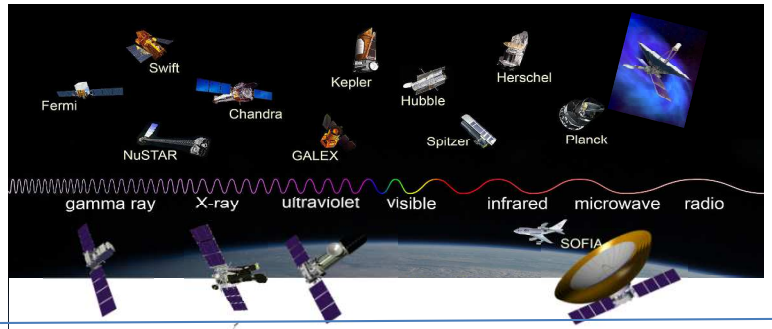
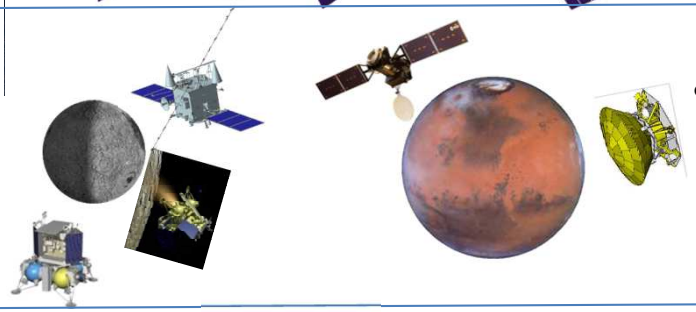
Russian Space Research Program

The ROSCOSMOS main goal is to ensure priority space science projects and exploration programs

Directions of Scientific Projects till 2030:



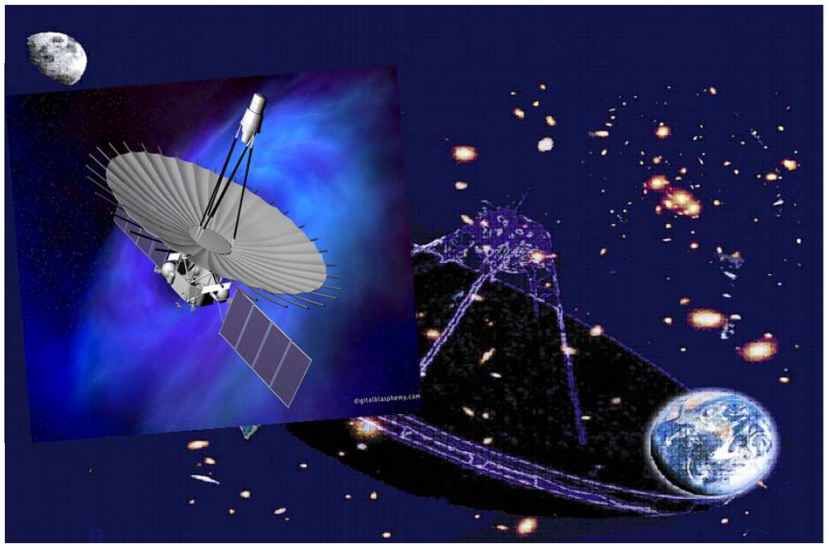
- **astrophysics:** space observatories “Spektr” series, “GAMMA-400”



- **exploration of the Moon and Mars:** lunar missions “Luna-25”, “Luna-26”, “Luna-27”, “Luna-28”/ “Luna-Grunt”; “ExoMars” and “Boomerang”/Expedition-M”

- **heliophysics and solar-terrestrial studies:** “Resonance-MKA”, “ARKA”, “Resonance” and “Intergeliozond”
- **space biology and microgravity physics projects: “**Bion-M 2 and 3”, “Vozvrat-MKA”

RadioAstron: Russian Project with Wide International Cooperation: Space radio-interferometer with bases up to 350 thousands km



SC “SPEKTR-R” was launched in July 2011, in Operation

Moscow State University Satellite “LOMONOSOV”

Space Goals:

- **Registration of Cosmic Rays with Extremely High Energies,**
- **Search for Space Gamma-Rays Bursts,**
- **Monitoring of Lighting Phenomena in Terrestrial Upper Atmosphere,**
- **Optical Observations of Space Debris and Small Celestial Bodies**

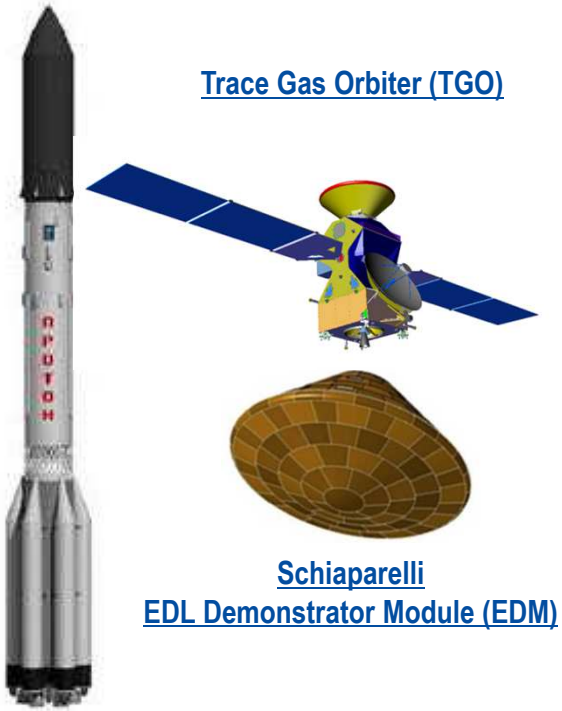
The Satellite was launched in April 2016

