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High Resolution Particle Beam Monitoring and Proportional Counters with the Help of Single Carbon Nanotubes

After a short review of modern beam monitors, ionization and proportional counters and discussion of the necessity to have thinner wires of better radiation hardness it is considered the possibility of the use of single carbon nanotubes to improve their resolution. Using the measured physical properties of nanotubes it is proposed the construction of nanotube particle beam monitors and counters and it is shown that nanotube beam monitors with nanometer resolution can be successfully used at high beam current densities of future International Linear Colliders. The calculated amplification factors of nanotube proportional chambers is better than in metallic wire chambers.

Summary (Additional text describing your work. Can be pasted here or give an URL to a PDF document):

As it has been shown in our works the nanocrystals of carbon nanotubes (NT) can find application in high energy and X-ray physics (see the review [1]). Films of oriented NTs already serve as cathode emitters for electron and X-ray beam production, and there is a proposal to construct particle detectors with better ability of particle identification using such films. On the basis of not oriented NTs there are tested radiation detectors sensitive to UV and IR. The advance of the methods of NT production and nanomanipulation allows to put the following question: can isolated single NTs be used in high energy physics due to their unique physical properties, or no? At present long NTs, in particular, separate single wall nanotubes (SWNT) with length more than 4 cm are produced. SWNT and the multi wall nanotubes (MWNT) have diameters equal to a few and few tens of nm, respectively, i.e. they are much thinner than the diameter of metallic wires and the laser beam diameter of the order of a few microns. NTs have sufficiently good radiation hardness. The advance of the methods of NT production and nanomanipulation allows to put the following question: can isolated single NTs be used in high energy physics due to their unique physical properties, or no?

1. X. Artru, S.P.Fomin, K.A. Ispirian, N.P. Shulga, N.K. Zhevago, Phys. Rep. 412, 89-189,
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