esa academy

esa academy

Officially launched in March 2016, the **ESA Academy** brings together existing and new elements of the ESA Education Programs for universities:

- **Hands-on Space Projects**, a continuing programme that enables students to gain first-hand, end-to-end experience of space-related projects.

- **Training and Learning Programme**, a new initiative offering an entirely new set of training courses and learning opportunities.

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Hands-on Space Projects (Experiments):

- REXUS/BEXUS rocket & balloon experiments
- Drop Your Thesis!
- Fly Your Thesis!
- Spin Your Thesis!
- Spin Your Thesis! Human Edition

Hands-on Space Projects (Experiments):

- **REXUS/BEXUS rocket & balloon experiments**

We will talk about this later…

Hands-on Space Projects (Experiments):

- **Drop Your Thesis!**

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Hands-on Space Projects (Experiments):

- **Drop Your Thesis!**

- ESA is looking to sponsor teams of university students from member states who have an **experiment to be operated in microgravity condition**
- The chosen projects will be **tested at the 146m high ZARM Tower Facility,** in Bremen, Germany
- The experiments will experience **microgravity while falling**

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Hands-on Space Projects (Experiments):

- **Drop Your Thesis!**

Get ready to design, build and then drop your experiment!

drop your thesis!

Hands-on Space Projects (Experiments):

- **Fly Your Thesis!**

Hands-on Space Projects (Experiments):

- **Fly Your Thesis!**

- ESA is looking to sponsor teams of university students from member states who have an experiment which would be affected by gravity
- The chosen projects will be flown on a parabolic flight campaign on board the Novespace Airbus 310 Zero-G
- The experiments will experience free fall state of about 22 seconds

Hands-on Space Projects (Experiments):

- **Fly Your Thesis!**

Ready to experience weightlessness condition?

Hands-on Space Projects (Experiments):

- **Spin Your Thesis!**

Hands-on Space Projects (Experiments):

- **Spin Your Thesis!**

- ESA is looking to sponsor teams of university students from member states who want to run an experiment in hyper-gravity condition
- The chosen projects will be tested at ESA's Large Diameter Centrifuge (LDC), housed at ESTEC, The Netherlands
- The experiments will experience a pull up of gravity 20 times larger than usual

Hands-on Space Projects (Experiments):

- **Spin Your Thesis!**

spin your thesis!

Sometimes it is good to get into a spin!

Hands-on Space Projects (Experiments):

- **Spin Your Thesis! Human Edition**

Hands-on Space Projects (Experiments):

- **Spin Your Thesis! Human Edition**

- ESA offers to university students the opportunity to perform non-invasive experiments investigating human physiological response to exercises in simulated 1Gz condition on a centrifuge
- The chosen experiments will be performed on human subjects at DLR's Short Arm Human Centrifuge (SAHC) facility, housed at DLR Institute of Aerospace Medicine

Hands-on Space Projects (Experiments):

- **Spin Your Thesis! Human Edition**

Calls are still OPEN!
Deadline: 29th December

Hands-on Space Projects (Satellite):

- CubeSats - Fly Your Satellite!
- European Student Earth Orbiter

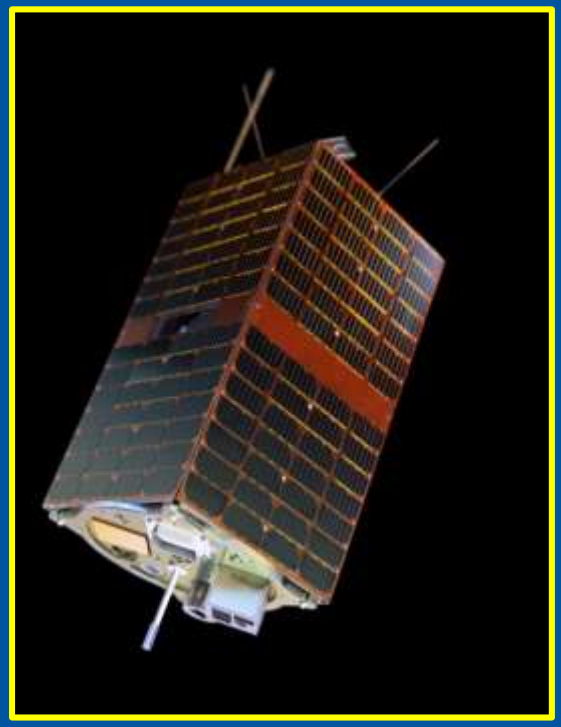
Hands-on Space Projects (Satellite):

- CubeSats - Fly Your Satellite!
- European Student Earth Orbiter

During the Fly Your Satellite! Program university students will be supported throughout the development, integration and testing of their own small satellites

Hands-on Space Projects (Satellite):

- CubeSats - Fly Your Satellite!
- European Student Earth Orbiter



The European Student Earth Orbiter (ESEO) is a microsatellite mission that will take pictures, measurements and test technology for future education satellite missions

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Training and Learning Programme:

- **CubeSats Concurrent Engineering Workshop (16-19 January 2018)**
- Deadline: 4 December 2017, 23:59 CET

- **Concurrent Engineering Workshop (20-23 February 2018)**
- Deadline: 5 January 2018, 23:59 CET

- **CubeSats Hands-on Training Week (26 February - 2 March 2018)**
- Deadline: 8 January 2018, 23:59 CET

- **Gravity-Related Experiments Training Week (15-18 January 2018)**
- Deadline: To be delivered

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Hands-on Space Projects (Experiments):

- **REXUS/BEXUS rocket & balloon experiments**

REXUS - Rocket EXperiments for University Students

- SNSB/DLR/ESA offer opportunities for student experiments to be **flown on sounding rockets**
- Around **two minutes of reduced gravity** can be obtained if the rocket is despun

Hands-on Space Projects (Experiments):

- **REXUS/BEXUS rocket & balloon experiments**

BEXUS - Balloon EXperiments for University Students

- SNSB/DLR/ESA offer opportunities for student experiments to be **flown on stratospheric balloons**
- The maximum high is around **25km** and the flight duration is **2-5 hours**

STRATONAV

STRATOspheric NAVigation experiment

RYMDSTYRELSEN Swedish National Space Board

DLR

esa

SSC

ZARM

MORABA MOBILE RAKETENBASIS

EuroLaunch

REXUS/BEXUS PROGRAMME

REXUS/BEXUS – Rocket and Balloon Experiments for University Students

The call for proposals is open until the 17th October.

HOW TO APPLY

The REXUS/BEXUS programme allows students from universities and higher education colleges across Europe to carry out scientific and technological experiments on research rockets and balloons. Each year, two rockets and two balloons are launched, carrying up to 20 experiments designed and built by student teams.

REXUS

REXUS – Rocket EXperiments for University Students – is an annual sounding rocket programme.
Read more

BEXUS

BEXUS – Balloon EXperiments for University Students – is an annual stratospheric research balloon programme.
Read more

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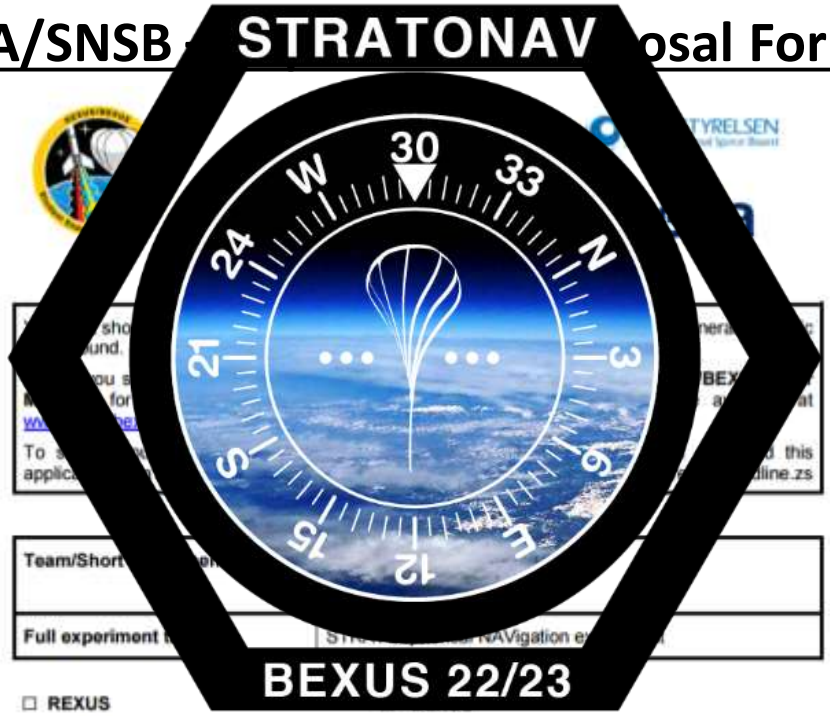
BEXUS 22/23

REXUS/BEXUS PROGRAMME

HOW TO APPLY

- **ESA/SNSB STRATONAV osal Form**



STRATONAV
BEXUS 22/23

HOW EVERYTHING STARTED

Invitation to Selection Workshop - 1 to 3 December 2015 - STRATONAV team

rexus-bexus@esa.int
a me

05/11/15

inglese › italiano Traduci messaggio Disattiva per: inglese

Dear STRATONAV team,

We are happy to inform you that your experiment proposal has been short-listed!

