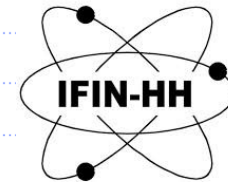


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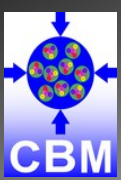


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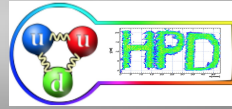
Simulating the Bucharest-solution for the mCBM setup

Alex Bercuci for the Bucharest-TRD Group

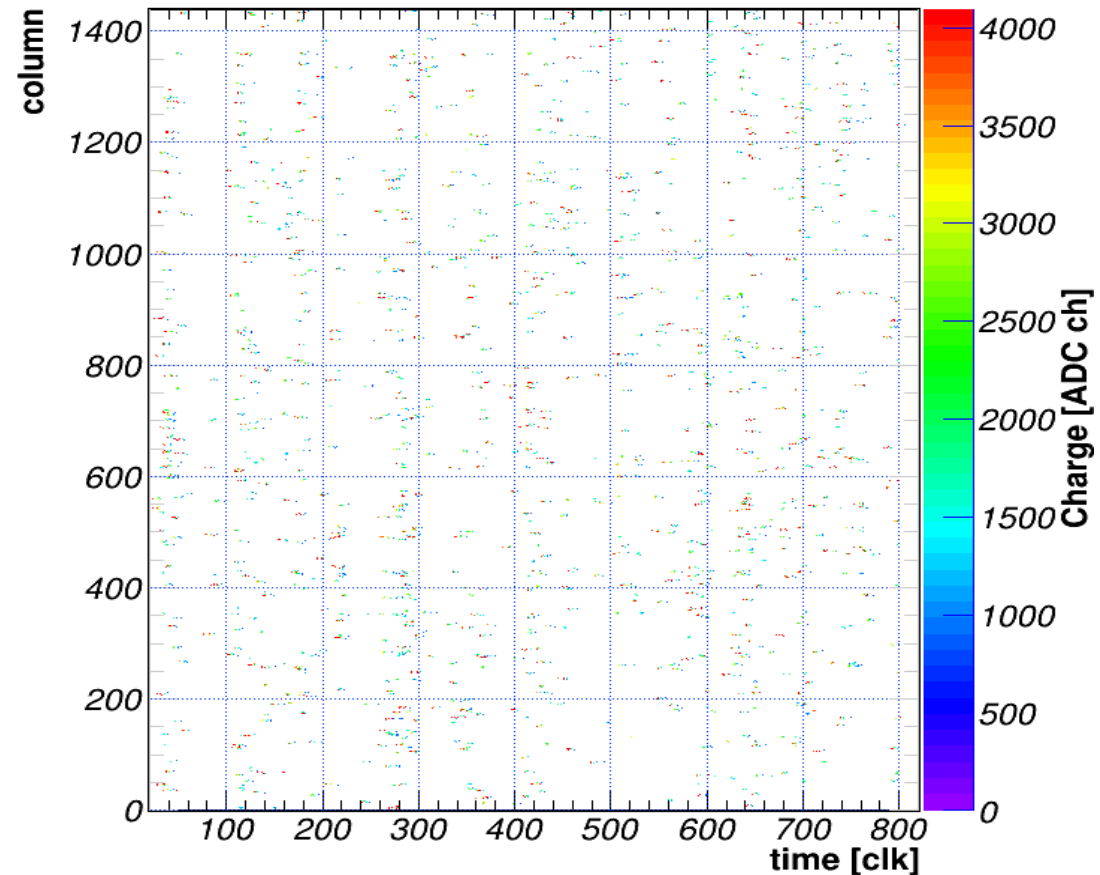
**CBM-TRD Retreat
27-29 March 2019
Schloß Waldthausen**



Outlook



- Track to Physical signal (time and amplitude)
- Physical to Electric signal
- FASP time-signal response [CADENCE]
- Reconstruction status
- Conclusions



Thu Dec 6 09:39:58 2018

Prerequisite

- Segment detector in y-z cells centered on each anode wire
- Use linear track model inside chamber

