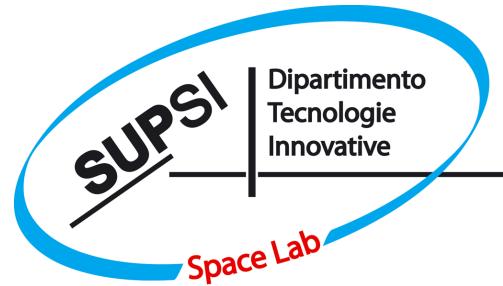


Scuola Universitaria Professionale  
della Svizzera Italiana

Dipartimento  
Tecnologie  
Innovative

SpaceLab

SUPSI



*Per il convegno*

## ***"Spazio e Radioamatori "***

organizzato da

***AMSAT Italia e C.I.S.A.R.***

Roma, 2 Dicembre 2006

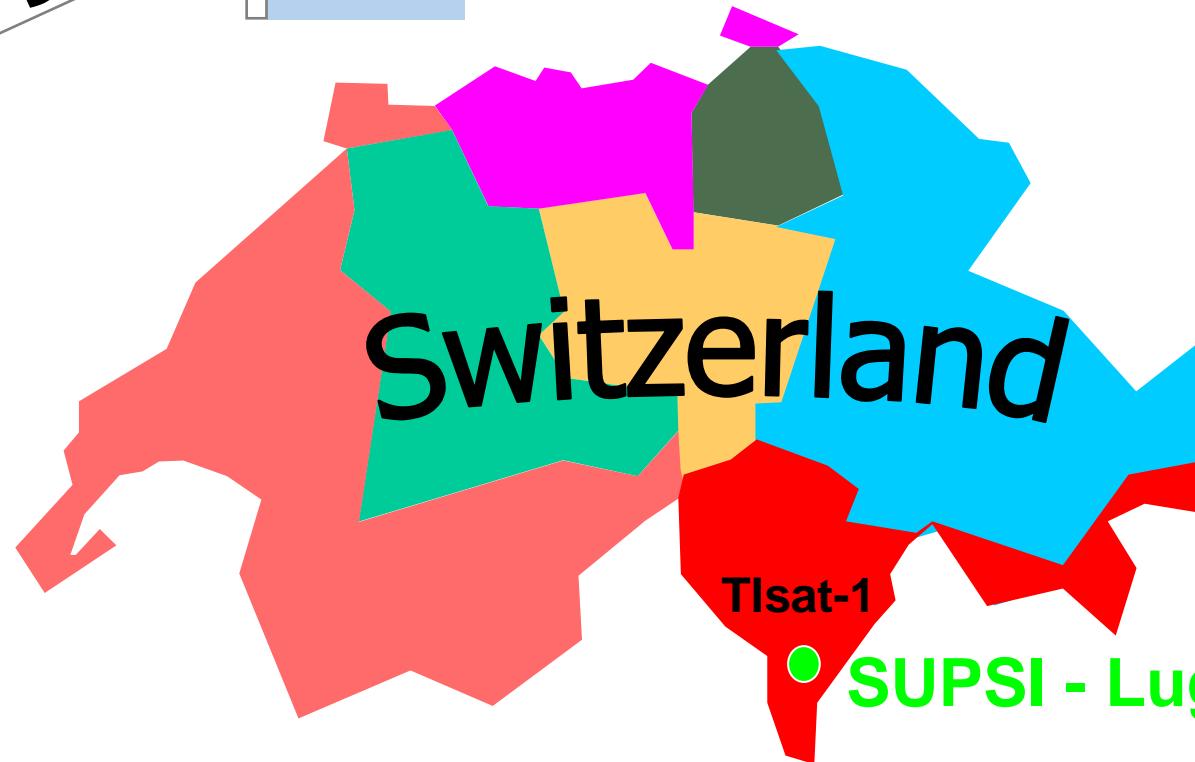
## **Scuola Universitaria Professionale della Svizzera Italiana**

