



САМАРСКИЙ УНИВЕРСИТЕТ
SAMARA UNIVERSITY

International Summer Space School: past, present, future

Prof. Dr. Igor Belokonov
The Head of School

Samara University, August 30, 2021



Motto: Space experiments on board microgravitational space platforms FOTON family

- **1. THE BEGINNING OF SPACE SCHOOL ACTIVITY (2003, 2004)**
Russian-European Summer Space School – project YES2
- **2. FIRST RESULTS OF SPACE SCHOOLS: IMPROVEMENT OF NAVIGATIONAL TECHNOLOGY IN 2005 ON FOTON-M2**
- **3. SPACE SCHOOLS OF 2006-2007: IMPLEMENTATION AND THE ANALYSIS OF RESULTS OF PROJECT YES2**





1. THE BEGINNING OF SPACE SCHOOL ACTIVITY (2003, 2004)

First Space School (2003)

The main goals:

- studying of characteristics and capabilities of the Russian scientific space vehicles of type the “Foton/Bion”,
- familiarization with the perspective youth project of European Space Agency “The Second Young Engineers' Satellite ” (YES2),
- familiarization with the Samara University space experiments program,
- theoretical problems of tether deployment,
- motion dynamics, aero-, termo-dynamics of ultra-light recoverable capsule





The First Russian – European summer space school “Future space technologies and experiments in space” (2003)

University of Modena e Reggio Emilia
(Reggio Emilia, Italy)

Universita di Roma "La Sapienza" (Roma, Italy)

University of Bologna (Bologna, Italy)

ENSICA (Toulouse, France)

Universidad de Valladolid (Valladolid, Spain)

Universidad Politecnica de Madrid (Madrid, Spain)

UPM Avda (Madrid, Spain)

Crandfield University (Crandfield, Great Britain)

Oulu University (Oulu, Finland)

Moscow State University (Russia)

Moscow State Technical University (Russia)

Scientific-Research Institute Physical Measurements (Russia)

Samara State Aerospace University (Russia)





The results of first Space School

- The decision of Samara University to take part in the project YES2,
- Creating an international team (foreign and Russian students) for study the YES2 international project with the purpose of its implementation on microgravitational space platform "Foton-M3" (the experiment was realized in 2007),
- The decision of carrying out auxiliary experiments in flight of MSP "Foton-M2" for improvement of some critical technologies of project YES2 (it was realized in 2005),
- Publishing of Proceedings of Space School as an ESA official publication





The Second Russian – European summer space school “Future space technologies and experiments in space” (2004)

The main goals:

- teamwork above project YES2,
- realization of experiments and the simulations directed on improvement of basic engineering solutions of the project YES2
- studying of a capability of YES2 implementation on MSP "Foton-M3",
- establish of Samara Center of Expertise for YES2 project,
- preparing auxiliary navigating experiments on MSP “Foton-M2” for improvement YES2 critical technologies





The Second Russian – European summer space school “Future space technologies and experiments in space” (2004)

Universidad de Valladolid (Valladolid, Spain)
University of Patras (Patras, Greece)
Politecnico di Milano (Italy)
University of Padua (Padova, Italy)
University of Modena e Reggio Emilia
(Reggio Emilia, Italy)
Technische Universitat Dresden (Germany)
University of Kent (United Kingdom)
Lulea University of Technology (Sweden)
Delta-Utec SRC (Leiden, The Netherlands)
Izhevsk Radio Plant (Russia)
Scientific-Research Institute Physical
Measurements (Russia)
Samara State Aerospace University (Russia)



ESA delegation



Martin Zell, Head of Utilization Department, Directorate of Human Spaceflight
Deter Isakeit, Head of Erasmus User Center and Communication Office
Werner Riesselmann, Head of Microgravity Payloads Division



The Second Russian – European summer space school “Future space technologies and experiments in space” (2004)