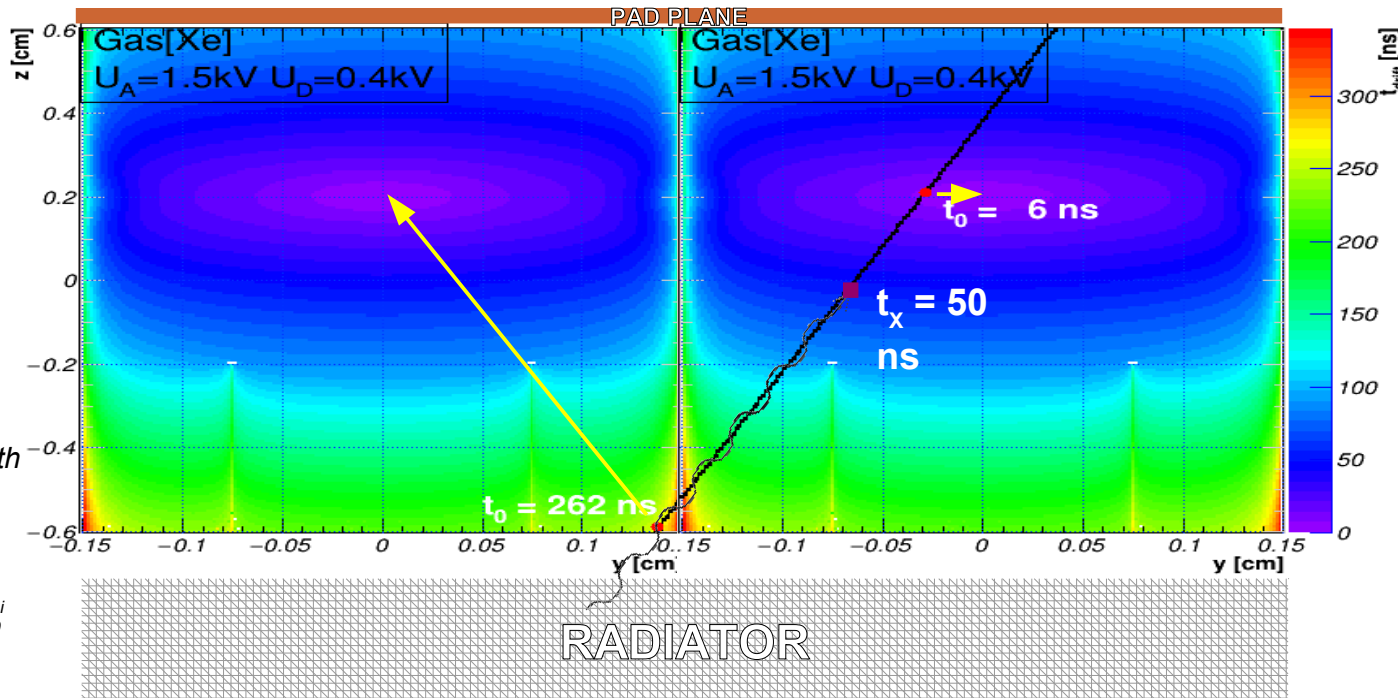
Energy deposit

• Ionization

- Split track on cells; find track length on each cell : dL_i
- Compute minimum drift time for each cell t_0^i
- Compute energy deposit in cell $E_0^i = dL_i * dEdx_{track} / L$

• X-ray interaction

- Compute penetration depth along the track (radiation length)
- Find cell; compute time t_x
- Check process
- For PE compute Auger probability
- Compute energy e.g. Ar
- $E_{PE} = E_x - E_k$; $E_{auger} = E_k - 2E_{L'}$; $E = E_{PE} + E_{auger}$ (if available)

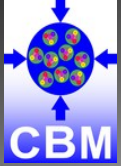


Physical digi (I)

