



# Education and Training Activities- APSCO Student Small Satellite Project

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# APSCO: Multi-Lateral Cooperation in the Asia-Pacific Region



**Vast Geographical Area**

**Large Population**

**Mostly Developing Countries**

**Prone to Natural Disasters**

**Exploiting Space Needs High Technology, Risk and Investment**

*Member States*

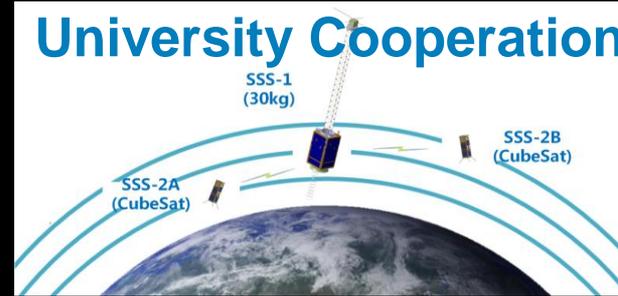
*Associate Member*

*Signatory State*

*Observer State*

## ➤ Education and Training Programs of APSCO

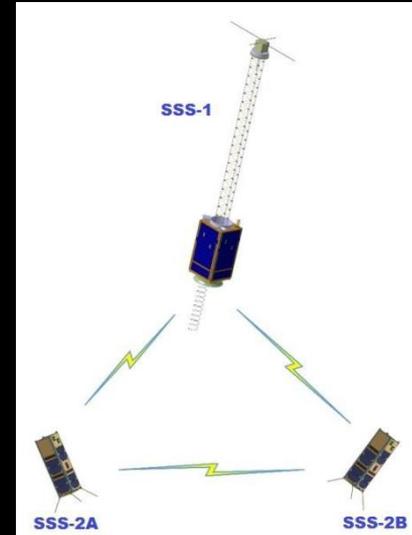
- Full Scholarship Support (215 Masters & 63 Doctors)
- Top Aerospace schools in China: Beihang, NPU & HIT
- Space Education Curricula Development
- Student Small Satellite (SSS) program



- Space Science Schools
- Space Innovation Contest
- APSCO Microsatellite Contest
- On-line, On-site, Centralized Trainings
- More than 1,500 trainees from 32 Asia-Pacific and 5 African countries

# APSCO Student Small Satellite (SSS) Project

APSCO SSS Project Consists of a 1 Microsat (SSS-1) and two Cubesats (SSS-2A and 2B)



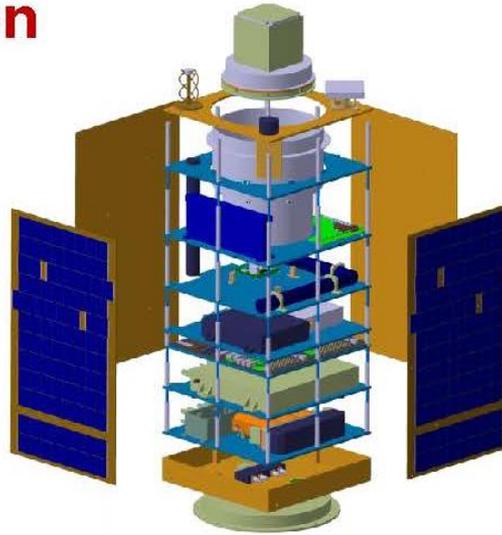
## APSCO Student Small Satellite (SSS) Project

- A basic activity of APSCO, It was kicked-off in December, 2016.
- Launch service will be provided by **CNSA** .
- Member States : **Bangladesh, China, Mongolia, Iran, Pakistan, Peru, Thailand and Turkey.**
- **Beihang University** was identified as the Leading University.

