These values are equivalent to the digits from the simulation, in fact the event, the side, the strip number and the signal as ADC channels are stored.

Charge distribution

The figure 4.17 shows the charge distribution for the strips, respectively on P-side and on N-side. We expect a Landau distribution, tipical for the energy losso of minimum ionizing particles. There is the primary peak we expected, located around channel 55 on P-side adn channel 65 on N-side, but there are also othe peaks.

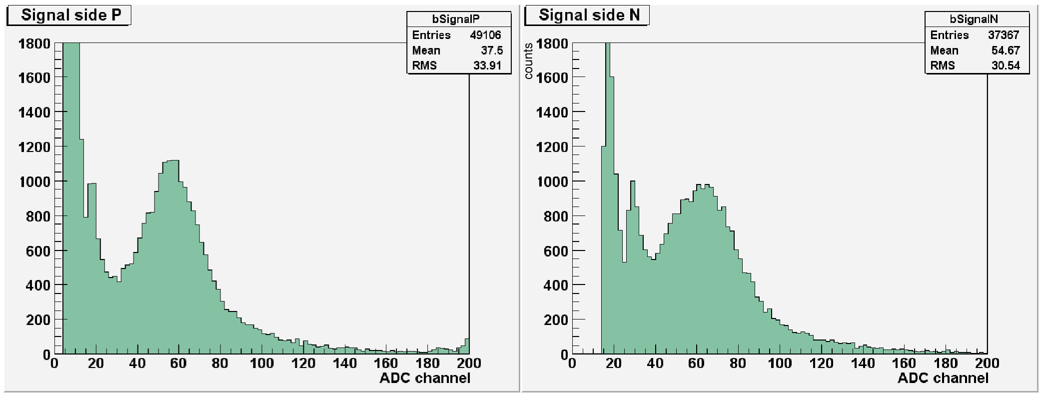

Figura 4.17: Charge distribution. There are more than one peak, because the energy lost by a particle is collected by more than one strip.

If a particle goes next to a strip, this collects all the released charge. The corrispondent signal increases the higher peak. If a particle passes in the middle of two strip, the charge is collected by both of them, so we expet a peak at intermediate values, now around 25-30 ADC channels; you can see this peak on N-side, but it is hidden by the noise on P-side.

If a strip collects all the charge, a part of it actives the next strip also, because of the capacitive coupling: as a conseguence some of these strip could have a signal a bit over the noise threashold and they increase the peak near the threashold. This fact happens more flrequently on P-side, where the noise threshold is lower. The peak near the threashold is due to noise event that goes over the 4σ threshold.

Cluster finding

For each event the strip cluster are searched; they are the set of subsequent strip which were activated by the same physicla event. To reconstruc the cluster I implemented two methods; the first based on a charge discrimination and a second on geometrical consideration.

For the first finding algorithm, a cluster is a set of consecutive strips which signals are at least four times the noise. This algorithm can be improved using two threshold as described by [3]: a first threashold, very high, identifies a strip whose signal is likely due to a particle crossing; after that, the cluster is made of the near consecutive strip whose signal goes over a second threshold, lower than the first. I chose the first threshold as 10σ on P-side and 6σ on the N-side and the second one as 4σ on both sides.

The second algorithm was iplemented in ALIROOT and it reconstructs the cluster only if, for each event, there is a geometrical corrispondence betwee the two sides. In fact, each strip on P-side crosses 16 strip on N-side; to P-side cluster, containing the considered strip, must corrispond a second one on N-side containing the strips which cross the P-side one.

Figures 4.18 and 4.19 shows the results of cluster finding; there are respectively the signal distributions and the cluster sizes. About the charge distributions, the results are similar, except the red ones obtained by the simpler algorithm; this one produce a peak at low ADC values. This peak is due to the noise, in fact it decrease using the second threshold (blue histogram) and disappear completely when I require the geometrical corrispondence with a cluster on the opposite side (green histogram). The algorithm implemented in ALIROOT is the most efficent to reconstruc the charge distribution; the table 4.3 shows the results of a fit using a Landau function on the histograms obtained by ALIROOT algorithm.

	average (ADC channels)	σ (ADC channels)
P	61	8
N	66	9

Tabella 4.3: Fit parameters of cluster signal distribution.

