САМАРСКИЙ УНИВЕРСИТЕТ
SAMARA UNIVERSITY

Summer Space School: outlooks of 15 years of human international capacity building and cooperation

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http://spaceresearch.ssau.ru/

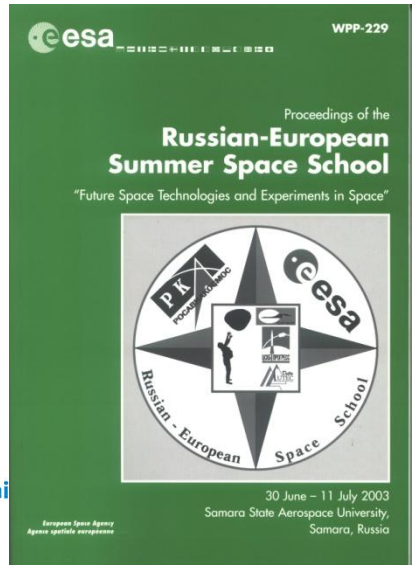
Samara 2017

THE BEGINNING OF SPACE SCHOOL ACTIVITY (2003, 2004)

http://www.volgaspace.ru/school/

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

University of Moderna 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 Politcnica 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)



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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 SSAU space experiments program,
- theoretical problems of tether deployment,
- motion dynamics, aero-, termo-dynamics of ultra-light recoverable capsule

The results of first Space School

- The decision of SSAU to take part in the project YES2,
- Join foreign and Russian students within the framework of this international project with the purpose of its implementation on microgravitational space platform "Foton-M3“ (2007),
- Realization of auxiliary experiments for improvement of some critical technologies of project YES2 in flight of MSP “Foton-M2” (2005),
- Publish of Proceedings of Space School as an ESA official publication

Second Space School (2004)

The main goals:

- teamwork above project YES2,
- realization of experiments and the modeling directed on improvement of basic engineering solutions of the project,
- studying of a capability of its implementation on MSP "Foton-M3“,
- establish of Samara Center of Expertise.

2004

http://www.volgaspace.ru/school

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

Universidad de Valladolid (Valladolid, Spain)
University of Patras (Patras, Greece)
Politecnico di Milano (Italy)
University of Padua (Padova, Italy)
University of Moderna 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”

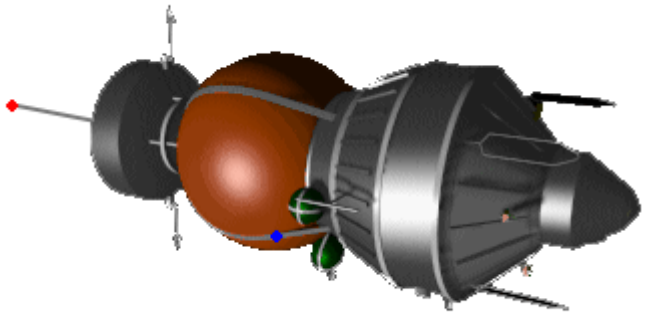
The results of second Space School

- design, manufacture and testing of prototype of recoverable capsule;
- development of a design and the mechanical and electrical interface with MSP "Foton-M3";
- selection and the substantiation of a sensors and the measuring equipment for the post-flight analysis of mission YES2;
- 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

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

-Designed and manufactured apparatus MIRAGE-M for MSP "Foton-M2“;

- Tested navigation technology (algorithmic and the software) for tracking of research experiments



