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Implementation of the deconvolution method for signal peak detection in read-out ASIC

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An application of deconvolution to signal peak finding in readout ASIC for GEM detectors is described. Unlike the traditional approach based on the use of an analog or digital peak detector, it is proposed to use the deconvolution technique to find the signal peak. In this case the digital data coming from the ADC are processed by a digital filter that deconvolves the data according to the transfer function of the analog channel. Such processing allows to identify the peak of the signal and also separate the overlaid pulses. That makes the higher rate capability in analog channels and reduces the amount of lost data.

Implementation aspects and design results for the digital filter built in the UMC 180 nm MMRF CMOS process are presented. The developed architecture allows to separate overlaid signals with minimum six ADC samples between input impulses.

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