Contribution ID: **235** Type: **Oral talk (15 min + 5 min questions)**

4 MeV ENERGY PROTONS FOCUSING BY DIELECTRIC CAPILLARY IN THE AIR

Friday, 15 July 2022 16:00 (20 minutes)

A classical method of the charge particle microbeams formation is based on magnetic or electrostatic ion focusing with preliminary input beam collimation. An alternative method of the microbeams formation is using of the capillary. New systems of transformation, control and transfer of the charged particle beams can be developed on a basis of this effect, particularly for obtaining the micron and submicron-sized beams which are interested for elemental and structure analysis, nanolithography, medical and biological applications, radiation technologies [1-3]. This method is the easiest and cheapest one for using in comparing with the existing micron radiation methods.
Experimental studies of transfer and focusing processes of the 4 MeV initial energy proton beam are carried out. For proton beam transportation into the air the SterilleFemtotips 11 dielectric capillary with 58 mm length (din = 1,5 mm, dout = 92 ± 3 mu-m; din = 1,5 mm, dout = 0,5 ± 0,2 mu-m) are used. EGP-10 accelerator [4] is used as a proton source.
The optimal distances from capillary to research object are determined as well as time when the least divergence of the beam is observed. Proton energetic spectra are obtained after passing of the protons through the capillary with and without the conductive layer. The method of the beam size determination using the semiconductor detector is proposed. Proton beam sizes at the beam ejection into the air are determined.
Recommendations of formation of proton micron and submicron-sized beam at EGP-10 accelerator are made basing on obtained experimental data.

1. A.S. Kamyshan et al, Vestnik BGU (2007).
2. G.U.L.Nagy et al., Nuclear Inst. and Methods in Physics Research B. (2018).
3. S. Wongke et al., Surface & Coatings Technology 399 (2020).
4. S.N. Abramovich, VANT Ser. Fiz.Yad.Reak. TIYaS-XI. 4. (1997).

The speaker is a student or young scientist

Yes

Section

1. Design and development of charged particle accelerators and ionizing radiation sources

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