

ITU Symposium and Workshop on the small satellite regulation
and communication systems
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Czech space instruments and satellites

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Czech tradition in space

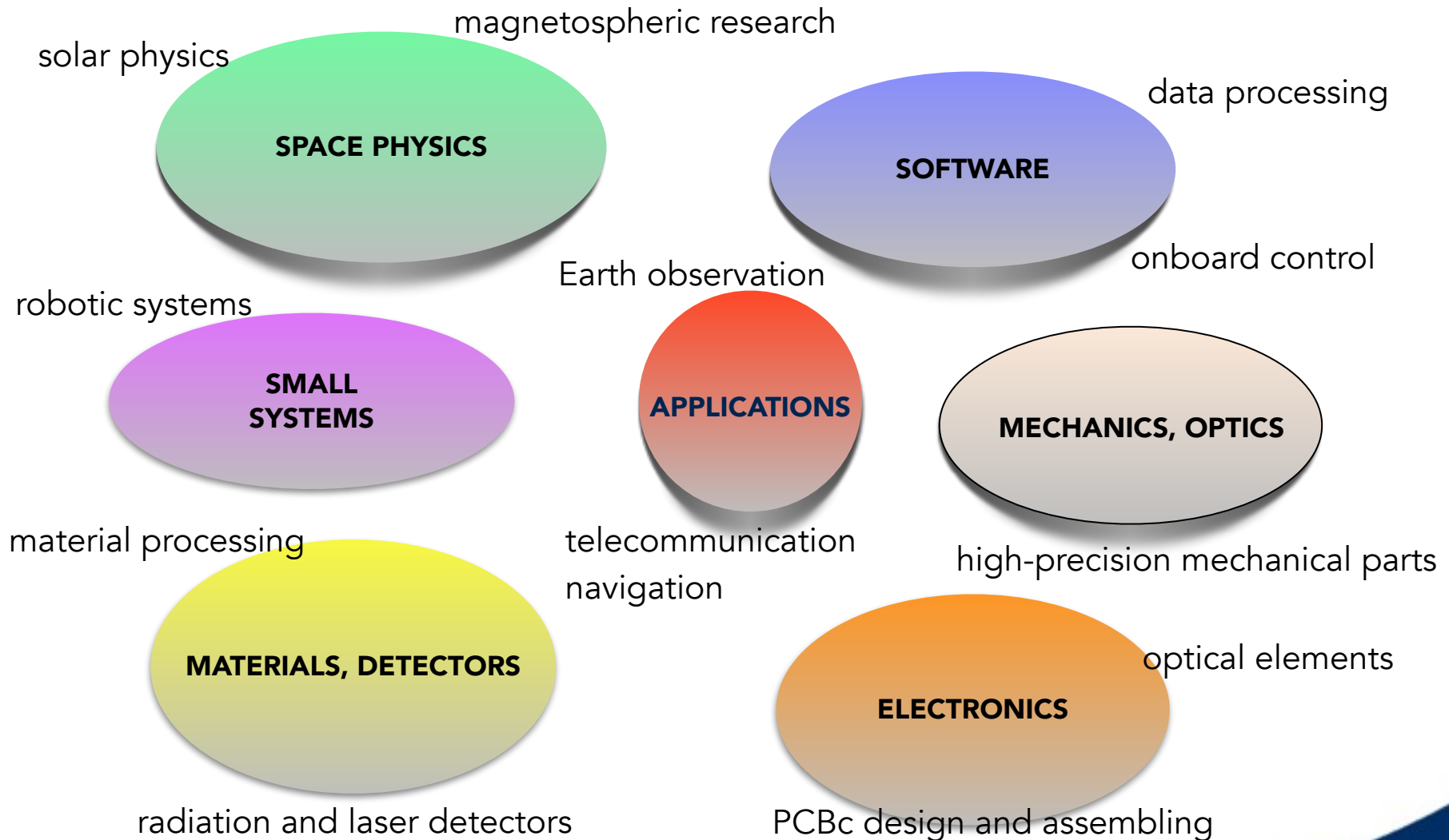
- Scientific instruments on 23 Interkosmos satellites (1969-1991)
- Manned flight of Czech astronaut Vladimír Remek on Saljut-6 orbital station (1978)
- Movable platforms for Halley comet probes Vega (1984) and for MIR space station (1989)
- Payload for Mars exploration - Phobos 1&2 missions (1988)

Czech in space today

- Member state of the European Space Agency (2008)
- participation in about 14 programs with more than 175 projects (mid 2014)
- EUMETSAT, European Union (Horizon 2020) programs
- National research and development projects
- Governmental yearly expenses for space R&D:
~19 M€ or about 0,04% of the state budget
- Czech contribution to ESA: in average nearly 14 M€/y

