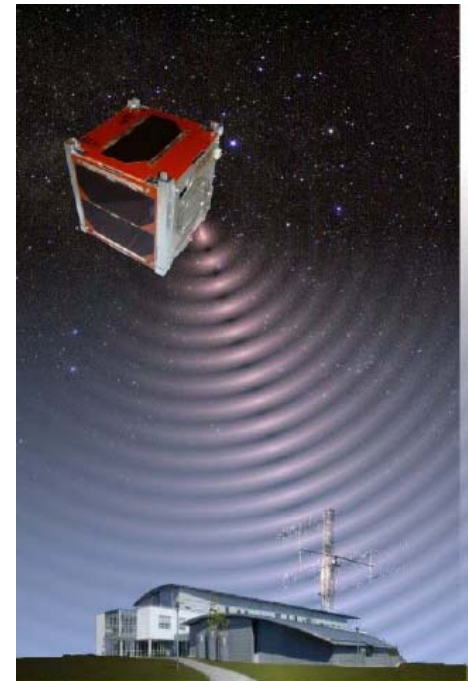




Pico satellite activities of the University of Wuerzburg

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www7.informatik.uni-wuerzburg.de



The UWE pico satellite project

- ▶ **UWE = University of Wuerzburg Experimental satellites**
- ▶ General Objectives of the UWE Project:
 - Building small satellites for education
 - Students can design and develop a complete satellite in their curriculum
 - Interdisciplinary groups are working together to realize a complex project

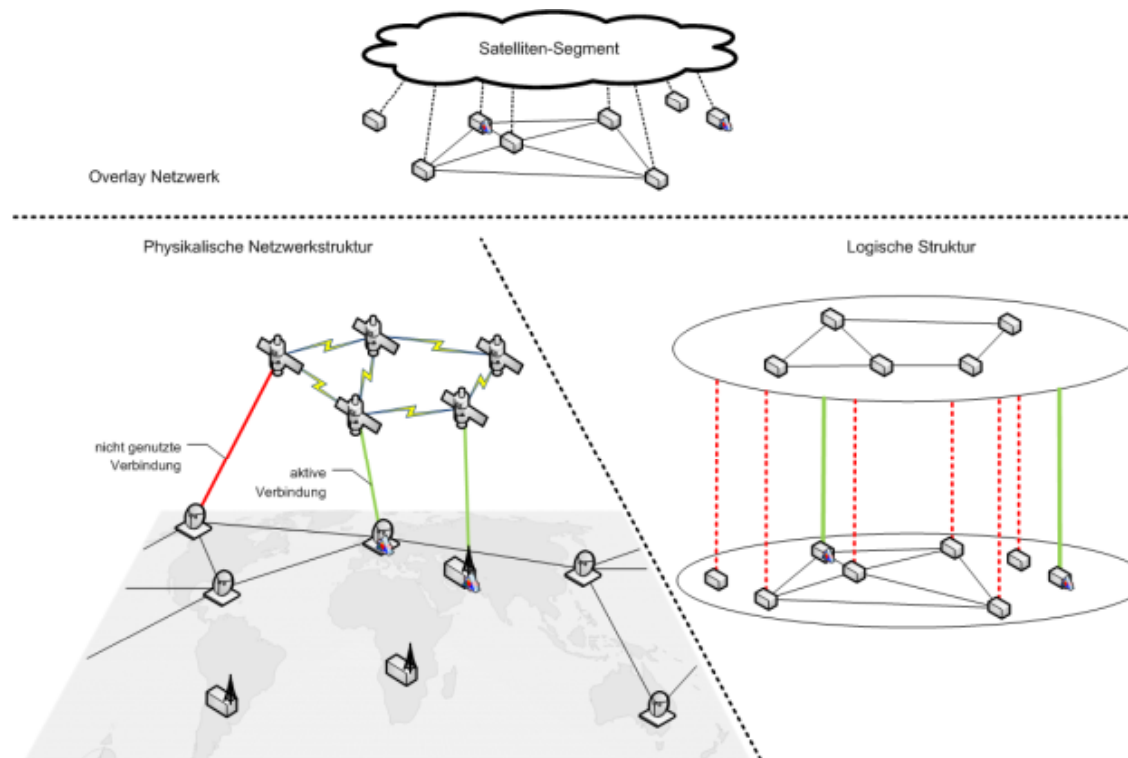


- Developing technologies for small satellites
- Building small satellites for space research



