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Development of innovative micropattern gaseous detectors with resistive electrodes and first results of their applications

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Recently developed micropattern gaseous detectors open new avenues in the detectors technology. However, due to the fine structure of their electrodes, these detectors are quite fragile and can be damaged by sparks. We have developed and successfully tested several prototypes of micropattern gaseous detectors based on a new design in which the cathode or the anode (in some case both of the electrodes) are coated by thin or thick resistive layers. These resistive coatings protect the detector and the front-end electronics in the case of sparks and thus make the detectors more robust and reliable. For example, an array of anode micropins each positioned in the centre of the microholes drilled in a thin resistive cathodes plate could operate either in proportional mode (at gains of up to 105) or in a streamer mode with an efficiency close to 100% for detection of x-ray photons.
We also investigated the possible application of such detectors combined with CsI photocathodes to the detection of UV photons. The results of systematic studies of the characteristics of these detectors including rate capability and a long-term stability under the harsh conditions will be presented.
Finally, we will present the first results of their applications to high energy physic and X-ray imaging.

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