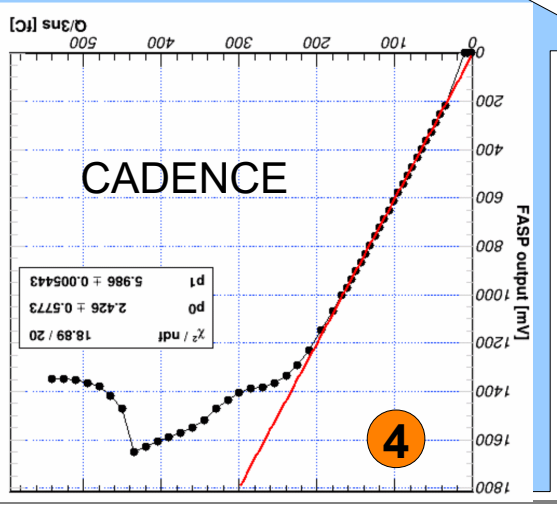
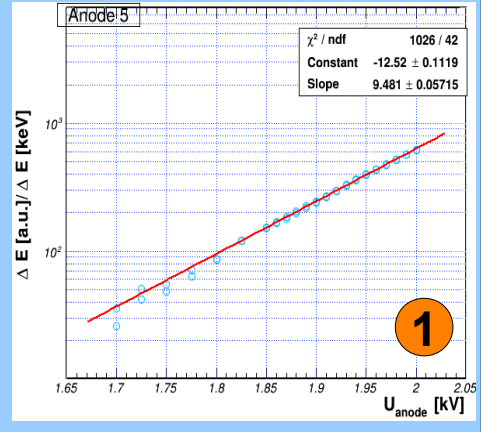
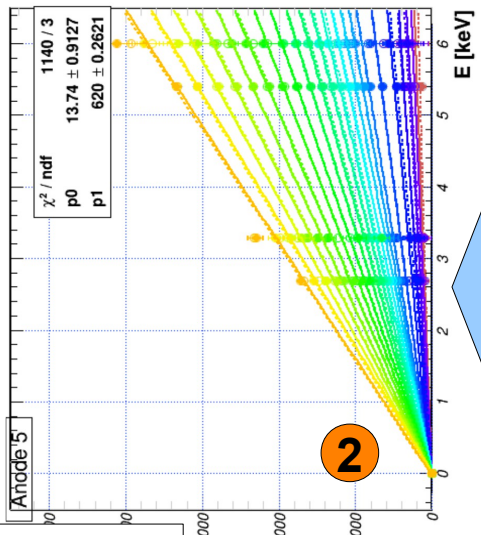
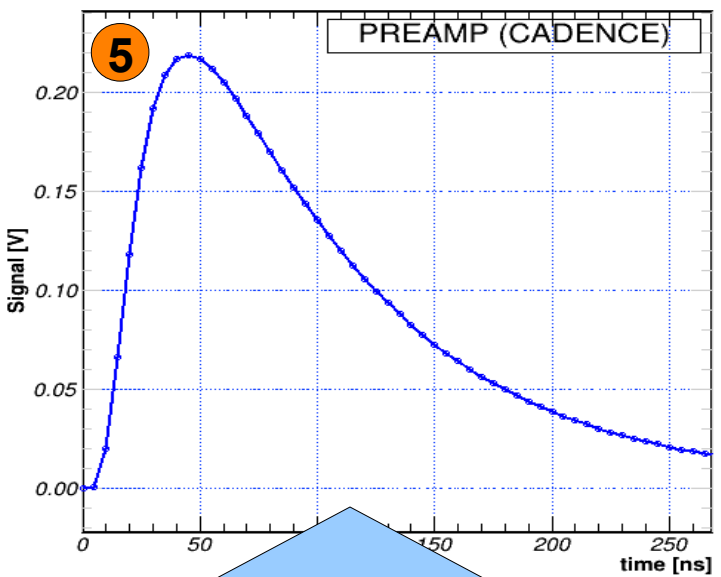
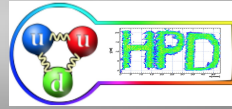
- X → mid of x-y projection in each cell
- Y → mid of the cell (anode wire)
- Z → anode wire
- T → t_0^i
- E → E_0^i

Physical digi (II)

