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Read-out analog channel with interpolator for signal peak finding

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A prototype analog channel with digital processing system for read-out signals coming from GEM detectors is presented. Each channel consists of a CSA, shaper and followed by a 10-bit ADC. Data from ADC processing by digital system based on an interpolator for finding the signal peaks in the digital domain. Interpolation allows us to find the fit curve function, which passes through a given set of points. Knowing function, it is possible to calculate the intermediate values near to the expected signal peak.

In order to select an interpolation algorithm several known approaches were considered. An interpolation of Lagrange polynomials has been chosen for implementation. The interpolator uses the 6-th order Lagrange interpolation polynomial. It keeps the accuracy of finding the signal peak within 1 LSB of the ADC having sampling frequency of 25 MHz at 200 ns peaking time of shaper.

The analog channel was designed in 180 nm CMOS MMRF process of UMC.

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