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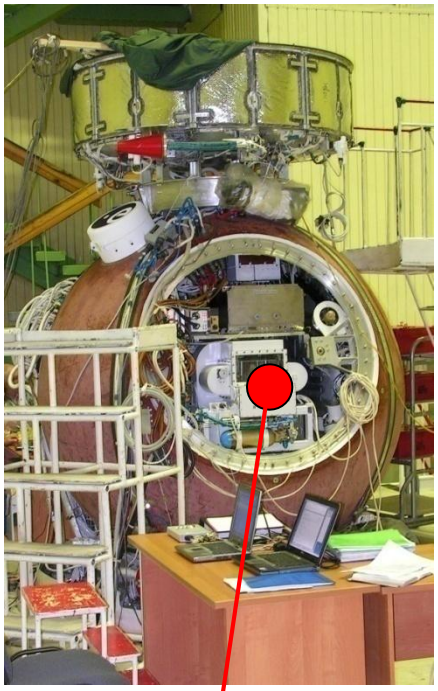
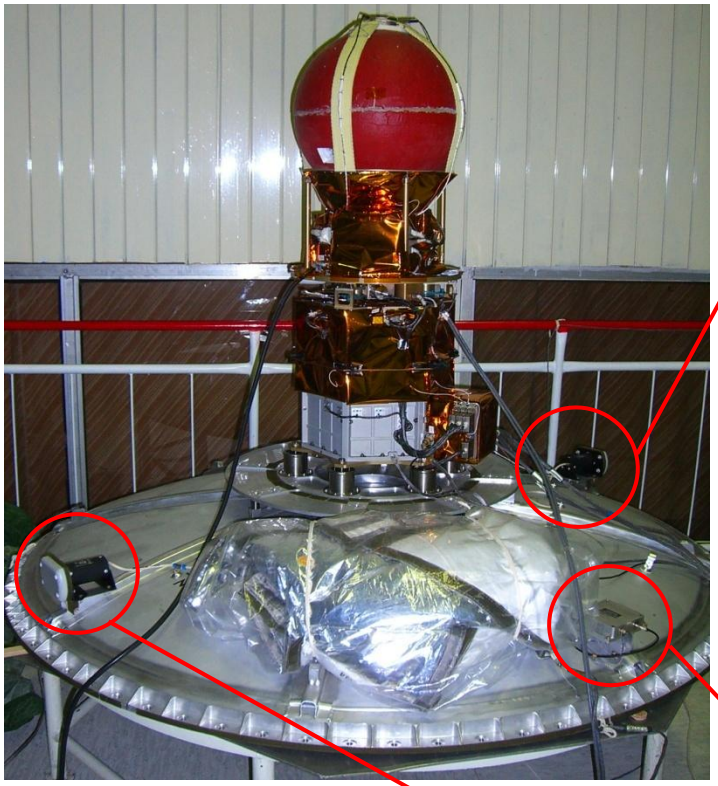
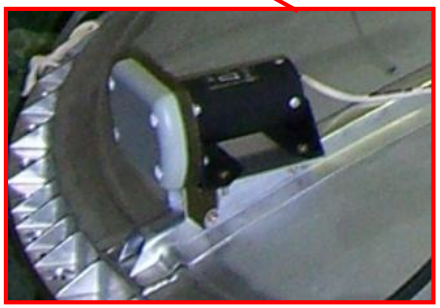
Experimental equipment «SSAU – YES2» on board of MSP “Foton-M3”



Electronic unit





Navigating antenna

Navigating antenna

Summator of navigating signals

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The Space Schools have been devoted to problems of development of nanosatellites and possibility their launches by rocket "Soyuz".

Participants of Space School have worked on the competitive basis above creation of technical proposals for nanosatellites to decide one of applied or basic problem, for example:

- *monitoring of a Earth magnetic field,*
- *monitoring of upper Earth atmosphere,*
- *monitoring of an Earth ionosphere,*
- *communication (a batch data transfer),*
- *Earth observations and so on*.

The nanosatellite have to be format CubeSat3U:
parallelepiped shape with dimensions of 0.1m x 0,1m x 0,3m;
mass no more than 5kg.

At the end of school each group has defended the own project before commission of experts which drew the conclusion about perceptivity of continuation of activities.

Participation statistics of Summer Space School since 2011

Summer Space School – 2011: 7 countries, 8 universities, 26 foreign participants

Country	University	Number of students
Netherlands	Delft University of Technology	2
Ukraine	National Aerospace University – Kharkiv Aviation Institute	2
Sweden	Luleå University of Technology	7
Belgium	Lessius Campus de Nayer	3
Moldova	Technical University of Moldova	4
Belarus	Belarusian State University	4
Lithuania	Kaunas University of Technology	1
	Vilniaus Gedimino technikos universitetas	3

Participation statistics of Summer Space School since 2012

Summer Space School – 2012: 10 countries, 13 universities, 39 foreign participants

