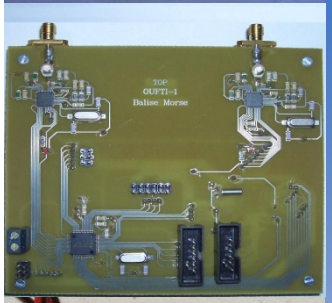
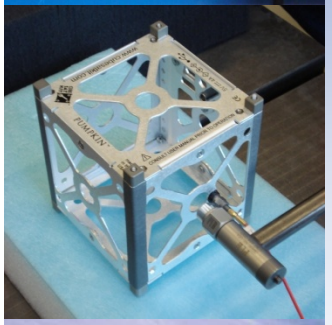




OUFTI - 1

The CubeSat developed at the University of Liège, BELGIUM

Renaud Henrard, Dept. of Electrical Engineering, ISIL

Gauthier Pierlot, Dept. of Aerospace & Mechanical Engineering, ULg

Damien Teney, Dept. of Electrical Engineering & Computer Science, ULg

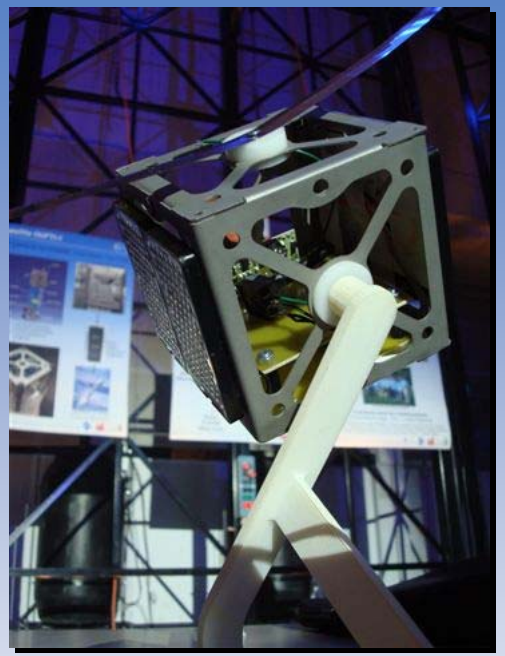
V. Beukelaers, L. Chiarello, N. Evrard, S. Hannay, J. Hardy,
L. Jacques, P. Ledent, F. Mahy, P. Thirion, J. Wertz

Université de Liège

Liège, Belgium

Université de Liège

Project overview



Primary objective:

