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New technique of ion identification in Accelerator Mass Spectrometry using low-pressure TPC with GEM readout

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We have developed and successfully tested a low-pressure Time Projection Chamber (TPC) with Gas Electron Multiplier (GEM) readout for Accelerator Mass Spectrometry (AMS).

At AMS in Novosibirsk, there is a problem to separate isobar ions of different chemical elements that have the same atomic mass. The typical example is radioactive isotopes ^{10}Be and ^{10}B that are used to date geological objects at a time scale of one million years. To solve this problem, a new ion identification technique, namely that based on measuring both ion track ranges and ion energies in low-pressure TPCs with GEM readout, has been developed. This technique is proposed to be applied in AMS for dating geological objects, namely for geochronology of Cenozoic era. We developed the TPC with a dedicated thin silicon nitride window for an efficient passage of ions. The TPC characteristics were studied in isobutane at low pressures using alpha particles of different energies. Based on these data and SRIM code simulation, it was shown that it is possible to efficiently separate isobaric boron and beryllium ions at a nominal pressure (50 torr). Based on this technology, a dedicated TPC was made, which is currently installed on the AMS. The latest results will be presented in my report.

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