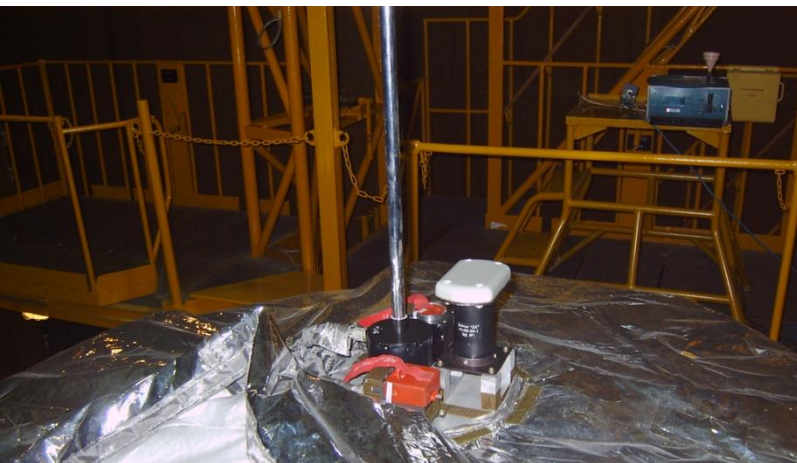
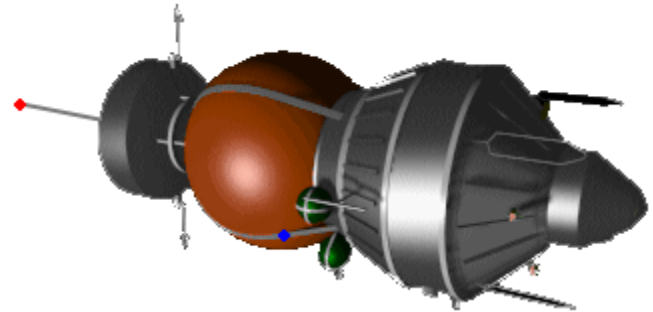
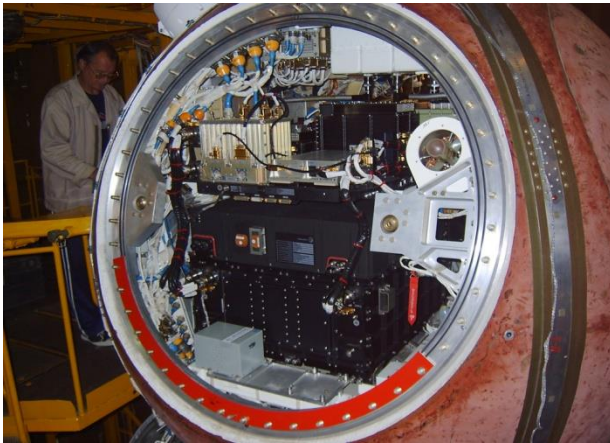
The results of second Space School

- Design, manufacture and testing of prototype of recoverable capsule for YES2 mission;
- Development of the design and the mechanical and electrical interface with MSP "Foton-M3" for implementation of YES2 mission;
- Selection of a set of sensors and the measuring equipment for the post-flight analysis of YES2 mission;
- Control of a tether deployment and safety control of fulfillment of MSP "Foton-M3" mission;
- Two Russian participants have gone on training to Holland on firm Delta-Utec SRC and ESTEC (ESA)