The UWE pico satellite project

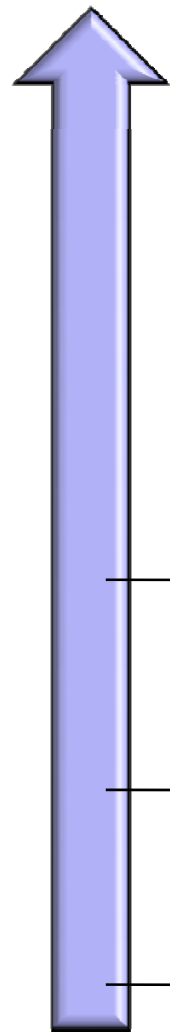
- ▶ Long term research objective
 - Operating swarms of small satellites
 - Intelligent swarm behaviour



- ▶ To achieve this goal, a step by step strategy is followed



The UWE pico satellite project



UWE X

- High Data Rates
- Attitude Control
- Formations
- Ad-Hoc Networks
- ...

201? UWE-3

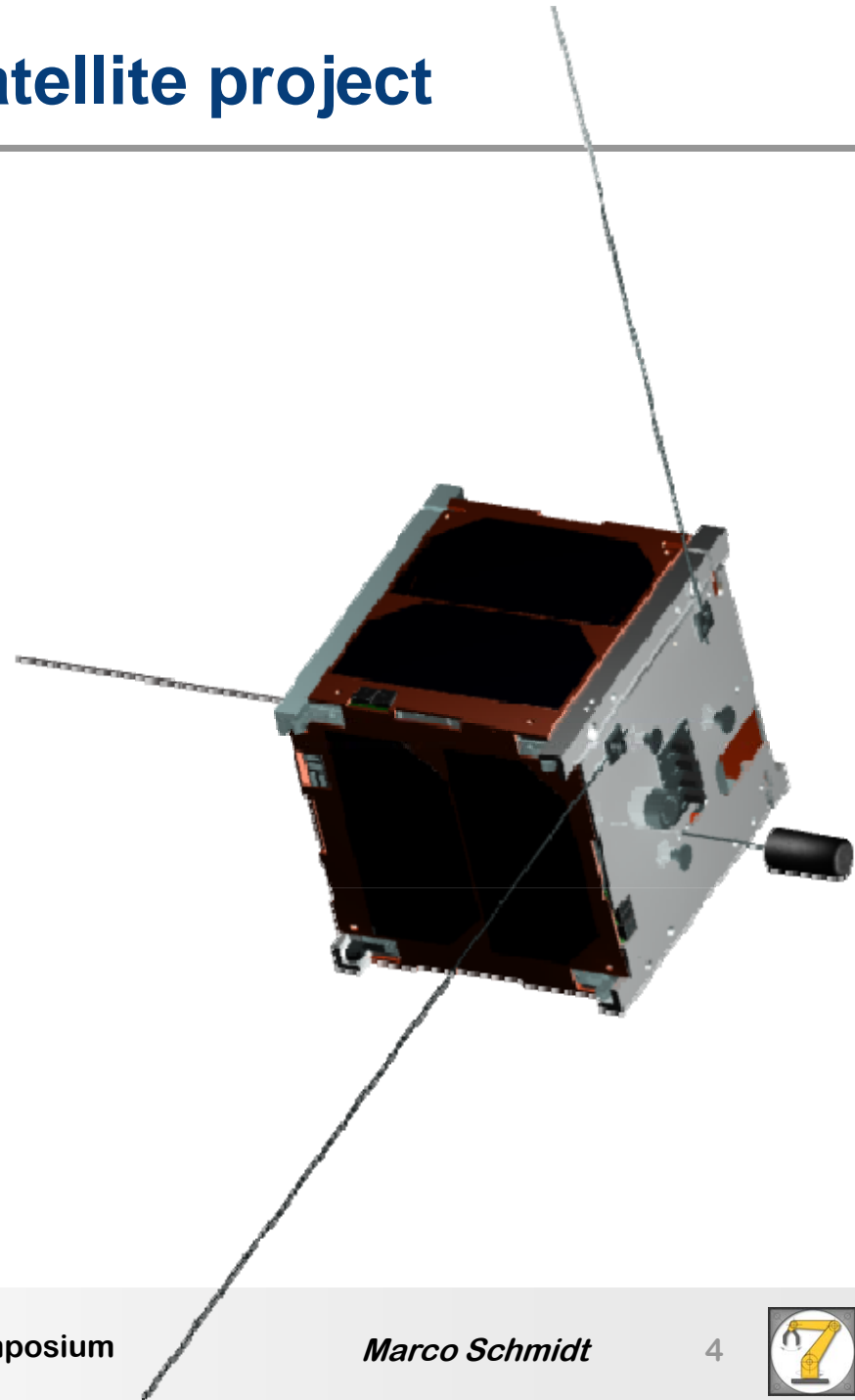
- Attitude Control
- ...