hands-on satellite

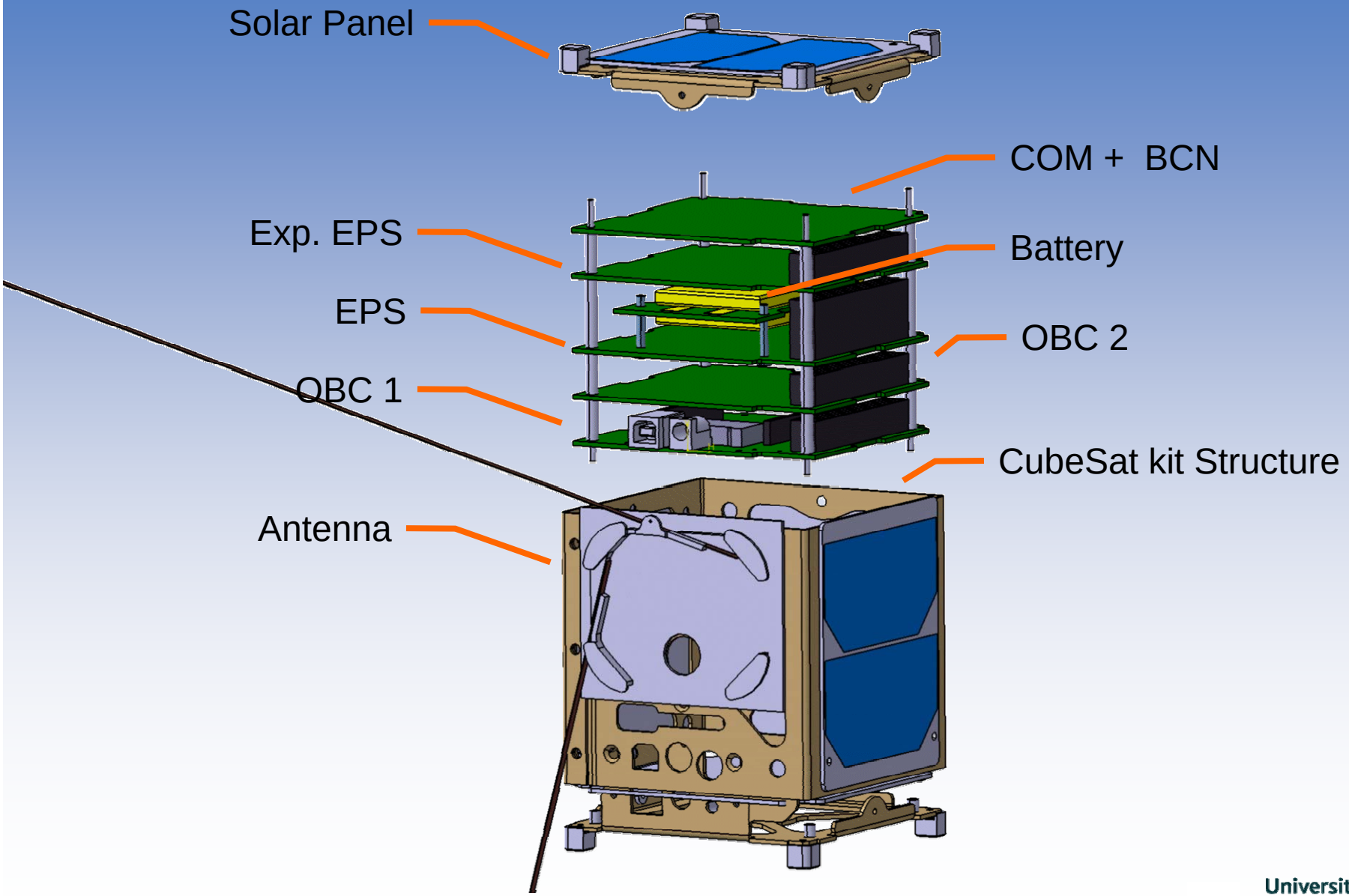
experience

for students

Three payloads

- new radio communication system
- new high performance solar cells
- innovative electrical power system