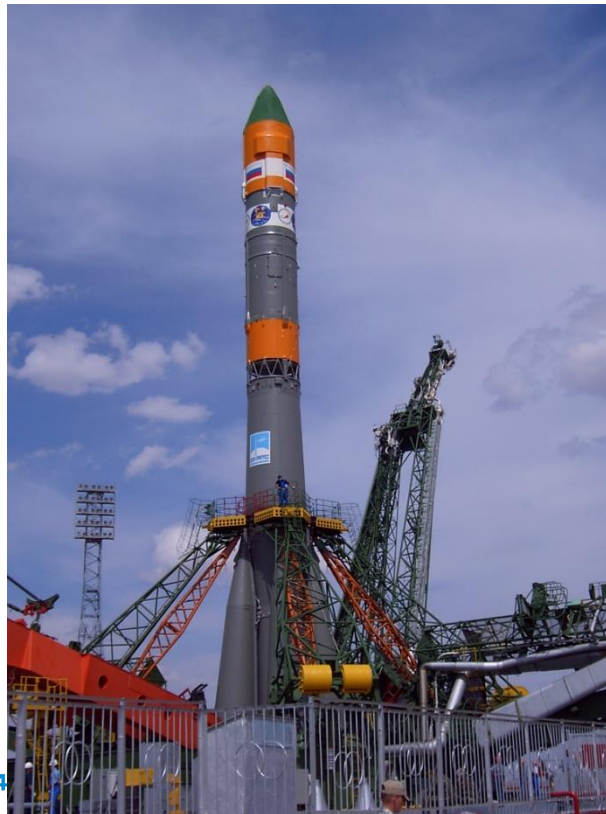
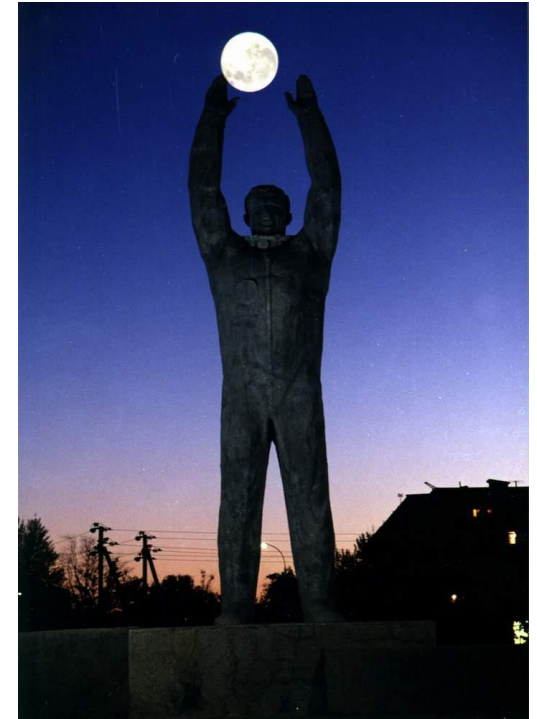


RESULTS OF THE FIRST AND SECOND SPACE SCHOOLS: IMPROVEMENT OF NAVIGATIONAL TECHNOLOGY ON FOTON-M2 IN 2005

- Designed and manufactured scientific equipment MIRAGE-M for MSP "Foton-M2";
- Tested navigation technology (algorithmic and the software) for tracking of research experiments



The implementation of YES2 mission critical technologies on “Foton-M2” (2005)

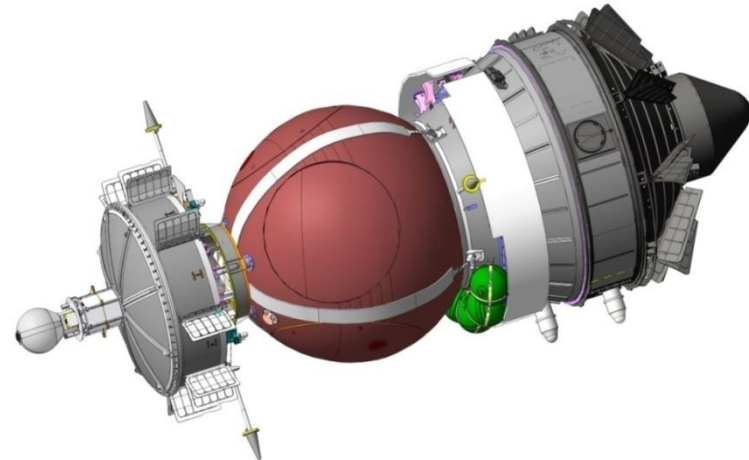


Forth Space School (2007)

