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Measurement of the time of flight of charged particles using the MCP detector

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Experiments with radioactive isotope beams become the direction of nuclear physics, which is currently very intensively developed. Using of such beams for modern nuclear physics research is highlighted by some problems, such as obtaining the required intensity beams themselves, accelerating them to the required energy and registering the products of nuclear reactions. The task of recording and further studying the results obtained, due to the complexity of experiments of a similar level (a large variety of reaction channels, the presence of neutron and gamma background, etc.), places special requirements on the characteristics of the recording equipment used. Under these conditions, one of the most efficiently used methods for determining the energy of a particle is the time-of-flight method, in which the energy is determined by measuring the time of flight of a particle of a given distance.

An important element of the time-of-flight technique is the start detector, which must have a high temporal resolution, minimal stopping losses when registering heavy reaction products, low sensitivity to the background of light particles and resistance to radiation damage. In our work, the MCP-detector (a detector based on microchannel plates) was chosen as the starting detector. As the primary test results for this setup, a time resolution was obtained.

The results of such studies are of practical importance for modern nuclear physics measurements. In particular, it is possible to use the electronic equipment described in the work as part of the data collection system of a nuclear physical installation.

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