



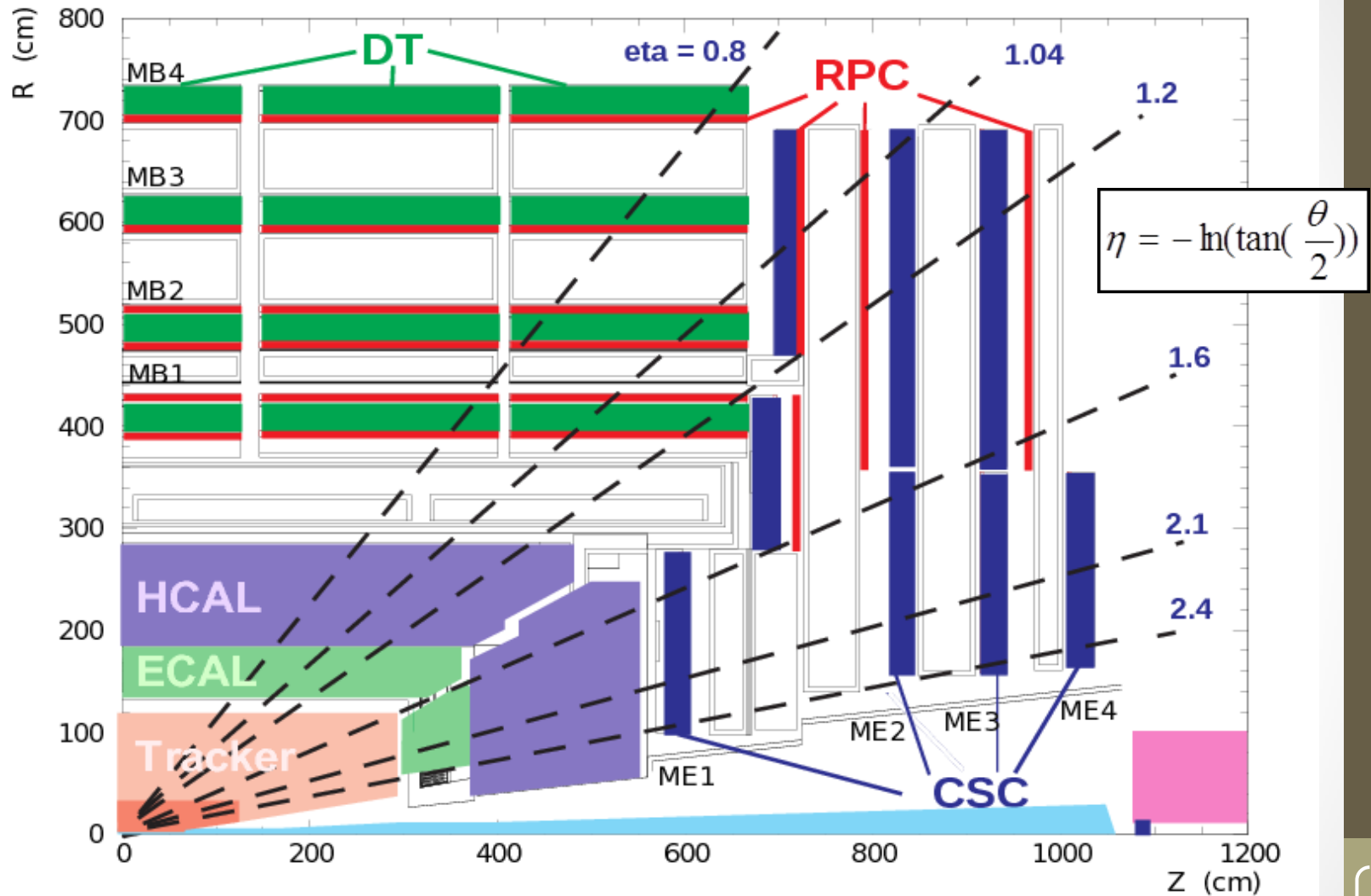
Local Reconstruction in Cathode-Strip Chambers of the CMS experiment