We would like to invite you to present your project in more detail at the SNSB/ESA Selection Workshop between Tuesday 01 December and Thursday 03 December 2015 at ESA's Space Research and Technology Centre (ESTEC) in Noordwijk, The Netherlands. ESA will sponsor the travel and accommodation costs of up to four members of your team, provided that they meet the eligibility criteria outlined in the attached document. Other members of your team can attend the event using alternative funding **after confirmation** from ESA Education Office. Please also ensure that all contributing team members have now registered, updated or completed their profile on the ESA Education Projects database: http://joinspace.esa.int

We would also like to give additional specific feedback (see attachment) on your initial proposal which should now be **updated and delivered via email before the 16th of November 2015.** Please submit additionally to the new version (add v2 in filename) a version where you highlight the changes from the initial proposal (name v2_highlighted). The first version will be distributed to panel member who did not read you first proposal, while the highlighted version will be for panel members who already know your proposal.

The programme of the workshop will begin at 13:30 on Tuesday 01 December and finish around 16:00 on Thursday 03 December, so we suggest that you plan to arrive on Tuesday morning and depart on Thursday evening (if that is not possible please contact us before booking your flight). You will be responsible for making your own travel arrangements, but ESA will make the hotel reservation for you. We will also provide the sponsored students with buses between the hotel and ESTEC, and to the airport on Thursday. More information about how to reach ESTEC is available at: http://www.esa.int/esaMI/ESTEC/SEMBAJ6K56G_0.html

The final decision on whether your experiment will be selected for participation in the REXUS/BEXUS programme should be made within two weeks of the workshop.

In the coming days, we will send you further information about the workshop, including the programme, hotel information and what is expected in your presentation. Please confirm **by 16th of November 2015** the participating team members to rexus-bexus@esa.int by filling in and sending us the attached excel sheet.

STRATONAV

BEXUS 22/23

BEXUS SELECTION WORKSHOP

STRATONAV

BEXUS 22/23

BEXUS SELECTION WORKSHOP

BEXUS SELECTION WORKSHOP

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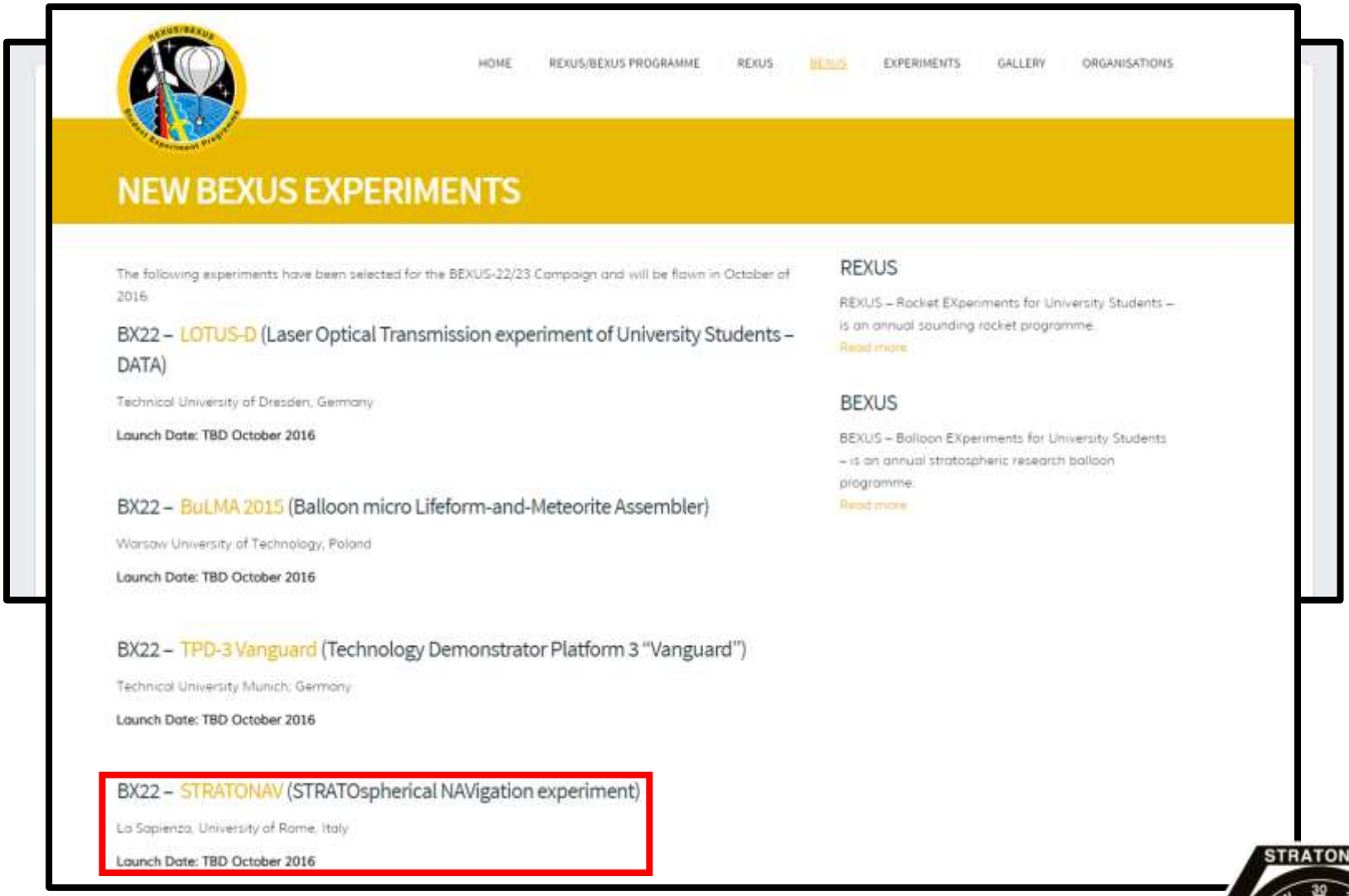
STRATONAV SELECTION



HOME REXUS/BEXUS PROGRAMME REXUS BEXUS EXPERIMENTS GALLERY ORGANISATIONS

NEW BEXUS EXPERIMENTS

The following experiments have been selected for the BEXUS-22/23 Campaign and will be flown in October of 2016:

BX22 – LOTUS-D (Laser Optical Transmission experiment of University Students – DATA)

Technical University of Dresden, Germany

Launch Date: TBD October 2016

BX22 – BuLMA 2015 (Balloon micro Lifeform-and-Meteorite Assembler)

Warsaw University of Technology, Poland

Launch Date: TBD October 2016

BX22 – TPD-3 Vanguard (Technology Demonstrator Platform 3 "Vanguard")

Technical University Munich, Germany

Launch Date: TBD October 2016

BX22 – STRATONAV (STRATOspherical NAVigation experiment)

La Sapienza, University of Rome, Italy

Launch Date: TBD October 2016

REXUS

REXUS – Rocket EXperiments for University Students – is an annual sounding rocket programme.

Read more

BEXUS

BEXUS – Balloon EXperiments for University Students – is an annual stratospheric research balloon programme.