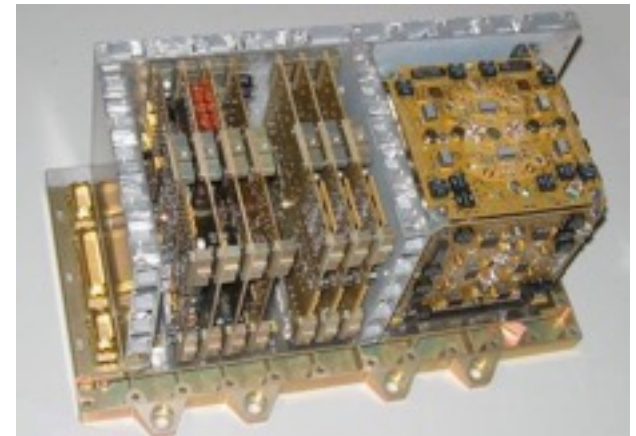
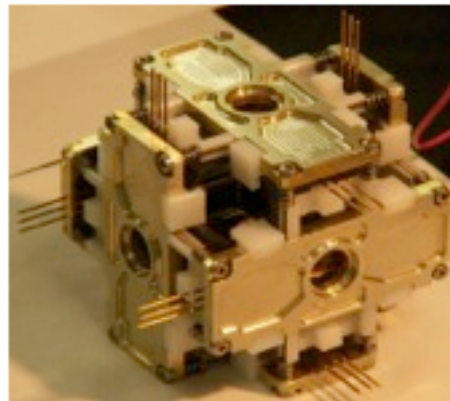
Czech capabilities in space projects

Dozens of various actors, mostly SMEs and academia



Czech instruments in space

- DSLP - plasma & ions measurement in magnetosphere onboard **Proba 2** satellite (ESA, 2009)
- SATRAM - charged particles detector on ISS (2012) and **Proba V** satellite (ESA, 2013)
- Micro-accelerometer - on three **SWARM** satellites (ESA, 2013)



Instruments in preparation (1)

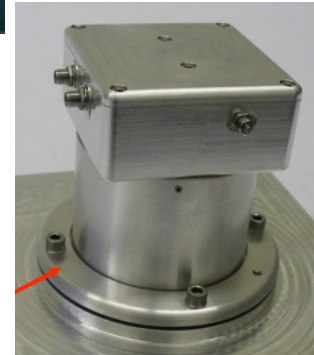
- 3D detector of charged particles
RISESat (Japan, 2016)



- wave HF analyzer, detector of energetic electrons
Taranis (France, 2016)

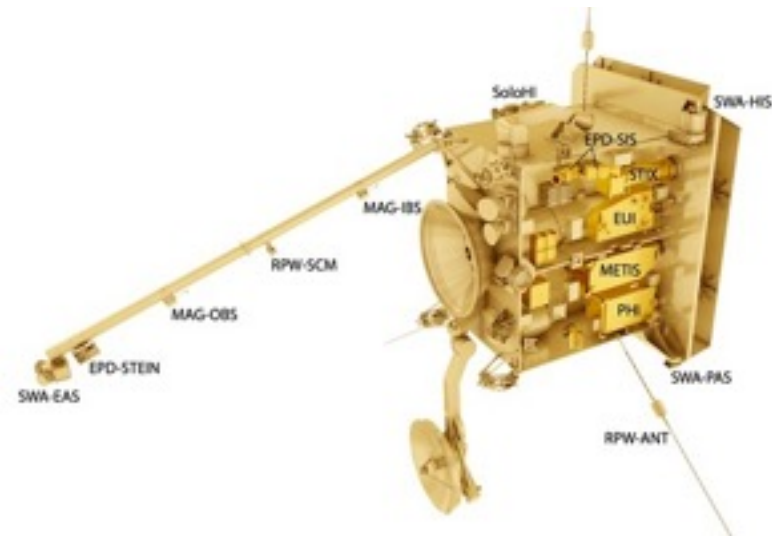
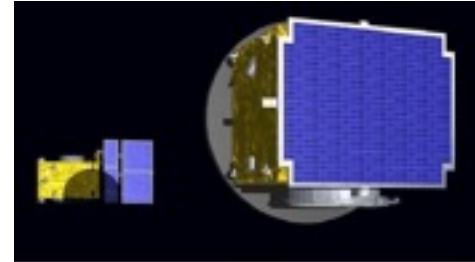


- ELT for time synchronisation of new atomic clocks to be tested on **ISS** (2016)