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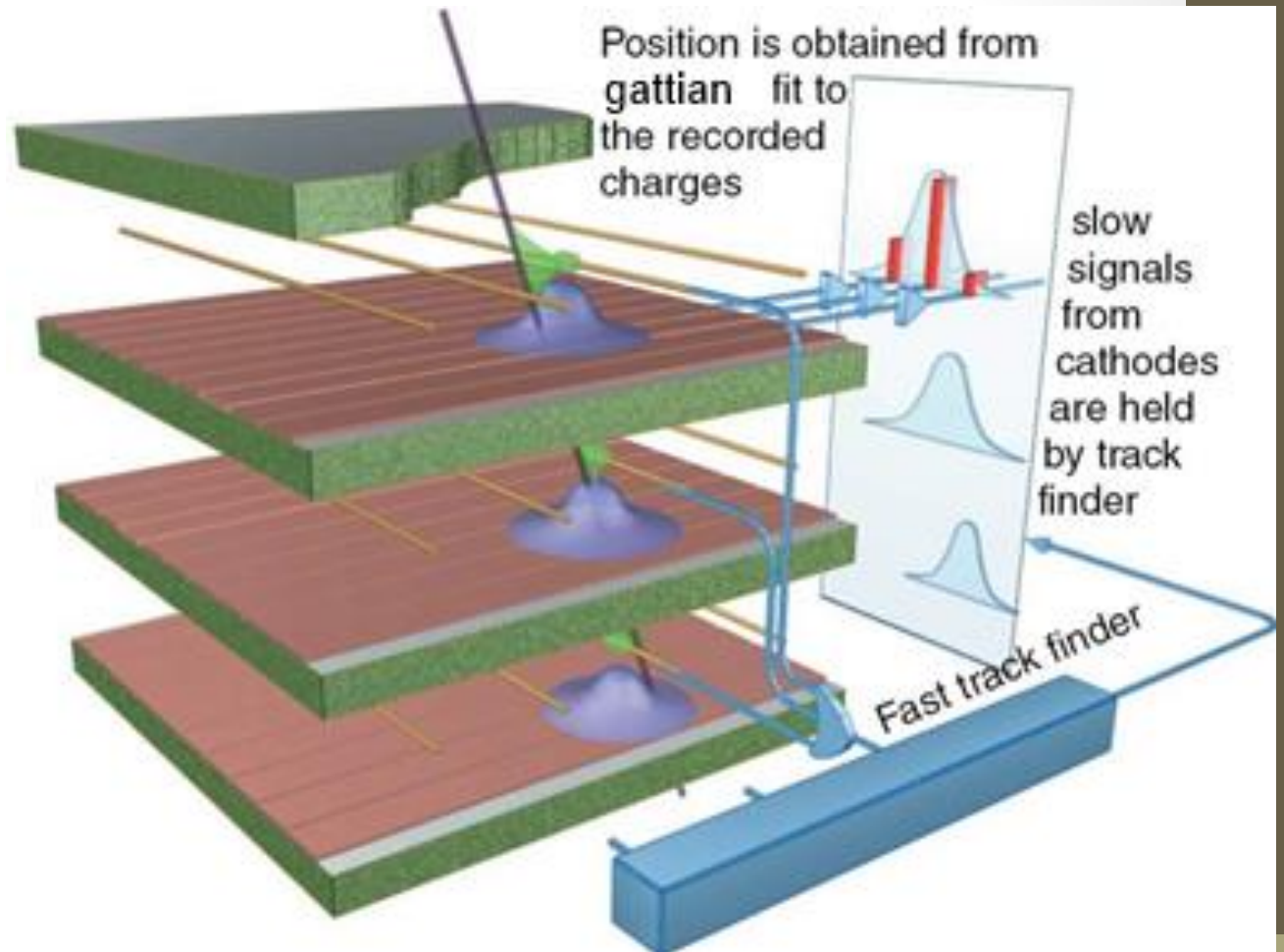
Cathode Strip Chambers (CSC)



CSC placement in the CMS experimental setup

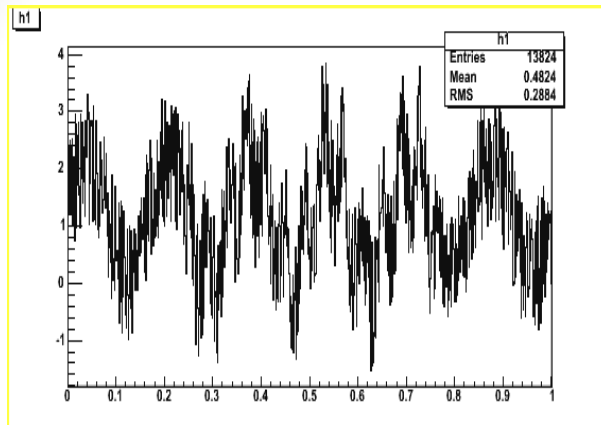
Cathode Strip Chambers (CSC)

