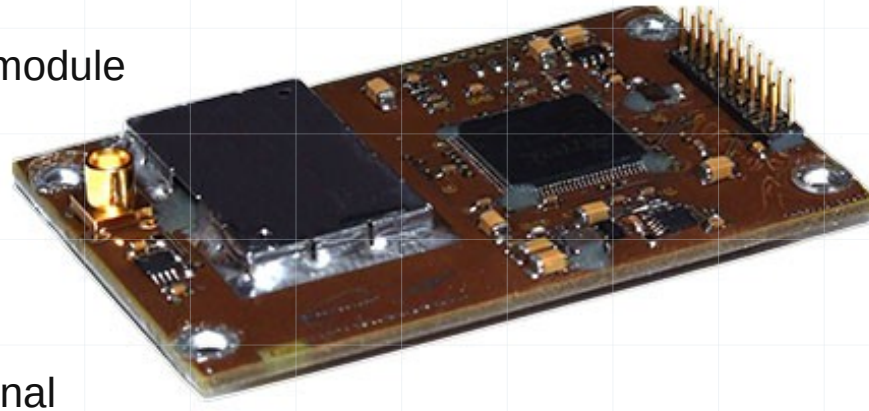
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piNAV GNSS Receiver and Orloy Navigation Signal Generation, Precision Ranging and Timing Payload

Czech Technical University in Prague, Faculty of Electrical Engineering (FEE CTU) and Eltvor Instruments, s.r.o.***

- **Core Payload:** Features the piNAV GNSS receiver for smallsats and the Orloy module for signal generation, precision ranging, and timing.
- **Mission Goal:** Demonstrates Low Earth Orbit navigation (LEO-PNT) as a complementary alternative to traditional GNSS.
- **Main Benefit:** Enhances the resilience, reliability, and precision of Positioning, Navigation, and Timing (PNT) services.
- **Strategic Value:** Places Czech LEO-PNT technology alongside major international initiatives (ESA Celeste, Safran Synchrocube, XONA Pulsar).



Team: * Dr. Jiří Svatoň, doc. Pavel Kovář, Dr. Petr Ondráček, **

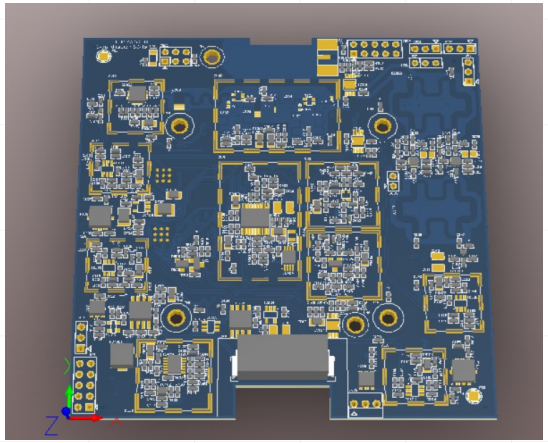
FACULTY OF ELECTRICAL ENGINEERING CTU IN PRAGUE

2. DIGITAL/ANALOG RADIO

ČVC Electronic CEVRO UNIVERSITY

Experimental dual-band communication module with SDR

Faculty of Electrical Engineering, University of West Bohemia in Pilsen



- **Primary Mission Objectives:** In-orbit validation of the SDR transceiver and ground station & testing advanced communication algorithms + radio beacon
- **Hybrid Architecture Concept:** Highly flexible SDR transceiver with a backup conventional UHF radio.
- **Powerful SocFPGA Platform:** FPGA for DSP & ARM Cortex running embedded Linux.
- **Frequency Bands & Modes:** Supports S-band and UHF in Full-Duplex and Half-Duplex modes.
- **Advanced Transmission Schemes:** Supports various modulations & advanced Forward Error Correction coding.

