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The ASIC FAST3, a front-end integrated circuit optimized to read out 50 μm LGAD sensors

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In this contribution, we will present the very preliminary experimental performances obtained with the ASIC FAST3. FAST3 is a multi-channel amplifier optimized to read out LGAD sensors and designed to achieve a temporal jitter below 20 ps.

FAST3 was developed by the microelectronic group of INFN Turin. FAST3 has been designed in UMC 110 nm CMOS technology, and has 16 channels distributed over a surface of 1x5 mm²; the power rail is 1.2 V and the expected power consumption is 2.4 mW/ch. Each FAST3 readout channel presents an amplifier with low input impedance (<50 Ohm), and wide bandwidth (~ 1 GHz) and wide input range in terms of charge (3-40 fC). The experimental tests presented include i) charge injection through an external pulser, in order to evaluate the temporal jitter of the ASIC as a function of the injected charge; ii) the characterization of the temporal performances of the ASIC coupled with an LGAD sensor 50 μm thick, using a Sr90 beta source to generate non-uniform signals inside the LGAD.

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