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Gamma Factory proposal

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Atomic physics, dismissed prematurely by many to the role of introductory chemistry, had a remarkable renaissance in recent decades thanks to the new ideas and progress in laser technologies. Could this path be followed in other research domains which address femtometer length scales? The key challenge is to create high intensity and brilliance photon beams in the gamma-ray, MeV region, which is inaccessible for the FEL based technologies. The aim of the Gamma Factory project, presented in this talk, is to extend the intensity frontier of the presently operating gamma beam sources by, at least, 6-7 orders of magnitude, for tuneable-energy, quasi-monochromatic gamma-rays, within the photon energy range of 100KeV - 400 MeV. The underlying idea is to use the CERNs high energy beams of partially stripped atoms as “converters” of the laser photons into the MeV gamma rays. High intensity gamma-ray beams could be used in a very broad spectrum of research domains such as: fundamental QED measurements, dark matter searches, investigation of basic symmetries of the Universe, studies of the QCD-confinement phenomena and studies of nuclear structure. They could generate high intensity, polarised electron, positron and muon beams for the future high energy physics projects, such as the TeV-range lepton collider and neutrino factory. They could also be used to produce intense neutron and radioactive beams for the nuclear physics applications.

Experimental Collaboration

The Gamma Factory study group

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