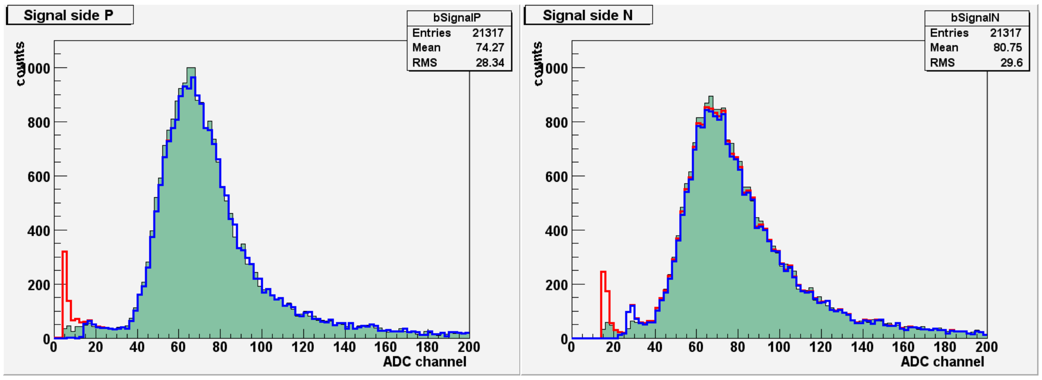

Figura 4.18: Cluster signal distribution. The red histogram is obtained by the simpler algorithm, the green one by the AliRoot geometrical algorithm. The peak follows the Landau distribution.

Cluster size Most of the events should activate only one strip. If the particle caused the event cross in the middle of two strips, each of them will be activated. Also capacitive coupling can produce cluster of more than one strip.

On N-side teh distribution is as we expected, as shown in the figure 4.19. The cluster size on P-side has, instead, a value over 2. This can be due to the effect of capacitive coupling together the noise lower than on the other side. If the charge lost by a particle crossing exactly a strip is equal to 70 ADC channels, the first neighbour strips will collect a charge about equivalent to 4.5 ADC channel, because of the considerations of paragraph 4.3.3; this charge is higher than noise threshold, which is 4.4, so the cluster is made of two strips. If we take on P-side a threshold similar to the N-side one in terms of ADC channels, the number of cluster of two or more strips decreases as expected (see figure 4.20).

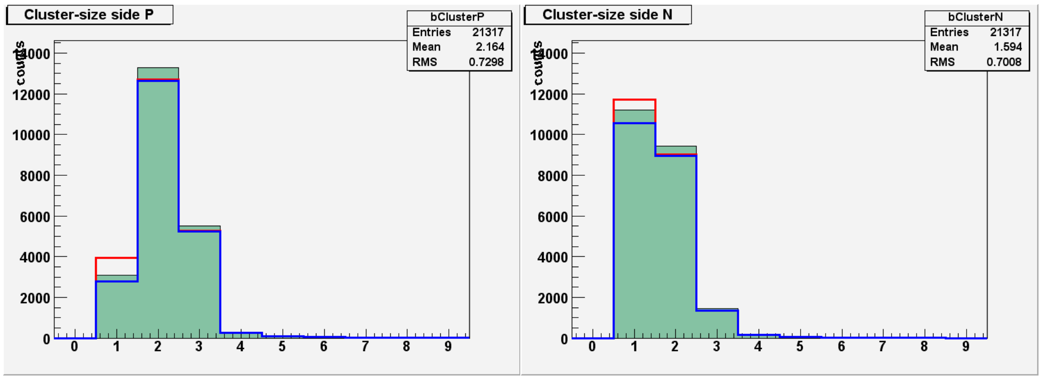

Figura 4.19: Cluster size. There are more cluster of two strip than one, this is not we expected.

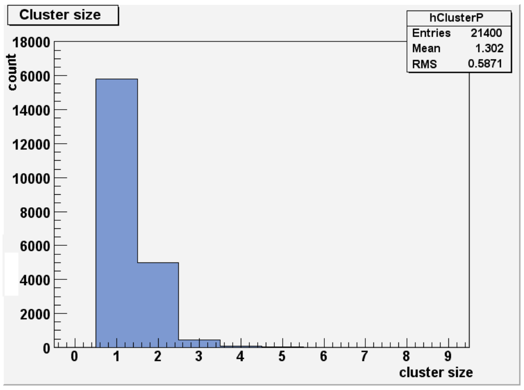

Figura 4.20: Cluster size on P-side after fixing a 10σ threshold.

Signal-to-noise ratio

For each cluster the signal-to-noise ratio is calculated. The signal is the sum of the signals of the cluster strips, while the noise is the mean noise of the cluster strips. This parameter allows to evaluate the detector sensibility. The figure 4.21 shows the signal-to-noise ratio, while the table 4.4 shows the fit parameters.

As a conseguence of the noise run analysis, the signal-to-noise ratio is lower on N-side than on P-side. This can be bad thinking about the spatial resolution of the reconstructed points.