Country	University	Number of students
Germany	Julius Maximilian University of Würzburg	2
Lithuania	Vilnius Gediminas Technical University	2
	Antanas Gustaitis' Aviation Institute	1
	Lithuanian Space Science and Technology Institute	2
Spain	University of Vigo	18
Belgium	Lessius Mechelen University	2
Netherlands	Delft University of Technology	1
Belarus	Belarusian State University	2
Peru	National Committee for Space Research	1
	Center aviation service	1
Sweden	Luleå University of Technology	3
Ecuador	Ecuadorian Civilian Space Agency	3
USA	Texas State University	1

Participation statistics of Summer Space School since 2013

Summer Space School – 2013: 6 countries, 6 universities, 14 foreign participants

Country	University	Number of participants
Germany	Julius Maximilians Universitaet Wuerzburg	2
Kazakhstan	L.N.Gumilyov Eurasian National University	5
Estonia	University of Tartu	1
Belarus	JSC "Peleng", Scientific-engineering department of "Cosmos"	2
Colombia	JSC "ASTCOL"	2
Ukraine	National Aerospace University – Kharkiv Aviation Institute	2

Participation statistics of Summer Space School since 2014

Summer Space School – 2014: 12 countries, 16 universities, 32 foreign participants

Country	University	Participants
Sweden	Luleå University of Technology	9
Belarus	Belarusian State University	5
	JSC "Peleng"	1
Peru	Universidad de Piura	2
	National Commission for Aerospace Research and Development	1
India	Noida International University	1
Kazakhstan	L.N.Gumilyov Eurasian National University	3
Italy	University of Bologna	2
	Sapienza University of Rome	1
Germany	University Of Berlin	1
	Julius Maximilians Universitaet Wuerzburg	1
Belgium	University Thomas More	1
Canada	University Of Toronto	1
Colombia	Industrial University of Santander	1
France	National Higher French Institute of Aeronautics and Space (ISAE-SUPAERO)	1
UK	Imperial College London	1

Participation statistics of Summer Space School since 2015

Summer Space School – 2015: 11 countries, 12 universities, 26 foreign participants

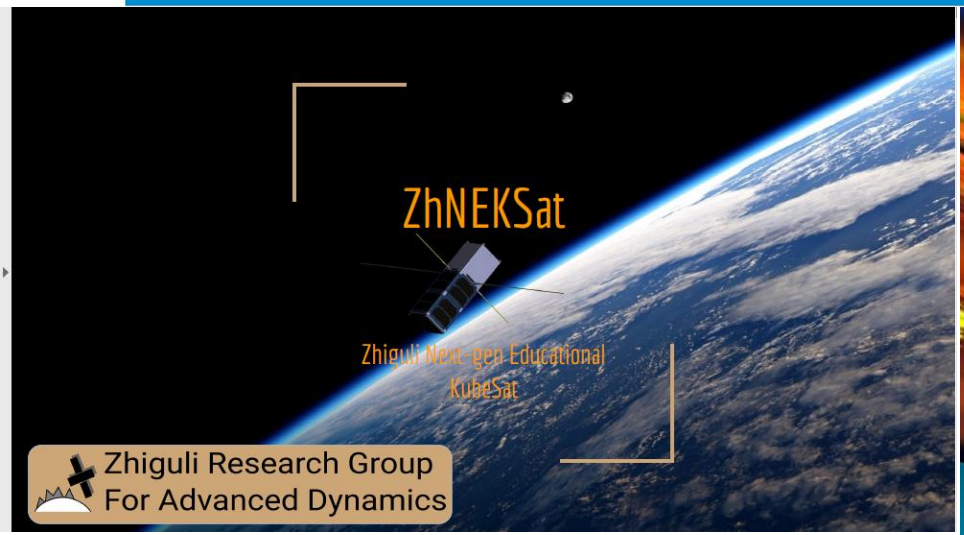
Country	University	Participants
Mexico	National Autonomous University of Mexico	7
Sweden	Luleå University of Technology	5
Colombia	Industrial University of Santander	1
	University of los Andes	2
Kazakhstan	Almaty University of Power Engineering and Telecommunications	3
UK	University Of Strathclyde	2
Italy	University of Padua	1
USA	University of Colorado	1
Romania	Technical University of Cluj-Napoca	1
Portugal	Technical University of Lisbon	1
India	Savitribai Phule Pune University	1
Japan	Technological Institute at Kyushu	1

