and anode wire. No transformation of the straw signal by the readout electronics is implemented at that stage. Examples of the obtained time distributions for the first and second arriving clusters, produced by a muon passing at a distance of 4 mm from the anode wire, are shown in Fig. 9.13 for a magnetic field of 0 T and 1.5 T.

The small width of the obtained time distributions (much smaller than 0.1 ns) points to a negligible contribution of the cluster distribution fluctuations and electron diffusion to the straw time resolution. The influence of the magnetic field on the most probable arrival time is clearly noticeable, while the time distribution widths are not affected (first arriving cluster) or affected slightly (second cluster). The dominating influence of the read-out electronics on the straw tube time resolution will be demonstrated later in Section 1.2.3.

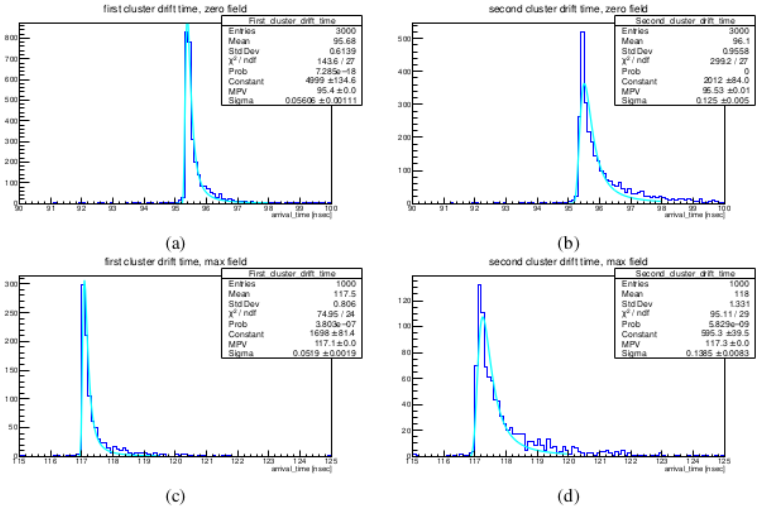


Figure 9.13: Examples of the obtained drift time distributions for the first (left) and second (right) arriving ionization clusters for a track passing at 4 mm from the anode wire for 0 T (top) and 1.5 T (bottom) magnetic field. To compare the most probable value (MPV) and the distribution width (RMS), the spectra (dark blue) are fitted to a Landau distribution (cyan).

The most probable values (MPV) of the arrival time distributions, obtained for field-free simulations using GARFIELD and GARFIELD++ [59] packages as functions of a distance between the muon track and anode wire, are shown in Fig. 9.14 (a). The measurements performed at the NA62 experiment with the nominal tracker read-out electronics are shown for comparison as a two-dimensional histogram. The simulation results are shifted by a constant delay to compensate for the time delays introduced by the read-out chain in real measurements. Comparison of the MPV obtained in the simulation for a magnetic field of 0 T and 1.5 T is presented in Fig. 9.14 (b).

Original TDR

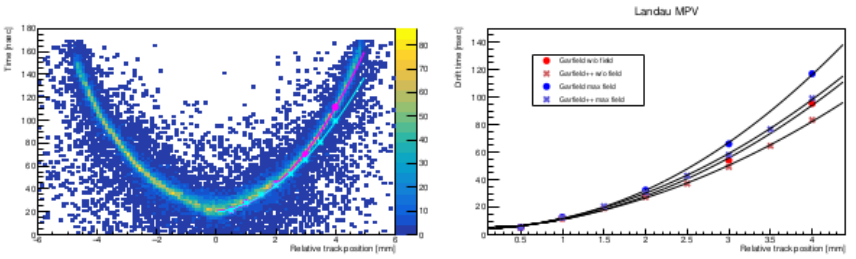


Figure 9.14: The most probable drift time of the first arriving cluster simulated with GARFIELD and GARFIELD++. (a) Values obtained with GARFIELD (magenta points) and GARFIELD++ (cyan points) delayed with a constant value compared to the experimental results, obtained for an NA62 tracker straw (2D histogram). (b) Most probable values of the first cluster arrival time for 0 T and 1.5 T magnetic field. The simulation results are fitted to a quadratic function.

GARFIELD are processed with LTSpice for a given electronics chain model. One of the possible SPD ST front-end electronics options, based on a VMM3a ASIC[REF], is considered in the study, and the corresponding model provided by the RD51 Collaboration (CERN) is used. Details of the read-out electronics are described in Section 9.3 [XREF]. At this stage, electronic noise and the influence of the magnetic field are not taken into account.

