



Technology aspects and opportunities for small satellite LEO mission

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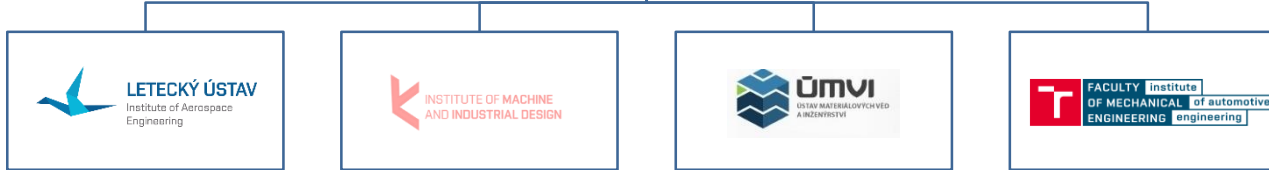
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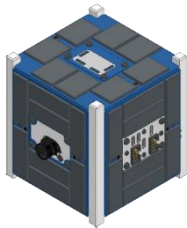
Faculty of Mechanical Engineering - BUT



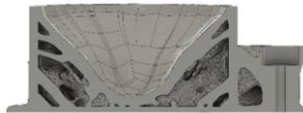
- 4 300 students
- 520 employees
- 15 institutes



- Spacecraft design
- FE analyses
- Spacecraft testing



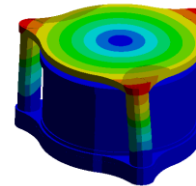
- Additive manufacturing
- Topology optimization



- Material testing



- Vibration testing

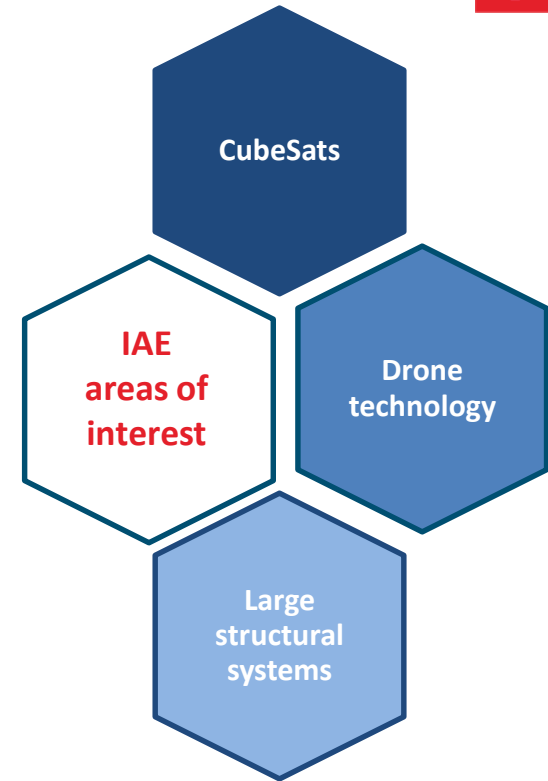


IAE: research and industry cooperation

- Research and industry cooperation
- National and international projects (Horizon 2020, FP7, ESA)
- Contractual research

Main competences covers:

- Conceptual **design** of vehicles
- Structural design and **testing** – static, quasistatic, dynamic, vibrations
- Dynamic impact tests
- Manufacturing of airframe parts, complete **integration** of the vehicles
- Flight testing at earth conditions



past

2013

SPARTAN

- SPace exploration Research for Throatable Advanced eNginE
- *FP7-SPACE - Specific Programme "Cooperation": Space*

2016

MHS - Miniaturized Heat Switch

- *Arescosmo (Aerosekur)*
- *ESA 400010509/11/NL/NA*

2021

ADAAC

- Additive Design for Aerospace Applications Capabilities
- *ESA 4000123317/18/NL/GLC/hh*

ONGOING

2020

MHS-DE

- Miniaturized Heat Switch – Design Evolution
- *ESA RFP/3-16288/19/NL/KML/va activity*
- „Prime contractor“

2021

Moon Drone

- Thales Alenia Space, GMV, T4i
- *ESA AO/1-9767/19/NL/KML*

2021

BUTCube – small satellite technology demonstrator development

- PhD student project
- National funding

SPARTAN (Space exploration research for throatable advanced engine)

Test module for hybrid rocket engines for controlled landing at Mars soil.