Read more

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BEXUS 22/23

STUDENT TRAINING WEEK

PRELIMINARY DESIGN REVIEW

STRATONAV

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STUDENT TRAINING WEEK

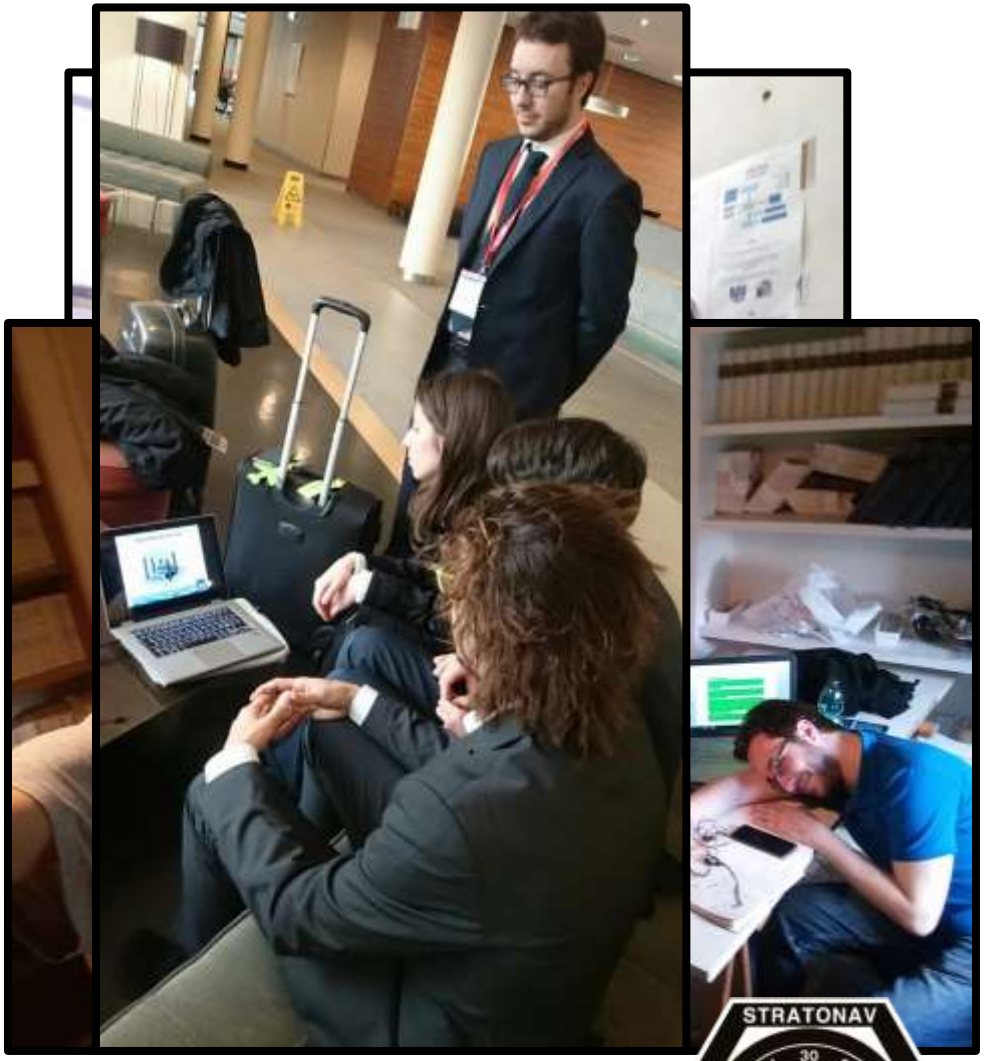
STRATONAV

BEXUS 22/23

CRITICAL DESIGN REVIEW

PREPARATION:

- **Components procurement**
- **Components testing**
- **Documentation refinement**
- **CDR presentation preparation and review**



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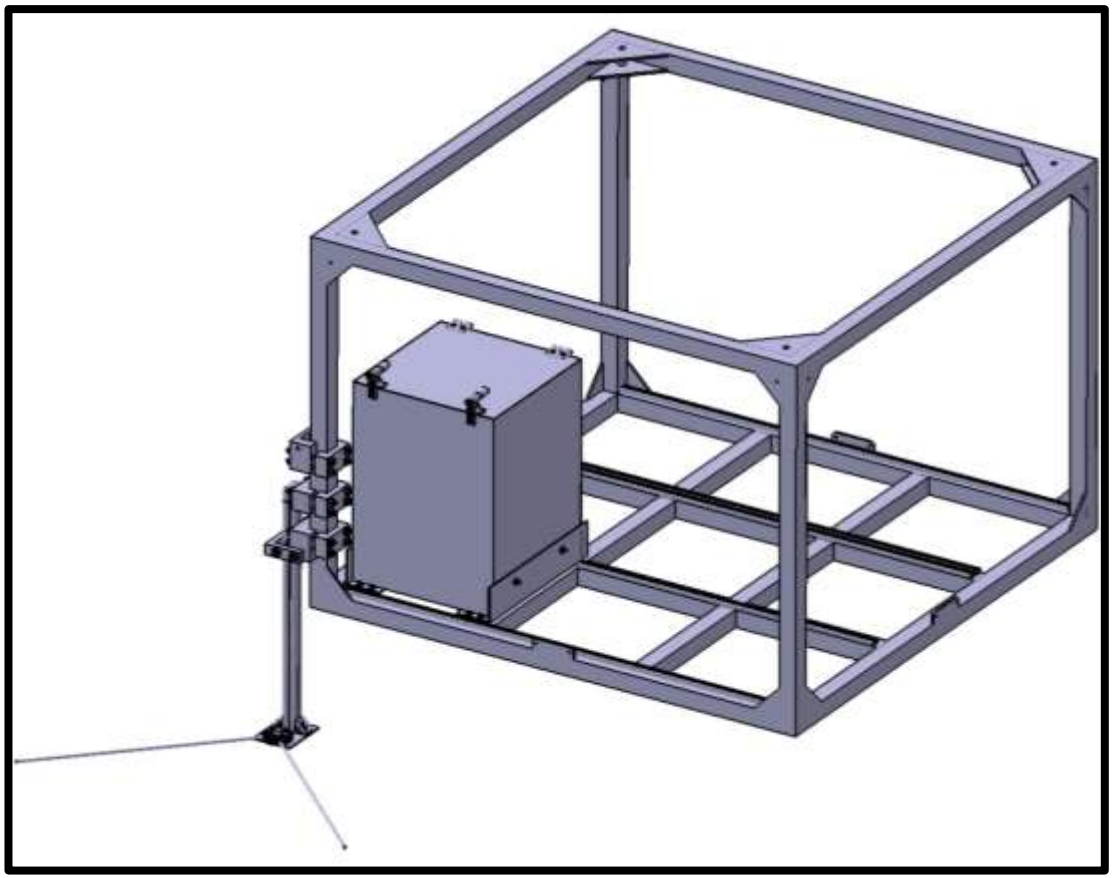
BEXUS 22/23

CRITICAL DESIGN REVIEW

BEXUS 22/23 Soldering Course:

CRITICAL DESIGN REVIEW

EXPERIMENT DEVELOPMENT



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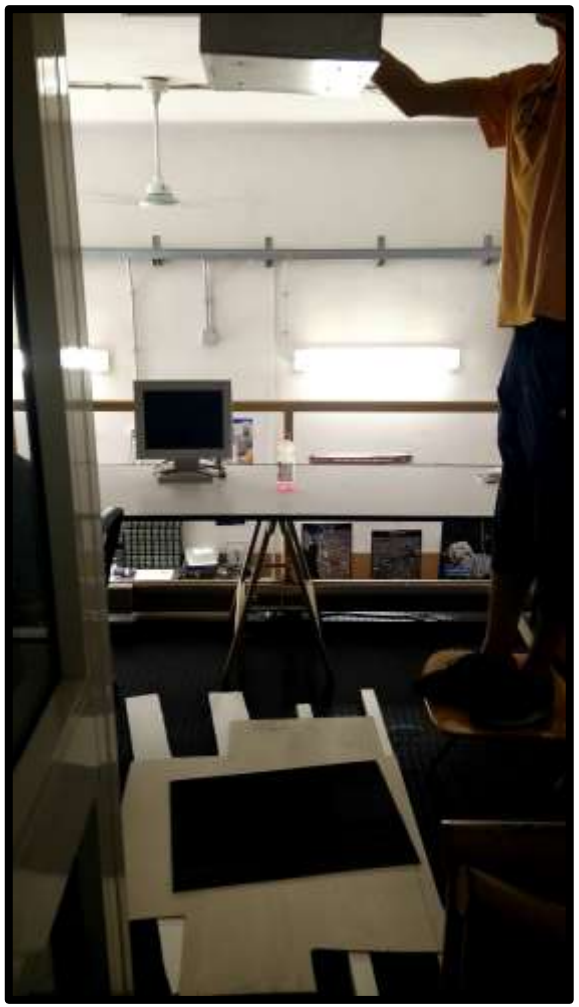
EXPERIMENT DEVELOPMENT

