Designing ASICs for science: opportunities for Algeria

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Abstract

Custom integrated circuits are central to modern scientific instrumentation, enabling the precise measurement of extremely small and fast signals in fields such as particle physics, medical imaging, environmental monitoring, and advanced sensing.

This talk introduces analog and mixed-signal IC design through practical examples of scientific readout ASICs developed for diamond detectors, graphene sensors, LGAD timing detectors, and CERN experiments. It provides a concise overview of the complete ASIC development process, from system specifications and circuit architecture to physical design, fabrication, and experimental testing.

The talk will also explore opportunities for Algeria to build a fabless microelectronics ecosystem through specialized education, shared design infrastructure, international partnerships, and engagement with the Algerian scientific diaspora. The objective is to highlight a realistic path towards developing local expertise in ASIC design for scientific, medical, energy, agricultural, telecommunications, and space applications.