PASTA tests update

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In this talk, the last results of the PASTA (PANDA STrip ASIC) chip are presented. After a brief recall of the last status, it is shown how it was possible to find an optimization of the chip global parameters. Considering that there are 28 different parameters for the analog part of PASTA and each one can vary from 0 to 31, it is obvious that this was not an easy task. It has been observed that the parameter labeled BLR_Vcas (controlling a cascode voltage inside the Baseline Restorer) has e strong influence on the chip behavior. A table shows that ranging this parameter from 0 to 31 there is an increasing of the number of the responding channels, however, after a certain value, there is a "saturation" and this bit doesn't affect the performance any longer. With this optimization, it is possible to reach up to 23 working channels with only 14 dead. The remaining channels appear to work, but some events seem to be somehow lost. Under these conditions, the calibration of each channel started. The first item of the list regarded the gain of each channel in terms of Time over Threshold (ToT) with respect to the input charge injected with the embedded calibration circuit. The figure shown in the talk highlights that before the calibration the difference in the gain of each channel was significant while afterwords most of the channels have the same gain (within a certain range of tolerance).
Moreover, the lowest charge detectable by each channel is different, so it is necessary to adjust the value of the local threshold to uniform the behavior of all the working channels. In the table in the slide 7, the comparison between the situations with and without the local fine tuning of the threshold is presented. It seems therefore possible to significantly improve the performance of many channels (a particular channel becomes able to detect a charge 10 fC lower with respect to the standard configuration).

Since PASTA is connected to an ITC sensor type p, using an α-source made possible to verify the connection with the sensor and get a preliminary response of the chip from this kind of signals. The convolution of the output of all channels reported in the slide 8 shows very promising results. It is important to highlight that only the coarse times are used to reconstruct this spectrum and that this analysis was performed before the optimizations of the parameters presented in the previous slides. This explains why the channel 0 has a strange spectrum with more counts at high energies respect to the other channels. Last remark, for this test the source was focused only on the first channels in light of the greater number of working channels in that area.

The last test done, regards the behavior of the chip at a different frequencies and with different number of input pulses. The most interesting observation is that decreasing the number of pulses sent to the chip, the number of channels losing events decreases significantly, while the CLK frequency changes affect the number of dead channels.

In conclusion, it is possible to assert that more than 86% of the chip responds with a frequency lower than 140MHz. With this new and important result, a new optimal calibration of the local parameters has to be found together with more studies with the source.