STRATONAV

BEXUS 22/23

EXPERIMENT DEVELOPMENT



SHOCK TEST

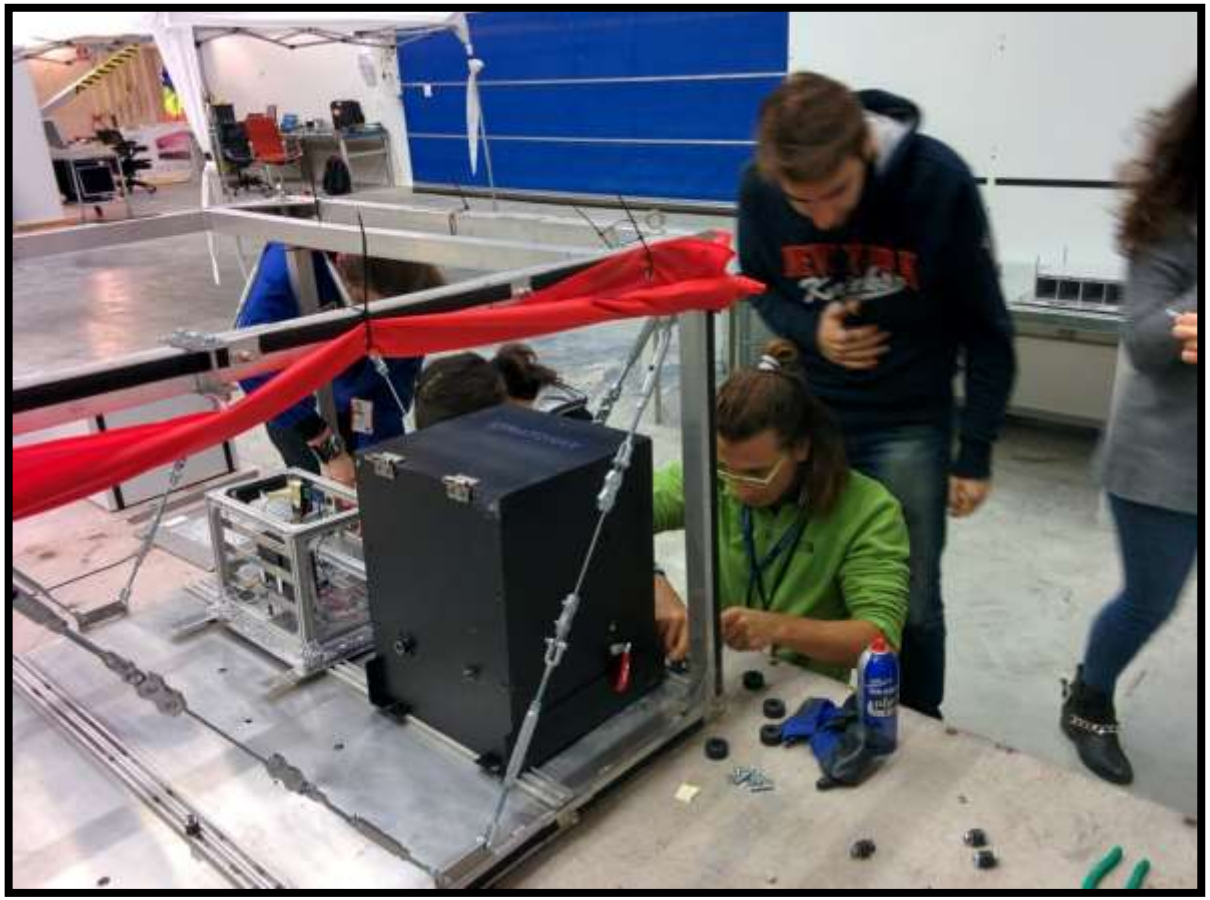
STRATONAV

BEXUS 22/23

LAUNCH CAMPAIGN

OCTOBER 2016

EXPERIMENT ASSEMBLY



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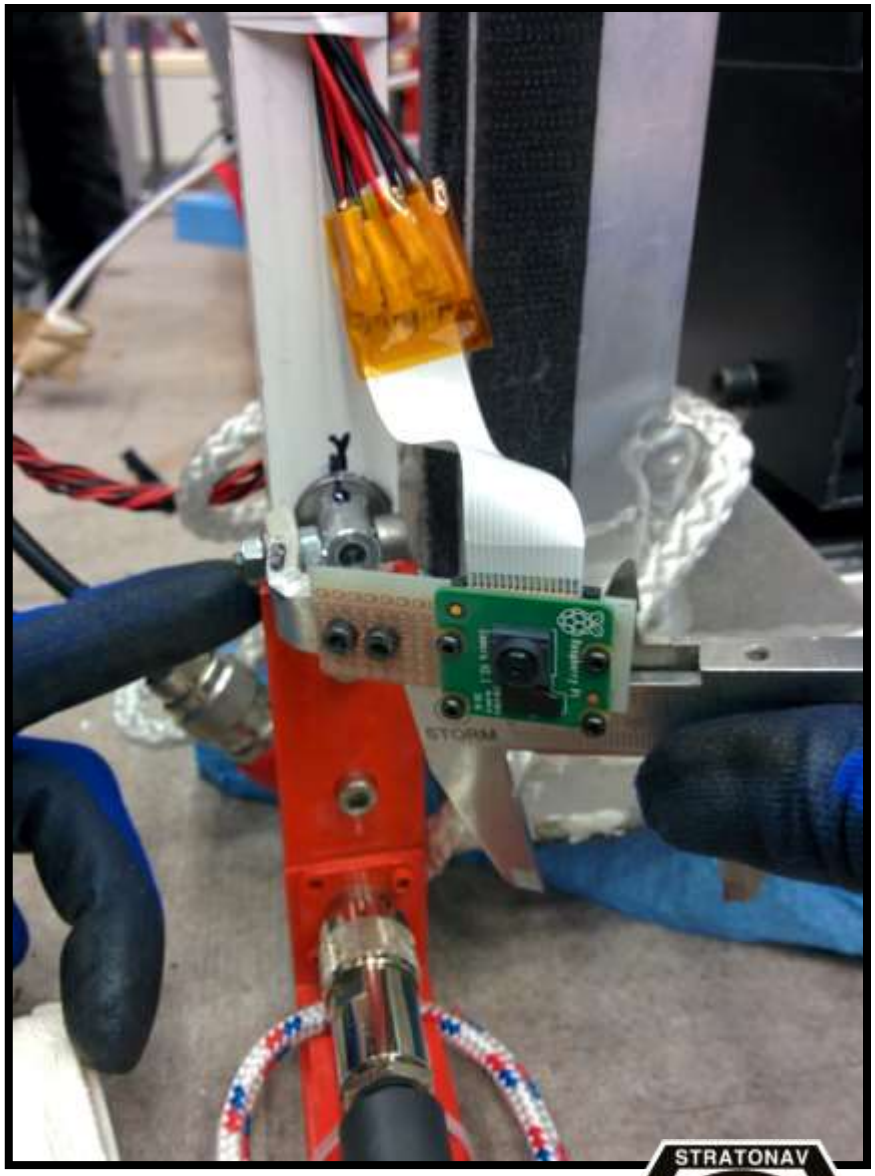
BEXUS 22/23