A practice-oriented, innovation-devoted higher education institution

Delivers graduates ready to face the challenges of the real world

In touch with enterprises

SUPSI



Italy

PICPOT

PalaMede

ALMASat

ITAMSAT

UNISAT

*and more...*

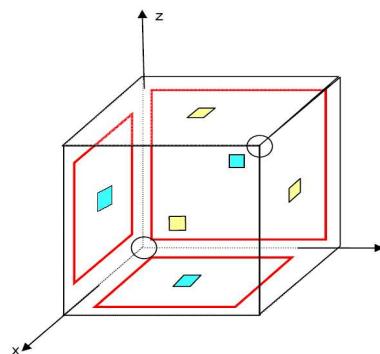
The satellite is primarily  
*an effective educational mean*  
to create motivation, responsibility,  
novelty and enthusiasm.

For a *university satellite* the *most important “payload”* is not what you launch, but what safely remains on the ground:

- System design skills with focus on
  - critical environment conditions
  - high reliability
  - do-it-right first
  - interoperability of wide range of systems
- Teamwork attitude and skills
- Scientific networking with highly qualified partners
- From concept to product, students see the end-to-end process.

# SpaceLab

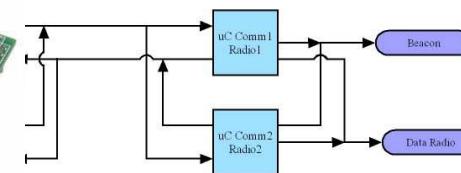
## The Facets



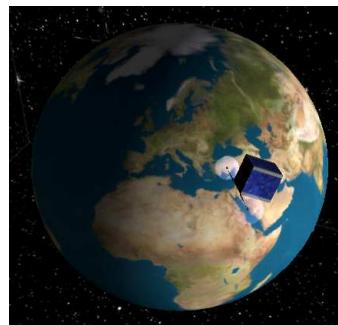
Attitude Detection  
and Control



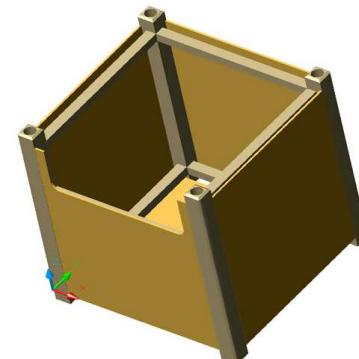
On Board Computer  
and subsystems



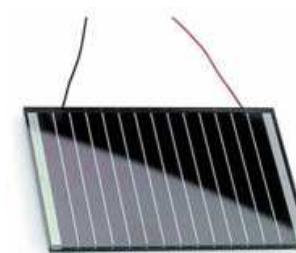
Ground Segment



Computer  
Simulations



Mechanical Design



Power Supply



Communication

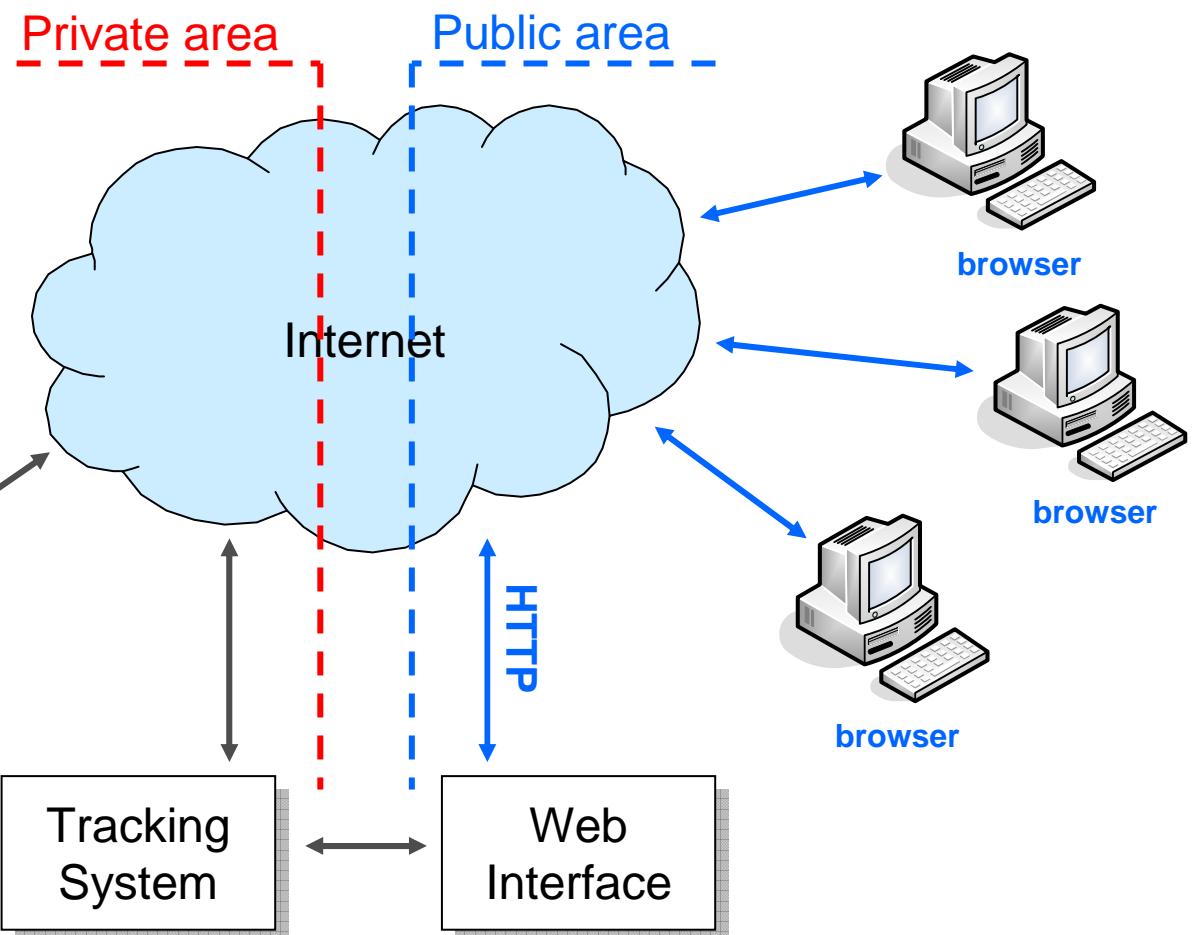
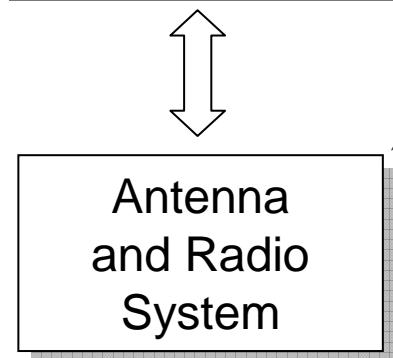
## SpaceLab