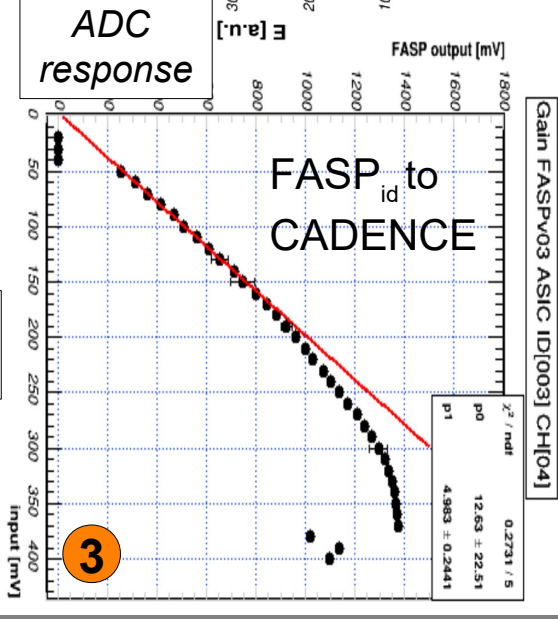
- $Box_{dx}(X-Y) \rightarrow Gauss(X, Y | \sigma_x & dx, \sigma_y)$
- Row → y position on the pad grid
- Col → x position on the pad grid
- Up → triangle selection
- $E(r, c, u) \rightarrow$ energy on the triangle
- $\sum_{r, c, u} E(r, c, u) < E_0^i$ [No energy threshold at this phase as it depends on digi-time topology (neighbor trigger)]
- T → t_0^i



Physical to Electric signal

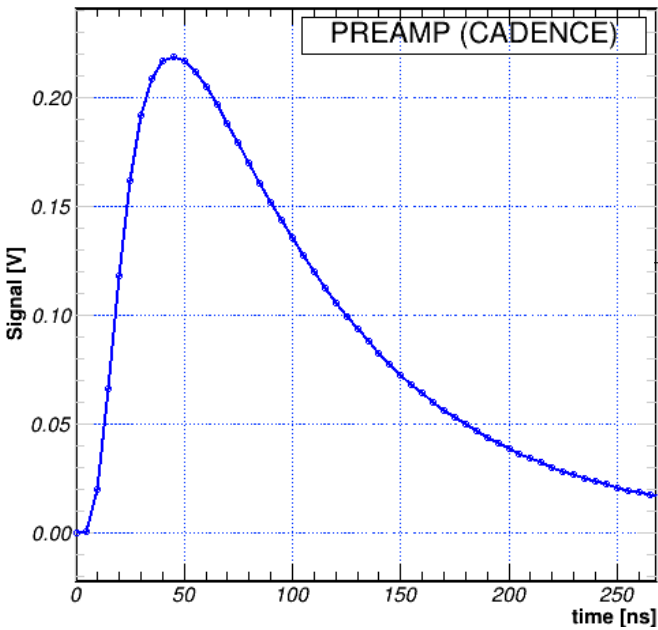
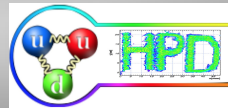


