



# Student activity report

BULGARIA Jan 2017 — Nov 2017

# Scope of Activities

- Higher education: Sofia University, National Military University
- Secondary education: Varna High School of Mathematics
- **Activities:** Satellite integration training, satellite mission design, Solar system exploration concepts

# HEPTA Sat Training Course

## DIMENSIONS

- Comparable to a CubeSat

## COMPONENTS

- Command & Data Handling Board (CDH)
- Electric Power System & Comms Board (EPS & Comms)
- Sensor Board

## PROGRAM GOALS

- Provide an understanding of the basic architecture of a small satellite
- Experience the development process
- Teach basic space systems engineering in a few days

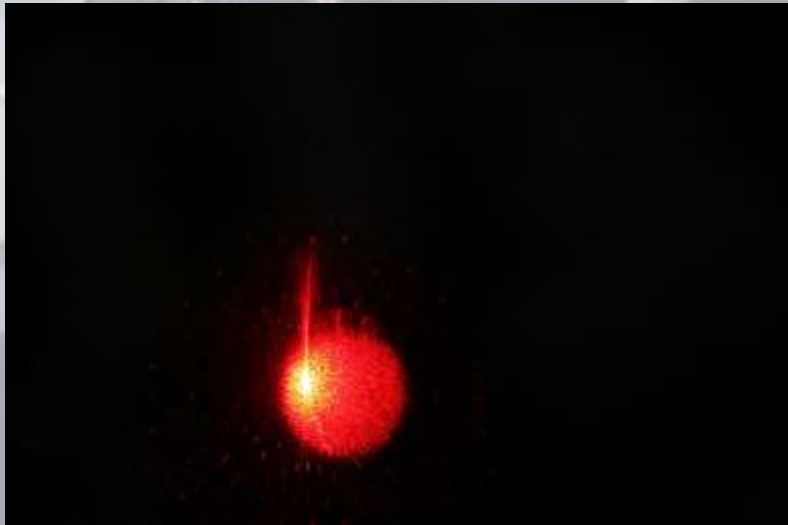
# Training Days



- Organized by the Faculty of Physics at Sofia University, [24 - 28 Oct](#)
- Sofia University, National Military University, Rakovski Military Academy and Varna High School of Mathematics were represented.
- Excellent hands-on practice in satellite integration, communication and payload design.

# Results

Variety of payloads, including laser communication

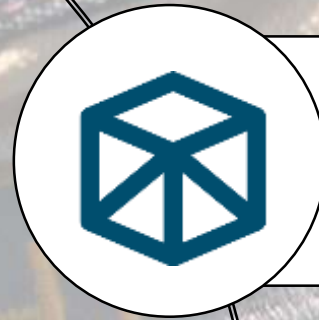


Improved practical value of FacPhys courses

# SAT-1 Initiative



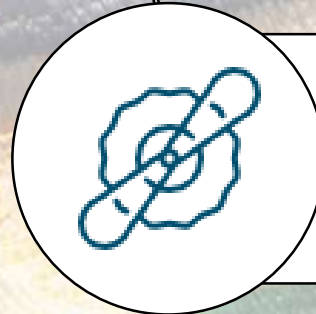
# Roadmap



## Phase 01

- **Unmanned spaceflight**
- CubeSats, LEO flight, satellite communications, integration, setting up educational network

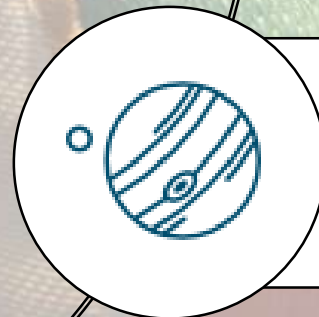
2018



## Phase 02

- **Advanced unmanned spaceflight**
- Lunar orbiter, deep space navigation, probes with increased autonomy, propulsion systems

2020 +



## Phase 03

- **Deep space & manned spaceflight**
- Planetary probe (Venus, Mars or Jupiter), life support systems, Lunar habitats, astronaut training