## Running Activities

- Study
- Research
- Build
- Verify
- Launch
- Monitor



80% done



# Antenna - Radio System



YAESU G-5500  
Rotors and Az/EI Controller



Radio transceiver  
YAESU FT-8800E



Radio receiver  
YAESU VR-5000

Present Version  
TCP/IP Connection



RS-232 - Analog audio

RS-232 – Analog audio

# Antenna - Radio System

Internet

TCP/IP  
Connection

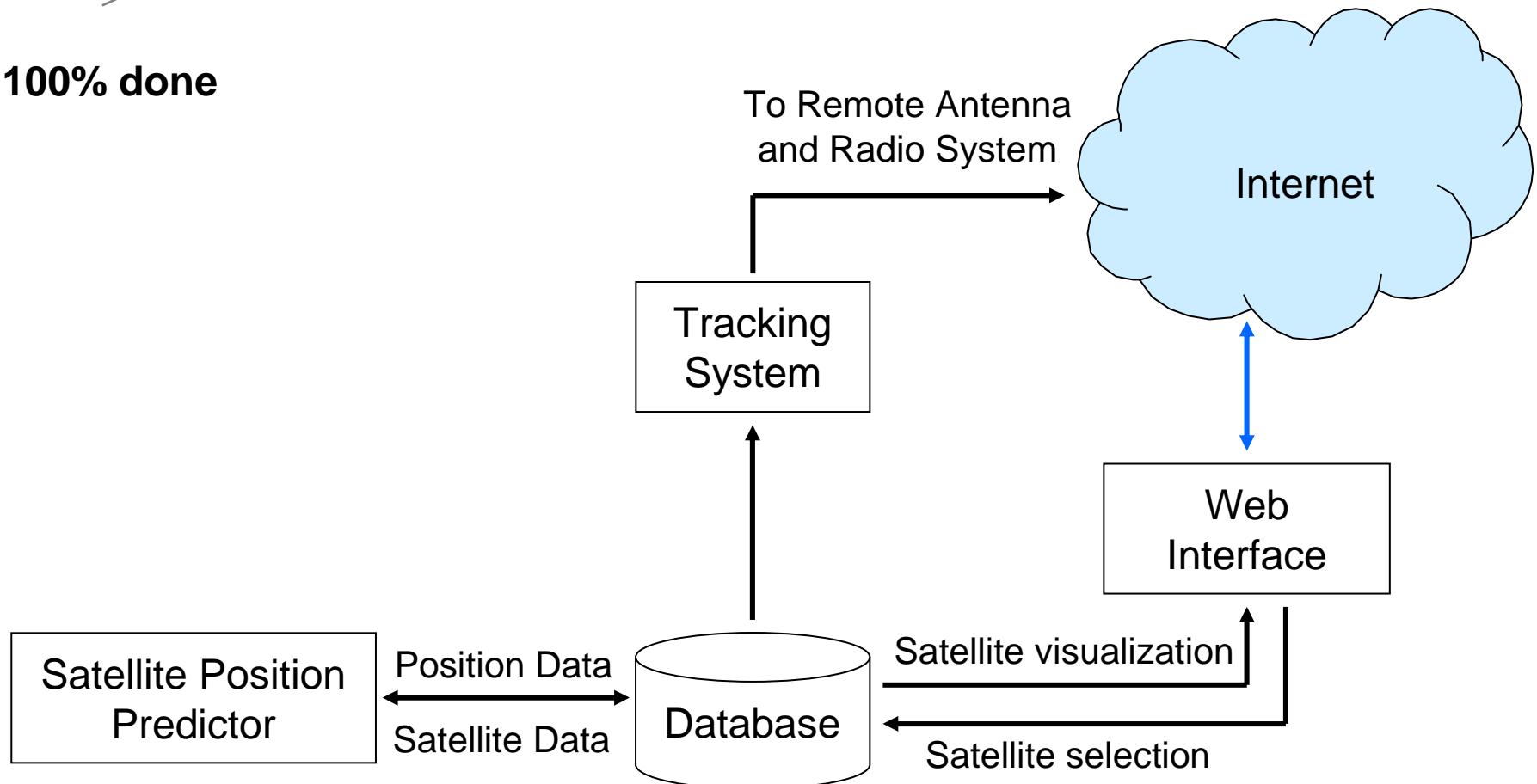
Future Version



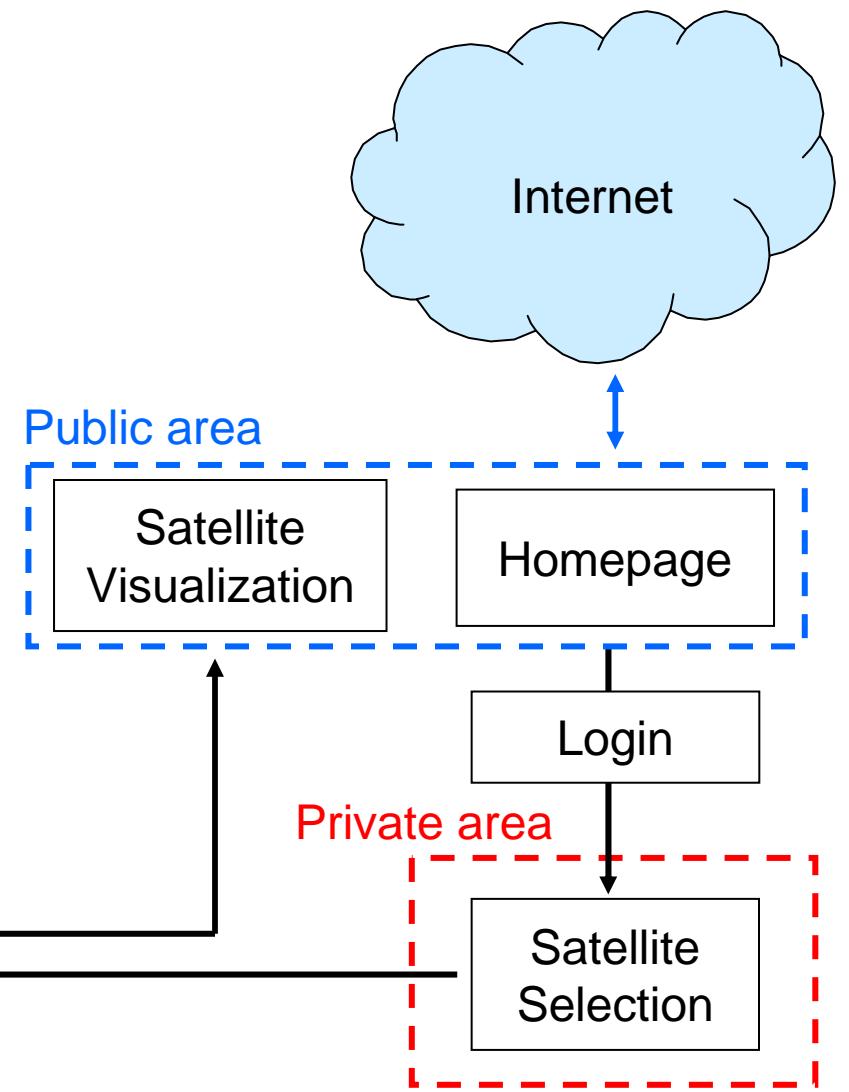
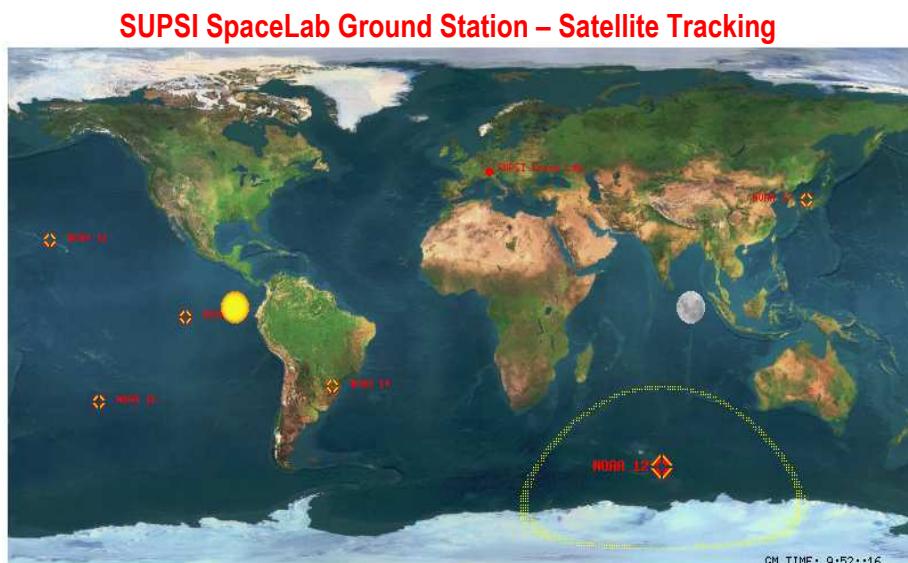
Radio Link  
145.6725  
146.0725

