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The simulation of gas avalanche in a Micro Pixel Chamber using Garfield++

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A micro pixel chamber (uPIC), the development of which started in 2000 as a kind of micro pattern gas detector, has a high gas gain over 6,000 in stable operation, a large detection area of 900 cm², and a fine position resolution of about 120 μ m, and it is used at MeV gamma-ray astronomy, dark matter search, medical imaging, neutron imaging, small-angle X-ray scattering, and so on. However, in its development, the verification using a simulator has not been useful so much, because conventional simulation results explain the partial experimental data only. On the other hand, some uPIC applications require the fluctuation of gas avalanche and the signal wave form for their recent improvements, therefore there is need of updating the uPIC simulation. For this purpose, we adopt Garfield++, which is developed for the calculation of microscopic avalanche, and are trying to explain the experimental data. In this paper, we report the simulation study of the gas multiplication, the electron collection efficiency, and signal wave form.

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