

# RPC Simulation in Avalanche and Streamer Modes Using Transport Equations for Electrons and Ions

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Simulation of development of a signal in an RPC is presented using simultaneous solution of transport equations for electrons, negative and positive ions. The model also includes space charge effect of all charged particles by Poisson equation. The equations are numerically solved using the Lax finite difference scheme. The simulation can well produce three modes of operation of RPC, i.e. avalanche mode, saturated avalanche, and streamer mode. Especially, the reality of Raether limit as the indication of transition from avalanche to streamer mode operation is also investigated by the simulation. In the streamer mode operation, it is shown that the space charge field can be high enough to completely distort the external electric field of the electrodes. In this case, the simulation shows that the streamer signal is basically originated from the growth of electrons and positive ions inside the gap and the development of negative ions is not so important. Accordingly, in the development of the streamer signal, the number densities of electrons and positive ions inside the gap are very similar to each other.

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