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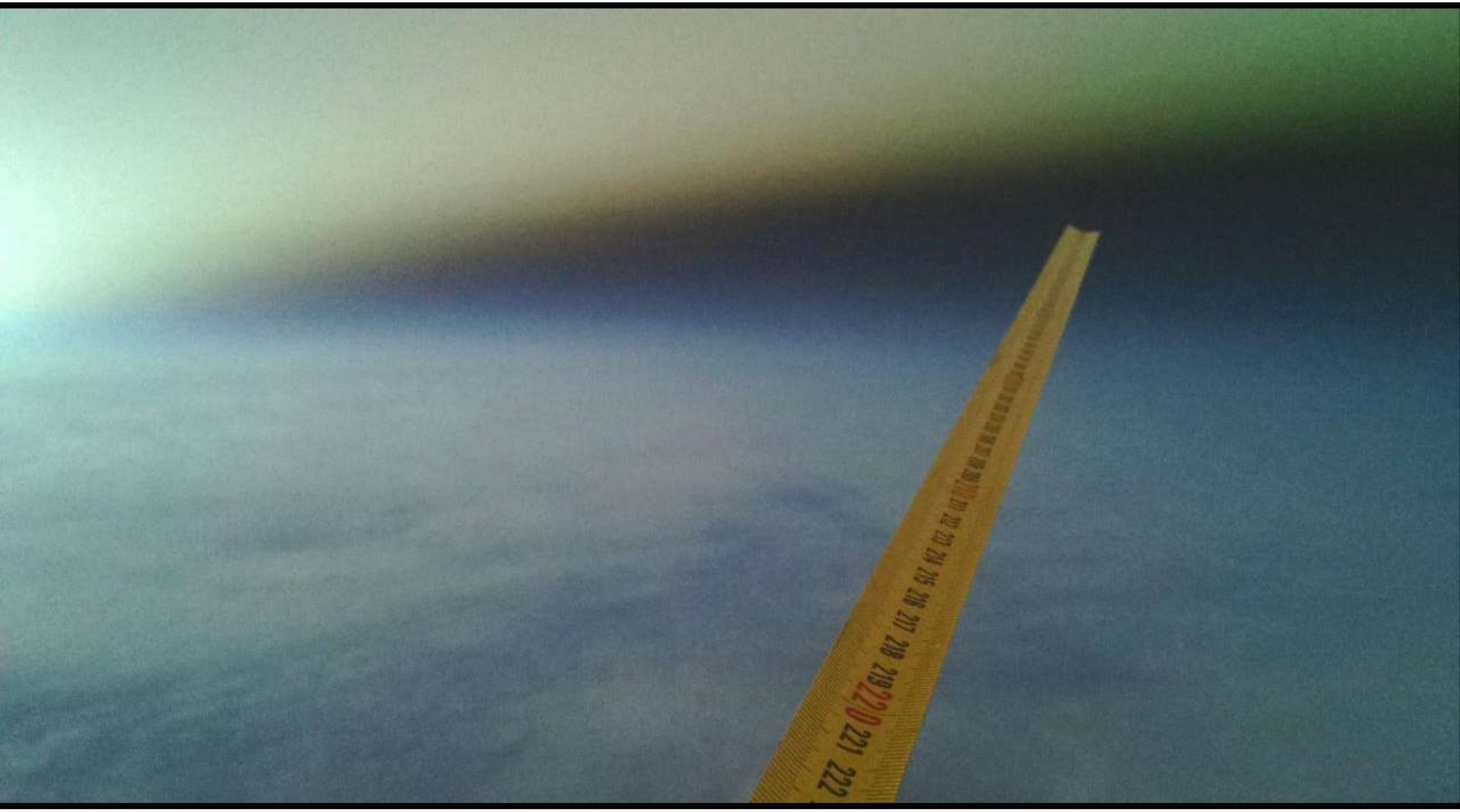
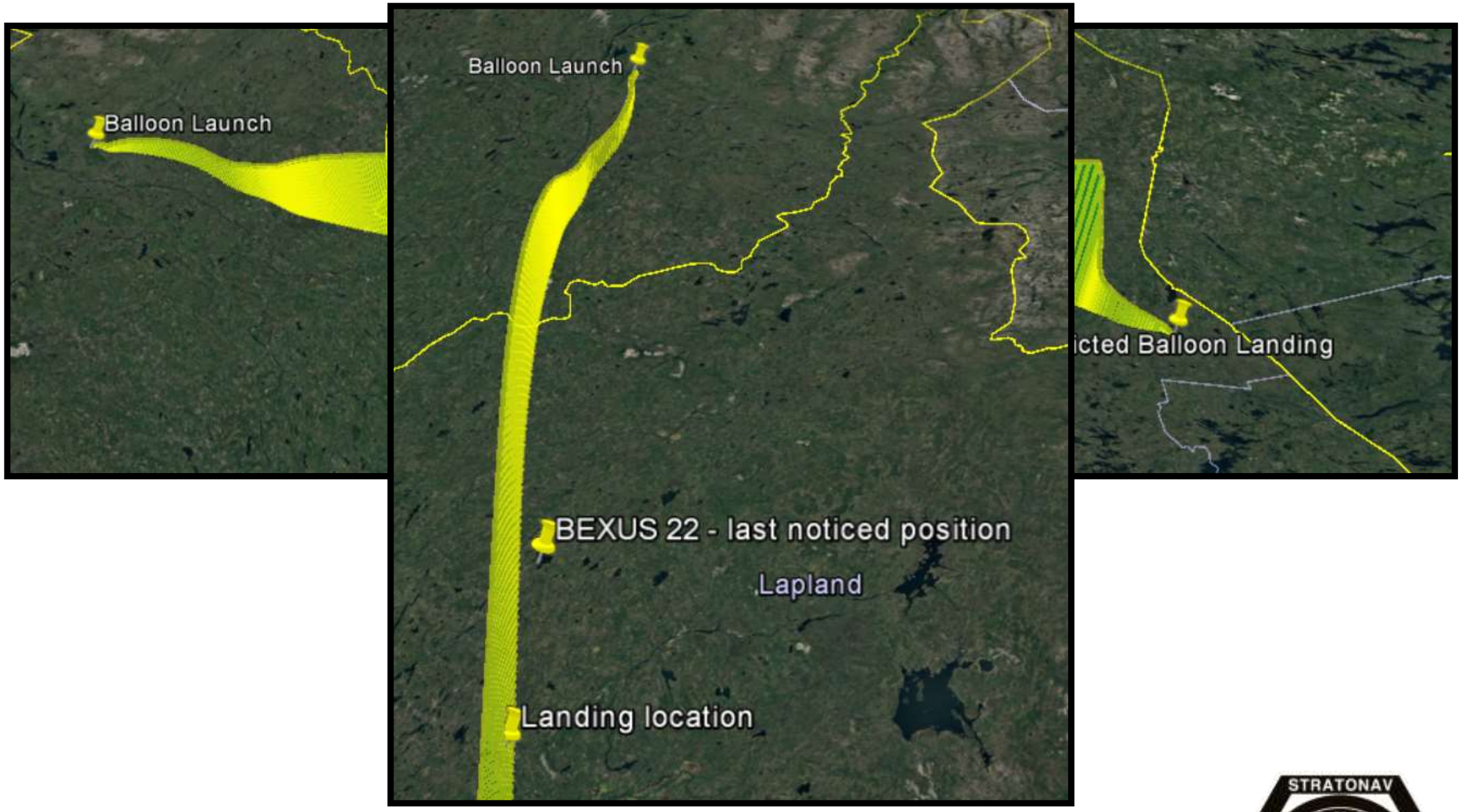
BEXUS 22/23