“ExoMars” Project – Current State

“ExoMars” – Two Missions with Launches in 2016 and 2020

- Mission-2016: now the *Trace Gas Orbiter* is passing into the working orbit
- Mission-2020: Carrier Module and Descent Module are under design and tests, Descent Module involves the Rover and Landing Platform – future Martian Long-lived Exploratory Station

2016 Mission



Proton M

Trace Gas Orbiter (TGO)

Schiaparelli
EDL Demonstrator Module (EDM)

ESA ESTRACK

NASA DSN

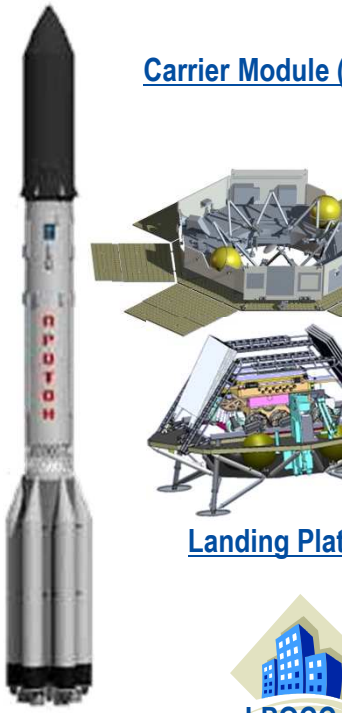
ROS Antennas

MOCC @ ESOC Spacecraft Operations

Science Operations Centre ESAC

Science Archive Back-up Centre IKI

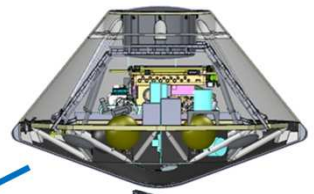
2020 Mission



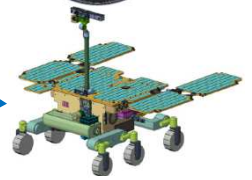
Proton M

Carrier Module (CM)

Descent Module (DM)



Landing Platform



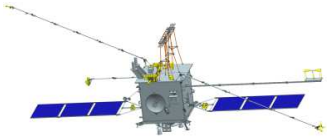
Rover

LPOCC

ROCC

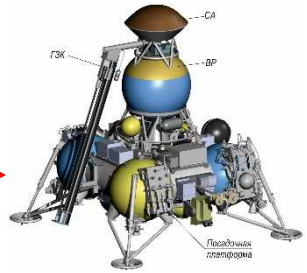
Russian Lunar Exploration Robotics Program
(in cooperation with ESA)

