

# **Beam Test Data Analysis**

## **Review of the Bari TKRDigi**

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# Review approach

We are looking for a simplified version of TKRBariDigiAlg (not excluding the “Full simulation” version)

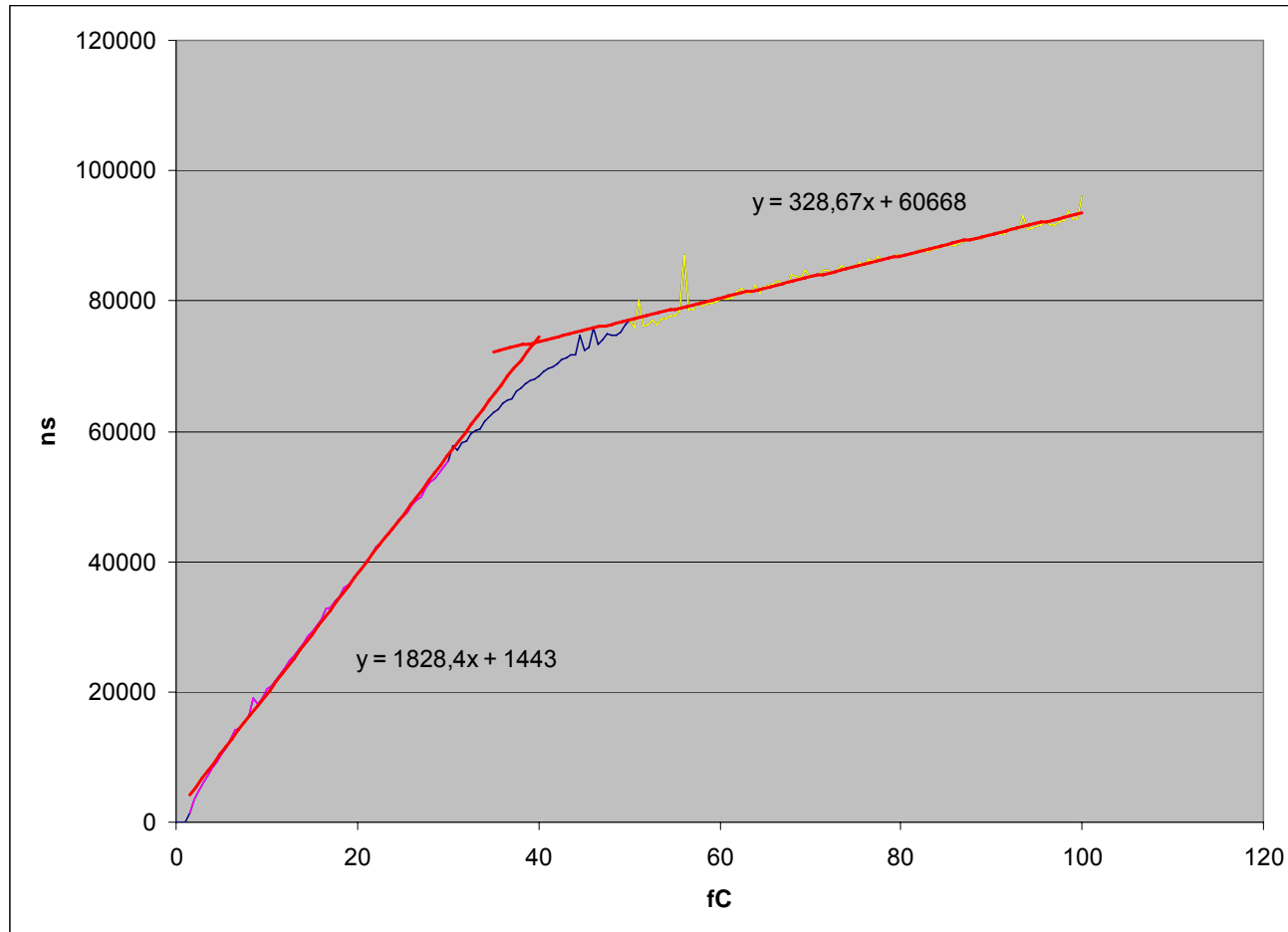
- **Level 0:** no SSDs detailed simulation (i.e. No e-h propagation, no current signal induced on the strips and no electronic simulation).
- **Level 1:** re-introduce only the cluster propagation (in order to simulate the sharing effect alone)
- **Level 2:** re-introduce the signal simulation (current Bari Digi algorithm version)

# MC (Simple)Digit simulation:

## Level 0

- convert the energy deposition  $E_{dep}$  in the near strip channel to number of pairs  $N_p = E_{dep}/3.6eV$
- add a fluctuation on  $N_p$  by using a gaussian random number with mean=0 and  $\sigma = \sqrt{F \cdot N_p}$ , where  $F=0.1$  is the Fano factor for Silicon
- add a fluctuation due to electronic noise of 1550 ENC by using a gaussian random number with mean=0 and  $\sigma=1550$
- convert the  $N_p$  in charge  $Q$  unit (fC), if  $N_p > 0$ , otherwise set  $Q=0$
- convert  $Q$  in voltage, by using the electronic gain and taking the saturation into account, i.e.  $V(mV) = \min(Q(fC) \cdot G, 1100)$ , where  $G=100$  mV/fC ( a gain fluctuation os 6% included)
- compare the voltage  $V$  with the threshold  $V_{th}$  of 125 mV, assuming that a most probable value of MIP is 500 mV (about 5 fC), then fire the channel strip if  $V > V_{th}$
- convert  $Q$  in  $T1$  and  $T2$  (where  $ToT = T2 - T1$ ) by using parameters from PSPICE simulation
- **N.B. The Bari digit needs the L1trigger simulation in order to take into account the  $T_{ack}$  ( $\sim 2\mu s$ ) and  $T_{req}$  ( $\sim 1\mu s$ )**