2009 UWE-2

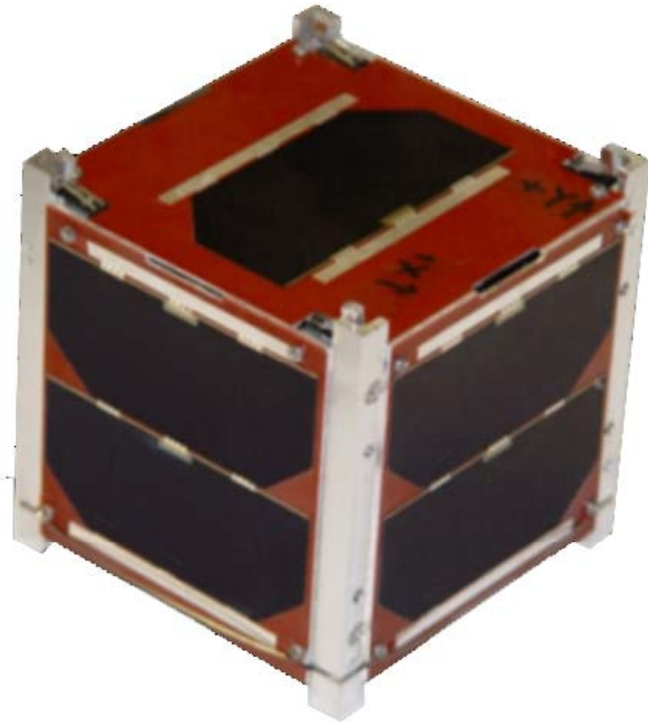
- Attitude- and Orbit Determination

2005 UWE-1

- Telecommunication



Cubesat UWE-1



UWE-1 was launched 2005 as research satellite

Dimensions: Size: 1 dm³, Weight: 977
(complies to Cubesat standard)

Scientific aim:

- ▶ IP communication experiments:
- ▶ Communication tests to characterize the radio link

Secondary objectives

- ▶ Experiments for in-orbit tests of hardware (e.g. solar cells)



Cubesat UWE-1

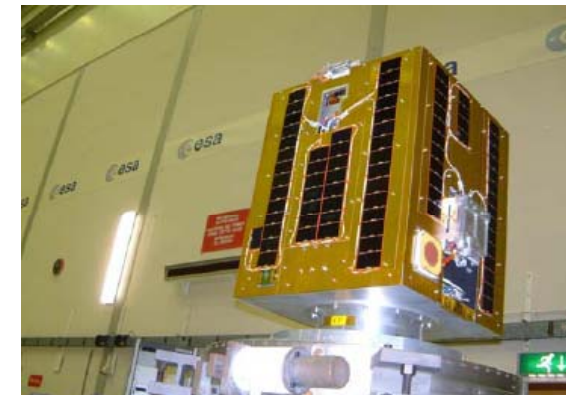
- ▶ Launch on 27. Oktober 2005 as payload on the ESA student satellite SSETI-Express
- ▶ Integrated in T-POD launch adapter
- ▶ UWE-1 orbit is a sunsynchronous, polar orbit