2023 +

# Roadmap Foundations

## Bulgarian space heritage

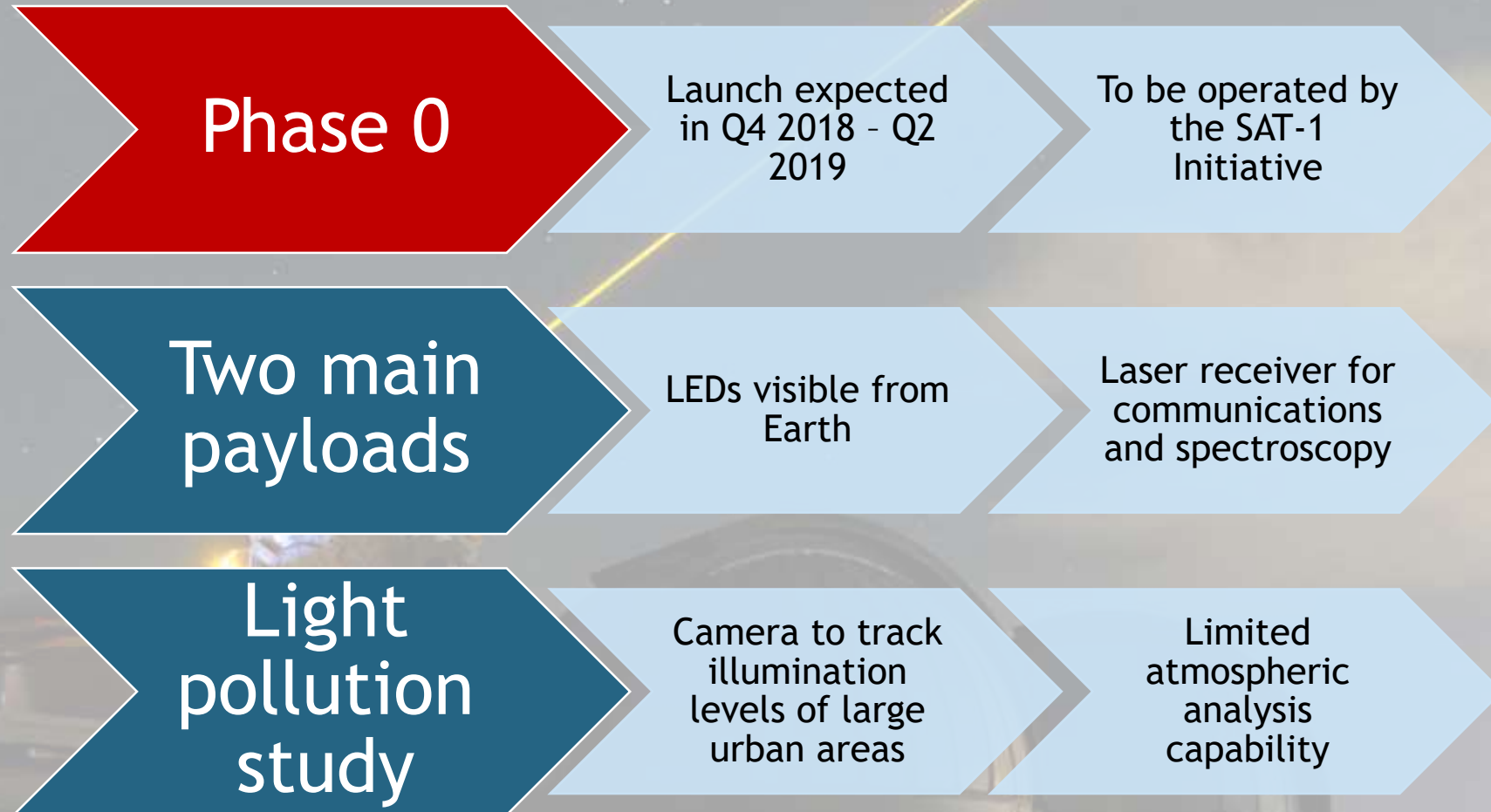
Project	Type	Status
“Bulgaria-1300” and “Meteor-Priroda”	Satellite payload design & assembly, ground stations, integration	Know-how deprecated
VSK & LIMA-D	Martian probe (Phobos 2) payloads	Know-how lost
SVET greenhouses	Space-based growing of crops	Limited activity
Astronaut program	Physiological & psychological testing and training facilities	Some facilities active; used by Air Force
	Soyuz training module	Active
	Space medicine equipment	Know-how lost
	Space food production	Mostly active

## Current technological frontiers

Project	Type	Status
CubeX, Lunar Flashlight, MarCO, CUVE	Lunar & planetary probes in a CubeSat form factor	Active development
Satellite AI	Concept	Studied
OCSD	CubeSat-based laser communications	Active satellite
Various missions and projects	Hall effect thrusters, field emission electric propulsion, others	Commercially available
XPNAV-1	Deep space navigation	Active satellite