STRATONAV

BEXUS 22/23

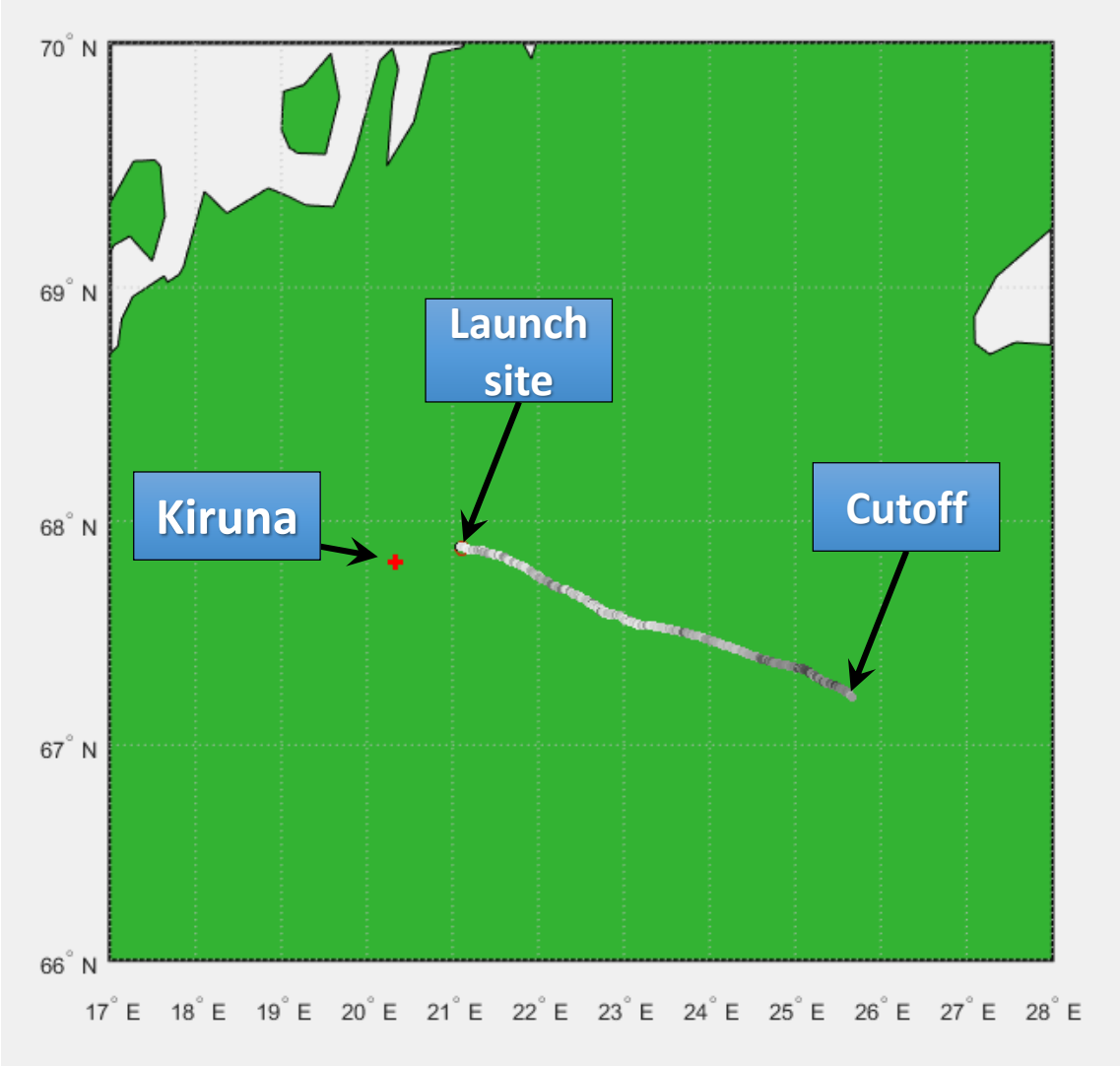
Simulated BEXUS 22 flight path



STRATONAV

BEXUS 22/23

Signal strength



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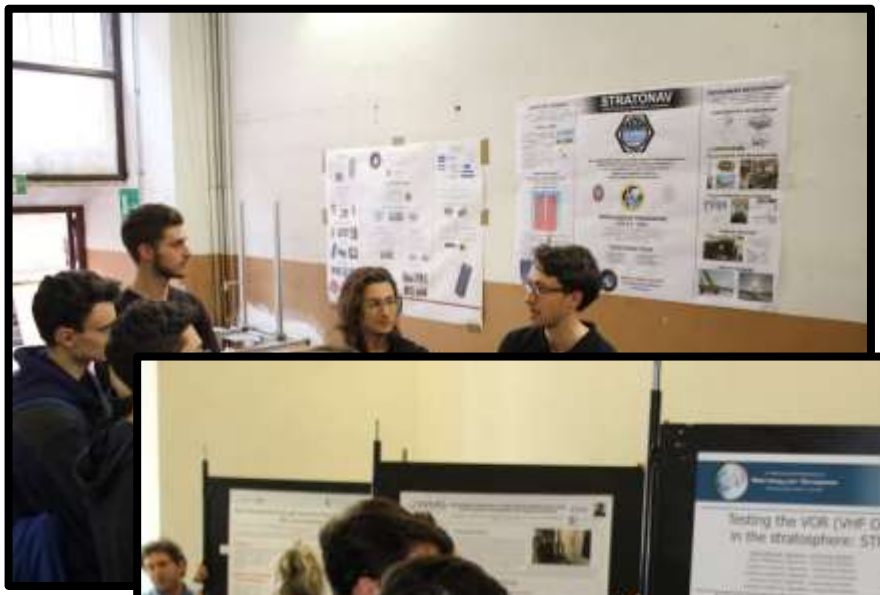
BEXUS 22/23

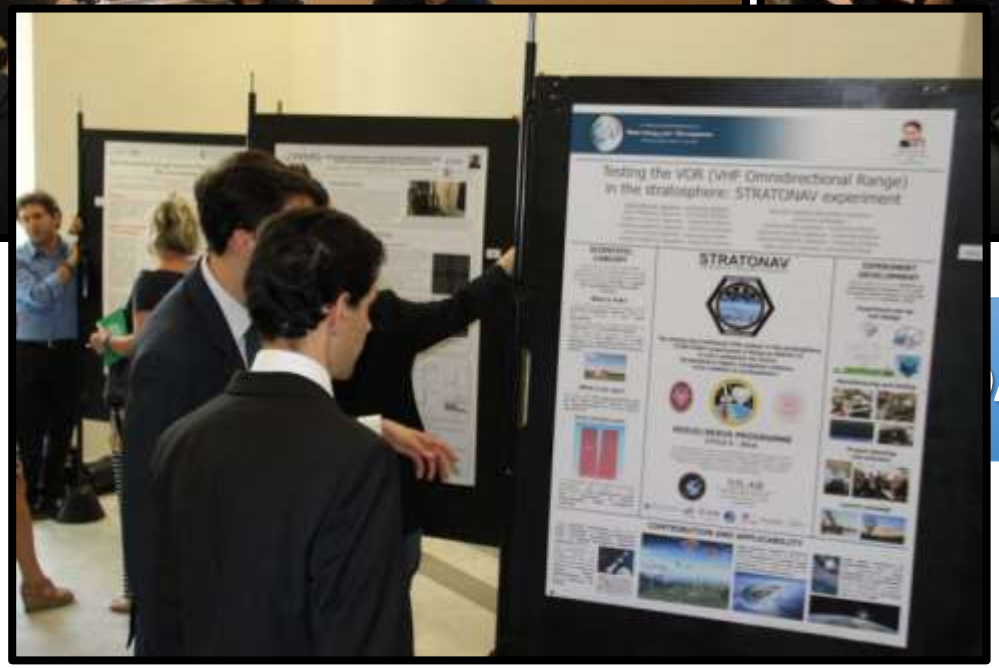
WHAT MAKES A SUCCESSFUL PROJECT?

PROJECT OUTREACH: VISIBILITY

Facebook page

PROJECT OUTREACH: SHARING





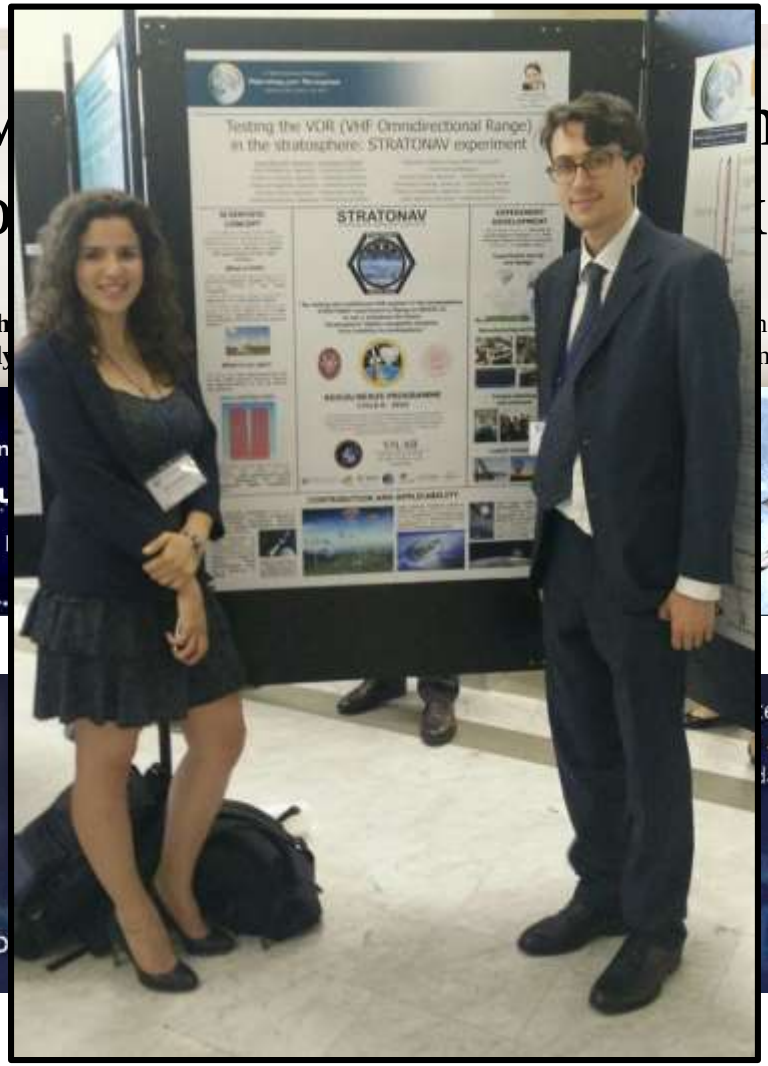
ATTENDANCE AT INTERNATIONAL WORKSHOPS

STRATONAV
BEXUS 22/23

PROJECT OUTREACH: IMPACT

Testing the V… …nal Range) in the strato… …periment

***Abstract* — The stratosphere is th… …e aircraft radial by measuring the phase atmosphere where aircraft can still fly… …nd directional sine waves, acquiring the



3rd IEEE In… Metrolog… Florence, …

…ember - 30th 2016 …dalajara, Mexico

IAC 2016 Guadalajara

SCT AEM AGENCIA ESPACIAL MEXICANA

STRATONAV BEXUS 22/23


STRATONAV
BEXUS 22/23

Hands-on Space Projects (Satellite):

- **CubeSats - Fly Your Satellite!**
- **European Student Earth Orbiter**


LEDSAT
LEDSAT
STVDIVM VRBIS
THE UNIVERSITY OF MICHIGAN
1817
u b
UNIVERSITÄT BERN
asi
agenzia spaziale italiana
INFN
SCF_Lab

Presentation of LEDSAT Feasibility Study

esa academy

New opportunity to Fly Your Satellite!