Further cubesats on SSETI
Express: Ncube, Cubesat XI-IV



Cosmos 3M rocket

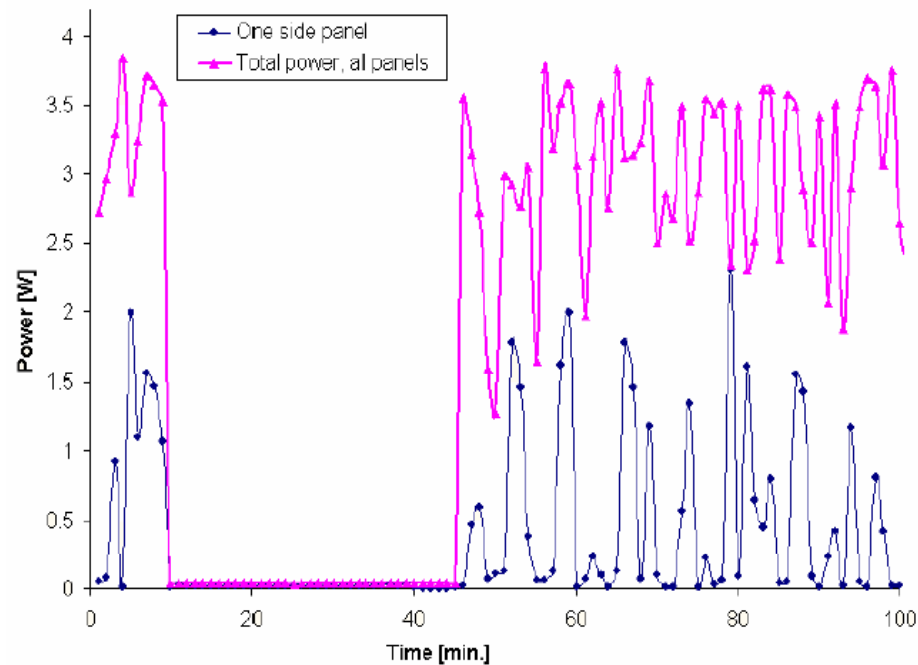


SSETI Express



Cubesat UWE-1

- ▶ Technology demonstration: Test of highly efficient GaAs solar cells from industry
- ▶ UWE-1 tested these solar cells for the first time under space conditions

