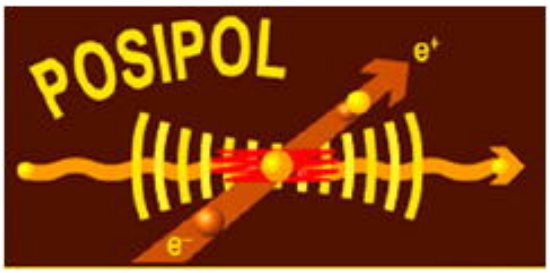

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Analysis of circular polarization of - quanta with energy 10-30 MeV using Compton-polarimeter.

Thursday, 25 June 2009 11:00 (30 minutes)

Recently the proof-of-principle experiments were carried out where a circularly polarized beams of -quanta with energy MeV have been produced in order to generate longitudinal-polarized positrons [1, 2].
In [1] the circularly polarized -beam was obtained via Compton backscattering of circularly polarized laser photons by an electron beam with energy 1.28 GeV.For real positron sources a required intensity of a laser flash may lead to significant contribution of a non-linear Compton process that leads to deterioration of polarization of a resulting -beam. The direct measurement of a -beam circular polarization will allow not only to estimate a validity of theoretical calculations, but also to use the obtained information for simulation of polarization characteristics of positrons.
We offer to use a Compton polarimeter for this purpose where the recoil electrons from a circularly polarized -quanta scattering in a thin iron magnetized target are detected.
We have performed simulation of Compton-polarimeter using CEANT4 code. For the 0.2 mm target thickness and 20 MeV photons we obtained the electron yield from Compton and pair production processes. Calculations show that energy-angular selection of the outgoing electrons corresponding to the acceptance of the polarimeter allows to suppress a contribution from pair process down to a few percent level. For the photon polarization error as low as 10% it is necessary to detect ˜ 10 electrons.

1.Omori T., Fukuda M., Hirose T. et al. Phys. Rev. Lett., 2006, v. 96, p.114801.
2.Alexander G., Barley J., Batygin Y. et al. Phys. Rev. Lett., 2006, v. 100, p. 210801.

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