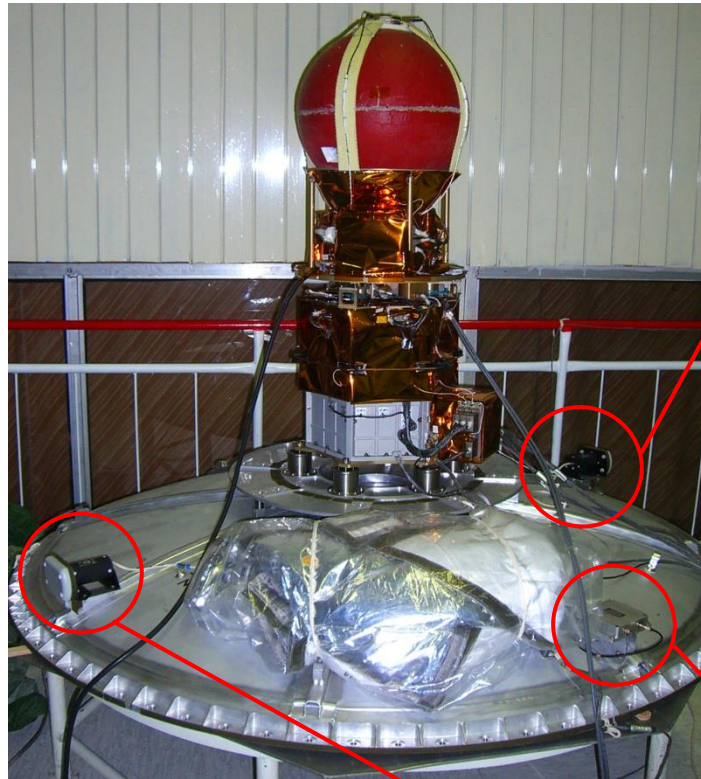
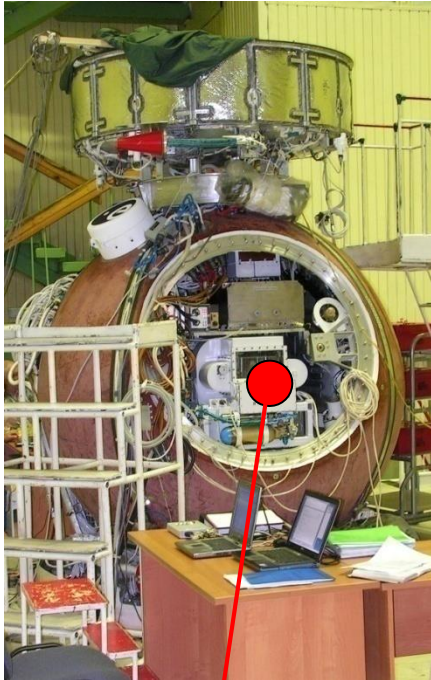
The first stage has been devoted to problems of application of tether systems for de-orbiting of small payloads from low-altitude orbits, and studied of YES2 mission.

The second stage has been devoted to questions of organization and preparation of research experiments on MSP "Foton/Bion", visited cosmodrom Baikonur looked for final operations at an assembly-and-test shop and observed launch of carrier-rocket "Soyuz» with MSP "Foton-M3"

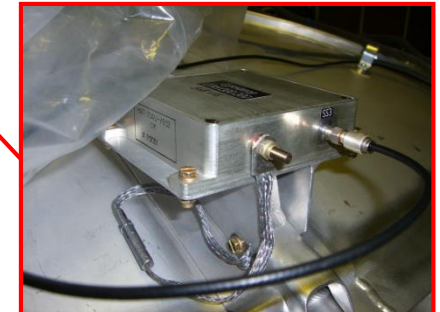
At the third stage carried out within the framework of session of youth conference «Korolyovskie Readings» on which have made reports participants of School



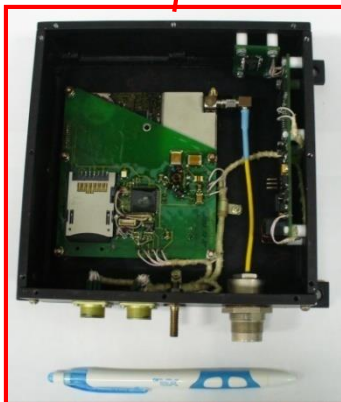
Experimental equipment «SSAU – YES2» on board of MSP “Foton-M3”



