Status report

MKAyoub
07/03/2019
IHEP HGTD meeting

Time stabilité performance of the reference sensor

- Studying the time resolution stability of the reference sensor LGA35
    - Preparing the results for today's test beam meeting
    - Fit is behaving well now
    - Still need to produce the results for another test beam campaign

Time resolution

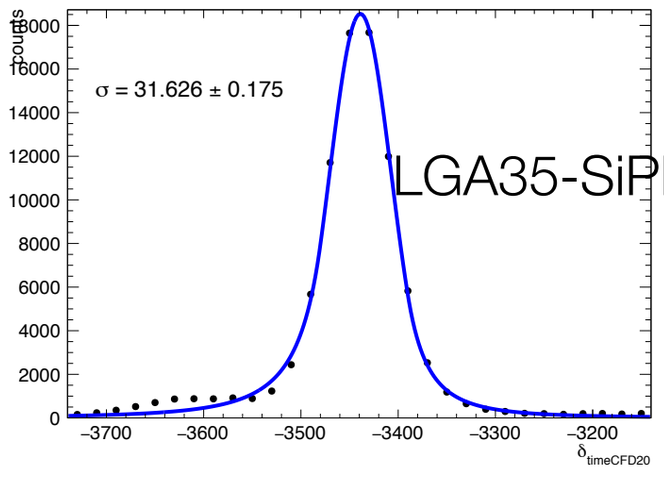
The time resolution can be extracted from the width of the time differences computed from the LGADs and the SiPMs. Assuming that N devices with time resolutions σ_k are used, there are N(N-1)/2 possible combinations

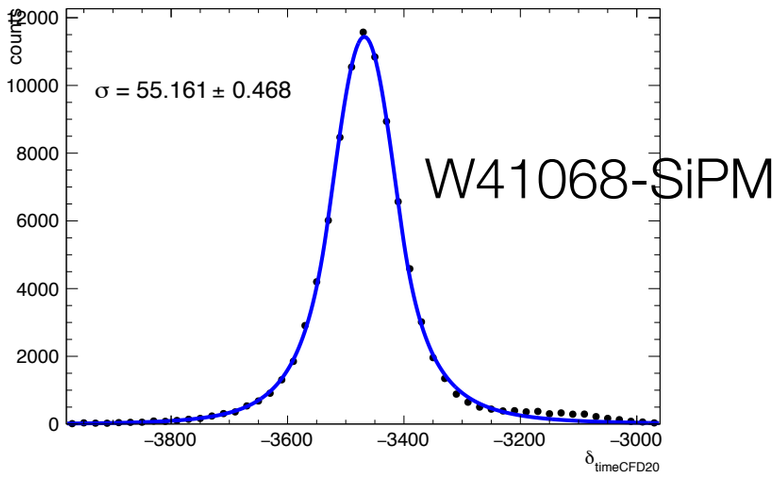
- For N=2, the system is under-constrained and no solution can be found without further assumptions (ex: knowing the SiPM time resolution).
- For N=3, the number of constraints equals the number of unknowns. In this case, the system of equations is linear considering the square of the time resolution as the unknown and it can be solved analytically.
- For N>3, the system is over-constrained and in order to fully use the available information, the time resolution can be extracted using a χ^2 minimization technique:

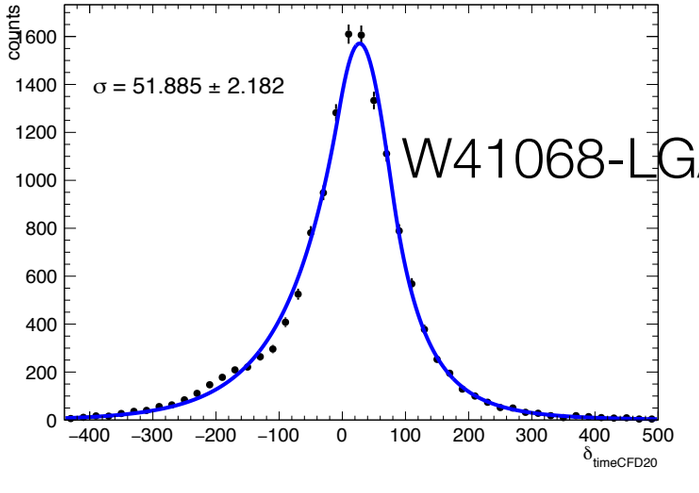
$$\chi^2 = \sum_{i=1}^{N} \sum_{j=1}^{j<i} \frac{(\sigma_{ij}^2 - \sigma_i^2 - \sigma_j^2)^2}{\sigma^2_{\sigma_{ij}^2}}$$

Fit results

- April batch
- Using the LGA35, W4-1068 and the SiPM







The system gives a time resolution of: 19 +- 3.2 ps for the LGA35