Luna-25
(Luna-*Glob*),
2019/2020

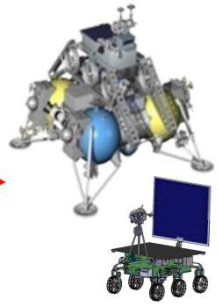


Luna-26
(Luna-Resurs-1
(Orbiter))
2021/2022

Luna-27
(Luna-Resurs-1
(Lander))
2022/2023



Luna-28/
Luna-Ground
(Luna-Grunt),
1-launche version
after 2025



Luna-Lunokhod
(Lunokhod/Rover),
1-launche version
after 2025

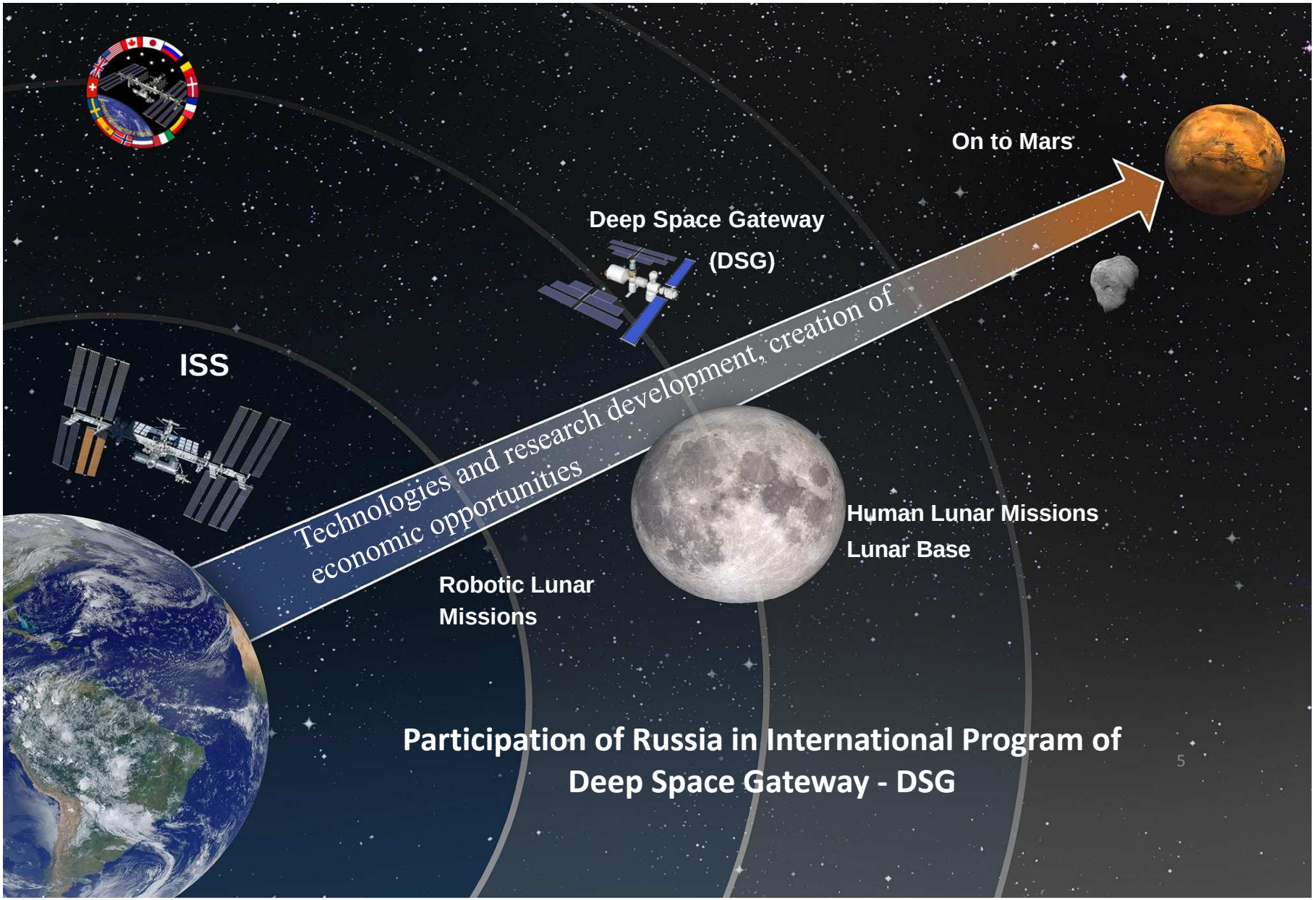
ESA Increasing Involvement :

”Luna-25” – one device “Pilot-D” (in testing mode),
“Luna-27” – the system of precise and safe landing, ground-sampling device (with drill), several scientific facilities,
“Luna-28”: in-depth cooperation and equal responsibility.
ESA – ESTRACK: operations are planned for all lunar missions

The Program is coordinated with Chinese National Lunar Program

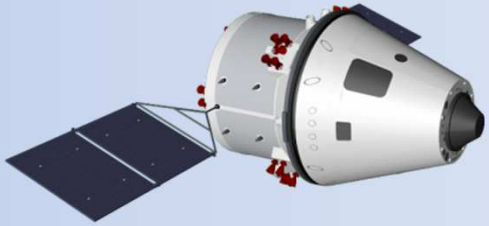
The Program is open for re-start of cooperation with ISRO and other international Partners

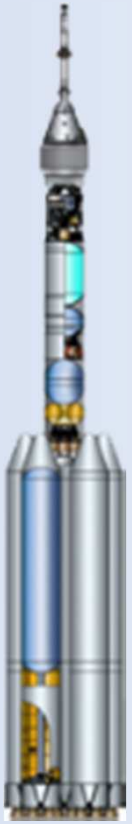
The Global Exploration Roadmap



POSSIBLE RUSSIAN CONTRIBUTIONS

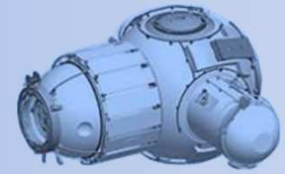
- **Russian Transportation System:**
  - ✓ Piloted spacecraft “Federation”
  - ✓ Super heavy LV





- **Robotic Research Missions**

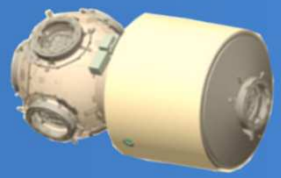
- **Airlock Module**



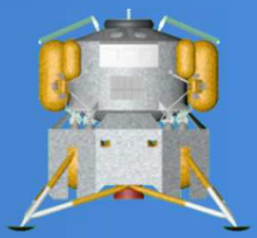
- **Russian Mission Control Center (TsUP)**

POSSIBLE JOINT CONTRIBUTIONS

- **Lunar Mission Support Module**



- **Lunar Infrastructure Elements**



POSSIBLE DSG CONFIGURATION