Exploded view of our CubeSat



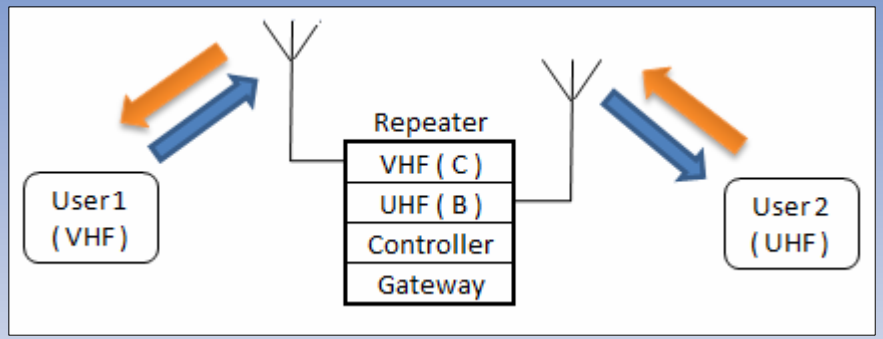
D-STAR : Introduction

Digital Smart Technologies for Amateur Radio

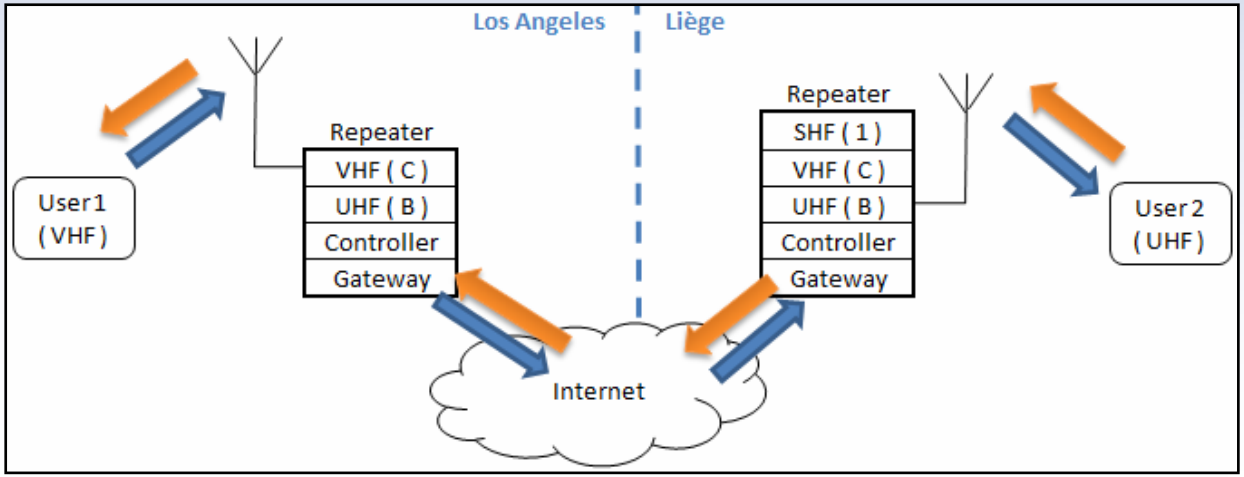
- Digital protocol for ham-radio communications
- Simultaneous data and voice transmission
- 2 transmission modes:
  - Data Voice : 4800bps = 3600bps (voice) + 1200bps (data)
  - Digital Data : 128Kbps (data only)
- Modulation : GMSK / QPSK
- Frequency bands : VHF/UHF/SHF

