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## **Multichannel Digital Readout Strategies for Next-Generation Physics Experiments**

*In the past decade, CAEN has dedicated considerable efforts to not only designing Digital Acquisition Systems but also developing firmware, software, and communication protocols that maximize the performance of these systems. With the introduction of a second generation of Digital Solutions, CAEN continues its strong collaboration with customers while leveraging new technologies such as 10 Gigabit Ethernet, USB 3, SoC, state-of-the-art FPGA, and detector-specific ASIC-based electronics. The second generation of CAEN Digital Solutions offers a unique combination of flexibility, high performance, and seamless integration, making them suitable for a wide range of applications.*

*Specifically, the new generation of Flash ADC Digitizers provides advanced capabilities in Digital Pulse Processing, thanks to a powerful open FPGA and user-friendly tools for programming custom firmware. Additionally, new high-speed communication protocols have been implemented, with ongoing studies to meet the throughput requirements of trigger-less/streaming DAQ. Furthermore, CAEN offers compact frontend solutions based on ASICs and a scalable architecture capable of reading thousands of channels from SiPMs, GEMs, Micromegas, Si strips, enabling precise energy measurements and extremely accurate timing.*