Participation statistics of Summer Space School since 2016

Summer Space School – 2016: 10 countries, 12 universities, 23 foreign participants

Country	University	Participants
France	National Higher French Institute of Aeronautics and Space (ISAE-SUPAERO)	5
Netherlands	Delft University of Technology	5
UK	University of Sussex	1
	Bright Ascension Ltd	2
Romania	University of Bucharest	1
	National Institute for Laser Plasma & Radiation Physics	1
Peru	National University of Engineering	2
Ghana	Space Science Systems Research Institute	2
Italy	University of Bologna	1
Portugal	University of Coimbra	1
Taiwan	National Chiao Tung University	1
Dominican Republic	UNAPEC University	1

Projects of nanosatellites on 12-th Summer Space Schoo



Group 4

Nanosatellite for Earth Remote Sensing

MEKO-1

Team Korea - Mexico

Supervisor: Segev Simakob

- Cesar Angel Giovanni Perez Moreno
- Gibran Trejo Aquino
- Rogelio Valdez Aldama
- Tania Robles Hernandez
- Isai Fajardo Tapia
- Hyuniai Cho
- Seokgyu Jeong

САМАРСКИЙ УНИВЕРСИТЕТ
SAMARA UNIVERSITY

NANOSATELLITE
FOR MONITORING OF IONOSPERE

interIon CubeSat

XII International
Summer space school
Russia, Samara, 2016

The participants of 12-th Summer Space School “Future Space Technologies and Experiments in Space” (2016)

Participation statistics of Summer Space School since 2017

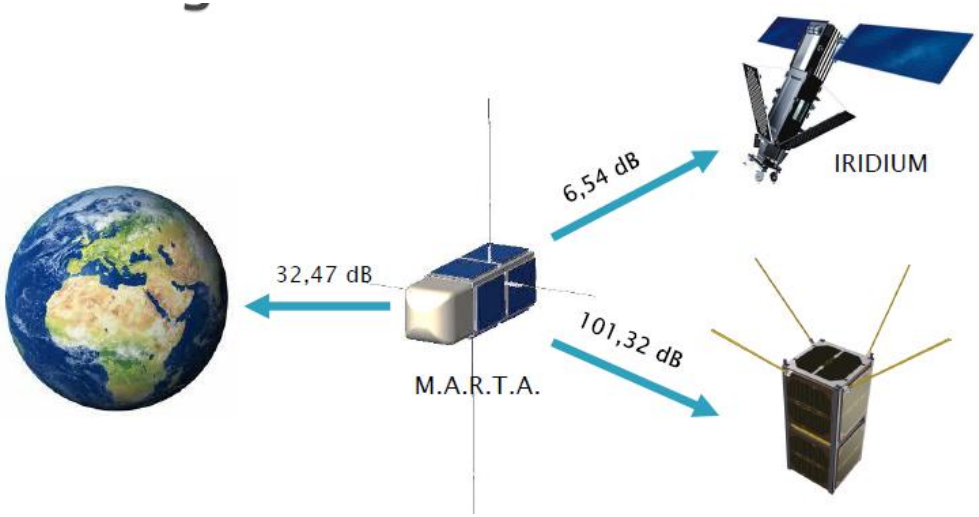
Country (14)	University (23)	Participants (76)
Bolivia	Higher University of San Andrés	2
Brazil	Federal University of Technology – Parana	26
	Federal University of Santa Maria	5
Dominican Republic	UNAPEC University	1
India	Vellore Institute of Technology	1
Spain	Polytechnic University of Catalonia	1
	ALTRAN Spain	1
Italy	University of Pisa	3
	Polytechnic University of Milan	1
Kazakhstan	Al-Farabi Kazakh National University	6
Korea	Moscow Aviation Institute	1
Costa Rica	Costa Rica Institute of Technology	1
Mexico	National Polytechnic Institute	10
	National Autonomous University of Mexico	1
	The Aeronautical university in querétaro	2
	Monterrey Institute of Technology and Higher Education	1
	OPAL-RT Technologies	1
	Instituto Tecnologico de Hermosillo	1
Slovenia	University of Ljubljana	1
France	National Higher French Institute of Aeronautics and Space (ISAE-SUPAERO)	7
Sri Lanka	Arthur C. Clarke Institute for Modern Technologies	1
	Open University of Sri Lanka	1
Japan	Waseda University	1

Two nanosatellites formation flight (2017-2019 г.г.) – Ru/Fr

Partners: Samara University, ISAE-SUPAERO University .