Updated plots and the corresponding changes in the text

1.2.2 *GARFIELD simulation of the straw tube response*

Detailed studies of a straw tube response are ongoing for the SPD straw tracker operation environmen
To evaluate influence of the SPD magnetic field on the tracker performance, GARFIELD simulation
the intrinsic straw response to a 1 GeV muon has been performed for two extreme cases of 0 T and 1.5
field, aligned with the straw longitudinal axis. Muon tracks are generated to be normal to the anode wi
at the distance of 3 mm. Drift trajectories of xthe electrons produced in clusters of primary ionization f
0 T and 1.5 T magnetic fields are compared in Fig. 9.12 (a) and (b), respectively.

Just a typo noticed

stage. Examples of the obtained time distributions for the first and second arriving clusters, produced by
a muon passing at a distance of 4 mm from the anode wire, are shown in Fig. 9.13 for a magnetic field
of 0 T and 1.5 T.

From line 2667:
...of 0T and 1.5T. Simulation is performed with the old fortran version of GARFIEDL and with the new Garfield++ package. A reasobable agreement between the two predictions was observed for both values of the magnetic field.

The small width of the obtained time distributions (much smaller than 0.1 ns) points to a negligible
contribution of the cluster distribution fluctuations and electron diffusion to the straw time resolution.
The influence of the magnetic field on the most probable arrival time is clearly noticeable, while the
time distribution widths are not affected (first arriving cluster) or affected slightly (second cluster). The
dominating influence of the read-out electronics on the straw tube time resolution will be demonstrated
later in Section 1.2.3.

From line 2668:
The width of obtained distributions does not exceed 0.3 ns even for the magnetic field of 1.5 T. This points to a negligible contribution of the cluster distribution fluctuations and electron diffusion to the straw time resolution. The influence of the magnetic field on the most probable arrival time is clearly noticeable, while the time distribution widths are not affected by the magnetic field aligned with the anode wire. The dominating influence of the read-out electronics on the straw tube time resolution will be demonstrated later in Section 1.2.3.

