Contribution ID: **36** Type: **Poster report**

LINEAR TRANSVERSE, ANGULAR, AND TIME CHARACTERISTICS OF ELECTRON-TO-POSITRON CONVERSION AT E^-⊠(55; 220; 1000) MeV

Thursday 15 October 2020 18:55 (20 minutes)

Beams of ultrarelativistic positrons are an essential tool for experimental studies in physics of atomic nuclei and elementary particles. Usually positrons for these beams are produced by conversion of ultrarelativistic electrons to positrons in thick targets-converters. In one variant some magnetic system separates from all positrons from converter those which have necessary energy without their additional acceleration (see, e.g., [1, 2]). In another variant initial positrons, emitted from converters with rather low energies, undergo acceleration up to necessary energies (see, e.g., [3, 4]).

The most important characteristic of positron generation in converters is a coefficient of conversion K(E^-,E^+,T,Z)=N^+/(N^-*Delta\Omega^*+Delta\E^+)

for a "instantaneous and needle-like"beam of electrons, normally incident on a converter, and a positron emission angle theta+\approx 0, where E^- and E^+ –kinetic energies of electrons and positrons; T–a converter thickness; Z–an atomic number of a converter material; N^- and N^+ –numbers of incident electrons and emitted positrons; \Delta\Omega^+ and \Delta E^+ small considered values of a solid angle and an energy spread for emitted positrons. In the previous our work [5] the calculations were made using GEANT-4 [6] for the pointed out conversion coefficients K for E^- from 10 MeV and up to 1000 MeV for converters from Cu, Ta, and Pb and close to optimal values of T in comparison with available experimental data.

To understand the possibilities of further handling positron beams from converters, one need to know also linear transverse, angular, and time characteristics of electron-to-positron conversion which we obtained in the present work from full array of data, calculated in [5] and compared them with some known data from [7–9].

The obtained new data together with K(E^-,E^+,T,Z)-data from [5] may be useful in modeling and designing equipment for matching emittances of positron beams and acceptances of further magnet systems and/or additional positron accelerators.

1. J.Miller, C.Schuhl, C.Tzara, G.Tamas. // J. Physique Rad. 1960. V.21. P.755.
2. L.Z.Dzhilavyan, N.P.Kucher. // Sov. J. Nucl. Phys. 1979. V.30. P.151.
3. C.P.Jupiter, N.E.Hansen, R.E.Shafer, S.C.Fultz. // Phys. Rev. 1961. V.121. P.866.
4. L.Z.Dzhilavyan, A.I.Karev. Proc. VII Sov. Part. Accel. Conf. JINR. Dubna. 1981. V.1. P.209.
5. S.S.Belyshev, L.Z.Dzhilavyan. Int. Conf. "Nucleus-2019". Book of Abstracts. Dubna. 2019. P.340.
6. GEANT-4. Version: geant4 9.5.0 (December, 2011) // Physics Reference Manual.
7. D.F.Crawford, H.Messel. Nucl. Phys. 1965. V.61. P.145.
8. J.Haissinski. // Nucl. Instrum. and Methods. 1967. V.51. P.181.
9. C.N.Yang. Phys. Rev. 1951. V.84. P.599.

Primary author: Dr DZHILAVYAN, Leonid (INR RAS)

Co-author: Mr BELYSHEV , Serge (Physics department of the Lomonosov Moscow state university)

Presenter: Dr DZHILAVYAN, Leonid (INR RAS)

Session Classification: Poster session 3 (part 4)

Track Classification: Section 3. Modern nuclear physics methods and technologies.