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AF Jradi, K., Pellion, D., Esteve, D., Boizard, J. -L., Le Padellec, A., Bazer-Bachi, A.R.
TI Computer-aided design (CAD) model for silicon avalanche Geiger mode systems design:
Application to high sensitivity imaging systems

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ACCELERATORS SPECTROMETERS DETECTORS AND ASSOCIATED EQUIPMENT

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DT Article

DE APD-Geiger; Noise; VHDL-AMS; Modeling

ID SIPM

AB Our consortium CESR-LAAS in Toulouse has developed generic technology for Geiger-APD and SiPM. The main feature of these devices is the high homogeneity in breakdown voltage. The work presented here describes the model that has been used to design these devices. This also includes the integration into micro-systems, with the ambition in the long term, to develop multiple applications in astrophysics, biology, optical sensing, and above all, imaging systems. The paper is divided as follows: 1. An introduction presents the main issues in the physics of silicon avalanche Geiger mode systems. 2. A section (Geiger mode) divided into two parts. The first part is devoted to the electrical model of the basic device, which provides the response of the Geiger-APD to an incident photon: gain, current, and voltage. The second part presents the production of the model using Simplorer simulation software under VHDL-AMS (VHSIC-Very High Speed Integrated Circuit-Hardware Description Language Analog and Mixed Signal) [1]. 3. A comparison between our model and that used by Otono et al. [5] followed by a discussion with a special emphasis on presenting the noise model based on the real component made and tested by our consortium. 4. A conclusion. (C) 2010 Elsevier B.V. All rights reserved.

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