# Parameters from PSPICE simulation for Q->ToT conversion

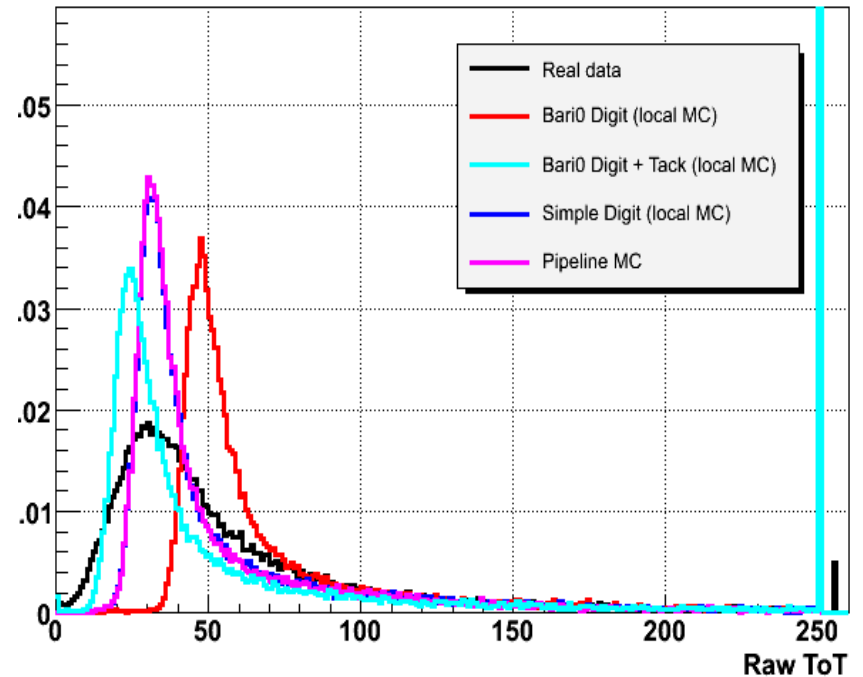
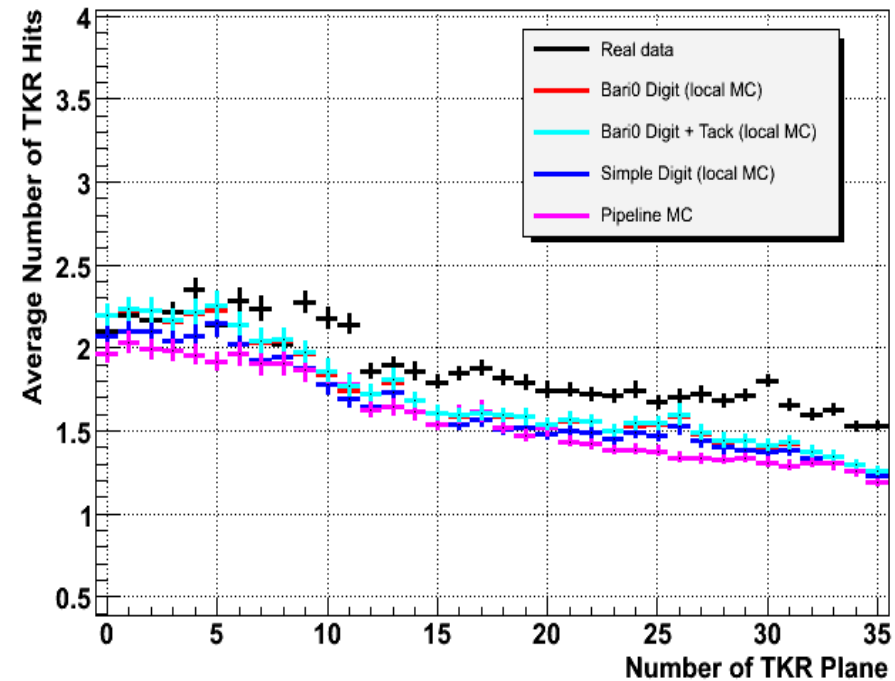


# MC re-production strategy

- **TkrDigi (Bari version) v2r5p1**  
**(BeamtestRelease-v6r0919p1)**
- **6GeV protons and 5GeV electrons (0degee)**  
**generated by ps\_setup (ps\_mc.root file as**  
**output) and digit, recon, merit and mc**  
**output root file produced using Gleam.**

# Raw ToTs and hits profile plots

6GeV protons (run 1423)



# Raw ToTs and hits profile plots

5GeV e- (run 1460)

