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Optimization of amplifiers for MAPS

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High precision particle tracking and imaging applications require position sensitive detectors with high granularity, good radiation tolerance, low material budget, fast read-out and low power dissipation. Monolithic Active Pixel Sensors (MAPS) fabricated in a standard microelectronic technology provide an attractive solution for these demanding applications. The signal-to-noise ratio of MAPS can be increased by using in-pixel amplifiers. The compromise between speed, noise, gain and power consumption has to be achieved in the design of the amplifier. The charge collection efficiency and total capacitance at the amplifier input is influenced by the size of charge collecting diode. Therefore, in order to achieve better MAPS performances, both the geometry of the charge collecting diode and the amplifier design have to be considered in the optimization process.
In this work different amplifier designs and geometries of the charge collecting diode are proposed. The characterization measurements of the amplifiers fabricated in AMS 0.35 um OPTO technology will be presented. The electronic properties of the amplifiers calculated with Spectre circuit simulator and the charge collection efficiency simulated with ISE-TCAD package will be compared with the measurements.
The advantages and drawbacks of the implemented designs will be discussed.

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