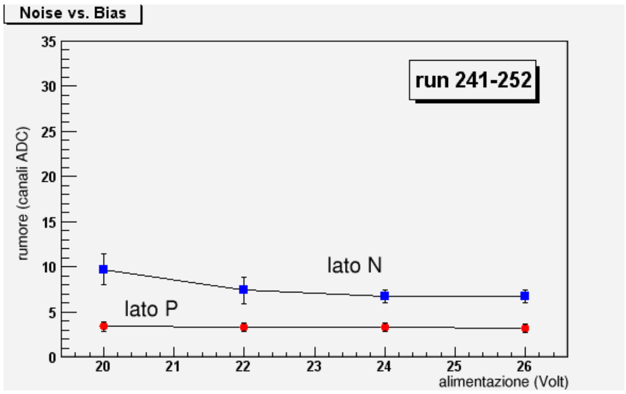

Figura 4.13: Noise as bias function for the M3 SSD module.

4.3.3 Signal run analysis

We collected 163 runs using sigle modules and 231 runs using a telescope, a total of about 4×10^6 events. Because of the next consideration, I choose to refer to the runs done during the surface scan of a module using the *French* scintillator. In these runs the bias condition are the best ones, as seen in tre previous paragraph, and there are a lot of events (20 000 events per run). In particulare I'll speak about run 146, in which the scintillator covered the central zone of the module; the other runs, done in the same bias and electronical conditions, but with different scintillator position, give the same results as signal and noise.

Pedestal and common mode

As done for the noise runs analysis, the first step is the calculus and subtracion of the pedestal. The process is similar to the one decribed in the paragraph 4.3.1, but now as beginning threshold we use the results of the noise run analysis. This choice allows to reject the physical events due to the particles crossing, now present. In reality if we iterate twice the program which calculates pedestal, the difference in the final values is very small using both arbitrary threshold and the ones from the previous analysis. In figure 4.14 you can see the differences between the two procedures; there are differences only at the second order. This happends because the module illumination is low (there is only one particle crossing per event) and there are only few (one or two) activated strips per event; in this way, if we don't consider the strips activated by a particle crossing, we loos only few strips per event and so the statistic doesn't change because of this loss.

The double iteration method allows to obtain pedestal and noise values directly from the signal run, so we need less analysis code duplication. This

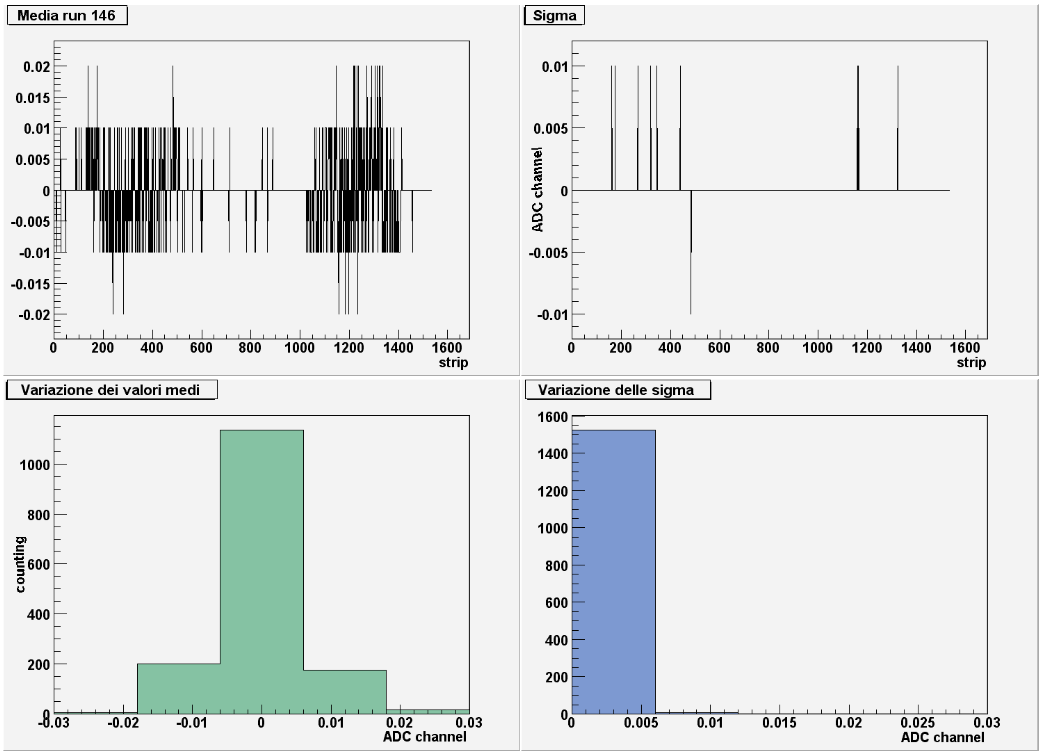

Figura 4.14: Differences between pedestal and noise at the second iteration; these differences are calculated starting with both arbitrary threshold and the ones from the previous analysis. Upwards there are the differences strip by strip, for pedestal and noise respectively; in the lower part there are the histograms of the same data. There are differences only at the sencon order.

is useful when we want to make automatic the analysis of more than one run, because it needn't recognize if the run is a noise run or a signal run befor starting the analysis.