D-STAR: connectivity

- Direct communication
- Local communication through repeater



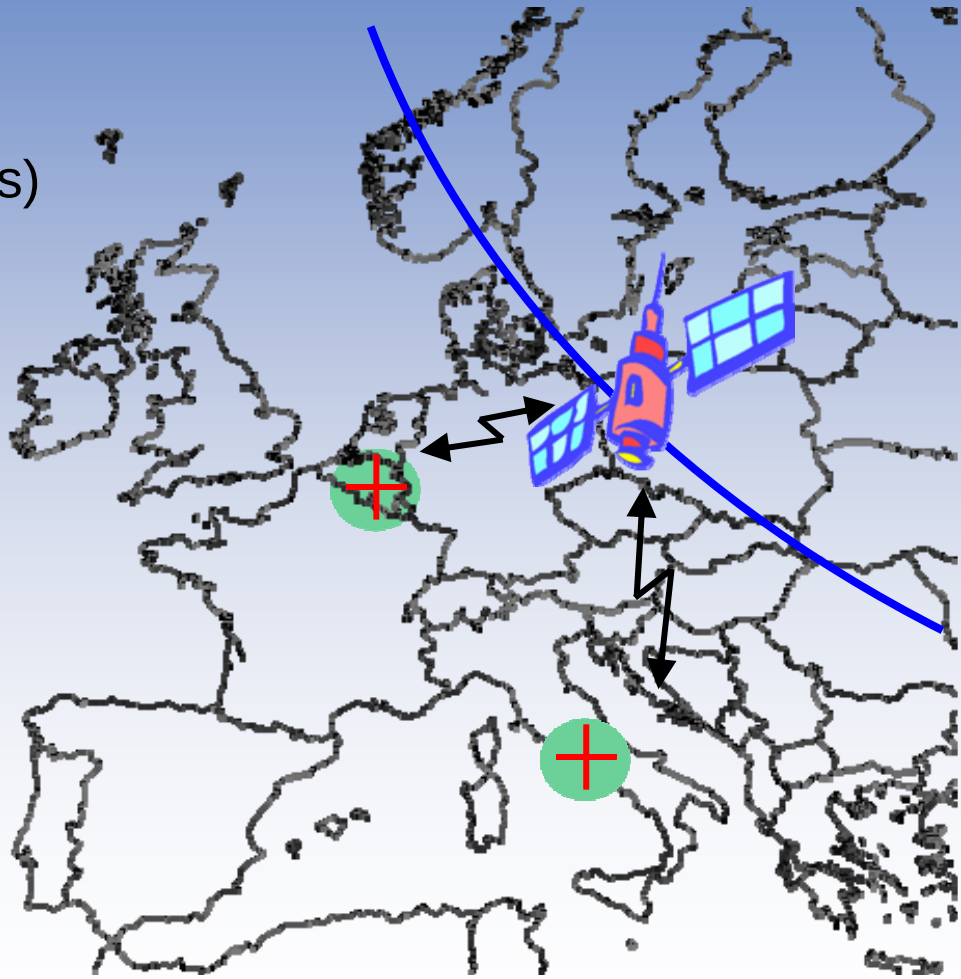
- Communication through gateway



D-STAR : OUFTI-1

OUFTI-1 = D-STAR Repeater

- UHF uplink / VHF downlink
- DV mode only (GMSK / 4800bps)
- Dual adaptive on-board Doppler compensation
- Up to 10 minutes of continuous D-STAR communication time
- Slots for custom compensation to be requested on our website

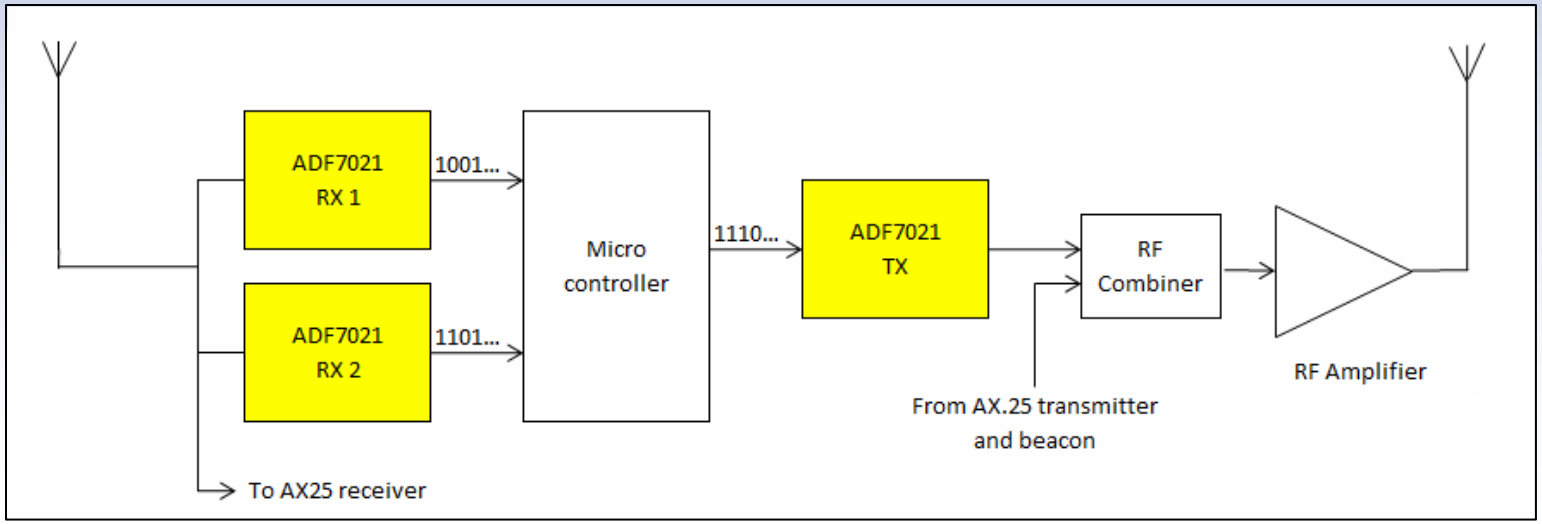


D-STAR : OUFTI-1

Our D-STAR system: based on

ADF 7021

integrated transceivers



Université de Liège

Secondary payloads

- **Experimental electrical power supply**

  Switching power supply with experimental digital control

  In collaboration with ThalesAlenia Space

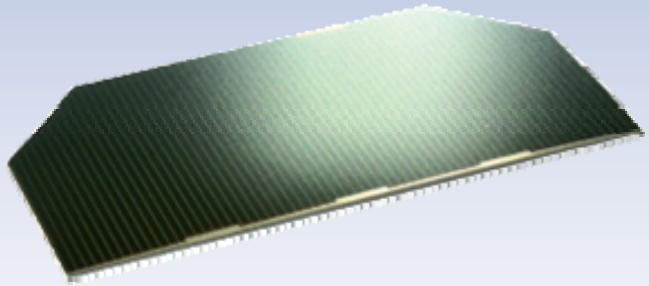
- **New solar cells**

  High efficiency (30%)

