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## Cluster ions in gas-based detectors

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Avalanches in gas-based detectors using

Ar-CO<sub>2</sub> or

Ne-CO<sub>2</sub> as drift medium

produce in a first instance Ar<sup>+</sup>, Ne<sup>+</sup> and CO<sub>2</sub><sup>+</sup> ions.

Although there is a wealth of information in the literature about ion transport and ion chemistry,

some gas-detector simulations simplify the treatment of ions to excess,

e.g. by taking only the noble gas ions into account,

neglecting the role of the quencher.

The noble gas ions transfer their charge to CO<sub>2</sub> in a few ns.

Over the next few ns the CO<sub>2</sub><sup>+</sup> ions pick up CO<sub>2</sub> molecules

and thus cluster ions, in particular CO<sub>2</sub><sup>+</sup> · (CO<sub>2</sub>)<sub>n</sub> are formed.

Since the cluster ions are ~ 20 % slower than the initial ions, the

ion-induced signals are substantially altered.

The effect is shown to be present in constant-field detectors

(LIP-Coimbra) and TPC readout chambers (ALICE and NA49), and is expected to affect devices such as Micro-megas and

drift tubes.

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