Navigating antenna



Summator of navigating signals



Electronic unit



Navigating antenna

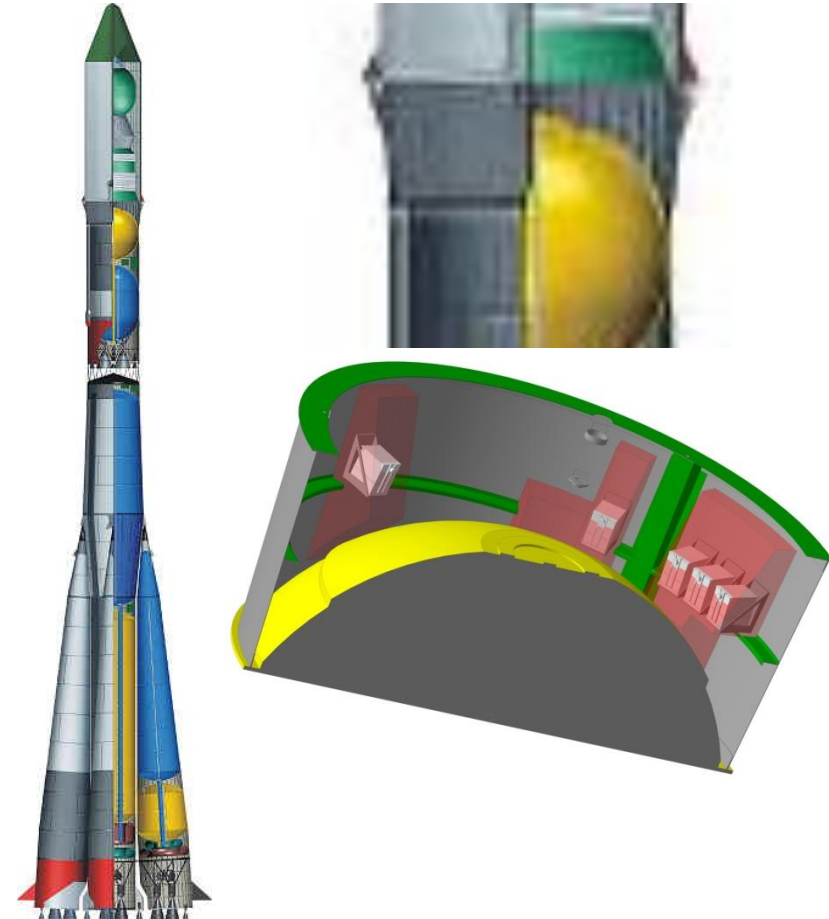


Fifth Space School (2008)

The first stage has been devoted to consideration of possibilities of “Soyuz” orbital stages utilization as to scientific-educational laboratory after separation of a main payload and transition to free uncontrollable motion.

The central theme was discussion of a capability of realization of scientific-educational experiments at the installation of instrumentation in a transfer compartment of an “Soyuz” orbital stage

At the second stage was carried out as a special session “Future space technologies and experiments in space” of International Conference “Scientific and Technological Experiments on automatic spacecraft and small satellites” (SPEXP 2008).