Team: Michal Pokorný, Pavel Fiala

FACULTY OF ELECTRICAL ENGINEERING
UNIVERSITY OF WEST BOHEMIA
IN PILSEN

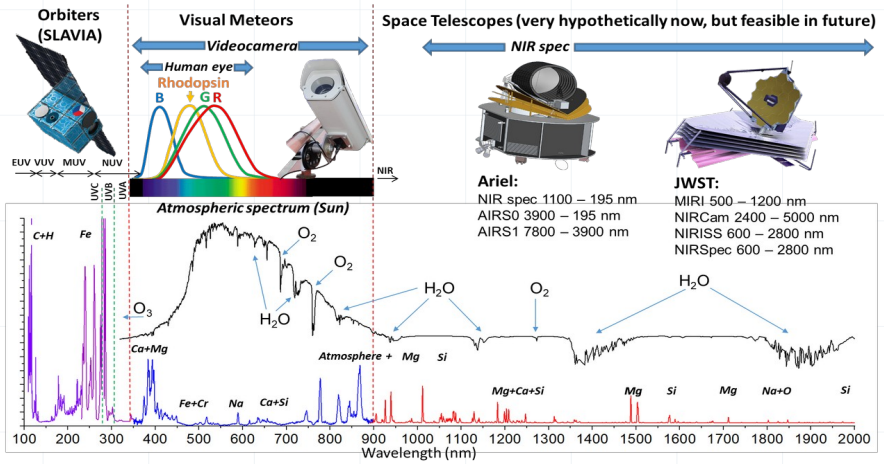
3. ULTRAVIOLET SPECTROMETRY

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ULTRAVIOLET SPECTROMETER CAMERA

Consortium: esc Aerospace, J. Heyrovský Institute, HiLASE (Institute of Physics of the CAS), and VZLÚ (camera).

- **CubeSat size UV/NIR Camera:** operating in the 200–800 nm spectral range.
- **Refractive Optics & Grating:** Captures spectral fingerprints for event identification and triangulation.
- **Atmospheric & Surface Sensing:** Monitors luminous phenomena, plasma, objects, and Earth's surface.
- **Ground Segment Network:** Integrated with ground infrastructure, including ESO's La Silla Observatory.
- **TRL 9 Target (2 Years):** Scheduled flight validation via Space Rider, SATen, and ESA-Ioslab.
- **Hyperspectral Evolution:** Driving Czech autonomy in advanced remote sensing and payload development.



Funding: National Competence Centre in Aerospace (NCK Letectví a vesmír), Czech Science Foundation (GA ČR), Technology Agency of the Czech Republic (TA ČR), Regional Cooperation of the CAS with the Valašské Meziříčí Observatory.

Heyrovský Institute

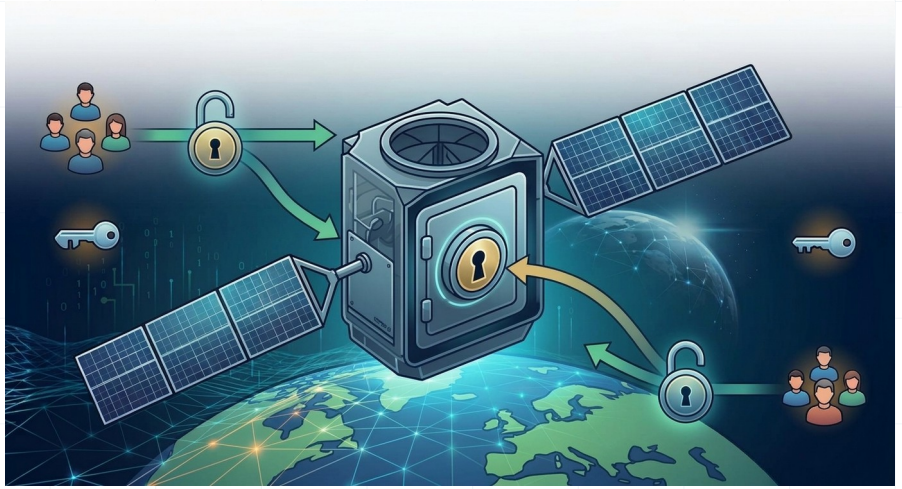
esc Aerospace

4. SECURE DATA STORAGE IN SPACE

ČVC Electronic CEVRO UNIVERSITY

European orbital data vault - SPACEBOX

Consorcium i46 s.r.o. & SkyUpdate s.r.o.