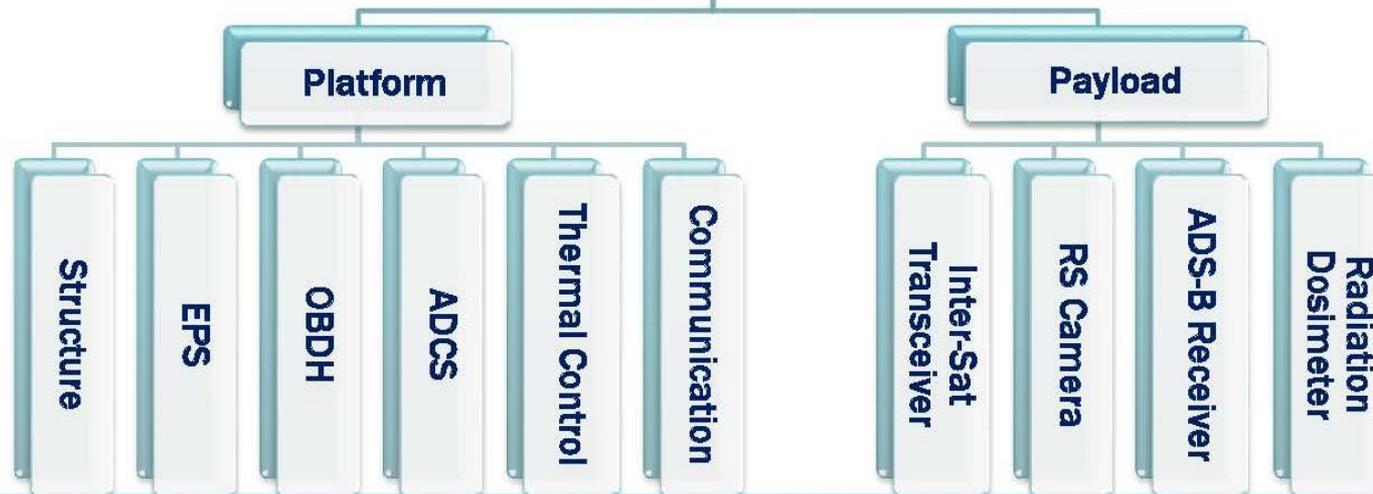


# SSS-1 Configuration

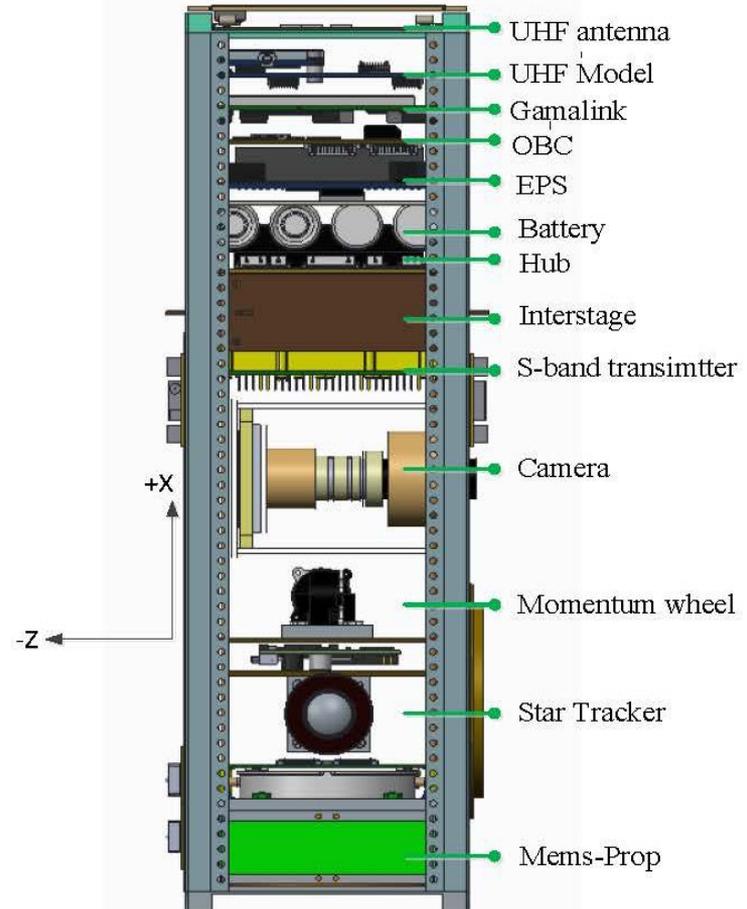
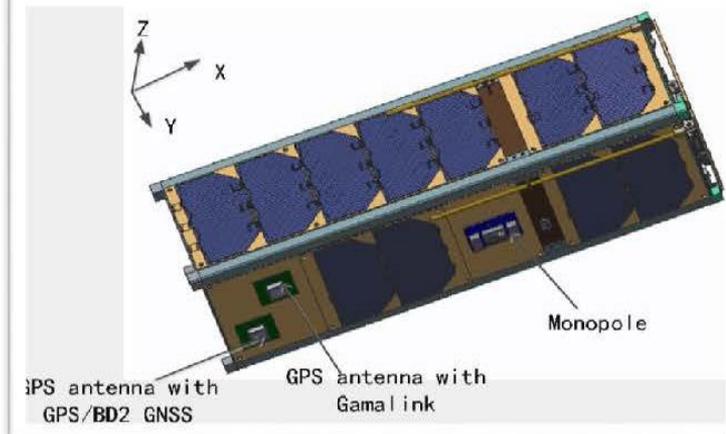
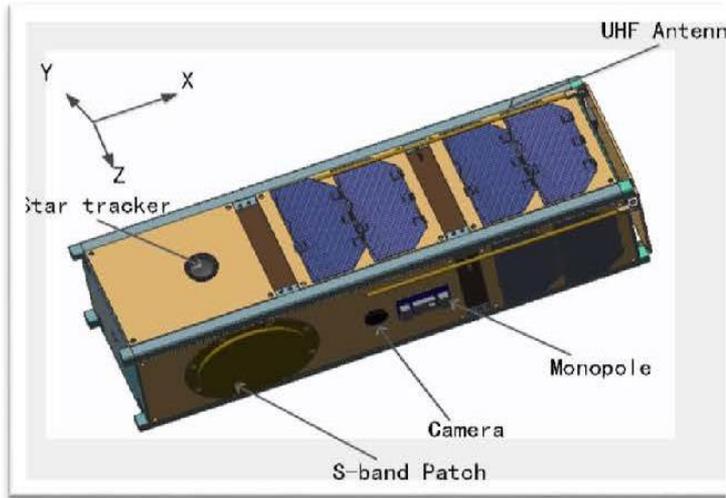
- Main/Sub-sat, Coilable Mast
- GaAs Solar Array + Li-ion Bat
- ARM Processor with CAN Bus
- Passive + Active (MTQ, RW)
- Passive(MLI) + Active(Heater)
- S-band TRX + UHF/VHF TRX