Th. response

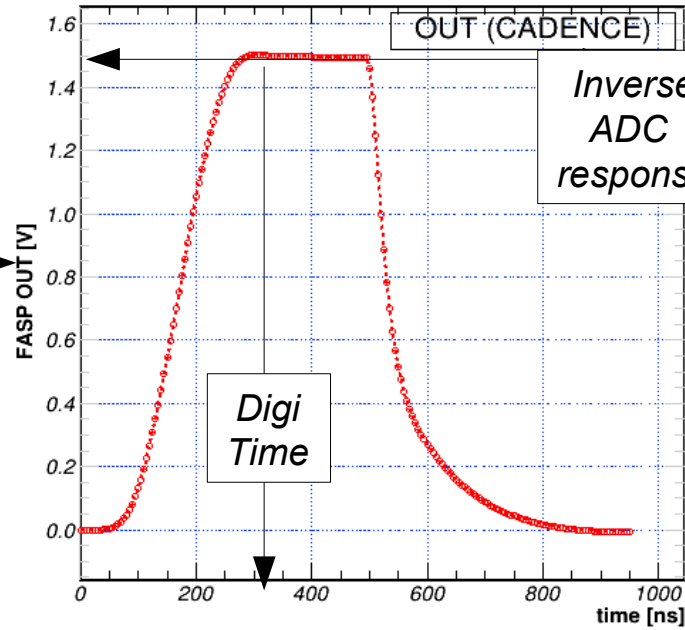




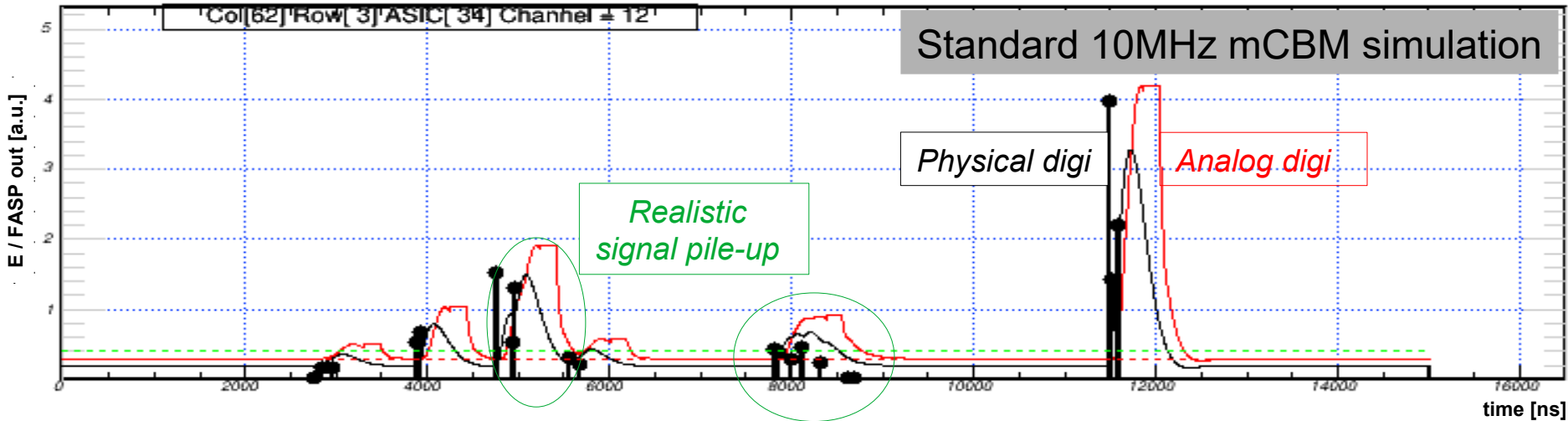
Physical to Electric signal

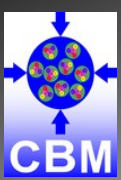


Analytic

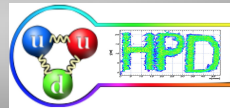


Digi Signal

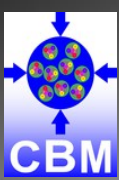




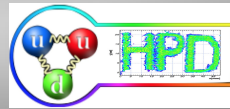
Other pieces for Time-Based simulation/reconstruction



Ring buffer for writing digis to Time-Slices.	DONE
Synchronization of local buffer with CbmDaq buffer	DONE
Time-based cluster reconstruction	DONE
Cluster parameter reconstruction (energy/xy position)	TEST
Pile-ups : cluster deconvolution	NO
Hit generation (cluster convolution)	NO



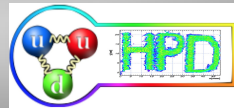
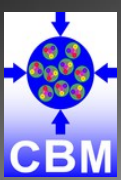
Status for Addendum, mCBM and beyond



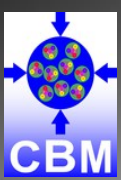
1. Experience from measured data analysis is transferred to CbmRoot shaping the code
2. Pay-back time is approaching i.e. using the simulation tool to check e.g. HCR measurements
3. Besides topics on the reconstruction the data unpacker is not yet started !!
4. Deadline Nov. 2019 for mCBM installation