IAE activities:

- Testbed integration and testing
- Dynamic impact tests
- Manufacturing of airframe parts, complete integration of the vehicle (including high pressure oxidizer pipelines and tanks, leak tests)
- Assistance at firing tests



Additive Design For Aerospace Applications Capabilities (ADAAC)

Improving performance and decrease manufacturing costs of aerospace hardware

Additive manufacturing of aero and space related parts

- Jet engine and turboprop engine parts
- Heat switch
- Heat exchanger for aero engine

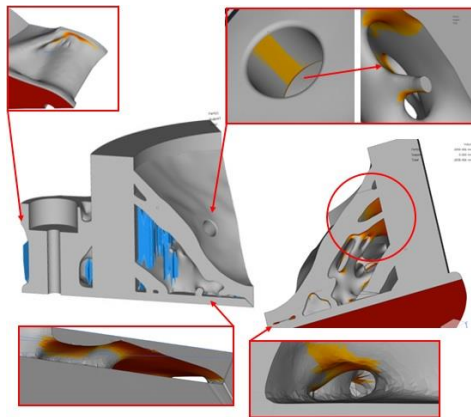
Estimated **TRL 3**



European Space Agency



GE Aviation



Miniaturized Heat Switch for probes and satellites

Passive thermal control unit

- Development
- Environmental testing
- Additive manufacturing

ESA Prime contractor

- Project management
- Procurement



Feasibility and preliminary design of a MOON DRONE



- ESA project, lead by Thales Alenia Space
- Design a drone vehicle able to autonomously depart from the surface of a lunar rover
- Conceptual design, integration and testing



THALES

T4i TECHNOLOGY
FOR PROPULSION
AND INNOVATION

gmv
INNOVATING SOLUTIONS



LETECKÝ ÚSTAV
Institute of Aerospace
Engineering



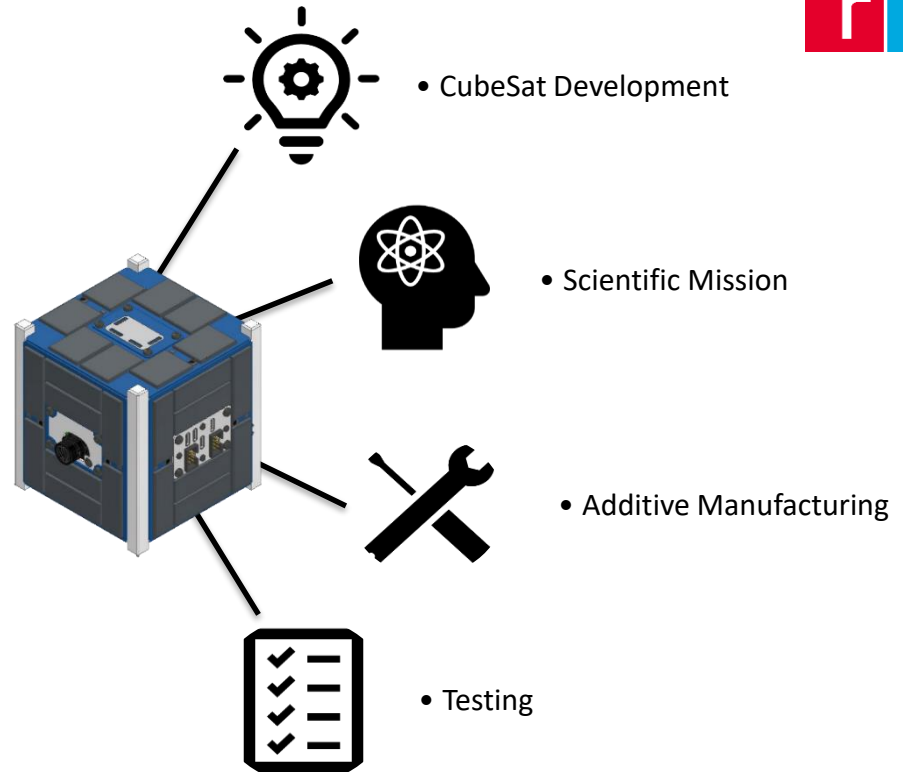
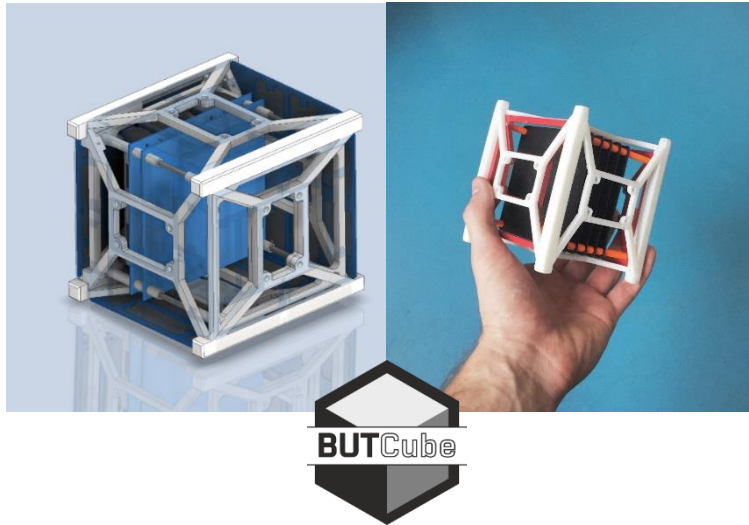
MOON DRONE