DSP  
Data Decoding

100% done

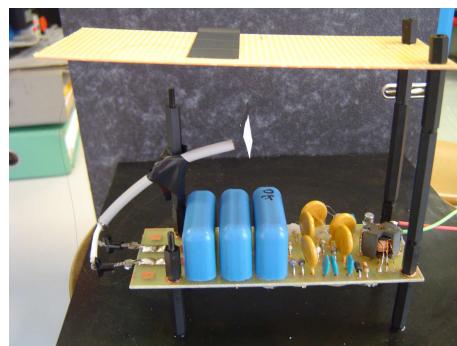


100% done



## SpaceLab

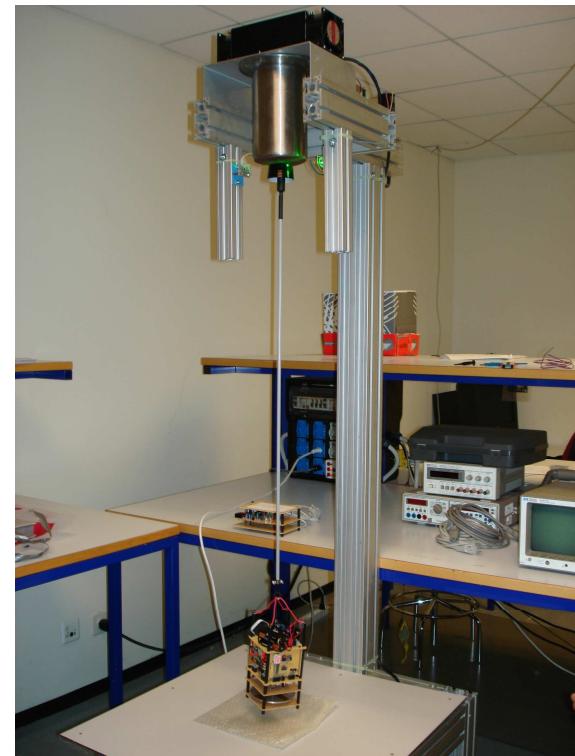
# Mockups and Experiments



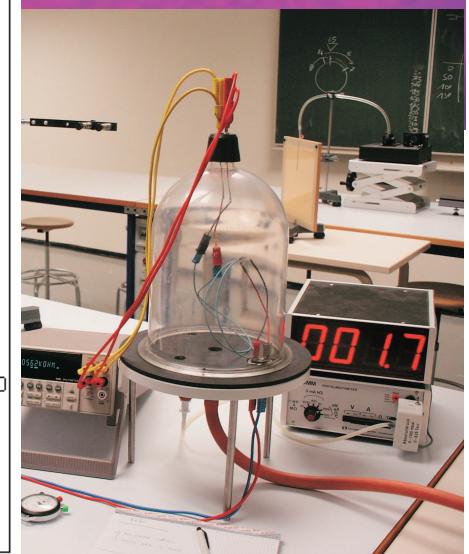
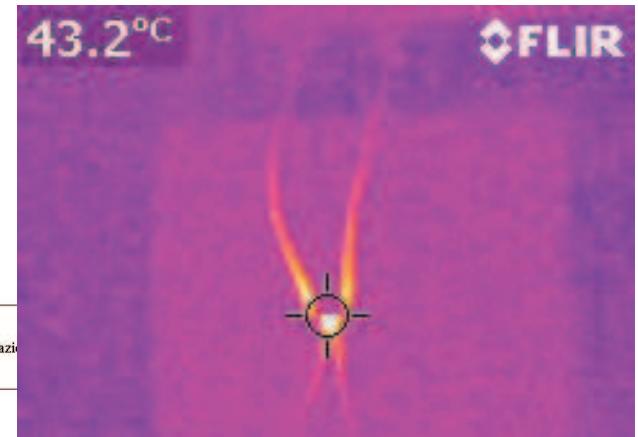
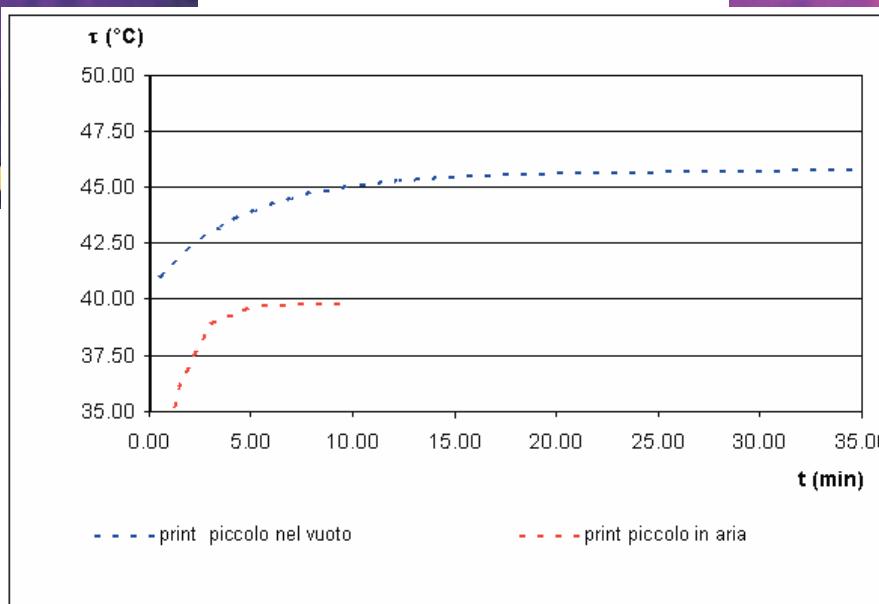
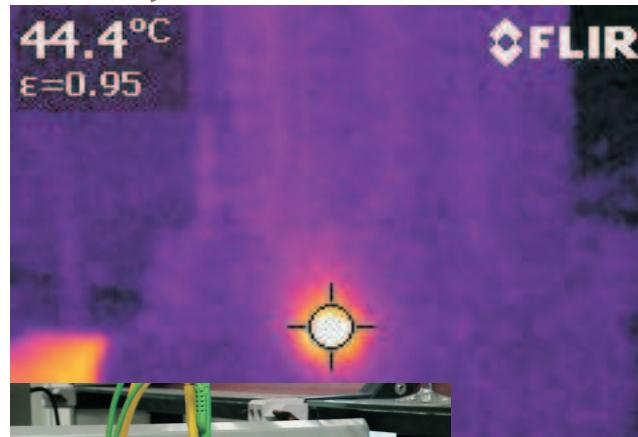
Pulsed Plasma Thruster