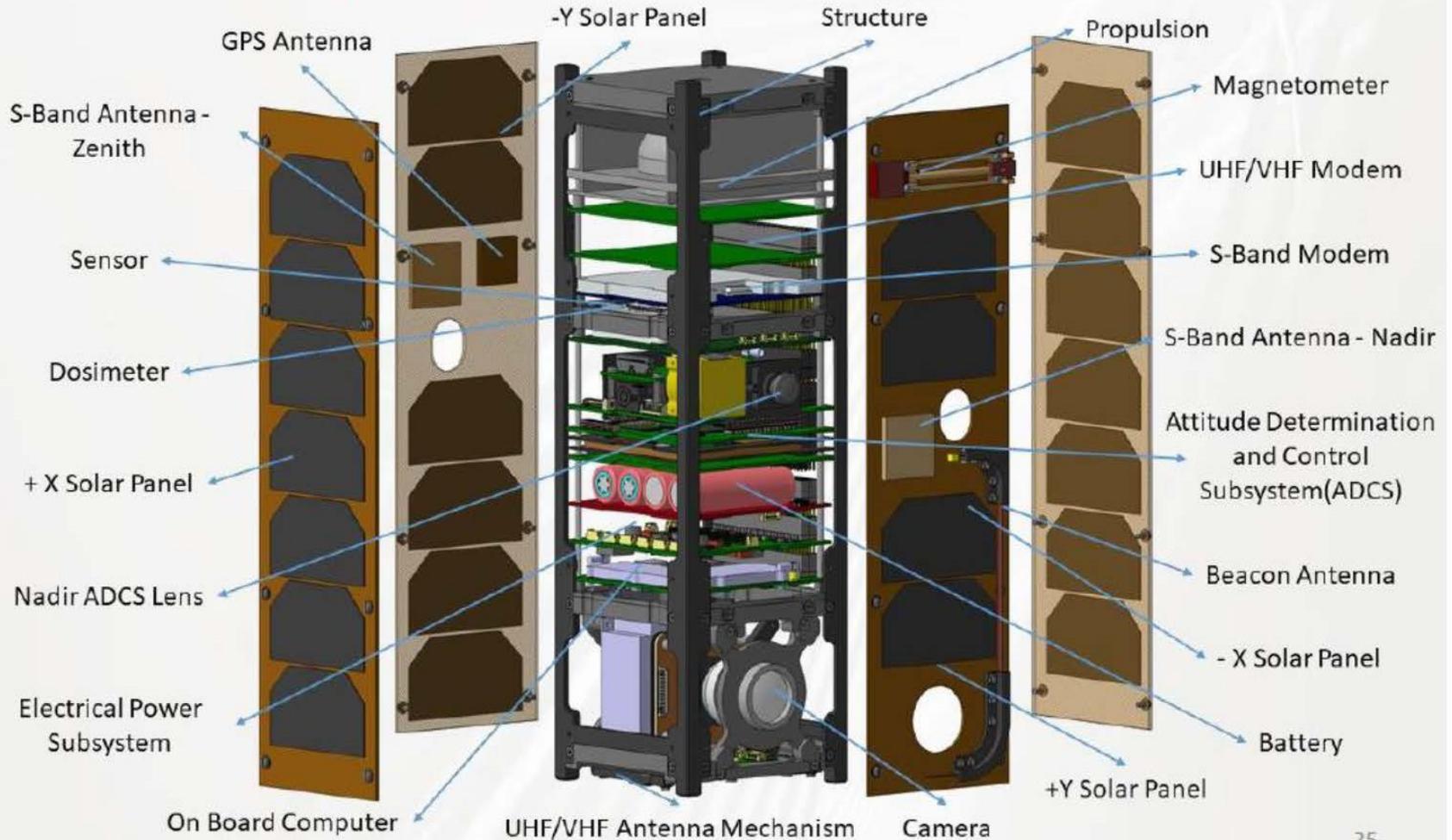
- Inter-Sat Transceiver
- Remote Sensing Camera
- ADS-B Receiver
- Radiation Dosimeter

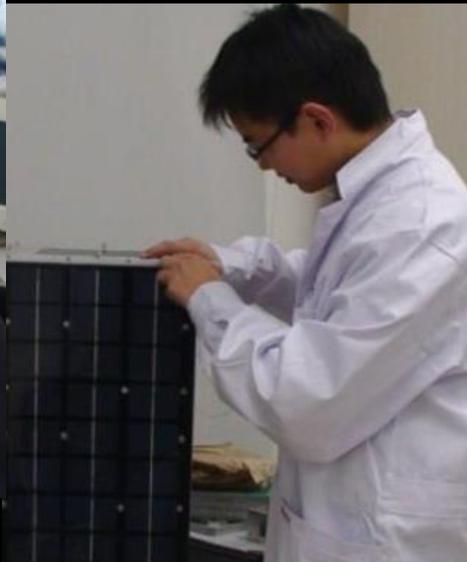


# SSS-2A Configuration



# SSS-2B Configuration





# Educational Programs of SSS Project

## Multilayer training program

### Selection of Student Teams

- Designation of the Universities joining this program
- Nomination of student teams by universities
- Each MS can nominate a student team including 2-10 students

### Training Material Sharing

- System level training materials by Leading University
- Subsystem level training materials by subsystem developers
- All students get a copy of training materials

