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Technique for detecting high-energy electrons and positrons by means of synchrotron radiation in the Earth's magnetic field

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The anomalous effect discovered in the PAMELA experiment[1] and confirmed by subsequent cosmic ray experiments consists in a sharp increase of the fraction of galactic positrons over much of energy range 1.5 - 100 GeV, which contradicts theoretical predictions. To study this effect, a new experiment for detecting high-energy electrons and positrons using synchrotron radiation in the geomagnetic field was proposed[2].

In this work, we simulated the operation of a detector for different satellite orbits and orientations. The counting rate of the detector located in the polar orbits at an altitude of 400 km above the Earth's surface for positrons in the energy range 1 - 10 TeV has been estimated.

[1] O. Adriani, G. C. Barbarino, G. A. Bazilevskaya // An anomalous positron abundance in cosmic rays with energies 1.5–100 GeV // *Nature*, 2 April 2009.

[2] A. M. Galper, S. V. Koldashov, V. V. Mikhailov and O. F. Prilutskii // High energy positron detection via synchrotron emission in magnetosphere // *Journal of Physics: Conference Series*, Volume 798, International Conference on Particle Physics and Astrophysics, 10–14 October 2016.

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