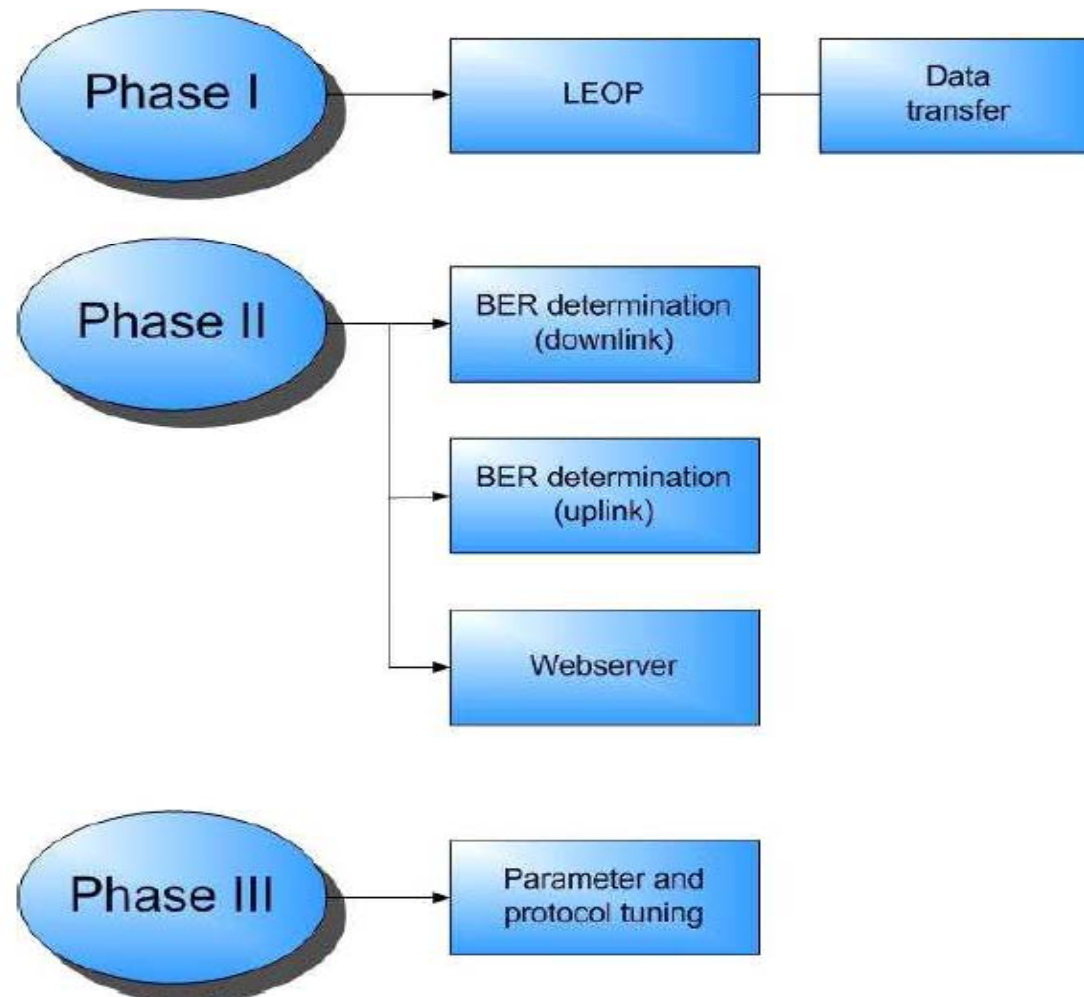


Produced energy from the solar cells

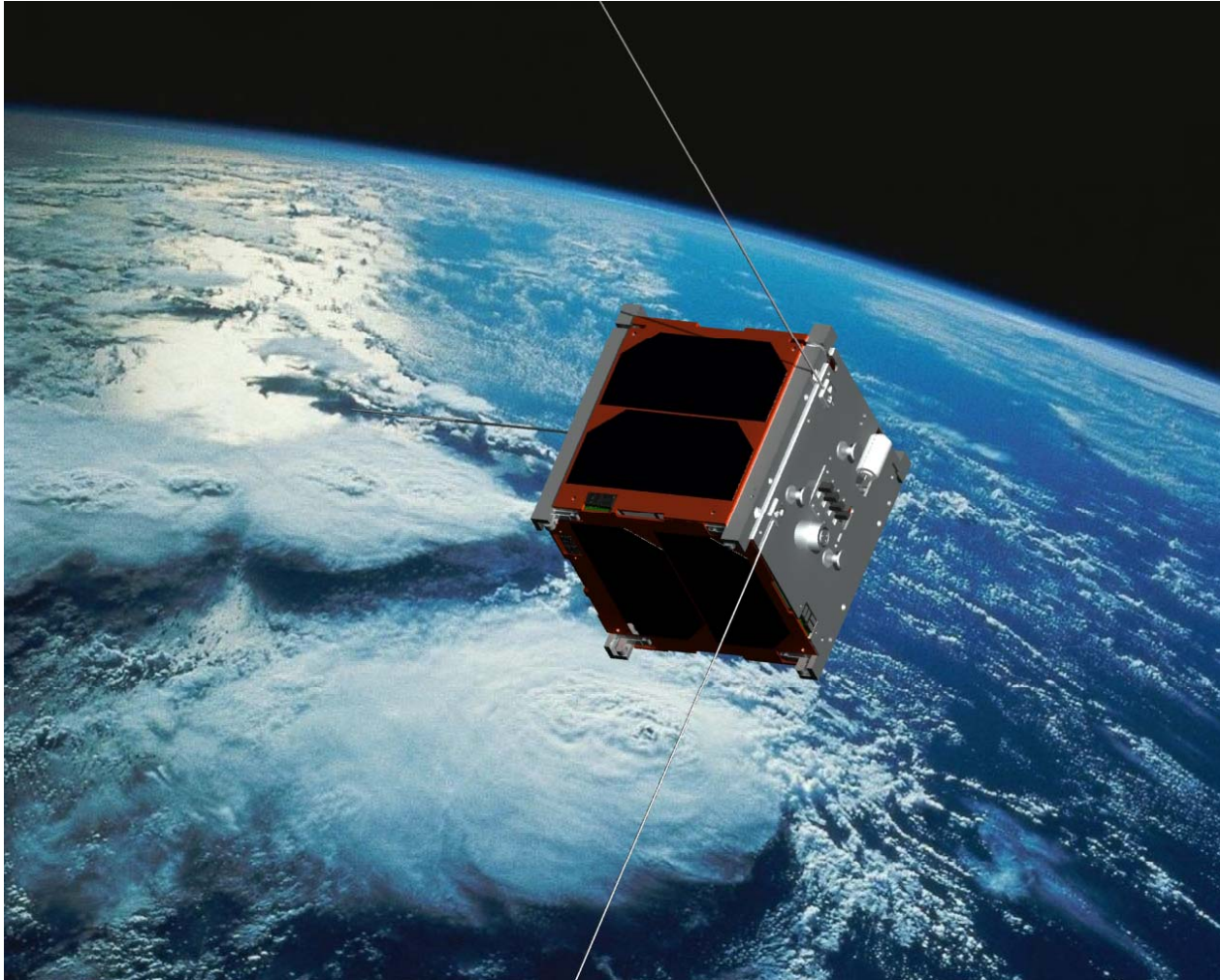


Cubesat UWE-1

- ▶ Tests related to communication and