Levitron and  
Magnetorquer



Levitron (2kg lift)  
with Momentum Wheel Experiment



For a 700km, circular, polar orbit,  
1 to 6 months mission

- Temperatures on and in the spacecraft: *reliable data?*
- Batteries: *temperature issues?*
- Electronic COTS: *bipolar vs. MOS devices for radiation tolerance?*
- Attitude: *materials for passive control and damping?*
- Composite structures for space: *caveats?*
- “Rock-solid” beacon: *HowTo?*
- Antennas: a *mechanical* issue, more than a *radiation* one?
- An *alternative path to the launcher?* (actually Cal-Poly)

Welcome to

<http://www.spacelab.dti.supsi.ch>

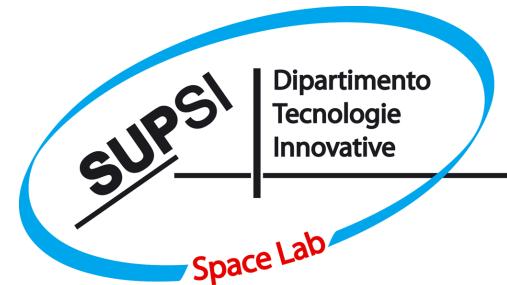
<http://www.spacelab.dti.supsi.ch/forum>

spacelab@dti.supsi.ch

SUPSI

SpaceLab

Knowledgeable Partners Welcome



In Space in partnership with

YOU

*Thank you AMSAT-I*

- **P. Ceppi**, ing. el. dipl. ETHZ; docente DTI
- **A. Graf**, dipl. fisico ETHZ; docente DTI
- **G. Salvadè**, dipl. fisico ETHZ; docente DTI
- **A. Weston**, ing. el. dipl. ETHZ; docente DTI
- **I. Bonesana**, ing. inf. SUPSI
- **S. Puseljic**, ing. el. SUPSI
- **A. Spiga**, ing. inf. SUPSI
- **P. Speranza**, tec. el.
- **L. Tognetti**, tec. el.