Titolo: Front-end channels in a 28 nm CMOS process for Pixel detectors in future High Energy physics colliders and advanced X-ray imaging instrumentation (PiHEX) Codice Progetto: 2022YW793M Responsabile scientifico UNIPD: Simone Gerardin Coordinatore nazionale: Università degli Studi di Bergamo Partner-Unità di ricerca: Università degli Studi di Padova CUP: C53D23001580006 Bando: PRIN 2022 - Decreto Direttoriale n. 104 del 02-02-2022 Durata: 28/09/2023 - 27/09/2025 (24 mesi) Budget totale progetto: 222.600,00 € Budget UNIPD: 73.800,00 €

**Abstract del progetto:** Next generation pixel detectors for high energy physics (HEP) experiments and imaging at advanced X-ray sources call for ultra-low noise, high data rate readout chips to be operated in extremely harsh radiation environments.

The PiHEX project aims at improving the state-of-the-art of pixel readout chip technology at high luminosity colliders and X-ray imagers at the next generation free electron lasers (FELs) by developing, in a 28 nm CMOS technology, the fundamental microelectronic building blocks for the pixel readout chips. Such blocks, implementing innovative circuit ideas, will enable the integration of a readout chip meeting a set of challenging requirements, such as high spatial resolution, high signal-to-noise ratio, very wide dynamic range and the capability to withstand unprecedented radiation levels.

Two different front-end architectures, one optimized for HEP applications and the other for X-ray imaging applications at FELs will be developed fitting a pixel cell size of 25×25 um^2 and 50×50 um^2, respectively. As a final demonstrator, the project will produce a prototype ASIC including two matrices of 16×16 front-end channels conceived for HEP and FEL applications.







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