If $\sigma_{Gatti\ fit} > 30\%$
the coordinate is
calculated using
Center Of Gravity
(COG) algorithm

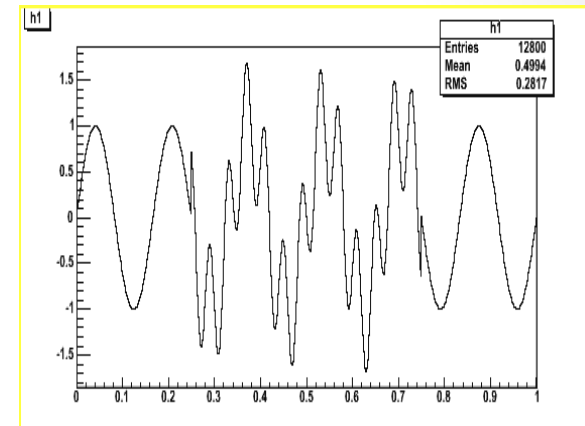


The principle of working of cathode strip chambers

Wavelet analysis for overlapped signals



Wavelet filter



$$N(x, A, y) = A \exp \left(-\frac{(x-x_0)^2}{2\sigma_x^2} - \frac{(y-y_0)^2}{2\sigma_y^2} \right)$$

A – Gaussian amplitude, x_0 and y_0 - centers of Gaussian

Usage for overlapped signal separation in HEP experiments

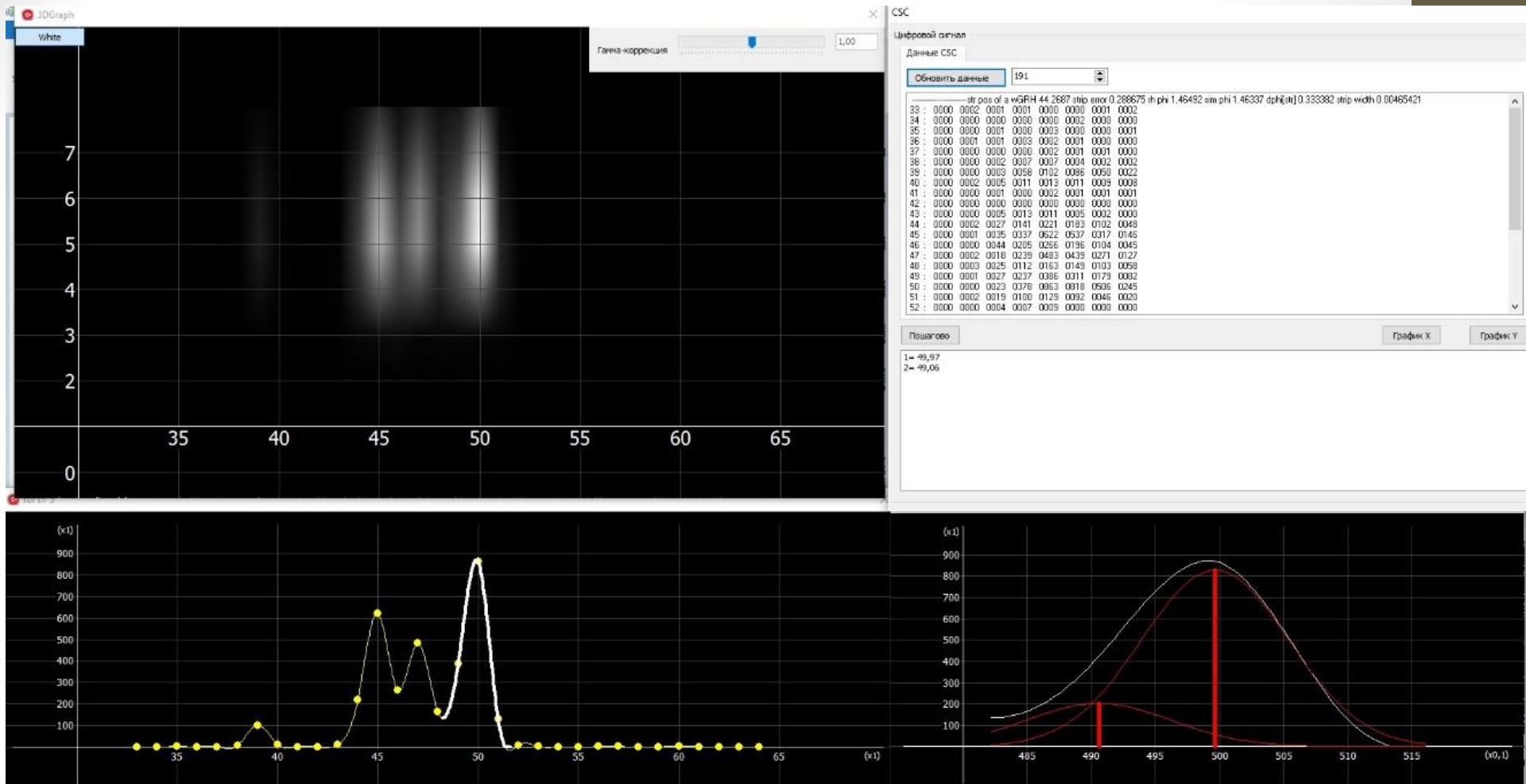


- high precision of extremum recognition;
- scalable number of extrema.



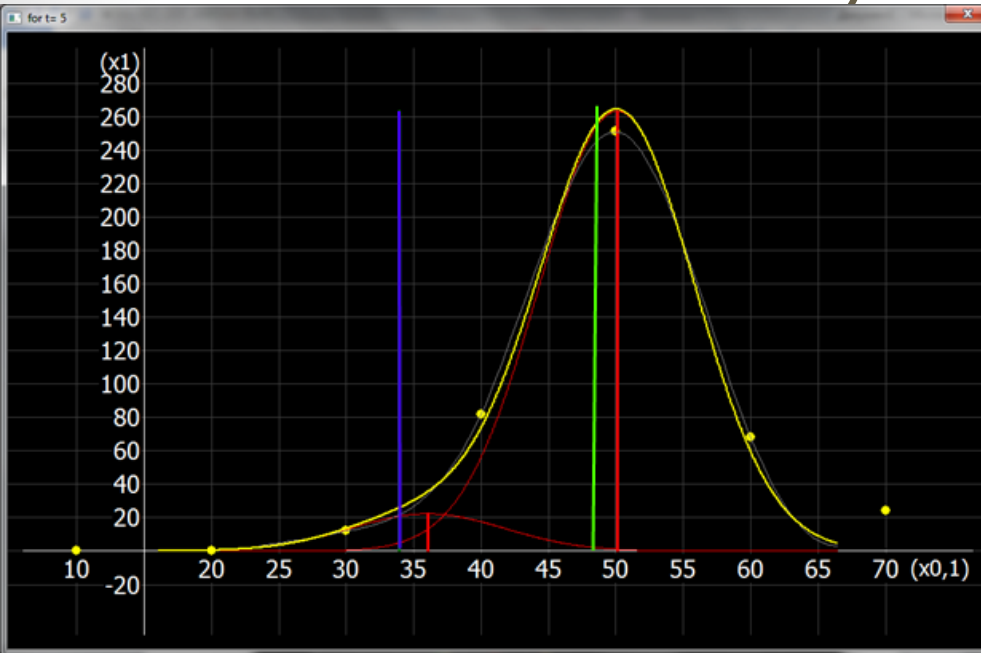
- numerical methods needed;
- slow calculation for > 3 extrema.