- Static firing and semi-constrained tests in 2021
- Tethered and free flight scheduled in 2022
- All in CZ

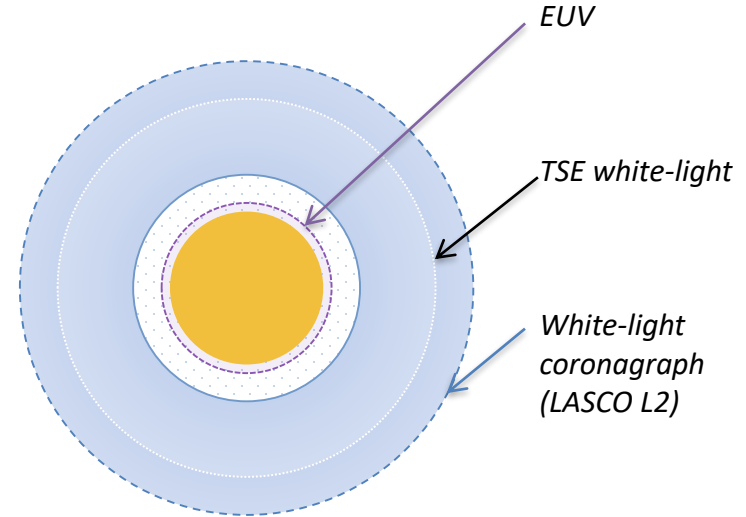
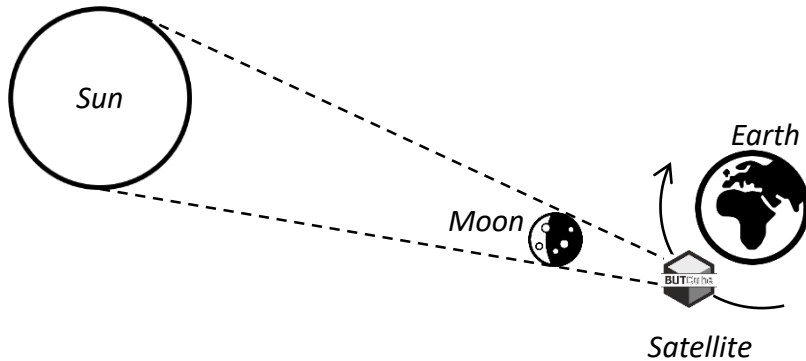
BUTCube - small satellite technology demonstrator development

- Research of 3D printed CubeSats capabilities
- 1U CubeSat Engineering Test Unit
- **1st BUT CubeSat development project**



