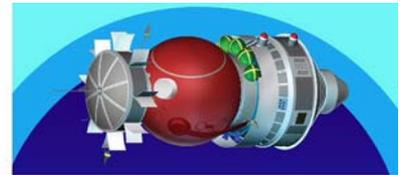




Human Spaceflight
SPACE FOR LIFE

Foton-M2 Mission



Mission Overview

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Foton are Russian unmanned recoverable capsules, which are used to carry out scientific experimentation in low Earth orbit. It has been flying since 1985 though this family of recoverable capsules, which also includes the Bion and Resurs-F has been in service since the early 1970s. The design is based on the famous Vostok spacecraft, which carried Yuri Gagarin as the first man into space in 1961.



Closed Foton-M1 spacecraft during procedures to integrate it into a Soyuz launcher nose cone in 2002. (Image: ESA)

The European Space Agency has been participating in this type of scientific mission for 18 years, the first of which was the Bion-8 mission in 1987. ESA's participation in the Bion-8 mission accounted for three experiments with a mass of a few kilogrammes. After ten such missions (seven

on Foton and three on Bion), the Foton-M2 mission becomes the eleventh Foton/Bion mission with ESA involvement, with a European payload of 385 kg covering 39 experiments. The Foton-M2 spacecraft will be put into orbit by a Soyuz-U launcher on 31 May 2005. The spacecraft will remain in orbit a total of 16 days, thereafter its re-entry module returning to earth with the aid of a parachute system.

The experiments cover a wide range of scientific disciplines, including fluid physics, biology, crystal growth, meteoritics, radiation dosimetry and exobiology. Applied research plays a prominent role with heat transfer experiments in the FluidPac facility, chemical diffusion experiments in the SCCO experiment, and material science investigations in the AGAT and Polizon furnaces. These experiments will likely contribute, respectively, to new heat-exchanger designs, to more efficient oil extraction processes, and to better semiconductor alloys.



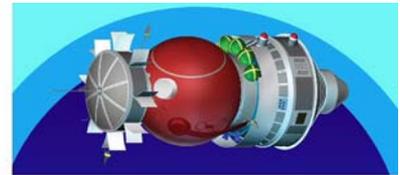
Foton experiments such as SCCO could help in the development of more efficient oil extraction processes (Image: ESA)

As on previous missions, biological research receives a great deal of attention, this time emphasising fundamental questions about the origin and spreading of life forms in space. Biopan, which is hosting most of these ground-breaking experiments, is making its fifth scientific



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flight on Foton. Education also plays a role in the mission with a germination experiment, which has come from ESA's education programme.



The Biopan facility after being opened at ESA/ESTEC following landing of the Foton-12 mission. 28 September 1999. (Image: ESA)

The Foton-M2 mission provides the reflight opportunities for almost the entire experiment programme originally assigned to Foton-M1. This was lost due to launcher failure on 15 October 2002.



The procurement order for Foton-M2 and Foton-M3 being signed on 21 October 2003 (Image: ESA)

The mission is part of an agreement signed between ESA and the Russian Space Agency, Roskosmos, on 21 October 2003. The agreement covered two Foton flights (Foton-M2 and Foton-M3), which would have a combined total of 660 kg of ESA-supplied scientific payloads on board. The agreement also ties in two Russian partner companies: the Barmin Design Bureau for General Engineering (KBOM) in Moscow and TsSKB-Progress in Samara, Russia.

Within the Foton-M2 experiment programme ESA is cooperating with other European and non-European agencies such as the German Aerospace Center (DLR), the French Space Agency (CNES) and the Canadian Space Agency.



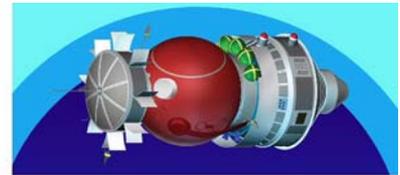
Foton-M2 mission logo showing individual partner logos (Image: ESA/D. Ducros)

The preliminary payload for the following flight as part of the Foton-M3 mission is set to include various experiments in biology, exobiology, fluid physics, protein crystallisation, material science, new re-entry technology plus additional autonomous experiments.



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Mission Key Reference Data

SPACECRAFT:

Launcher:
Spacecraft:

**Soyuz-U
Foton-M2**

LAUNCH and LANDING SITES:

Launch Site:
Landing Site:

**Baikonur Cosmodrome, Kazakhstan
Near town of Orenburg, Russia, close to
Russian/Kazakhstan border**

MISSION PARAMETERS:

Launch Date:

31 May 2005, 14:00 Central European Time

Lift off latitude
Lift off longitude
Inclination:

**63° E
45° N
63°**

Time in orbit:
Orbital period:
Altitude:

**~15 days 20 hour
89.9 minutes
262-304km**

Return Duration:
Landing:

**~30 minutes
16 June 2005, 10:32 Central European Time**