RecHit reconstruction for overlapped signals



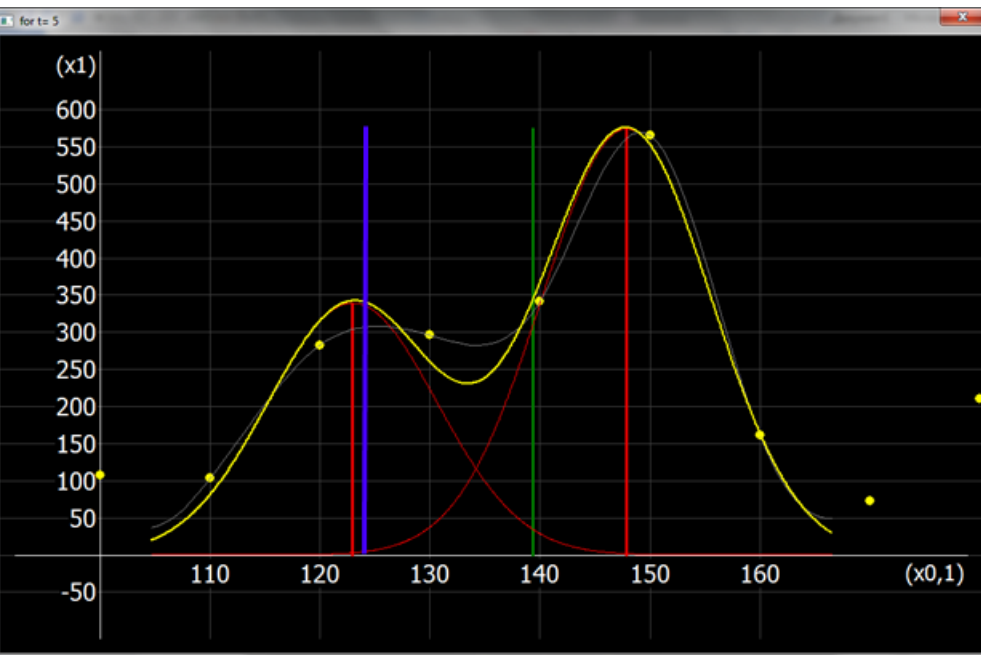
Current status of tools for overlapped signal reco