  5 complete panels

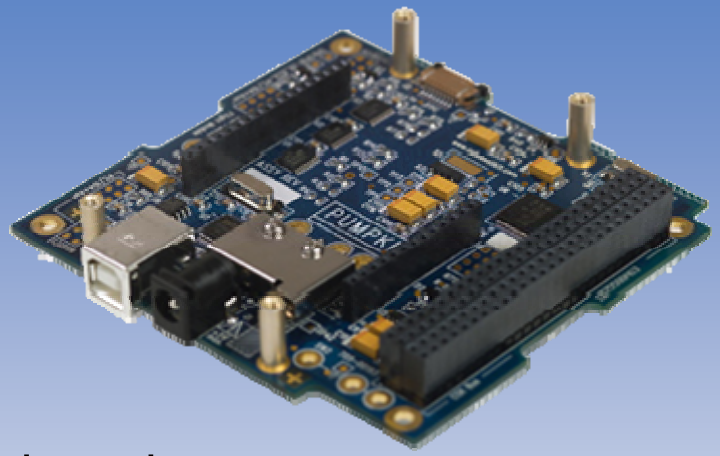
  Measurements will be done in orbit

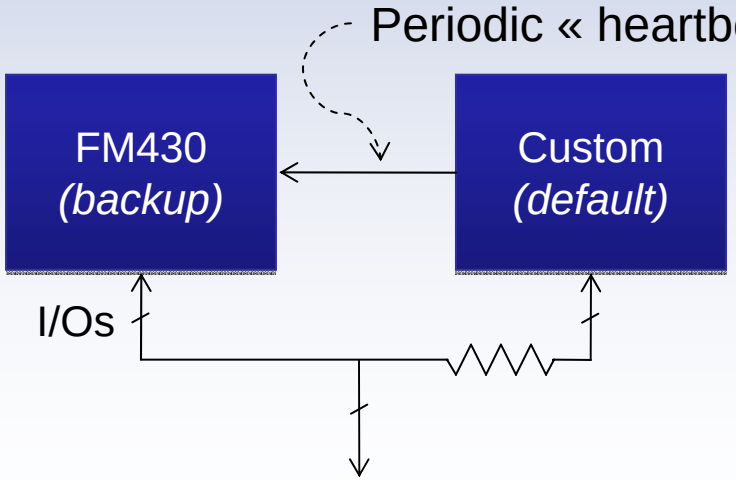
  In collaboration with AZURSPACE SOLAR POWER GMBH

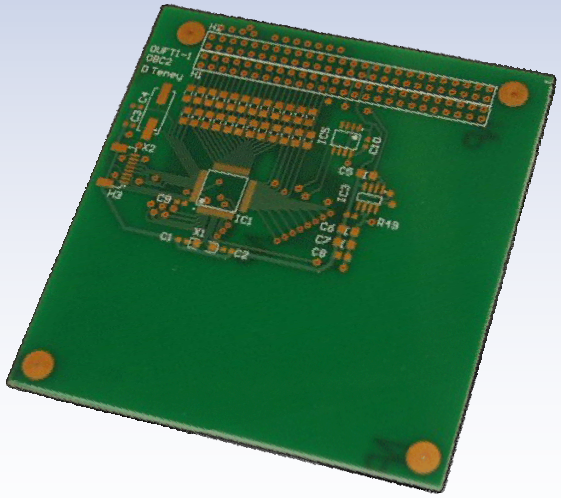


On-board computer

- **Baseline** simplicity for reliability
- **Off-the-shelf solution**
  Pumpkin's FM430
  Sufficient for all the tasks
- **Drawback: lack of redundancy**
  ➔ Second processor on a second custom board
  Only one processor active at a time







Conclusions

- Great hands-on experience for students
- Innovative technical solutions
- Enthusiastic response from everyone (not only in the university !)
- Raise interest in aerospace engineering

THANK YOU !

http://www.oufti.ulg.ac.be

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