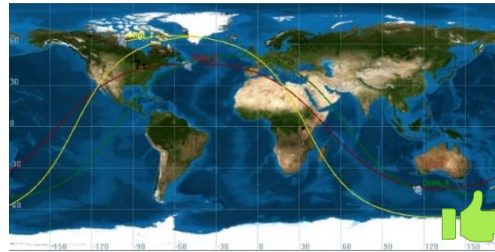
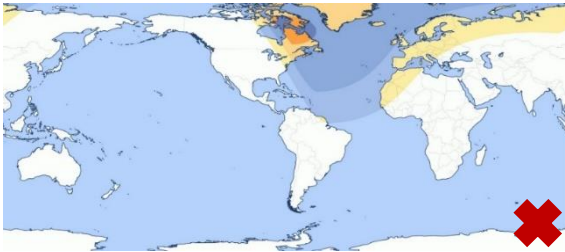
SCIENCE - Solar Corona Investigation by Employment of Non-natural Solar Eclipse

- White-light corona observation
- No atmospheric light scattering
- **Moon occuler – close limb region**

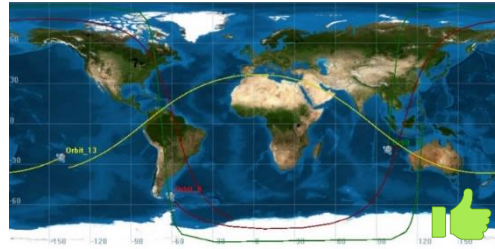
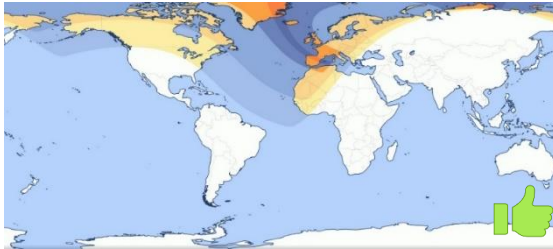


SCIENCE – observation orbits

- One observation per orbit
- **Multiple orbits** found for **1 eclipse event**

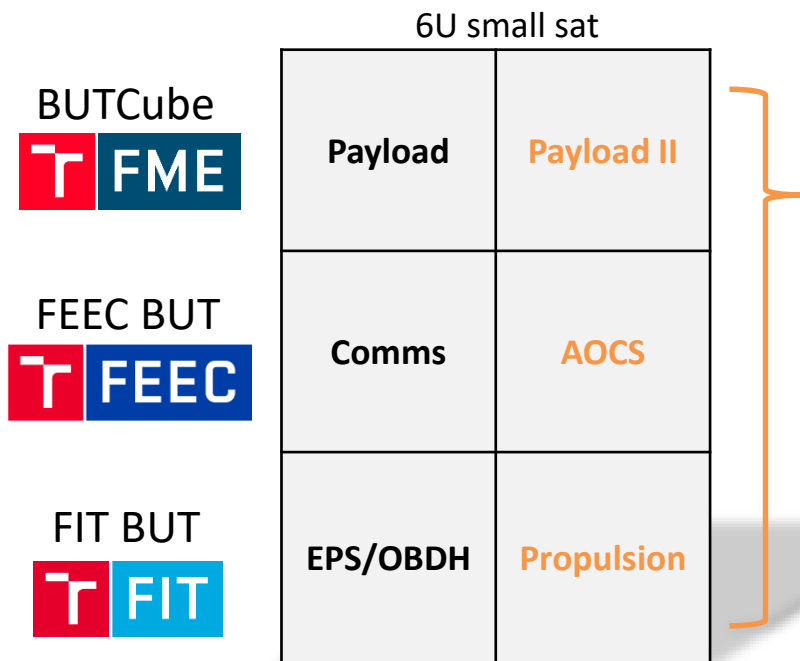


2025 partial eclipse event



2026 total eclipse event

SCIENCE – integration opportunities



OPEN FOR PARTNER

SCIENCE mission:

- Solar system exploration
- **Sun** observation
- Space technology **development**

THANK YOU FOR YOUR ATTENTION

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