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# A Wide Dynamics Range Front-End Electronics for SiPMs using High-Speed Operational and Integration Amplifiers

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Silicon photomultipliers (SiPM) have gained popularity in particle physics due to their inherent advantages in terms of compactness, low power consumption, and high photon detection efficiency. Moreover, we have to deal with signals ranging from a few photoelectrons (PE), where we need to reconstruct the exact shape, up to thousands of PEs in short time intervals.
In this design, when we need to analyze fast events with few PEs, the signal of the SiPM is handled by a high speed operational amplifier. Special care is required in the design of the printed circuit board (PCB) to handle the high-speed signals. Dual power of each op-amp is provided by indivivual L-C fiters and its ground is not directly connected to the plane, but with a dedicated top layer route.
As the number of PEs increases we will begin to use the integrated outputs, at first the one after three stages of amplification, and finally the one after two stages of amplification. In both cases, the output voltage level will be directly proportional to the number of the input PEs.
Two channels are managed by the PCB and in order to minimize the output noise and crosstalk, ground and power planes are splitted independently for each channel.
This poster is focused on the design of a two channel board, and the results achieved on the first prototypes with 3x3 mm. photosensitive area SiPM in cryogenic environment.

## Collaboration

## Role of Submitter

I am the presenter

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