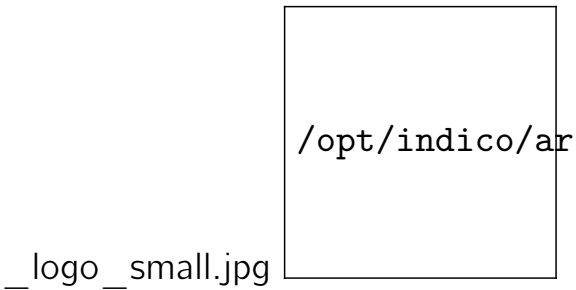

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High resolution micro-pattern gas detectors for particle physics, developments at the Budker INP

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Content

Micro-pattern gaseous detectors (MPGDs) allow operation at very high background particle flux with high efficiency and spatial resolution. This combination of parameters determines the main application of these detectors in particle physics experiments: precise tracking in the areas close to the beam and in the end-cap regions of general purpose detectors. MPGDs of different configurations have been developed and are under development for several experiments in the Budker INP. The system of 8 two-coordinate detectors based on cascade of Gas Electron Multipliers (GEM) is working at the KEDR experiment at the VEPP-4M collider in the tagging system that detects electrons and positrons, lost their energy in two-photon interactions and taken out of the equilibrium orbit by a dedicated magnetic system. Another set of cascaded GEM detectors is developed for the almost-real Photons Tagging System (PTS) of the DEUTRON facility at the VEPP-3 storage ring. The PTS contains 3 very light detectors (material content is about 0.2% of radiation length) with very high spatial resolution (below 50 um). At present the system is completed and the detectors are under tests at the extracted electron beam facility at the VEPP-4M collider. Dedicated detectors based on cascaded GEMs are developed for the extracted electron beam facility at the VEPP-4M collider. These devices will allow precise particle tracking with minimal multiple scattering having very low material content (about 0.2% of radiation length). The readout structure of these detectors has 0.25 mm strip pitch in X and Y directions, and spatial resolution below 50 um is expected from them according to the simulation studies. The last results from the first detector of this series will be presented at the Conference. An upgrade of the coordinate system of the CMD-3 detector at the VEPP-2000 collider is proposed on the basis of the resistive micro-WELL (mu-rWELL). This structure is in fact the GEM lying at the resistive surface that have readout structure below the resistive layer. If a high voltage is applied between the top GEM electrode and the resistive layer, the gas amplification occurs in the GEM holes (wells) and such structure works as a surface with distributed amplification. An advantage of such approach in comparison with cascaded GEMs system is that there is only one active surface and, thus, a detector with curved (i.e. cylindrical) surface can be easier to manufacture. We propose to make a thin cylindrical chamber based on mu-rWELL and thin end-cap disc detectors based on the same technology. A research activity on this subject is starting.

Summary

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