- **SW solution to run orbital extreme safe datastorage**
- **Cloud & Legal Shield:** Bypasses ground cloud vulnerabilities and jurisdictional overreach.
- **Post-Quantum Security:** Hardened with NIST FIPS 203 (ML-KEM-768) and AES-256-GCM.
- **Air-Gap Connection:** Secure serial link operating without an IP stack.
- **Blind Write Access:** Mobile apps perform local encryption and one-way upload only.
- **Strict Retrieval:** Data download requires an M-of-N cryptographic quorum.
- Example – 7 people has keys to Bohemian Crown Jewels, but all are needed to open door
- **Roadmap & Users:** Terestrial version operational, orbital demo on CEVROSAT-2 (2027) -space validation, then 3-satellite constellation (2028+) for critical infrastructure, finance, and enterprise.

i46.cz

Team: Erel Rosenberg,Clea Rosenblum, Tomáš Trpišovský

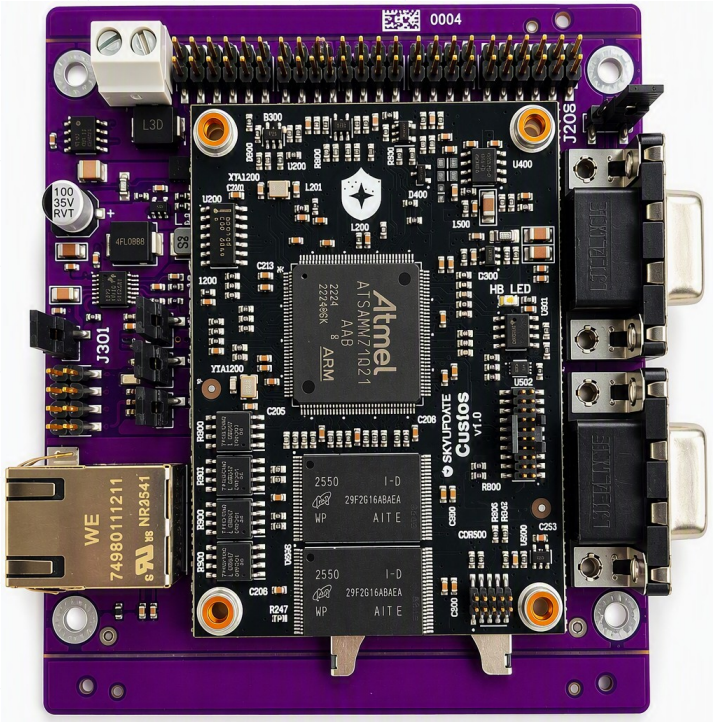
4. SECURE DATA STORAGE IN SPACE

ČVC Electronic | CEVRO UNIVERSITY

Module CUSTOS HW experiment

Consorcium i46 s.r.o. & SkyUpdate s.r.o

- **Experimental Hardware:** verify the reliability and safety of remote software updates for multiple electronic systems.
- **Core Objectives:** Detection of failures based on bus communication monitoring and automatically decide on the need for an update, without a command from Earth.
- **Telemetry & Reliability:** Continuous monitoring of operational parameters and update mechanism verification.
- **Performance and reliability assessment** of cryptographic protection for software updates and image transfer.
- **Secondary application:** Module is used by i46 to test their datastorage