# EFIR Mission



# Extraterrestrial Atmospheric Flight

Planetary Aviation Group at the Faculty  
of Physics / Aviation and Space Forum

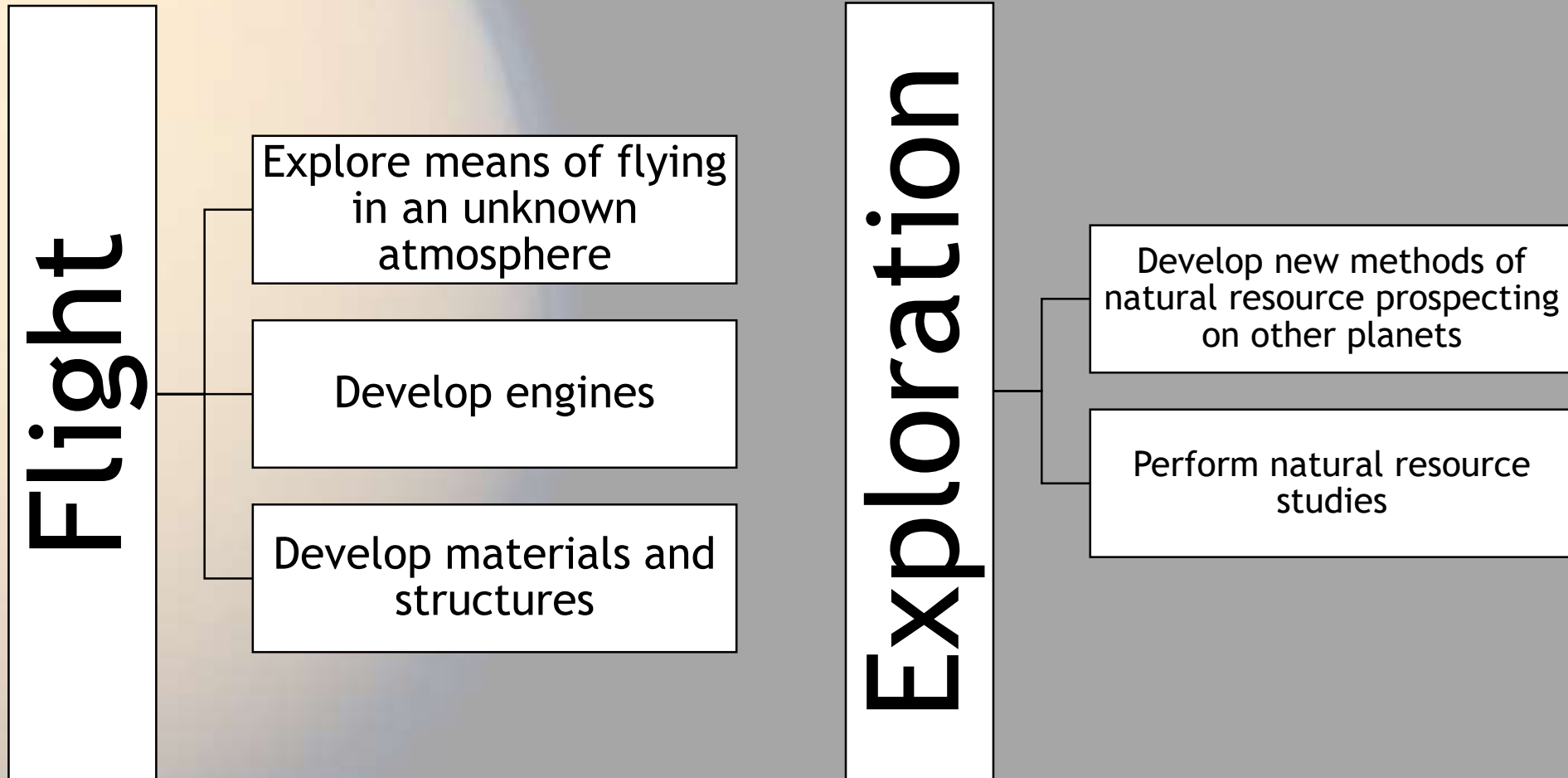


Created to study powered  
flight in the atmospheres  
of Solar System planets  
and moons

Developing a  
new flight  
concept

Study the  
scientific  
requirements for  
such flights

# Practical Tasks



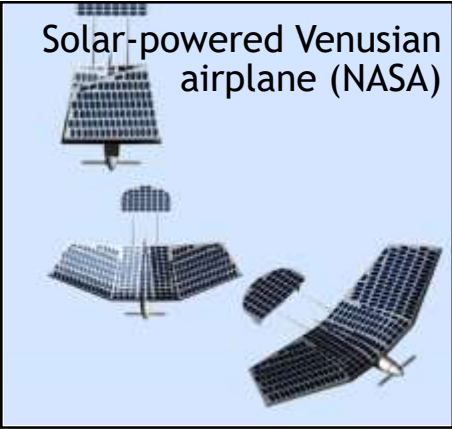
Concepts already studied by other entities



Venus Atmospheric Maneuverable Platform (Northrop-Grumman)



Titan Saturn System Mission (NASA)



Solar-powered Venusian airplane (NASA)

A photograph of a starry night sky, likely showing the Milky Way galaxy, with a white horizontal band at the bottom. The text "Thank you" is written in black on the white band.

Thank you