Summer Space School: third stage since 2016

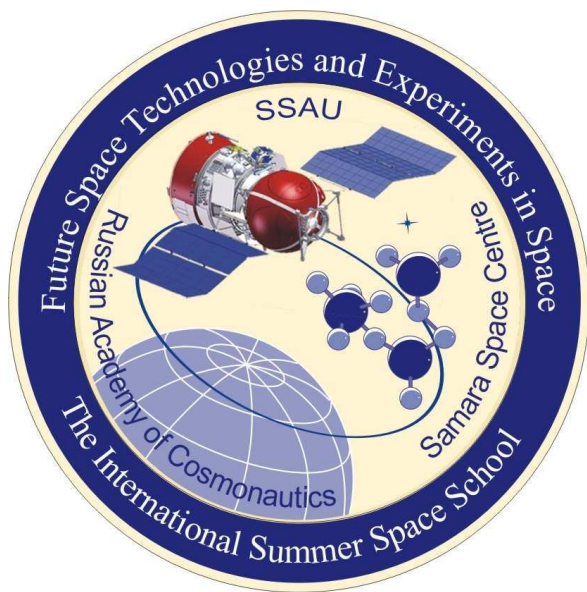




International Summer Space School

“FUTURE SPACE TECHNOLOGIES AND EXPERIMENTS IN SPACE”

From mission idea to project of nanosatellite.



Organized by
Samara National Research University
Volga Branch
of the Russian Academy of Cosmonautics

Supported by



Space University Administrative Committee of
the International Astronautical Federation



UNISEC SAMARA

http://volgaspace.ru/school_cms/

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E-mail ibelokonov@mail.ru





5. Collaboration with Emerging Countries

Regional Centre for Space Science and Technology Education for Western Asia (RCSSTEWA)



•Regional Centre for Space Science and Technology Education in Asia and the Pacific (RCSSTEAP - China)



•The Arthur C Clarke Institute for Modern Technologies (ACCIMT), Sri Lanka



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•The Regional Centre for Space Science and Technology Education for Latin America and the Caribbean, Mexico



•The National Commission on Space Activities of Argentina (CONAE)



•The African Regional Centre for Space Science and Technology Education in English, Nigeria



AGENCIA ESPACIAL
DEL PERU CONIDA



Summer Space School “Future Space Technologies and Experiments in Space”



**Since 2017 is supported
by UNOOSA**

UNOOSA supported participants

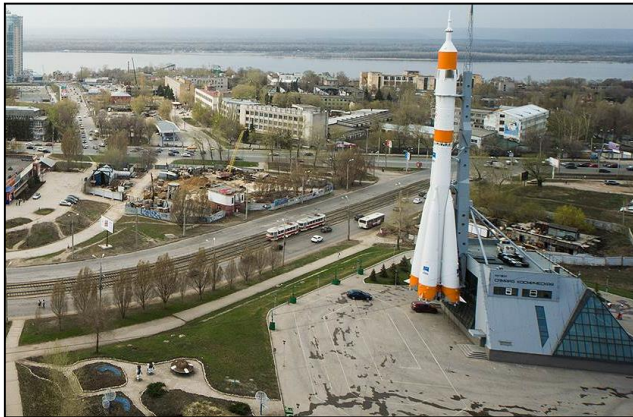
No	First, Last name	Country
1	Samer Lahouar	Tunisia
2	Chameera Wijenayaka	Sri Lanka
3	Wilfredo Jr. Pardorla	Philippine s
4	Sawat Tantiphanwadi	Thailand
5	Nebiyu Mohammed	Ethiopia
6	Cristopher Jair Cabanillas Casas	Peru
7	Funmilayo Bunmi Erinfolami	Nigeria
8	Sibri Alphonse Sandwidi	Burkina Faso



Typical program of the Summer Space School

Duration

2 Week in Samara



Number of participants

Up to 40 people

Age

Senior students
PhD students

Number of participating countries

15-20

Main goals and topics of the School program:

1. Establishing cooperation
between universities in the
field of space technologies
and experiments in space

2. Developing of new
nanosatellites missions

3. Developing of team
project working experience

1st Week



Theoretical knowledge

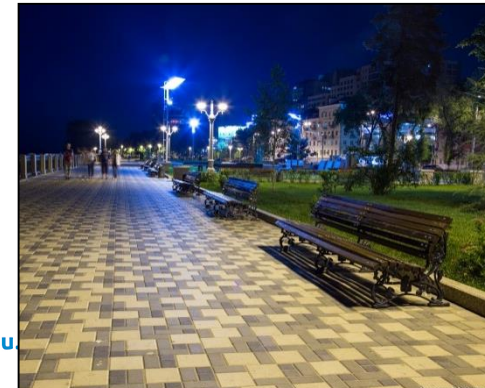
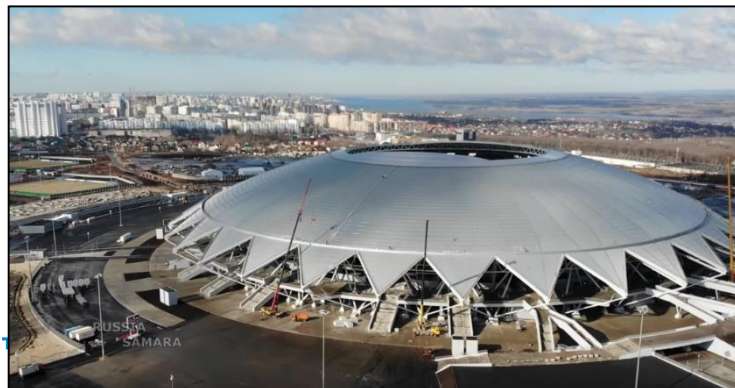
2nd Week



Project development



Project defense





Summary of Summer Space Schools

**Number of Summer
Space Schools**

15

**Number of
participants**

480

**Number of
countries**

47





Examples of projects developing in the frame of Summer Space School

Mission: ISS Cosmonauts Rescue

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SAMARA UNIVERSITY

SUMMER SPACE SCHOOL

Nanosatellite Design for a Cosmonaut Rescue Mission

CORESAT

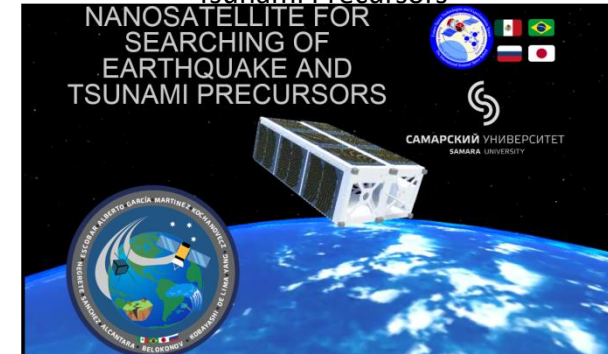
31th August 2018

Team Members	
Joak Carlos	Brazil
Wickner	Brazil
Lorenzo	Brazil
Leonardo	Brazil
Theo	France
Jeannette	Mexico
Anna Karen	Mexico
Edoardo	Mexico
Maria	Venezuela

Mission: Monitoring of the Ionosphere



Mission: Searching of Earthquake and Tsunami Precursors



Mission: ISS Inspection



Mission: Using LEO Satellite Communication Systems



Mission: Automatic Identification system



Mission: Research of the Atmosphere



Mission: Space Telescope (participants' mission)

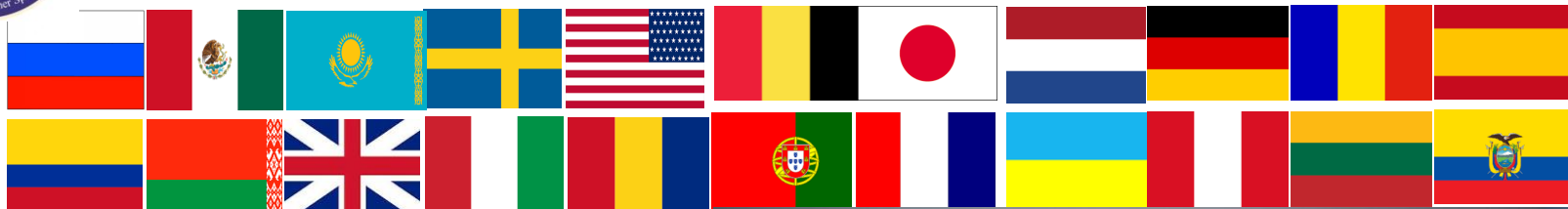


Mission: Study of problems for re-entry atmosphere





15-th Summer Space School (2019) “Future Space Technologies and Experiments in Space”