Results and analysis



$\sigma_{Gatti\ fit} \sim 11\%$
STD algo – Gatti fit maximum

— STD algo
— Wavelet algo
— MC sim hit position

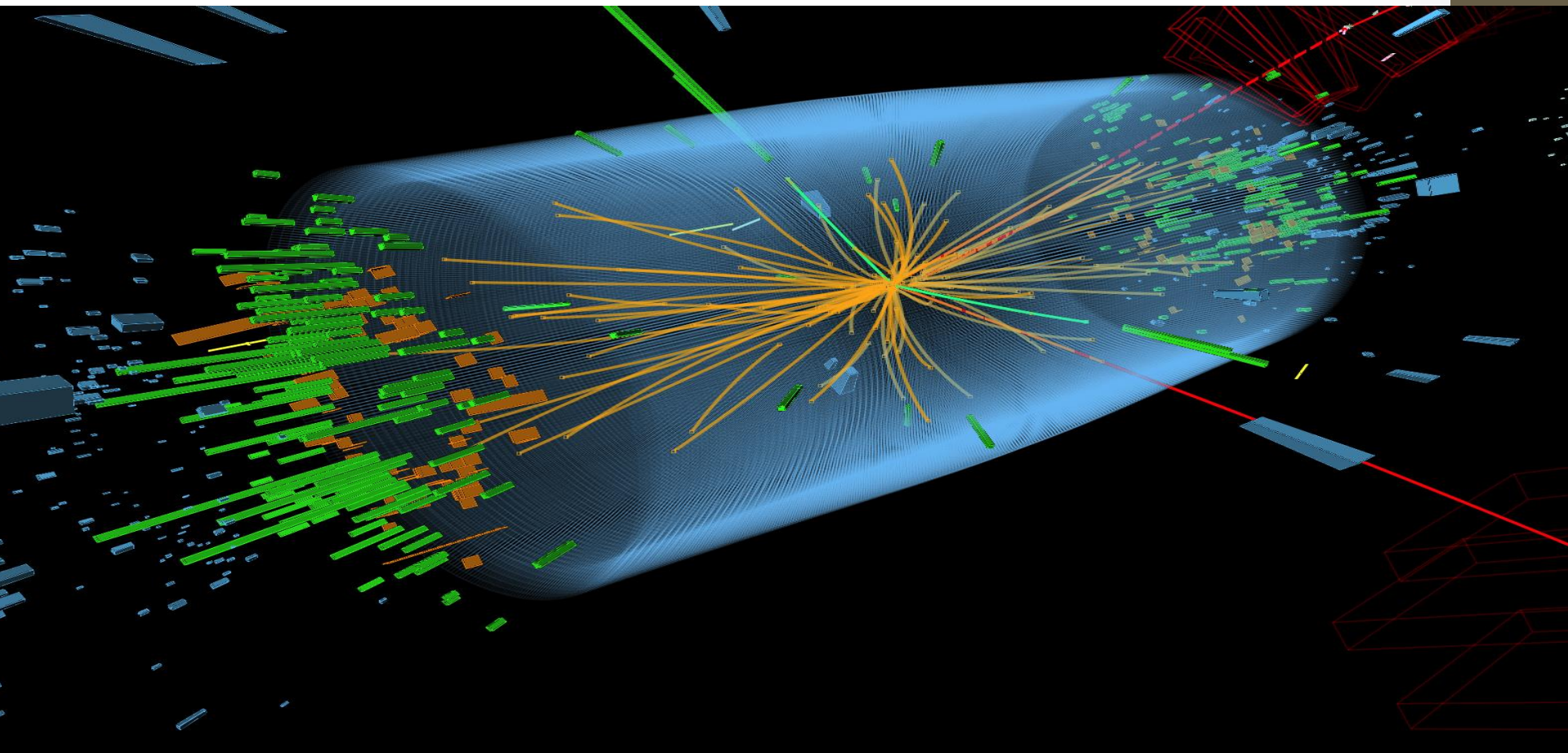


$\sigma_{Gatti\ fit} > 30\%$
STD algo – COG

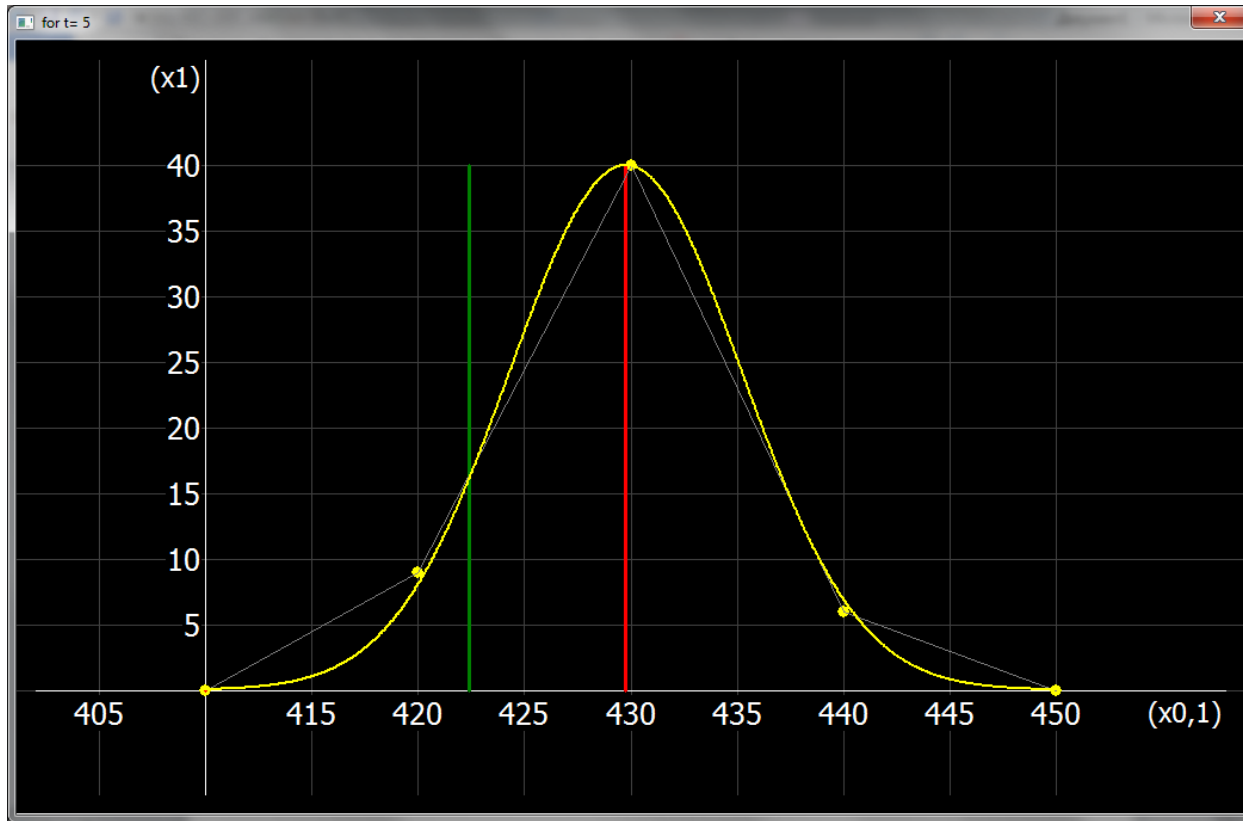
Summary

- LHC high intensity collisions cause multiple overlapping of signals in the muon system of the CMS experiment;
- Wavelet analysis is chosen for the improvement of signal delimitation precision;
