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Multichannel read-out ASIC design flow for high energy physics and cosmic rays experiments

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In the large-scale high energy physics and astrophysics experiments multi-channel read-out application specific integrated circuits (ASICs) are widely used. The ASICs for such experiments is a complicated system, which usually includes both analog and digital building blocks. A trend to a complication of the system architecture, increase of the channels and building blocks amount in the chip is required to the proper methodological approach to the system design. The paper presents the mixed-signal top to bottom design flow of the ASICs for high energy physics and cosmic rays experiments. This flow was successfully embedded to the development of the read-out ASIC prototype for the muon chambers of the CBM experiment. The approach was approved in UMC CMOS MMRF 180 nm process. The design flow permits to analyze the mixed-signal system operation on the different levels: functional, behavioral, schematic and post layout including parasitic elements. The proposed design flow allows reducing the simulation period and eliminating the functionality mismatches on the very early stage of the design.

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