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Test results of a new design of the thick gas electron multiplier

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Widely using of gas electron multiplier (GEM) in nuclear physics and applications are due to a several number of attractive features such as high spatial and time resolution, the ability to work in more intensive beams compared with wire detectors. The paper presents the recent results of the study of characteristics of a thick gas electron multiplier (TGEM), whose design has fundamental differences from other devices of this type. The first difference is that both electrodes with holes are separated by a gas gap through spacers. This option substantially eliminates the surface leakage current on the inner walls of TGEM holes. This makes possible to apply a higher voltage to the electrodes of the detector. As a result the electron rnultiplication factor of the order L06 can be obtained without entering the area of the streamer or Geiger discharges. The second difference consists in the use of dielectric films on inner surfaces of whole electrodes in the gas gap. Thanks to this solution it is possible to avoid the ejection of secondary electrons from a metal surface under bombardment of electrodes by a high energy photons and gamma rays. Thus the possibility of spark breakdown is significantly reduced. For p-particles with energy r.rp to 3 MeV from a radioactive source lsreo-Yeo1 the pulse amplitude of several volts at the load resistor 50 ohms has been measured. The maximum working voltage on TGEM was about of 4.5 kV for the gas mixture of 75% argon +25% CAz. The pulse width was observed in the range of 5 to 10 ns depending on the angle of incident of particles.

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