CBM-TRD Bucharest team

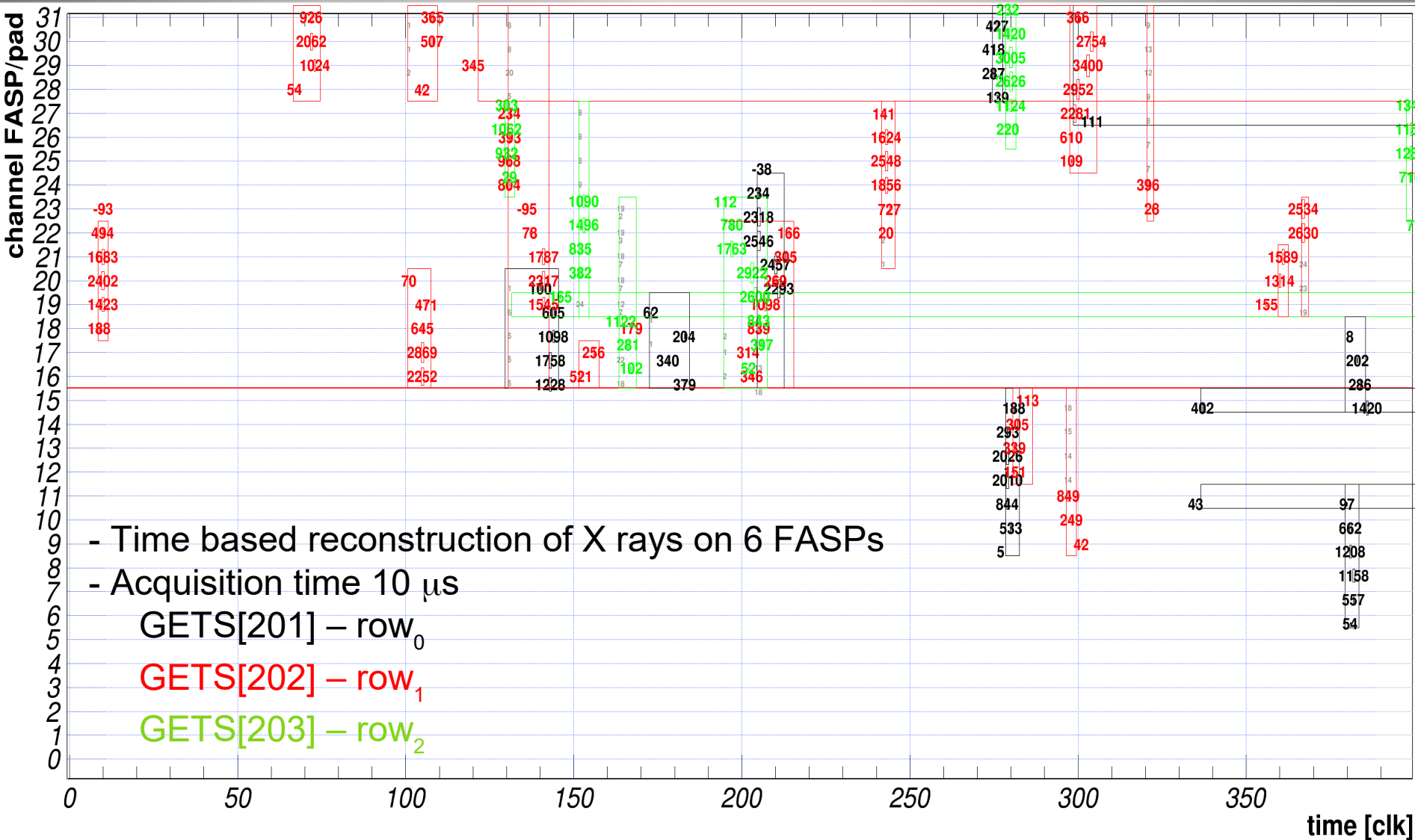
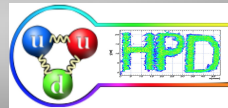
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Mariana Petris,
Mihai Petrovici,
Lucia Prodan,
Andrei Radu,
Laura Radulescu
Claudiu Schiaua,
Victor Simion**



BACKUP



RATE → real life signals @ 100 kHz/cm²



Mon Mar 25 12:22:25 2019