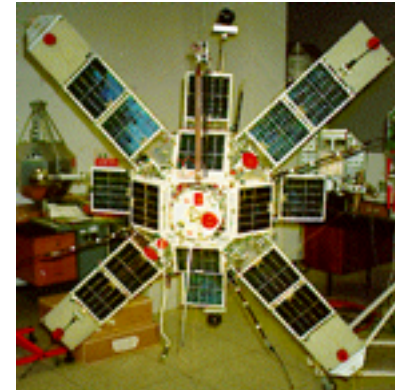
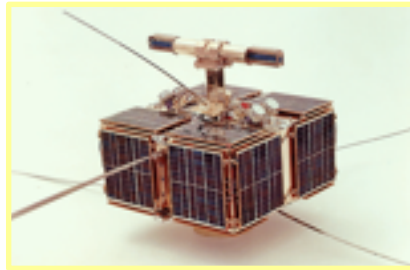


Instruments in preparation (2)

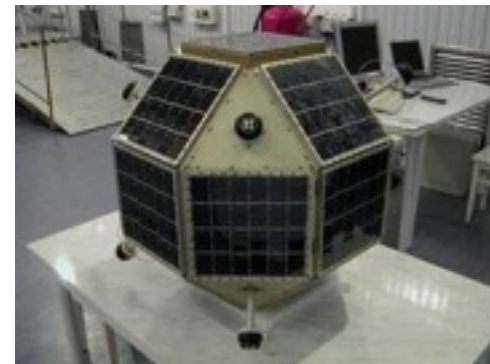
- optical/mechanical parts for coronagraph on **Proba 3** (2017)
- **Solar Orbiter** (2017)
 - electronic parts for 3 instruments
 - coronagraph elements
- wave analyzer for lunar orbiter **Luna 26** (2018)
- **JUICE** (2022)
 - magnetometer & power unit
 - elmag fields measurements



MAGION series of 5 satellites 1977-1996
for ionospheric / magnetospheric research

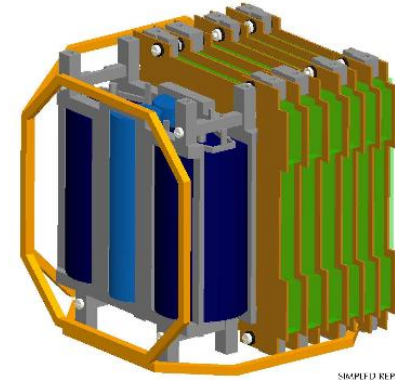


MIMOSA satellite 2003
for astrodynamic measurements
microaccelerometer
- Atlantis STS-79 (USA) 1996

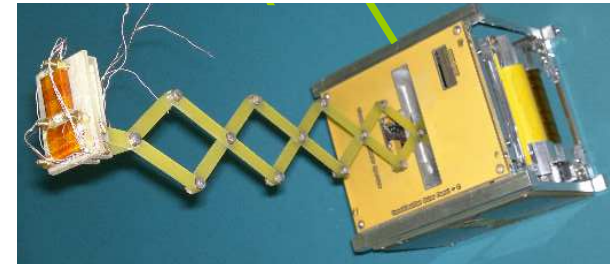


Czech cubesats

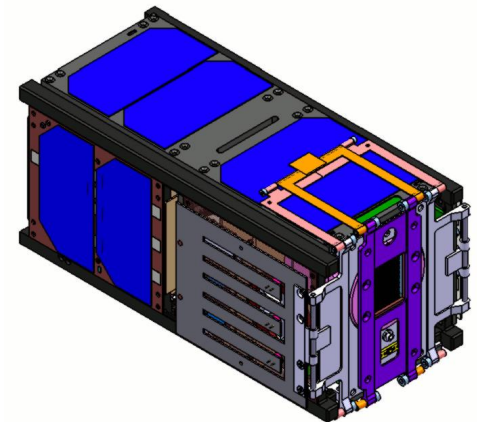
PilsenCube - WBU in Pilsen 2009-11
design, prototype computer
and solar panels



CzechTechSat - CTU in Prague 2011-14
magnetometer, three axis stabilization



VZLUSAT-1 - Aviation Research Inst. 2013-17
European project QB50
2U cubesat with scientific payload:
Xray telescope, radiation detector
satellite environment



- Satellite telecommunication
CR is member: Intersputnik (1971), IMSO (1988), Eutelsat (1993)
- Satellite navigation
software solutions for localization-based services
- Satellite Earth observation
weather forecast, controlling of farmers' applications for subsidy, forest health monitoring
- Manufacturing of parts for satellite platforms
- Be ready to use of low-cost commercial transport offers
balloons, suborbital (Virgin Galactic, XCOR), orbital

Considerations for next steps

- Use of space - challenge for every country and society.
- The 55-year development gradually makes astronautics more accessible and like other human activities. Small satellites are one part of the "new space" trend.
- Basic tasks:
 - to possess necessary knowledge and skills
 - to set up legislation rules ensuring reliance and safety for new operations and further development.
- Efficiency of administrative, legal and knowledge support provided by national infrastructure is a key factor influencing the result of the use of the "new space" opportunities in society.

THANK YOU



www.czechspace.cz