The procedure for common mode subtraction is also the same used in the noise run analysis. The final results are the same obtained in the noise run analysis as pedestal and noise. As an example, the figure 4.15 shows pedestal and nois of a signal run; these plot should be compared to the ones showed by figure 4.9.

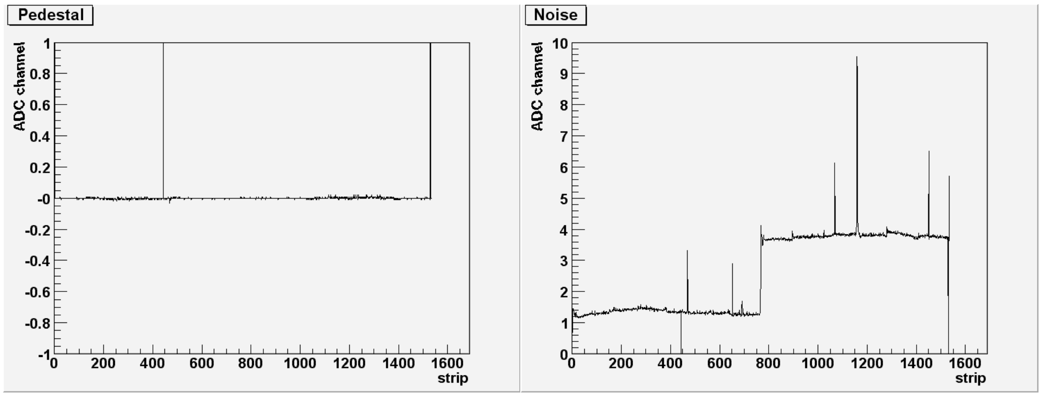

Figura 4.15: Pedestal and noise values of a signal run for each strip after pedestal and common mode subtraction. The plots are almost equal to the ones finded in the corresponding noise run (figure 4.9).

Capacitive coupling and cluster shape

The *cluster shape* describes the charge distribution among the strips belonging to the same cluster (see also paragrph 3.4.1) and it gives an important simulation paramenter, because it is really close to the interstrip capacitive coupling.

In this analysis I considered only clusters which are simmetrical respect to one strip; this means that the particle went near the consedered strip, not in the middle of two next strips. To do this, I conseder as the central strip of a cluster the one whose signal is al least 10 times the noise on P-side or 6 times on N-side[1]. Moreover the previous strip and the next one mustn't carry more than 10% of the central strip charge; this condition allows to exclude the events where the particle went through the module in the middle of two strip, porducing similar charges on both.

Once the central strip has been choosen, I take in consideration the 7 previous strip and the next 7 ones. The total signal of these strips is the cluster signal. For each event it is stored the signal ratio collected by the strips as a function of their position. Averanging over all the events, we obtain an histogram showing the cluster signal ratio carried by each cluster strip as a function of the distance of the strip from the central one. The so obtained distribution is the *cluster shape*.

The figure 4.16 shows the cluster shape for P-side and for N-side. The

[1]This difference exists because on N-side the noise is higher than on P-side, while the signals run around the same values. If I use the same threshold, I'll lose a lot of good event on N-side

“0” strip is, as definition, the central strip of the cluster. The cluster shape is similar on both sides. The table shows the ratio of total charge on the first neighbour strips; the values are a bit bigger than 2% obtained in the past (page 26). This can happen because of the used model is very simple.

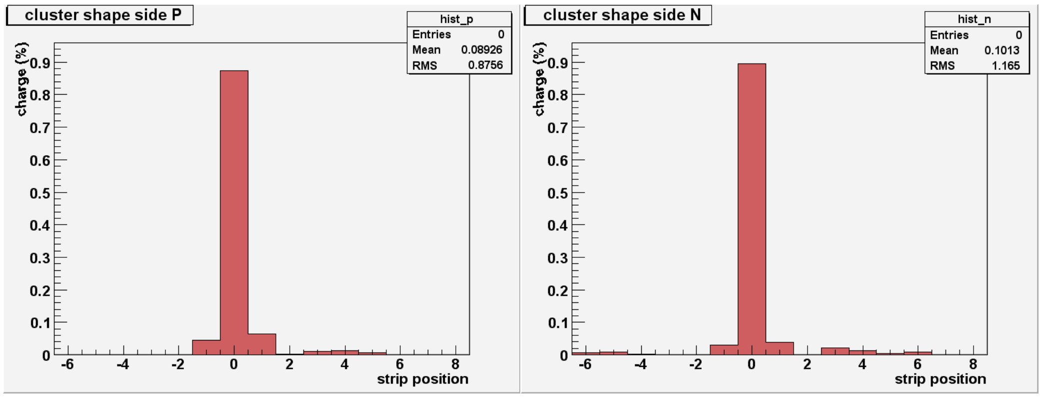

Figura 4.16: Cluster shape. There are the mena values for the charge ratio as a function of the strip position.

	previous strip	next strip
Lato P	5%	7%
Lato N	3%	4%

Tabella 4.2: Percentage of cluster charge carried by the first nieghbour strips respect to the central one.

Zero suppresion

The previously calculated noise is used to discriminate signals on background. Using a 4σ threshold we can eliminate the 99.9% of the noise. For each event only the data of the strip witha a signal over threshold are stored. This procedure is called *zero suppression*.

The information which are stored for each strip are equivalent to the simulated digits: event number, strip number, signal collected by the strip ad ADC channels. For the digits from real data, as for the simulated ones, is possible to use the reconstruction algorithms of AliRoot.