SKYUPDATE

Team: Radek Kuchta, Jaroslav Kadlec

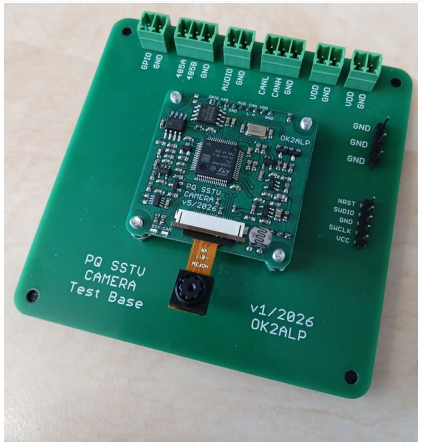
5. FEEC Brno Experiments

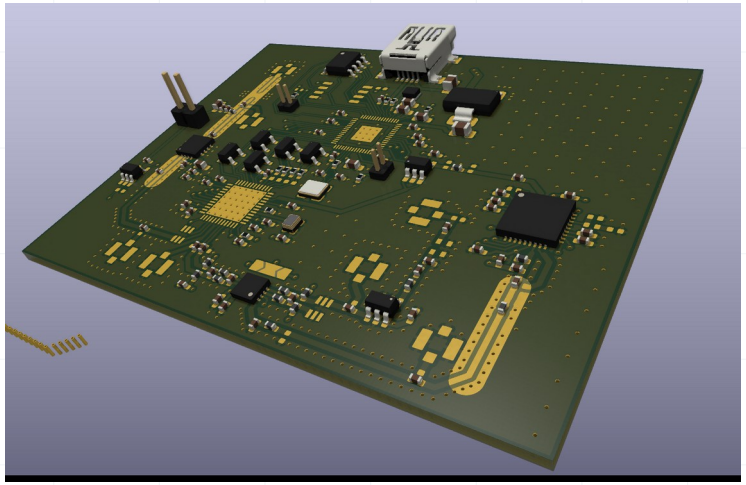
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Space validation experiments

Department of Radio Electronics, Faculty of Electrical Engineering and Communication, BUT Brno

- **Miniature camera:** interfacing with CSP via I2C, RS485, and CAN buses. Configurable resolution, image quality, and optional capture sequences.
- **Experimental L- to S-band transponder:** reconfigurable with integrated antennas on a single panel. Control interface via I2C or RS485 to CSP.
- **Sun sensor:** miniature board mounted directly on the outer skin/panel, connection via I2C or RS485 to CSP.





Team: Tomáš Urbanec, Aleš Povalač, Michal Hanus, Patrik Bachorec, Ivan Kirsanov, Valerie Šilo

FEEC also provides ground station services for all satellites

FEEC

5. FEEC Brno Ground Station

ČVC Electronic | CEVRO UNIVERSITY

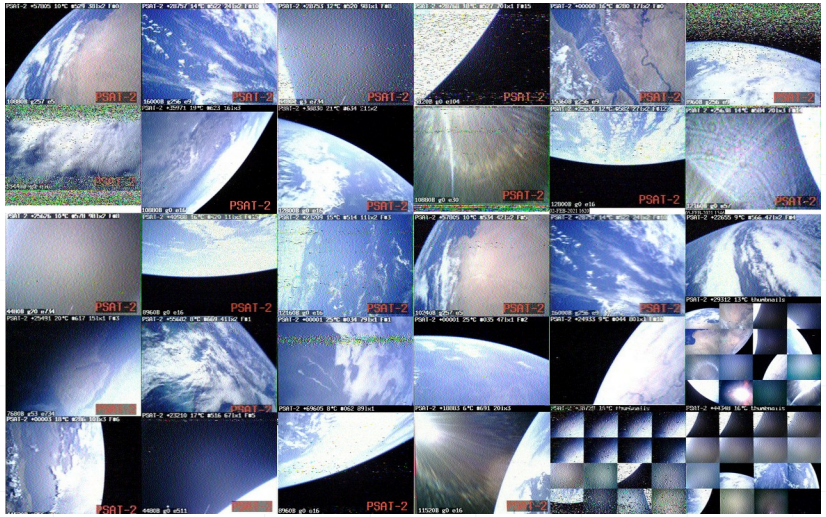
Ground station support

Department of Radio Electronics, Faculty of Electrical Engineering and Communication, BUT Brno

- **CEVROSAT-1 & 1B Ground Station:** CEVROSAT-1 (supported in 2025) and CEVROSAT-1B ground station support is feasible and ready.
- **Next Year Plan (2027):** Priority is commissioning UHF and professional S-band for the Brnosat and SATén satellites.
- **Long-Term Roadmap:** Future expansion beyond S-band/UHF remains open-ended.

