STRAW-DETECTOR WITH CATHODE READ-OUT

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The detectors based on thin drift tubes (straw) with a diameter of 4 to 10 mm are widely used nowadays as position-sensitive detectors, for example, in such experiments as SDC, ATLAS, COMPASS. These detectors have several advantages: high coordinate resolution (by measuring the drift time) of about 100 microns, track reconstruction efficiency close to 100%, the rate capability of 500 kHz per readout channel, simple design, and, consequently, relatively low cost. Additionally, the cylindrical geometry of the tube provides good mechanical properties at a low weight.

At present with the rise of beam luminosity of modern accelerators the rate capability becomes the most important detector parameter, which is achieved either by increasing the registration speed, or decreasing the detector size. This applies to the straw tubes, where the problem of reducing the rate per readout channel is usually solved by using tubes of smaller diameters.

We propose to solve the problem of increasing the straw tube rate capability by independent readout of avalanche-induced signals from electrically isolated segments on the cathode surface. The signal from an avalanche at the anode wire is induced on one or more segments of the cathode, depending on the diameter of the tube, the length of the segment and the place of formation of the avalanche. Information from the cathode segments is used both to determine the radial coordinate of the particle track by measuring the drift time of the primary ionization and to localize the position of the track along the straw by the number of the fired cathode segment [1].

Manufacturing of such segmented straw tubes became possible thanks to development of technology of ultrasonic welding of Mylar tape [2]. It should be noted that the tubes made by ultrasonic welding have thinner walls than ones produced by conventional tape winding technology. Such tubes can withstand pressure up to 8 atmospheres.

The proposed method for increasing the rate capability of straw detectors by using cathode segmentation has several advantages such as high "transparency" for particles, possibility to register two track coordinates at once and high manufacturability of ultrasonically welded straw tubes.

1. N.A.Kuchinskiy, V.A.Baranov, V.N.Duginov, *et al.* // JINR P13-2013-100.
2. S.A.Movchan // NIM. A. 2009. V.604. P.307.