Internet Protocols (IP)



Cubesat UWE-2



Supported from DLR (FKZ 50RU0704)



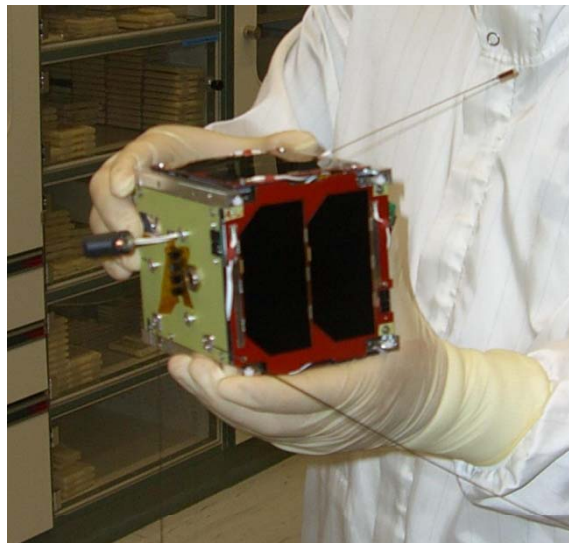
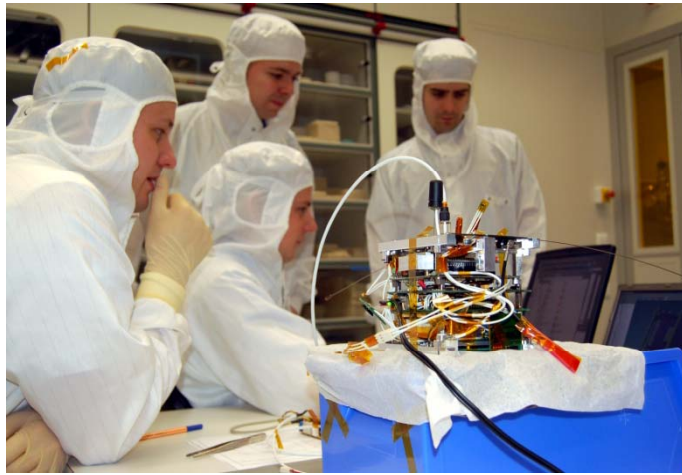
Cubesat UWE-2

