

Physics Opportunities with the Gamma Factory

D BUDKER^{1,2,3}

¹*Department of Physics, University of California, Berkeley CA, USA*

²*Helmholtz-Institut Mainz, GSI Helmholtzzentrum für Schwerionenforschung, Mainz, Germany*

³*Johannes Gutenberg-Universität Mainz, Mainz, Germany*

Contact Email: budker@uni-mainz.de

The Gamma Factory (GF) is an ambitious CERN proposal [1] for a source of photons with energies up to about 400 MeV and photon fluxes up to 10^{17} photons per second, exceeding those of the currently available gamma sources by orders of magnitude. The high-energy (secondary) photons are produced via resonant scattering of the primary laser photons by highly relativistic partially-stripped ions circulating in the accelerator. The secondary photons are emitted in a narrow cone, and the beam's energy can be monochromatized, eventually down to the ppm level, via collimation, at the expense of the photon flux. In this talk, we will highlight the opportunities offered by the GF in fundamental physics across many subfields [2-4].

References

- [1] M W Krasny, arXiv:1511.07794 [hep-ex] (2015)
- [2] D Budker, J C Berengut, V V Flambaum, M Gorchtein, J Jin, F Karbstein, M W Krasny, Y A Litvinov, A Pálffy, V Pascalutsa, A Petrenko, A Surzhykov, P G Thirolf, M Vanderhaeghen, H A Weidenmüller and V Zelevinsky, arXiv:2106.06584 (2021)
- [3] B Wojtsekhowski and D Budker, Ann. Phys. (2021), DOI:10.1002/andp.202100141; arXiv:2104.03784 (2021)
- [4] D Budker, J R Crespo López-Urrutia, A Derevianko, V V Flambaum, M W Krasny, A Petrenko, S Pustelny, A Surzhykov, V A Yerokhin and M Zolotarev, Ann. Phys. (2020), DOI:10.1002/andp.202000204; arXiv:2003.03855 (2020)