Team: Tomáš Urbanec, Aleš Povalač, Michal Hanus, Patrik Bachorec, Ivan Kirsanov, Valerie Šilo





Ivan Hruska - EGSESPACE s.r.o



FEEC

6. SPACE WEATHER & EARTH MAG FIELD

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RADVERIS Project

Space radiation monitoring, space weather, radiation effects & onboard processing
VSB – Technical University of Ostrava, Faculty of Electrical Engineering and Computer Science
Czech Technical University in Prague, Institute of Experimental and Applied Physics



- **Radiation monitoring:** precise measurements of the orbital radiation environment.
- **Space weather:** analysis of space environment variability and its links to solar activity.
- **Radiation effects:** fault logging and assessment of onboard electronics reliability.
- **Onboard processing:** data reduction for efficient telemetry and scientific analysis.

VSB–TUO team: Radek Martinek, Milan Skula, Carlos Granja, David Vala, Dominik Grzegorz, Vladimír Kašík, Martin Stankuš, Václav Snášel, Ivan Zelinka, Petr Bilík.
IEAP CTU team: Milan Malich, Robert Filgas, Ondřej Pavlas.
Contact: milan.skula@vsb.cz

VŠB TECHNICKÁ UNIVERZITA OSTRAVA | FAKULTA ELEKTROTECHNIKY A INFORMATIKY | KATEDRA KYBERNETIKY A BIOMEDICÍNSKÉHO INŽENÝRSTVÍ

FEI

INSTITUTE OF EXPERIMENTAL AND APPLIED PHYSICS CTU IN PRAGUE

7. FLIGHT MONITORING

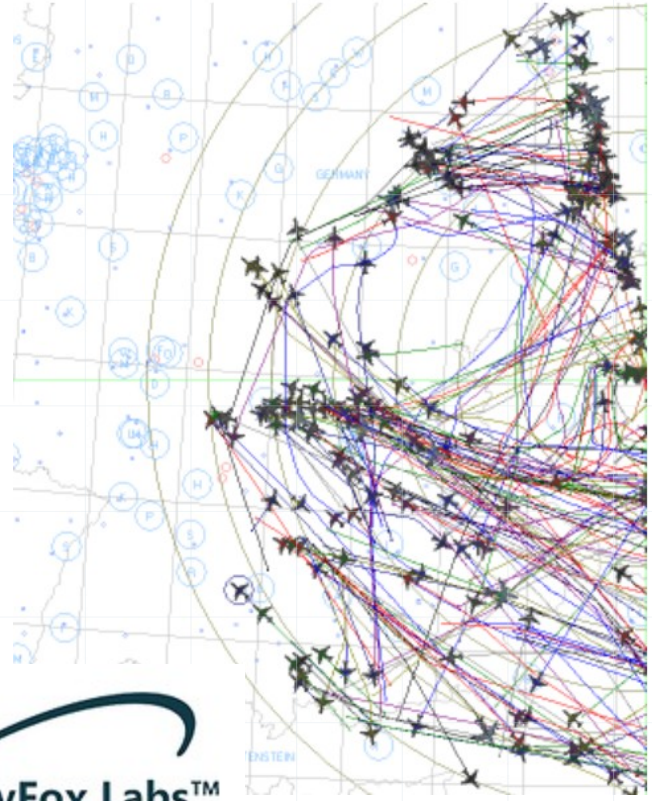
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Flight monitoring application

SKYFOXLAB + CZECH AIR TRAFFIC COMMAND

- **Next Generation CubeSat ATC Receiver:** Purpose-built solution for monitoring aircraft air traffic via standard squitter transmissions.
- **All-in-One Compact Solution:** Fully integrated single-unit payload streamlined to focus strictly on the core tracking mission.
- **Integrated antenna:** solution offering zero risk of mechanical deployment failure.
- **High Reliability & Mission Focus:** Minimum energy consumption
- **Versatile Mission Applications:** Ideal for training ATC specialists, building tracking constellations, or supporting search and rescue operations.