Dynamics of applicants number for Summer Space School from developing countries

Participants of Summer Space Schools

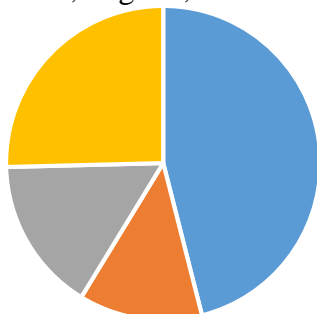
2018

- (34) Croatia; Azerbaijan; Indonesia; Thailand; Nepal; Bolivia; Colombia; Afghanistan; Egypt; Iran; Ethiopia; Uganda; Venezuela; Bulgaria; Algeria; Sudan; Malaysia; Philippines; Sri Lanka; India
- (10) Tunisia
- (12) Nigeria
- (36) Peru
- (40) Brazil
- (51) Mexico



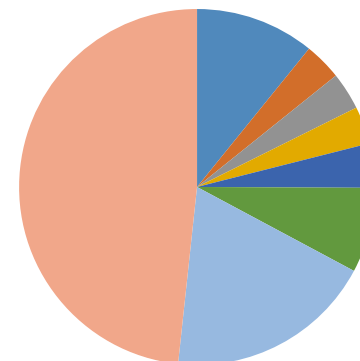
2019

- (29) Afghanistan; Algeria; Brazil; Venezuela; Mongolia; Serbia; Burkina Faso; Peru; Egypt; Tunisia; Kazakhstan; Nigeria; Sri Lanka;
- (8) India;
- (10) Ethiopia;
- (16) Mexico



Applicants of Summer Space School - 2020

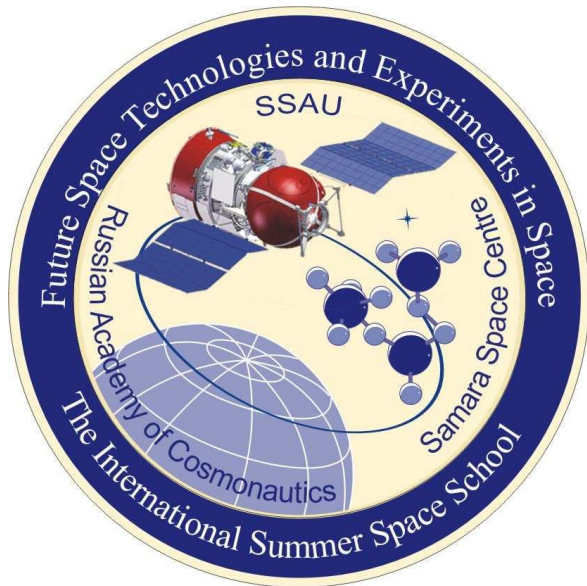
- (35) Pakistan; Philippines; Turkey; Bangladesh; Kenya; Algeria; Argentina; Ecuador; Guatemala; Salvador; Bulgaria; Costa Rica Egypt; Tunisia; Honduras
- (11) Colombia;
- (11) India;
- (11) Ethiopia;
- (13) Nigeria;
- (25) Brazil;
- (30) Peru;
- (104) Mexico.



The 16th International Summer Space School
“FUTURE SPACE TECHNOLOGIES AND EXPERIMENTS IN SPACE”

From mission idea to project of nanosatellite.

August 30-September 10, 2021 Samara, Russia



Total number of foreign applications: **505**

Europe: Germany; Spain; Bulgaria; France

Asia: **India (2)**; Afghanistan; South Korea; Fiji;

Latin America: **Mexico (22)**; Ecuador; Peru; Venezuela; Colombia; Argentina

Africa: **Ethiopia (2)**; Nigeria, **Egypt (11)**





We wish you a pleasant stay and
interesting work in the frame
of 16-th Summer Space School

Thank you for attention