### Training Opportunities

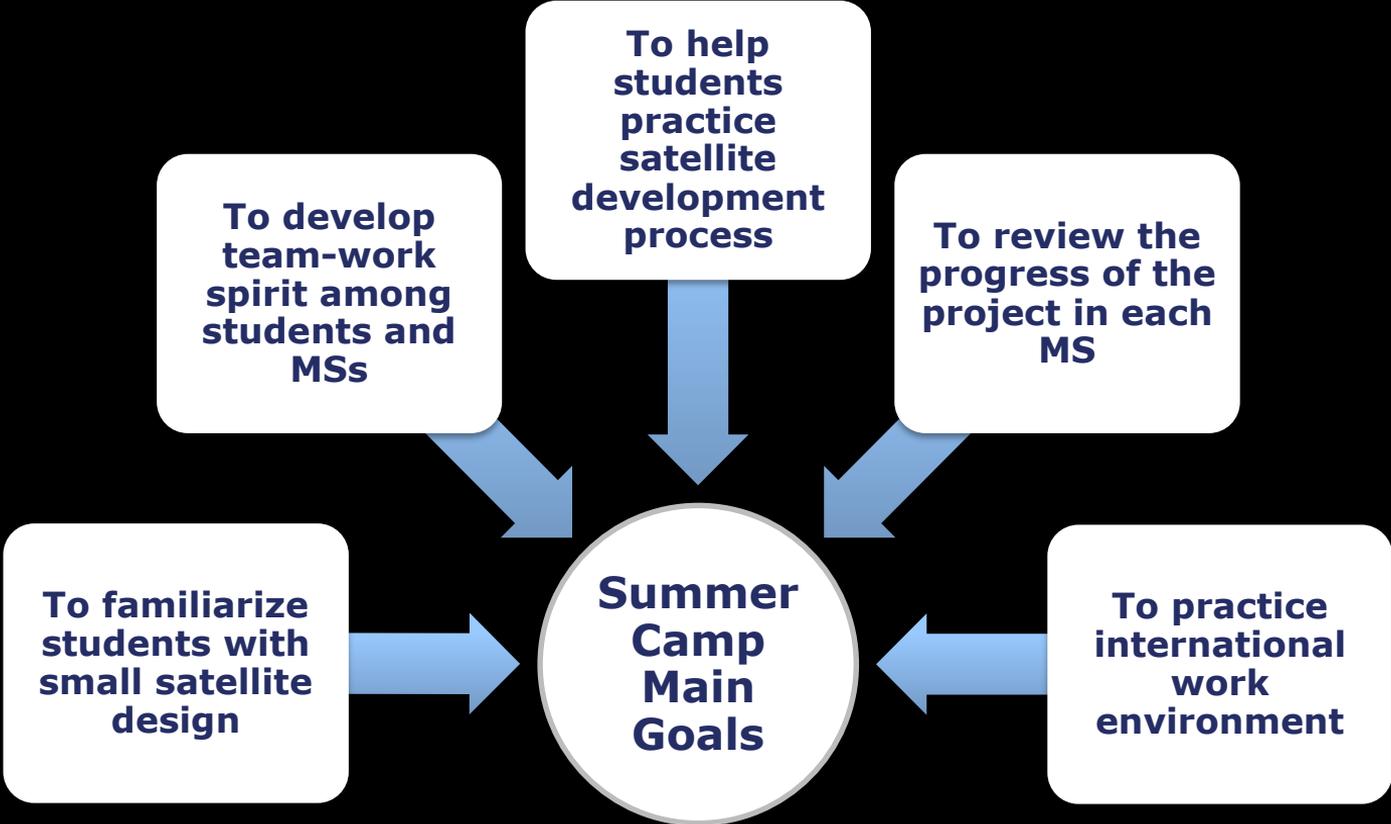
- Microsatellite Technology MASTA 2017 and 2018 (Master Degree)
- 4 students and 1 faculty member per MS join each summer camp (2017-2018-2019)
- Subsystem developers provide hands-on training for students
- Satellite Integrators provide hands-on training on AIT for students

### Training Costs

- APSCO will cover travel and accommodation costs for MS students
- China will fully support the MASTA students through government scholarships
- Other MS are encouraged to provide similar opportunities



# Summer Camp Programs



# Summer Camp Programs

The following are Summer Camp main Modules:

<b>M1- Course</b> Small-satellite Interdisciplinary Lectures	<b>M4-WORKSHOP</b>  Satellite Technical Workshop	<b>M5-HP</b> Project Hand-on Practice
<b>M2-TP</b> Team Project		
<b>M3-IP</b> Individual Project		

# The Summer Camp Sequence



## 1<sup>st</sup> Summer Camp - 2017

Design and team-work

APSCO & Beihang University



## 2<sup>nd</sup> Summer Camp - 2018

Manufacturing and test

APSCO & Middle-East Technical University



## 3<sup>rd</sup> Summer Camp - 2019

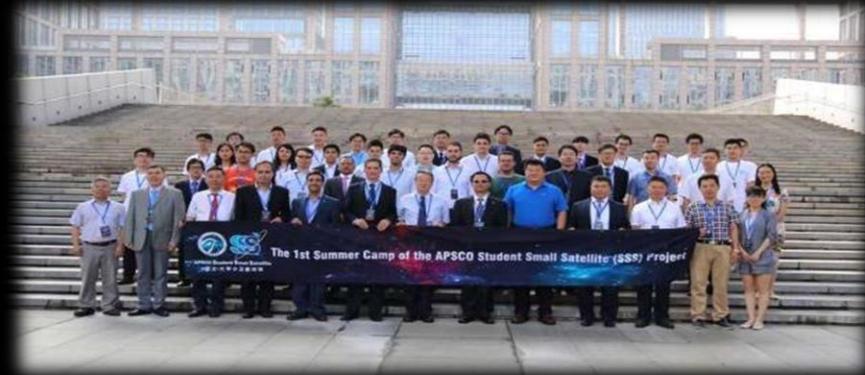
AIT and operations

APSCO & Shanghai Jiaotong University

# First Summer Camp: August 14 - September 2, 2017 Beihang University, Beijing, China

The training covered over 13 topics and was given to nearly 40 students from Member States of APSCO.

- 1) System Systems Engineering
- 2) ECSS and CubeSat Mission Design and Engineering Implementation
- 3) Cube System Design and Verification
- 4) Structural Design and Analysis of Small Satellite
- 5) Small Satellite Technical Process
- 6) Small Satellite Test (Thermal Vacuum, Thermal Balance, Vibration, Magnetic, EMC) and AIT Technology
- 7) Small Satellite EPS System Design and Test
- 8) Attitude and Orbit Determination & Control Subsystem of Satellite
- 9) OBDH & On-board Software
- 10) Space Program and TT&C network
- 11) Chinese Launch Vehicle Technology
- 12) Electrical Power Subsystem Design and Implementation
- 13) Research & Development of S-band Segment



## Second Summer Camp: July 23-August 10, 2018, Middle East Technical University, Ankara, Turkey

This activity concentrated on the micro/nano satellite subsystems (EPS, Tracking & Communications, ADCS, Structure & Mechanism, Thermal Control, etc.), and provided the valuable opportunity of hands-on training.



# Third Summer Camp: July 15-August 2, 2019 Shanghai Jiao Tong University (SJTU), Shanghai, China

The third Summer Camp concentrated on the CubeSat assembly, integration, and testing and focused on the ADCS hands-on training.



# University Cooperation Framework

## ✓ Educational Hands-on Projects

- To train students for satellite engineering through hands-on practical training until the flight model is made;
- Universities will be able to
  - ✓ Develop their own space education system;
  - ✓ Build their own capability to develop small satellites;
  - ✓ Build their own payload/subsystem integrated on the satellite(s);
  - ✓ Build their own capability to operate satellites and/or process image/data.

## Ongoing and Future Activities



**Second Phase of Student Small Satellite Project**



**A series of Cubesat Competitions, first one with NPU in November 2019**



**A series of on-site trainings with model Cubesats and developmental kits**



**A series of free launch opportunities for the winners provided by CNSA and/or private sector launchers (under negotiation)**



- A**ctive Involvement in international space affairs
- P**eaceful use of outer space
  - S**haring knowledge and experiences
- C**ollaborative gains with its Member States
- O**pen worldwide to international space communities

# THANK YOU