- **Team:** SKYFOXLAB & CVC electronic



SkyFox Labs™

Air Navigation Services of the Czech Republic

8. MATERIAL RESEARCH FOR SPACE

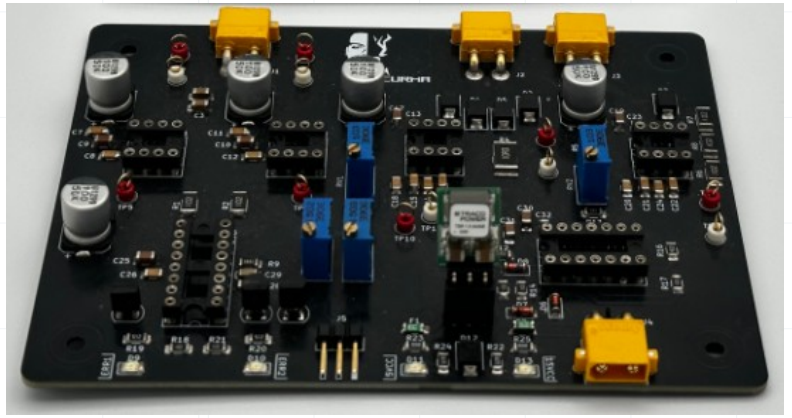
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SpaceRad - Compact Space Dosimetry Module

TUKE KOSICE – Faculty of Mechanical Engineering

- **Goal:** Builds expertise in space electronics and protective materials.
- **Function:** Measures radiation, tests shielding materials, and evaluates electronics.
- **Soft Error Analysis:** Studies temporary, non-destructive radiation faults.
- **Reliability:** Ensures stable measurement, data integrity, and radiation tolerance.
- **Testing:** Compares shielding methods using reference and modified sensors.





Team: Miroslav Palko, Peter Curma, Marek Vrabel, Maros Palko

Strojnícka fakulta

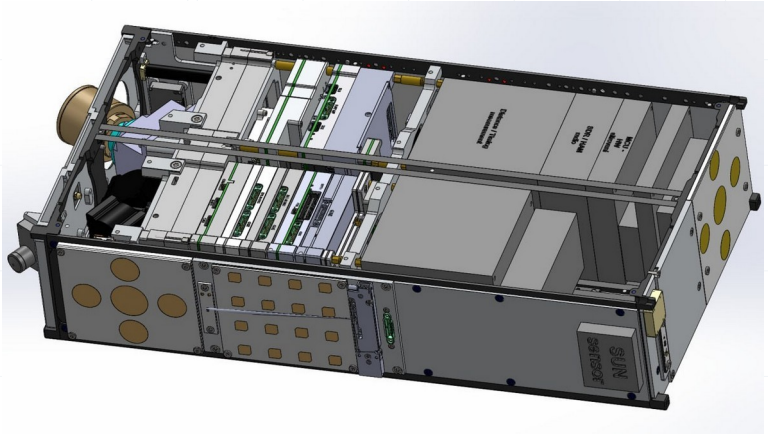
TECHNICAL UNIVERSITY OF KOŠICE

8. STRUCTURE DYNAMIC

ČVC Electronic CEVRO UNIVERSITY

Assesment of CEVROSAT2 structure dynamic

TUKE KOSICE – Faculty of Mechanical Engineering, LENAM s.r.o., AUREL CZ s.r.o., TUKE PAIC – Prototype Center



- **Dynamic Properties & Stiffness Assessment (LENAM)**
  - **Modal Analysis:** Dynamic behavior and natural frequencies
  - **Frequency Response:** Structural response to vibration/launch loads
  - **Thermomechanical Analysis:** Temperature gradient impacts on deformation and stress
  - **Bolted Joints:** Preload variation and retention analysis

- **Experimental Validation (AUREL CZ)**
  - **Strain-gauge measurements** for FEA model correlation
  - **Environmental testing** in a cryogenic chamber

