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PRODEX Programme – Annex 1

PRODEX Poles of Expertise in Belgium

Issue June 2018

This list is subject to regular reviews and can be consulted at <u>www.belspo.be/space</u>. Coordinated suggestions from the Belgian scientific community to update it are welcome and meetings can be organized to discuss future Belgian priorities.

A. Space Sciences (SS)

- Solar and Plasma Physics
- Planetary Atmospheres
- Planetary Geodesy
- Astrometry, Binaries and Fundamental Stellar Parameters
- Asteroseismology and Variable Stars
- Stellar Atmospheres and Circumstellar Material
- High-Energy Astrophysics
- Quasars, Gravitational Lenses and Cosmology

B. Space Exploration (SE)

- Planetary Atmospheres
- Planetary Geodesy

C. Earth Observation (EO)

- Atmospheric Chemistry
- Meteorology and Climatology

Other scientific topics in EO are supported within the STEREO Programme of BELSPO. The development of instruments related to all topics of EO can however be considered within PRODEX.

D. Life and Physical Sciences in Space (LS&PS)

Since end 2016, the slice SciSpacE of the E3P Programme of ESA has replaced the ELIPS Programme of ESA (2001-2016) for the development of experiments in the area of LS&PS. The table below summarizes the Science Road Maps underpinning the SciSpacE objectives which are of application in Belgium, as participating state to E3P.

Top level Road Map themes		
Physical Sciences	Biology	Human Research
Ultra-precise cold atom sensors, quantum information and high energy particles Boundaries of relativity and quantum physics. Advanced navigation and communication. Soft or Complex matter Interactions and self-organisation in foams, emulsions, granular matter, atmospheric dust and colloids. Food and (petro)chemical industry, physics of biological processes. Boiling, evaporation and heat transfer Multi-scale modelling of fluid physics including phase change. Efficient cooling of micro- electronics, industrial boilers and power plants.	Astrobiology Chemical and biological effects of exposure to space radiation and vacuum. Origins, limits and signs of life in the Universe. Biology under non-Earth gravity conditions Understanding gravity-dependent processes in cells and organisms. Unravelling the biochemistry of processes in the human immune, skeletal and cardiovascular systems. Supporting life in hostile environments Understanding the effects of space factors on microorganisms and plants. Integrated closed-loop life support systems for exploration.	The Human body under space conditions: adaptations and countermeasuresUnderstanding human physiological processes. Exploration -related health risks and their prevention. Health and ageing issues on Earth.Psychological and neurosensory adaptations to reduced gravity, isolation and confinementImpact of spaceflight on psychological, sensorimotor and neuro-behavioural performance. Selection, training and support methodologies for crew on long- duration missions.
Casting, automotive and aerospace industry.	Cosmic radiation risks for Human Exploration of the Solar System	
Selfstanding and multidisciplinary research		

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Energy storage, fire safety, cardiovascular fluid physics, hibernation and torpor