- ▶ University of Wuerburg
Experimental satellite 2
- ▶ Launched successfully 23.
September 2009

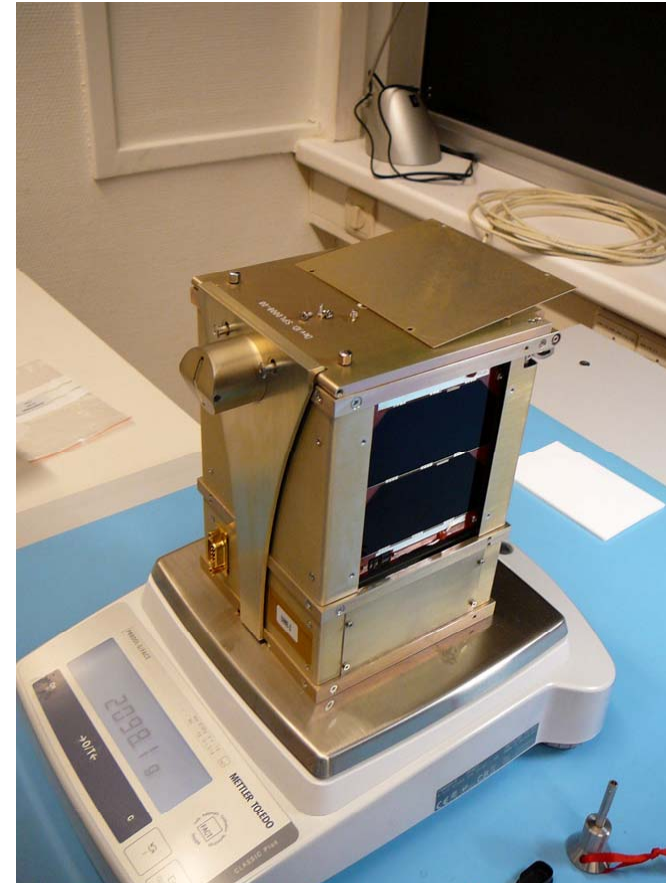
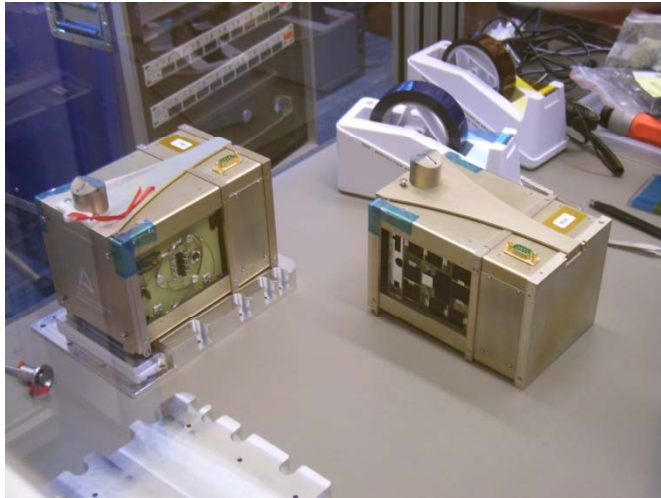
- ▶ Scientific aim
 - Verification of the newly
developed Attitude
Determination System (ADS)
 - Testing the performance of
the integrated Phoenix GPS
receiver