TUKE : Miroslav Palko
AUREL CZ: Team Miroslav Pažout
LENAM: to Anna Luciová

PAIC LENAM AUREL Strojnícka fakulta TECHNICAL UNIVERSITY OF KOŠICE

8. OTHER COLLABORATING SUBJECTS

ČVC Electronic

CEVRO UNIVERSITY

- **CAS** – Panska Ves ground station
- **ITU + CTO** – frequency plan
- **TUKE FA** – Ground station
- **UNIBA** – Bratislava – UV data analysis
- **Egsespace** – power management + app coordination
- **StellarSpace** – Slovakia coordiantion

INSTITUTE OF ATMOSPHERIC PHYSICS CAS

ITU

Czech Telecommunication Office

Faculty of Aeronautics

UNIVERZITA KOMENSKÉHO V BRATISLAVE

egsespace®

STELLAR SPACE

REPRODUCIBILITY: FIRST MISSION CREATES THE FOUNDATION FOR OTHERS

The project transforms a recurring integration challenge into a standardized platform service.

Cost reduction principle: the first mission funds the development of a common foundation. Each subsequent similar mission primarily addresses configuration, integration of specific experiments, and launch - not the development of the entire integration infrastructure from scratch.



Common foundation

control and power layer, firmware, test procedures

Flight configuration

port assignments, drivers, current and data limits

Mission verification

host integration, operations, data and deviations

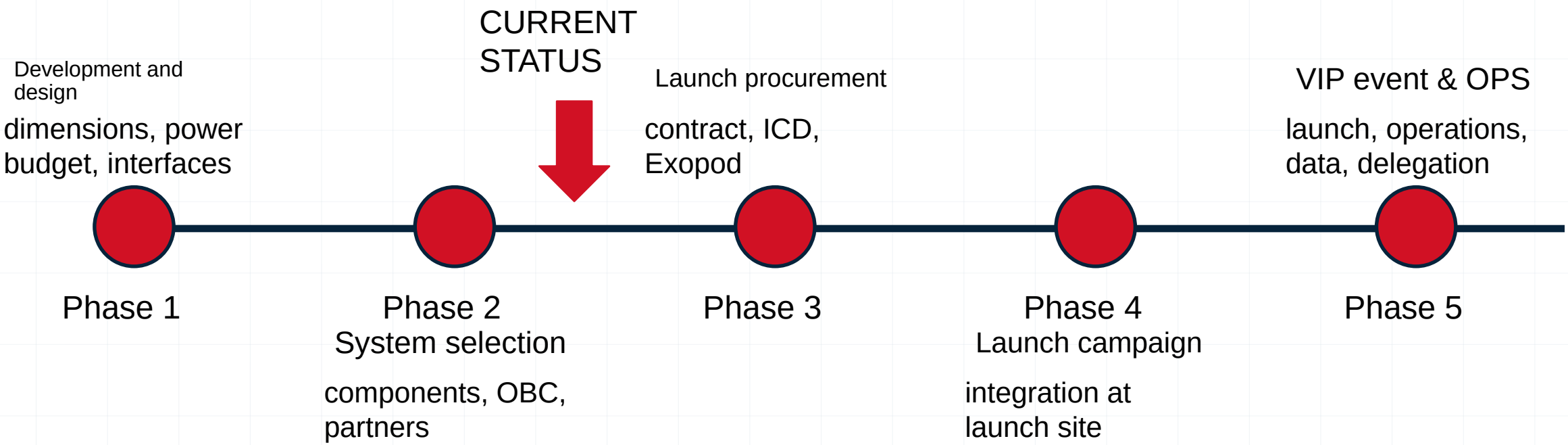
Next missions

reuse of documentation, interfaces and proven procedures

Recommended support condition: separately account for and classify the common reusable foundation versus the one-time configuration of the first mission, both financially and at project level.

PROJECT MILESTONES: FAST TRACK WITH QUALITY GATES

The Fast Track timeline is realistic only with clear decision points and defined responsibilities.



Acceptance logic: documented design results, functional tests, representative hardware, deviation records, and reliable data handover to the host.