HIGH-ENERGY PHYSICS AND OTHER APPLICATIONS

Besides providing a driver beam for a free-electron laser, EuPRAXIA targets applications for high-quality electron beams that exploit the unique features of plasma accelerators.

Innovation potential of EuPRAXIA

Phase-contrast x-ray imaging using betatron radiation

Wakefield-accelerated electrons may produce betatron radiation. The small source size and high spatial coherence of the high-brilliance x-ray beams is ideal for phase-contrast imaging.

Gamma ray sources by Inverse Compton Scattering

EuPRAXIA could provide an all-optical gamma ray source by scattering a laser off the wakefield-accelerated electron beam. The bright gamma ray beams emitted may be used to study nuclear processes.

High-energy physics detector technology

Detector components can profit from superior timing of beam electrons, variable number of electrons in beam bunches, and a large range of beam diameters and angular divergences.

High-energy-density physics

The bright hard x-rays produced by betatron radiation in wakefield acceleration are an ideal tool for probing high-energy-density plasmas.

Medical accelerator technology

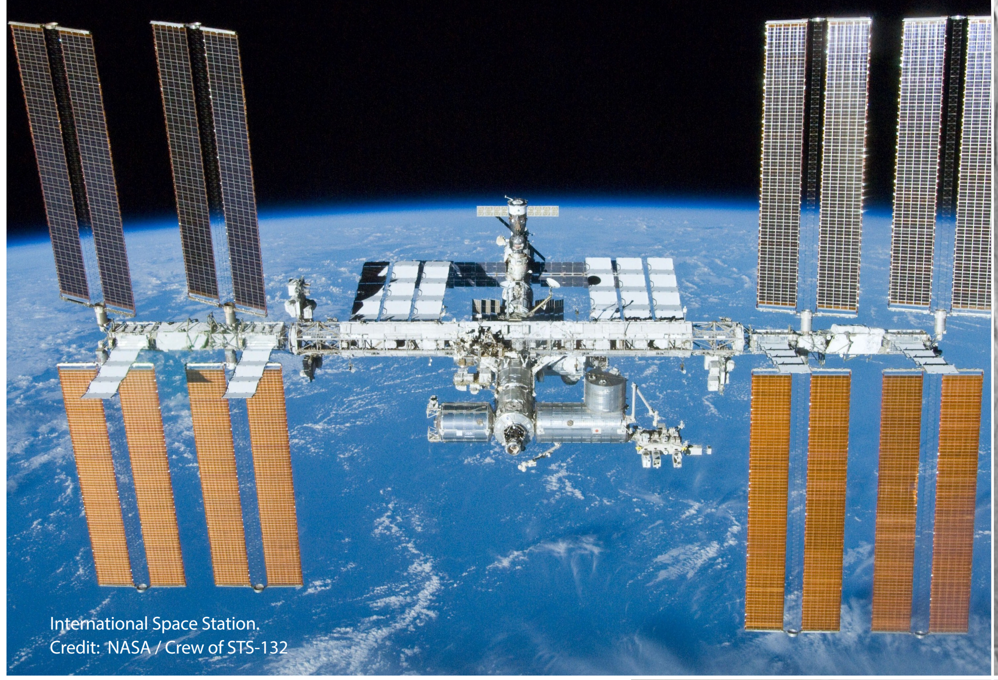
The achievements in EuPRAXIA towards stable plasma accelerators will directly demonstrate the path to medical applications.

Reproduction of space radiation

The particular time structure and energy spectrum of wakefield-accelerated electrons can be of particular interest for studying radiation damage in electronic components for space technology.

Positron sources

EuPRAXIA will examine the possibility of creating low-emittance high-charge positron beams for various applications.


International Space Station.
Credit: NASA / Crew of STS-132

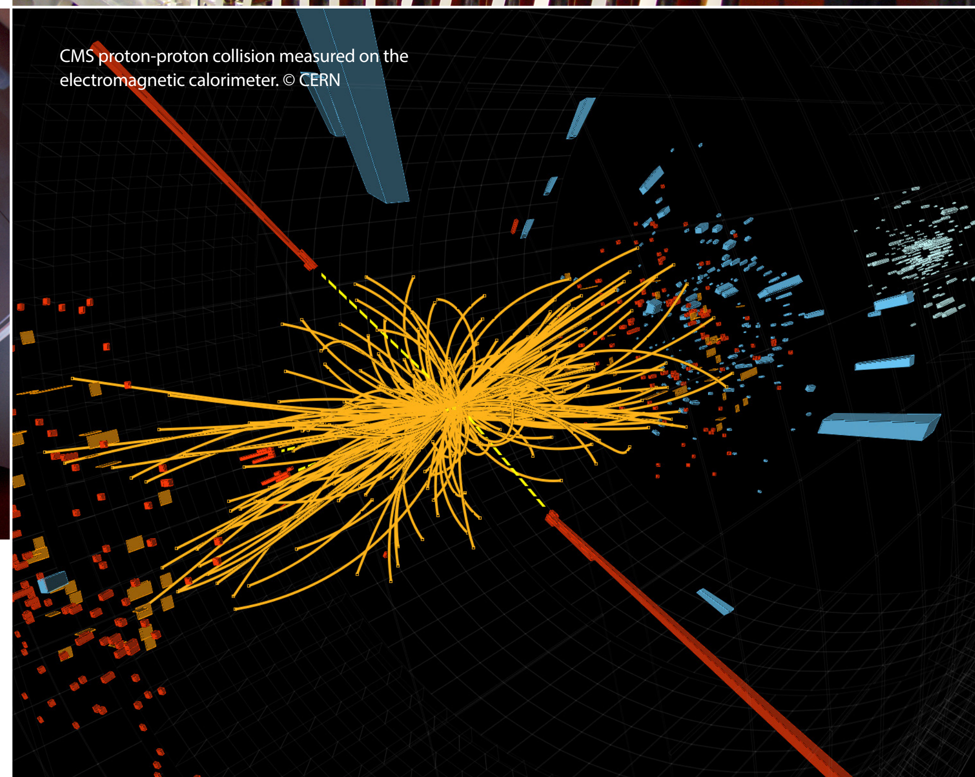

Phase-contrast x-ray image of spider.
© Excillum AB, Sweden

Unique characteristics of plasma accelerators

- Ultra-high instantaneous particle flux.
- Short bunch duration.
- Unique time structure and energy spectrum.
- High-quality electron beam synchronized with a laser.


LHCb VErtex LOcator (VELO) system. © CERN


Woman being prepared for radiation therapy.
Credit: Michael Anderson (Photographer)


CMS proton-proton collision measured on the electromagnetic calorimeter. © CERN

This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant no. 653782. The information herein reflects only the views of its authors and the Research Executive Agency is not responsible for any use that may be made of the information contained.

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