20 December 2016

Noordwijk, 05/04/2017

Subject: "Fly Your Satellite!" Selection Results

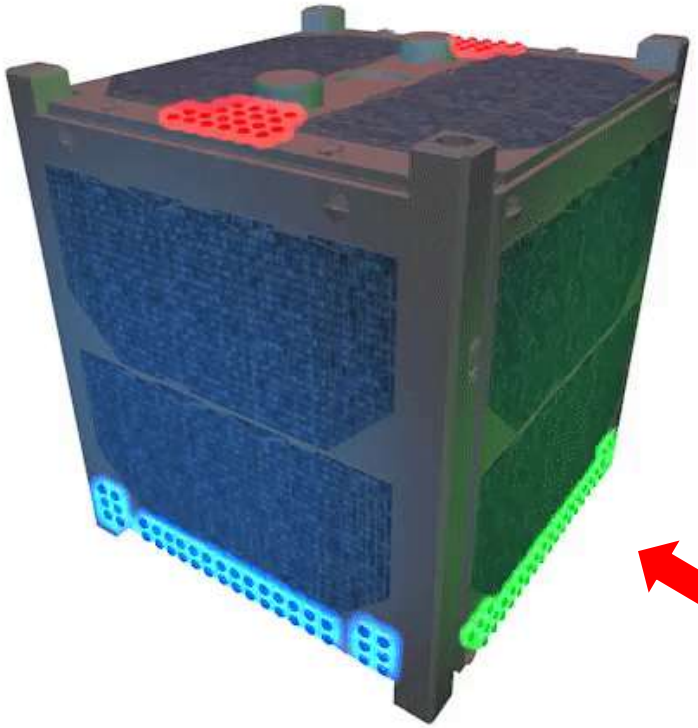
Dear LEDSAT team,

Following your application to the Fly Your Satellite! programme, and the subsequent evaluation by the CubeSat Evaluation Panel, the ESA Fly Your Satellite! team is delighted to inform you that you are invited to participate in the Selection Workshop of the Fly Your Satellite! programme. Upon conclusion of the Selection Workshop ESA will take the final decision on the teams that will be selected for the participation in the new edition of the Fly Your Satellite! programme.


LEDSAT
ESA Fly your satellite!
Selection Workshop
ESA/ESTEC
Netherlands

MISSION CONCEPT

1U CubeSat equipped with a LED-based payload



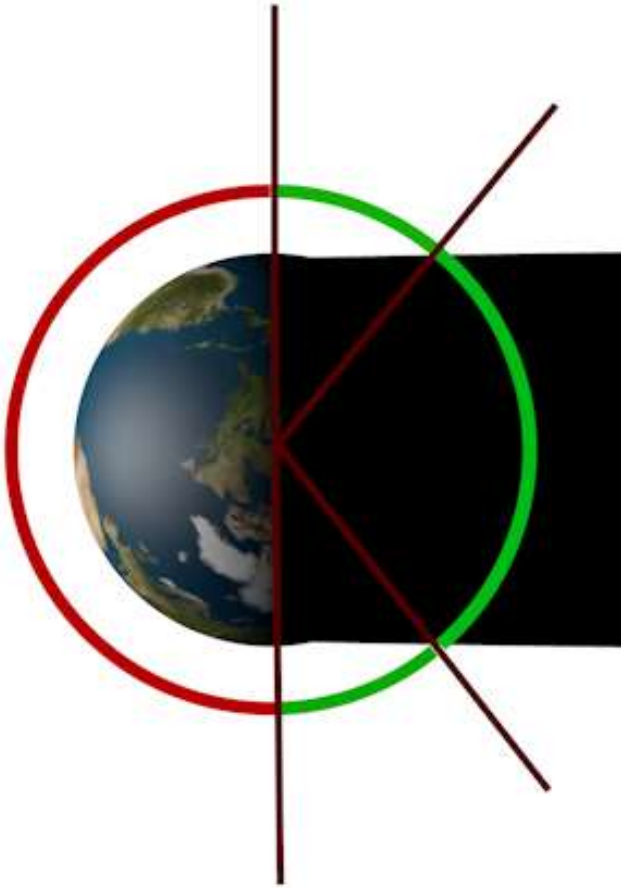
On-board LEDs: 3 colours (RGB) for each pair of opposite faces

MISSION CONCEPT

1U CubeSat equipped with a LED-based payload

Active illumination on the spacecraft

- Visibility even when the satellite is in eclipse
- Possibility to distinguish spacecraft soon after their deployment (multi-satellite launches)



LEDSAT

NOMINAL MODE

Using the LEDs for orbit determination

Determine orbit using optical observations → Information about the real orbit from GPS, NORAD or laser ranging → Comparison between the gathered data to validate the proposed technique

Example with LEDs flashing Morse for R, B and G on the different faces

LEDSAT

EXPERIMENTAL MODE

1. Using the LEDs to get information about the attitude

Tool for attitude determination based on optical measurements already available

- **Comparison between the virtual model and the measurements**
- **Minimization of a cost function to obtain attitude information**

Simultaneous observations by using different color filters help discriminating the different faces

Estimated attitude is compared with on-board data

LEDSAT

EXPERIMENTAL MODE

2. LED-based back-up optical communication method

Transmission of housekeeping or dummy data by flashing one face

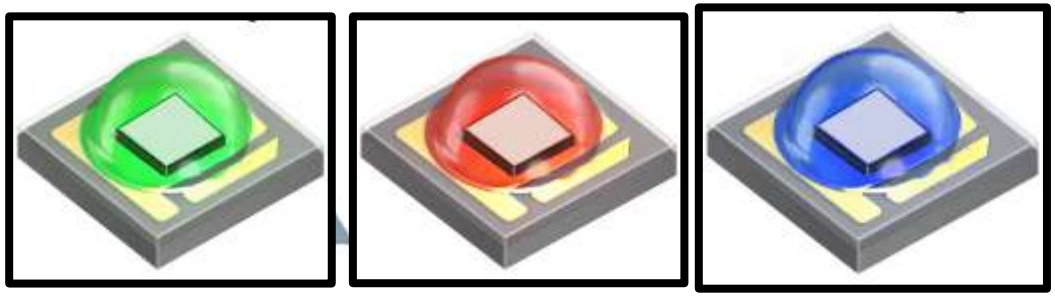
- Light-streak Method
- Telescope Tracking Method

→ Example transmission with the Manchester coding

LEDSAT

PAYLOAD: LEDs

OSLON SIGNAL 120 Series



Colour	GREEN	RED	BLUE
Wavelength at peak emission [nm]	503	632	472
Dominant wavelength [nm]	503	625	475
Luminous intensity [cd]	39.9	34.5	16
Number of LEDs (per face)	30	40	30

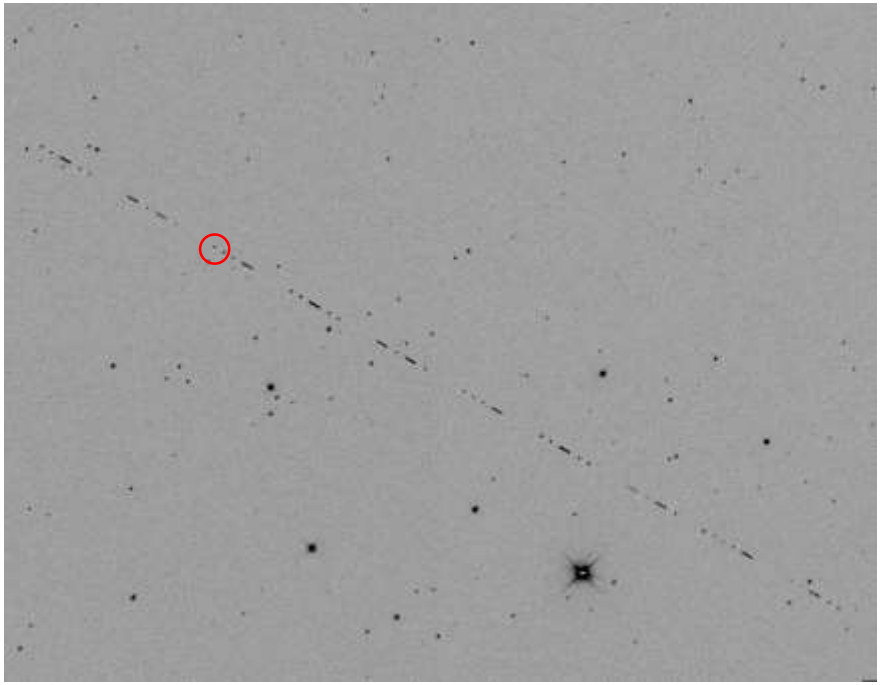
MAIN CONFIGURATION DRIVERS

- Quantum Efficiency
- Power Budget
- Geometry and Weight

LEDSAT

ORBIT DETERMINATION

Method	Angular Resolution	Ranging Precision	Weather Dependence	Limitations
Passive Optical Tracking: sidereal tracking	Poor (if long streak)	N/A	High (clouds)	Twilight
Active Optical Tracking: LEDSAT	1 arc-sec (if dots)	N/A	High (clouds)	In Earth shadow