Cubesat UWE-2

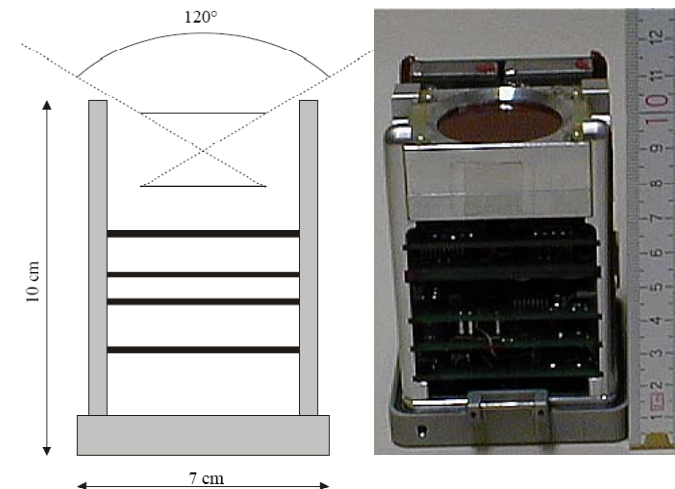
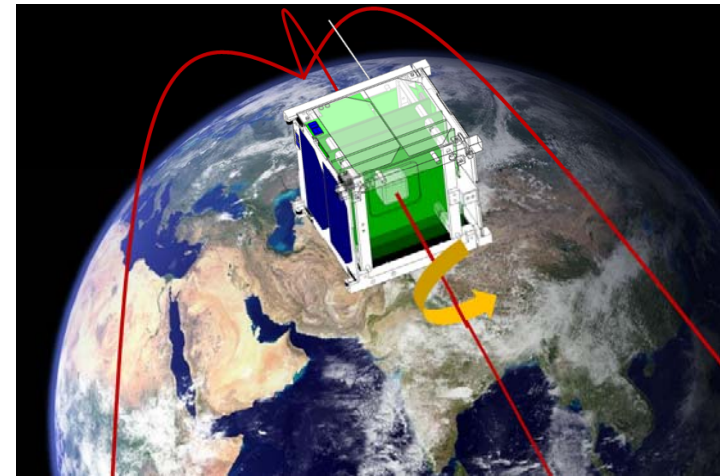


Cubesat UWE-2



Cubesat UWE-3

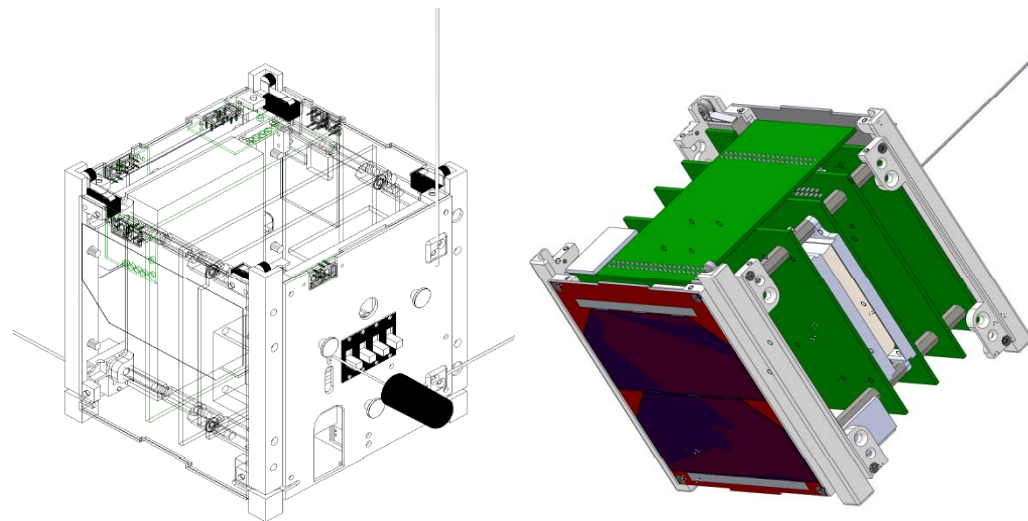
- ▶ 3rd satellite of the UWE series
- ▶ Currently backup for the Vega Maiden flight
- ▶ Scientific aim:
 - Verify simple actuation for attitude control
- ▶ Planned secondary objective:
 - Testing new prototype dosimeter



Cubesat UWE-3

- ▶ Radio Subsystem
 - custom design
 - compact, efficient
 - unrestricted access
 - comprehensive configuration enables flexible adjustments to varying orbital conditions

- ▶ Thermal & Structure
 - various optimizations
 - mass
 - assembling
 - support for CAD based thermal simulation



Thank You!