Mission Goals:

- flight testing of maneuvering unit ,
- approve the technology of group flight (relative navigation, maneuvering and communication),
-approve of technology of communication between nanosatellites through low-orbital satellite communication net (for example, Globalstar),
- studying problem of entry in atmosphere and construction destroy,
- approve technology of orbiting from transfer compartment of Soyuz rocket carrier



Nanosatellite SamSat- Ion

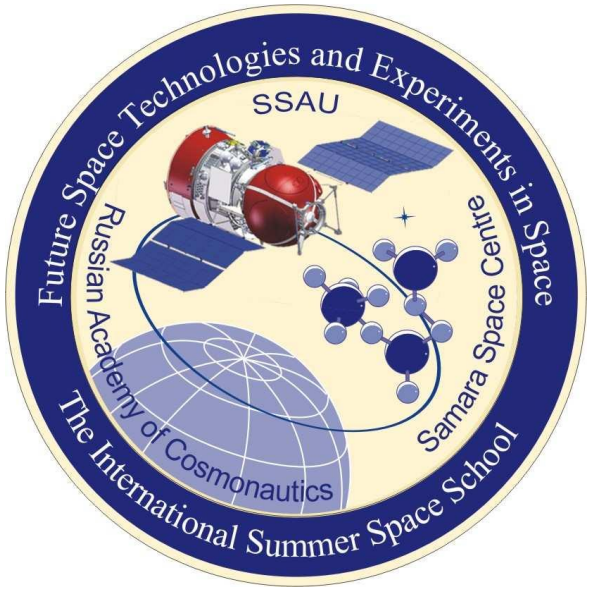
International project of nanosatellite constellation for monitoring of Earth ionosphere

Leading organization:
Institute of Space Research of RAS
Possible participants:
Russian Space Systems Enterprise,
Amur State University,
Perou, Bolivia, Columbia Universities

The 14th International Summer Space School
"FUTURE SPACE TECHNOLOGIES AND EXPERIMENTS IN SPACE"

From mission idea to project of nanosatellite.

August 20 – September 1, 2018 Samara, Russia



Organized by

Samara National Research University

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Volga Branch of the Russian Academy of Cosmonautics

Supported by

International Astronautical Federation (Space Universities Administrative Committee)

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THE CONCLUSION

1. The experience of conducting of Space Schools (2003-2017) has shown, that the large interest of participants and the best results are reached, if the format of Space School includes the independent work above the common project which has chance to be implemented.
2. The participation of Space Rocket Center “Progress” in Space Schools sharply reinforces interest of participants as they feel that their innovational ideas and development have a real capability of implementation and are interesting for practice.
3. Since 2003 the 12 Russian participants defended PhD thesis, more 60 Russian participants sixty defended master.
4. As a result of Space Schools there are some new scientific directions have appeared and actively developed in Samara University : theory and applied application of tether systems for space activity; dynamics and thermodynamics of ultra-light recoverable capsules; improvement of space navigation due to an integration of measurements of various type; research of a capability of implementation of scientific-educational programs at carrier-rocket orbital stages; design and control of nanosatellites; development of small-sized sensors and devices, etc.
5. One of the important results of this activity is Samara University participation in grant CRIST «Curricula Reform in Space Technology in Kazakhstan, Russia, and Ukraine» which oriented to establish of common education space (www.crist-kru.eu)

PROPOSALS:

Samara University covers the expenses of the participants of the School for accommodation, meals and training. However, transportation costs must be covered by the participants themselves.

We propose to introduce Summer Space School "Future space technologies and experiments in space" in the list of educational programs supported by the UNOOSA.

We are interested in developing of cooperation with the UN Regional Centers.

UNOOSA could provide on a competitive basis for part of participants from developing countries grants to cover transportation costs.

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Thank you for attention

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