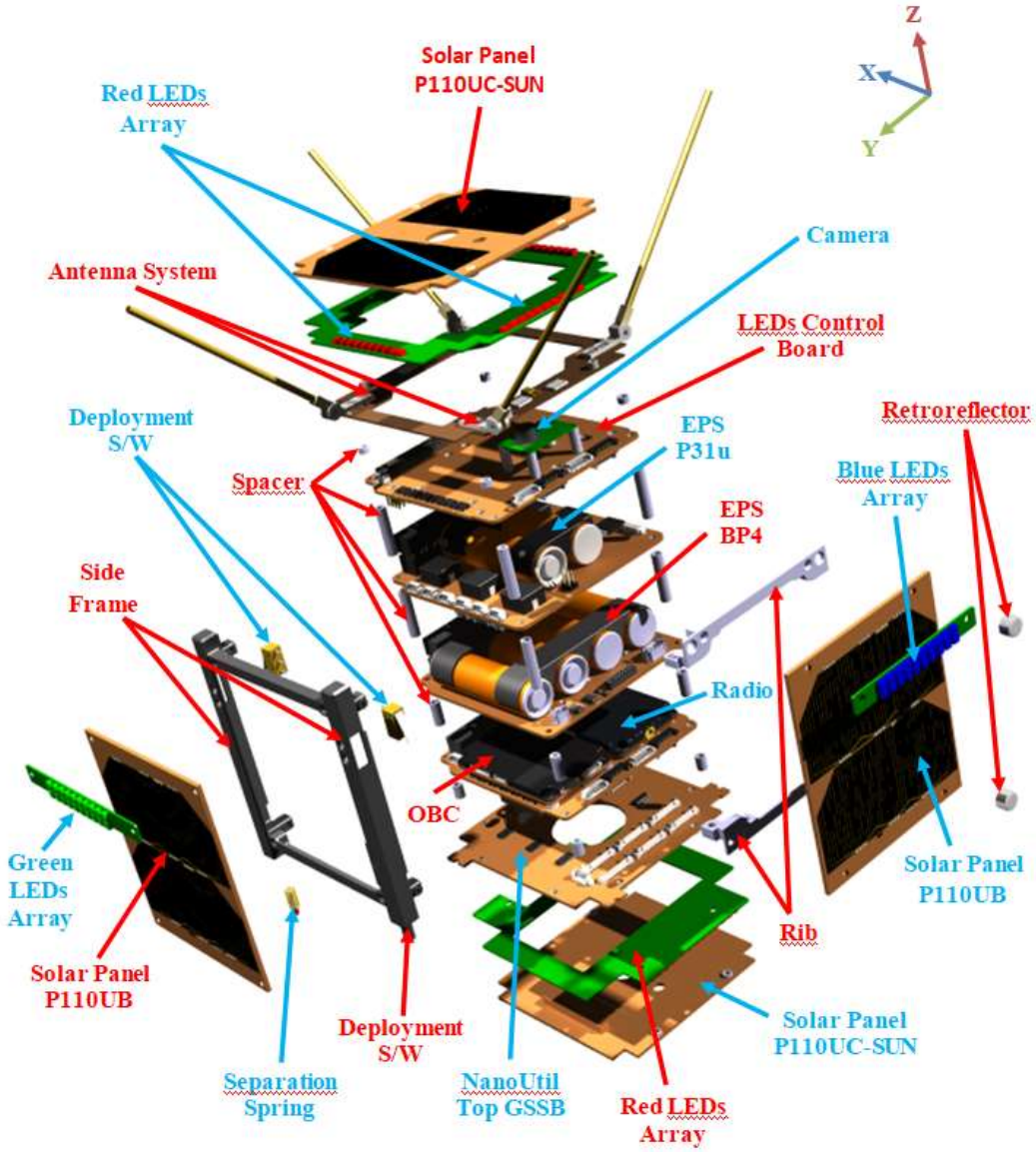


- Exposure time: 5s
- The longer the streak, the harder it is to get a good centroid
- Flashes of about 12ms will appear similar to stars

Highest angular resolution

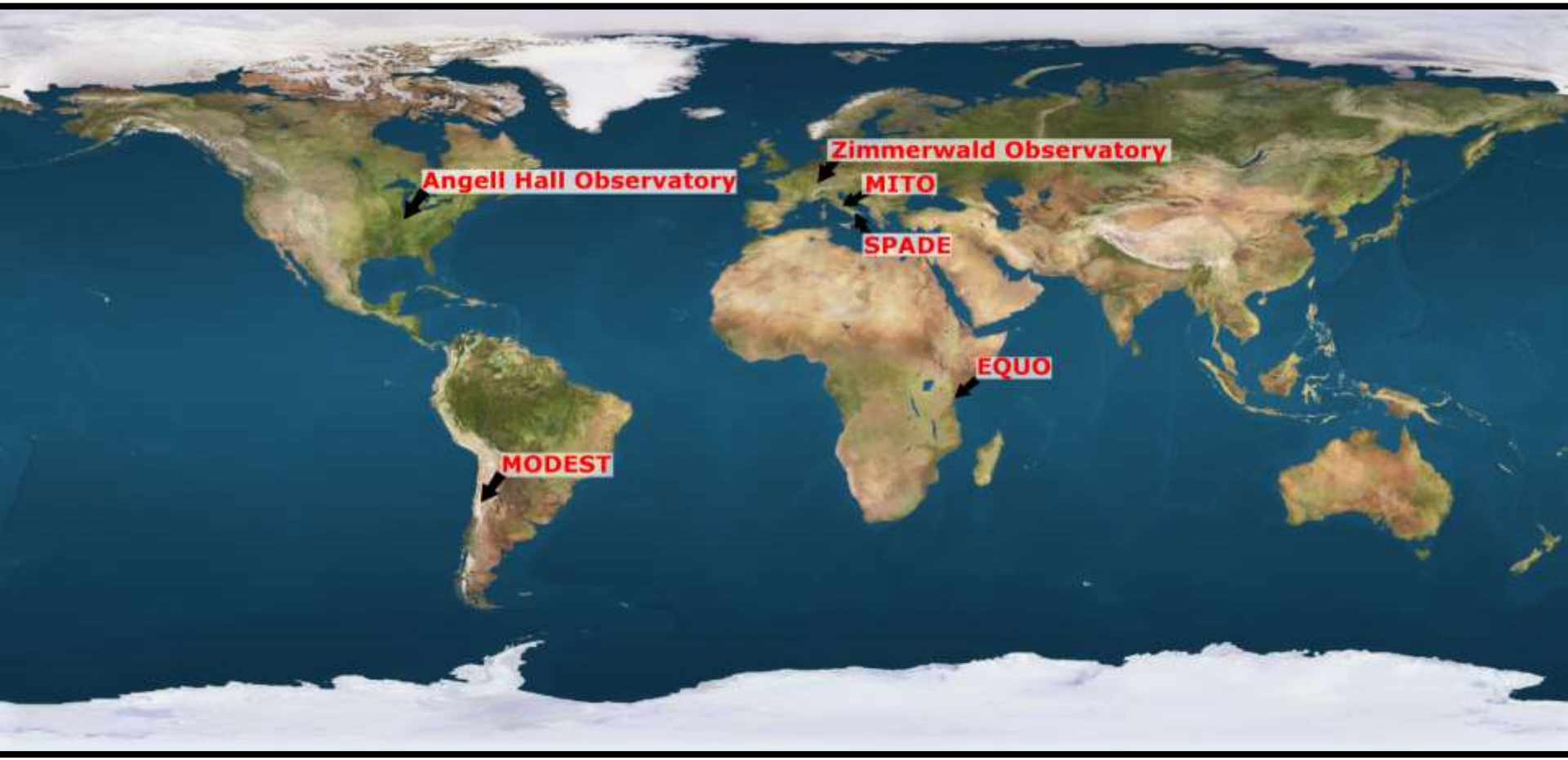
LEDSAT

CUBESAT BUS



1U CubeSat STANDARD

GROUND SEGMENT



- **Optical GS Network (6 Ground Stations)**
- **Laser Ranging GS Network (2 Ground Stations)**
- **RF GS Network (3 Ground Stations)**

LEDSAT

OUTREACH

7TH EUROPEAN CONFERENCE ON SPACE DEBRIS

esa

LEDSAT: Design of a Cubesat equipped with LEDs as Calibration Target

***Abstract* — The increasing number of small satellite cluster launches (i.e. CubeSats) leads to a greater risk of their confusion and collision after deployment. This encourages the states all over related to the issues of man-made and natural debris in space, is currently promoting observations for the characterization of orbital debris by using spectro-photometrical and light-curve**

Presentation at the 35th Inter-Agency Space Debris Coordination Committee (IADC) Annual Meeting in Darmstadt (April 2017)

INTERNATIONAL ASTRONAUTICAL CONGRESS 2017

ADELAIDE, AUSTRALIA • 25-29 SEPTEMBER 2017

68TH IAC ADELAIDE 2017

Unlocking imagination, fostering innovation and strengthening security.

3 accepted papers about LEDSAT!

LEDSAT

LEDSAT

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What are you waiting for?
Hurry up and join the ESA Academy program!