- Wavelets applied for cases when $\sigma_{Gatti\ fit} > 10\ %$;
- The algorithm is ready for delimitation of 2 signals, 3 signals – under development;
- > 3 signals delimitation – not practicable, because of big computing time consumption;
- Start implementing the code into the official CMS software package in the nearest future.

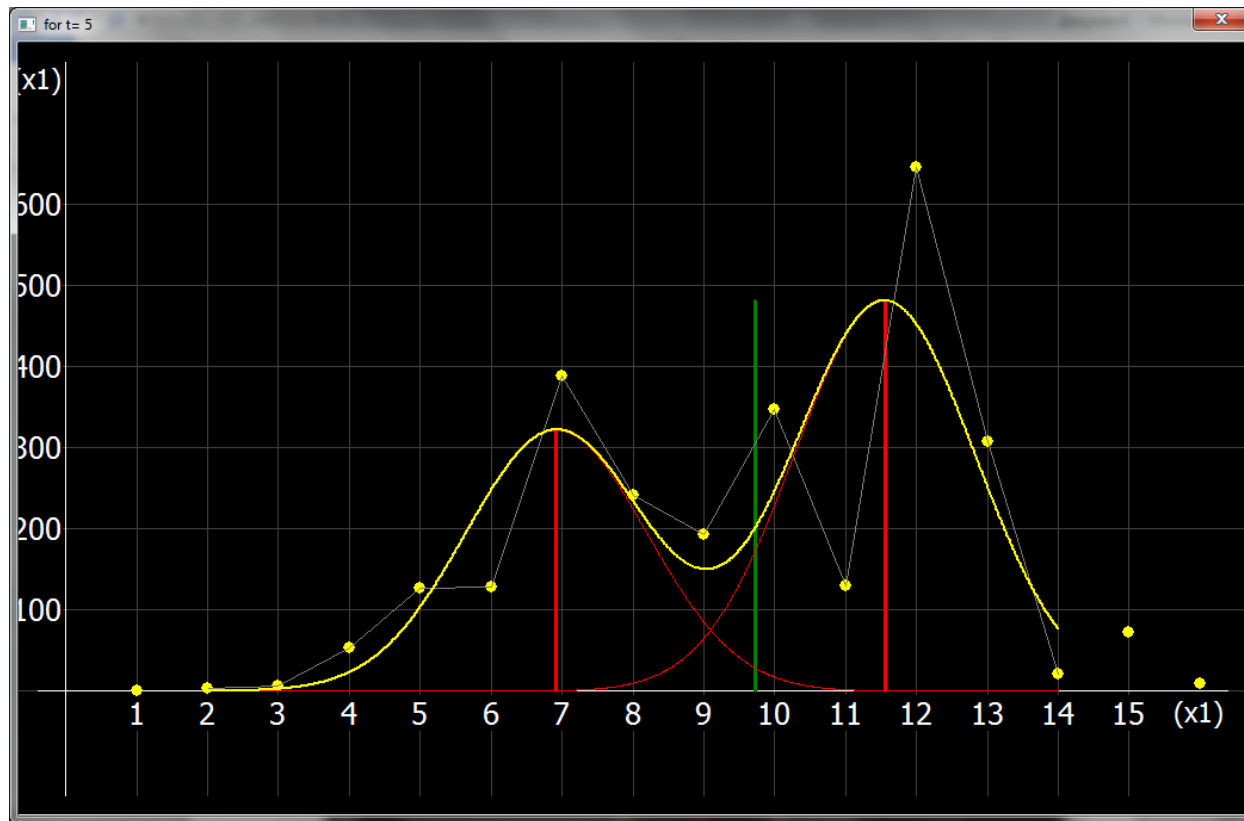
Thank you for your attention!!!



Backup slides



Single signal



multiple signals (> 4)