

Fast timing detectors for the high field μ SR spectrometersA. Stoykov^{1,2}, R. Scheuermann¹, K. Sedlak¹¹*Laboratory for Muon Spin Spectroscopy,
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Observation of the muon spin precession in high magnetic fields imposes strict requirements on the time resolution of the scintillation counters used for detection of incoming muons and the decay positrons. For example, the observed amplitude of the muon spin precession signal in 10 Tesla field will be above 55% of its low field value providing the time resolution of each counter (muon, positron) is better than $\sigma = 90$ ps [1].

The time resolution of PMT-based detectors is limited in high magnetic fields due to an additional broadening of the light pulses in the light guides. The detector systems using photodetectors insensitive to the magnetic field, such as multipixel Geiger-mode Avalanche Photodiodes (G-APDs), do not require light guides and thus can prove to be more advantageous for such application.

In this work we demonstrate the feasibility of G-APD based scintillation detectors meeting the requirements of the 10 Tesla μ SR spectrometer planned at the Swiss Muon Source of the Paul Scherrer Institut.

[1] *High Magnetic Field μ SR instrument. Project description.*

http://lmu.web.psi.ch/facilities/PSI-HiFi/Project_Description.pdf