

Performance of the HADES T0 and beam tracking prototype system based on Ultra Fast Silicon Detectors

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The HADES collaboration [1] at GSI Darmstadt, Germany, is developing a new T0 and beam tracking system based on the Low Gain Avalanche Diodes (LGAD) [3,4], aka Ultra Fast Silicon Detectors (UFSD).

The group has prepared a demonstration system realized as a beam telescope consisting of two UFSD strip sensors with size of about 5mm x 5mm and the strip structure with a 140 μm pitch. They are equipped with multi-stage analog amplifying circuits connected to leading edge discriminators whose outputs were digitized by a TDC system based on the FPGA-TDC concept.

In a series of experiments conducted at COSY Synchrotron at Jülich, we have demonstrated a timing precision of 56 ps. To our knowledge, these are the best results obtained so far using this type of sensors integrated in a complete detection system.

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[1] Agakishiev, G. et al. Eur. Phys. J. A41:243-277, 2009

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Primary authors: Dr PIETRASZKO, Jerzy (GSI Helmholtzzentrum für Schwerionenforschung GmbH, 64291 Darmstadt, Germany); Dr WENDISCH, Christian (GSI Helmholtzzentrum für Schwerionenforschung GmbH, 64291 Darmstadt, Germany); Dr KOENIG, Wolfgang (GSI Helmholtzzentrum für Schwerionenforschung GmbH, 64291 Darmstadt, Germany); TRAEGER, Michael (GSI Helmholtzzentrum für Schwerionenforschung GmbH, 64291 Darmstadt, Germany); Dr KIS, Mladen (GSI Helmholtzzentrum für Schwerionenforschung GmbH, 64291 Darmstadt, Germany); TRAXLER, Michael (GSI Helmholtzzentrum für Schwerionenforschung GmbH); LINEV, Serguei (GSI Darmstadt); MICHEL, Jan (Goethe University Frankfurt); KOZIEL, Michal (IKF Frankfurt am Main); ROST, Adrian Wolfgang (Technische Universität Darmstadt (DE)); GALATYUK, Tetyana (TU Darmstadt / GSI); SUMARA, Konrad (Smoluchowski Institute of Physics, Jagiellonian University of Cracow, 30-059 Kraków, Poland)

Presenter: Dr PIETRASZKO, Jerzy (GSI Helmholtzzentrum für Schwerionenforschung GmbH, 64291 Darmstadt, Germany)

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