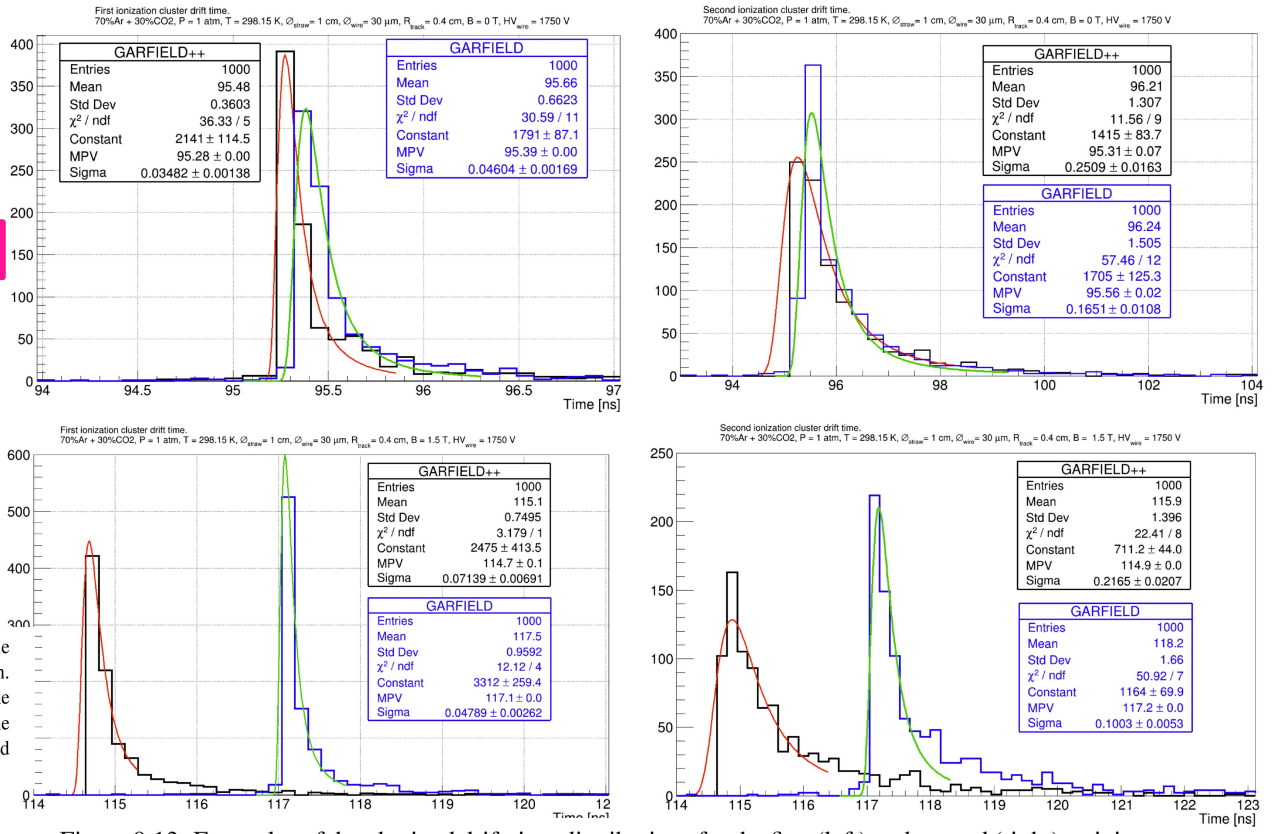
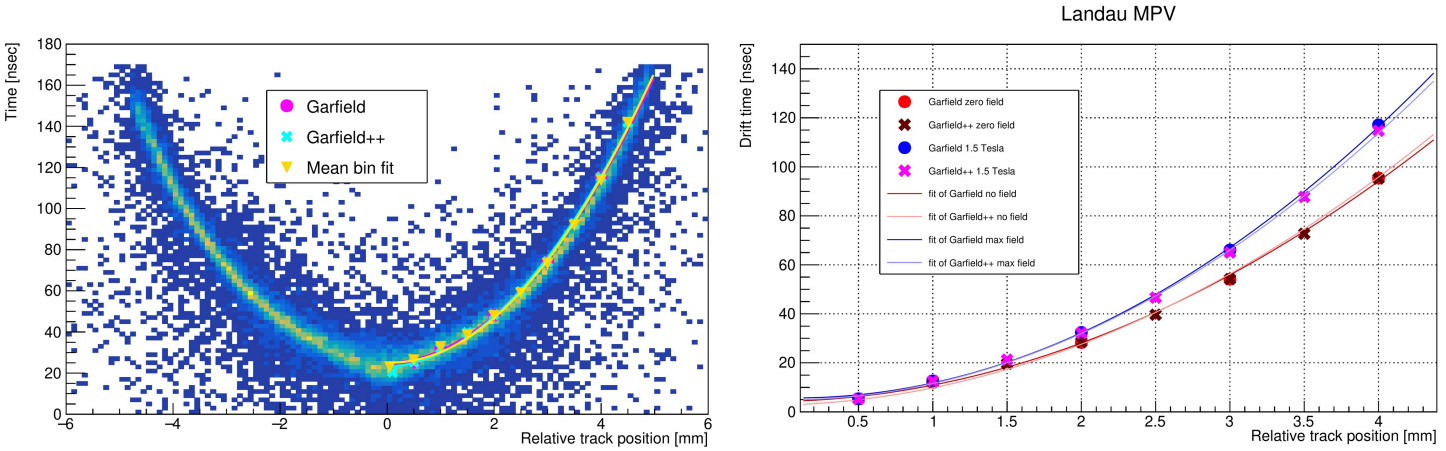


Figure 9.13: Examples of the obtained drift time distributions for the first (left) and second (right) arriving ionization clusters for a track passing at 4 mm from the anode wire for 0 T (top) and 1.5 T (bottom) magnetic field. To compare the most probable value (MPV) and the distribution width (RMS), the spectra (dark blue) are fitted to a Landau distribution (cyan).

From 4th line:
magnetic field. To compare the most probable values (MPV) and the distribution widths (Sigma), the GARFIELD (blue) and Garfield++(black) predictions are fitted to a Landau distribution (green and red correspondingly).



No text update is needed, just change of the figure caption.

Figure 9.14: The most probable drift time of the first arriving cluster simulated with GARFIELD and GARFIELD++. (a) Values obtained with GARFIELD (magenta points) and GARFIELD++ (cyan points) delayed with a constant value compared to the experimental results, obtained for an NA62 tracker straw (2D histogram). (b) Most probable values of the first cluster arrival time for 0 T and 1.5 T magnetic field. The simulation results are fitted to a quadratic function.

and most probable value of the experimental data (yellow).