Olivier Callot

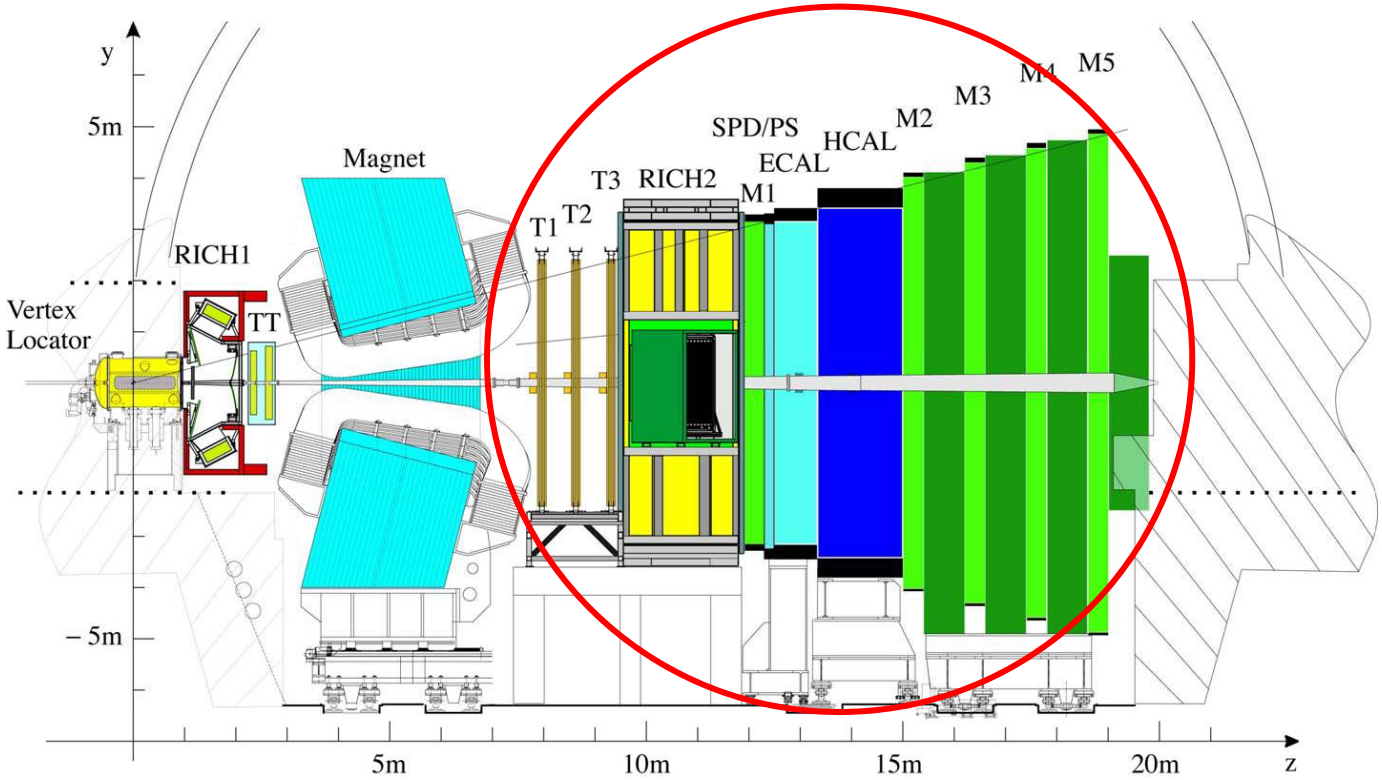
On behalf of the LHCb collaboration

Last week at LHCb

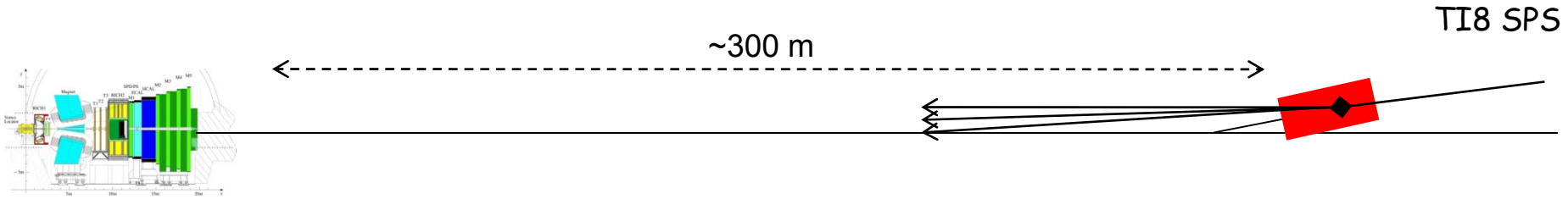
- Before the machine started
- Splash events
- "Quiet" beam
- Collisions

LHCb was ready

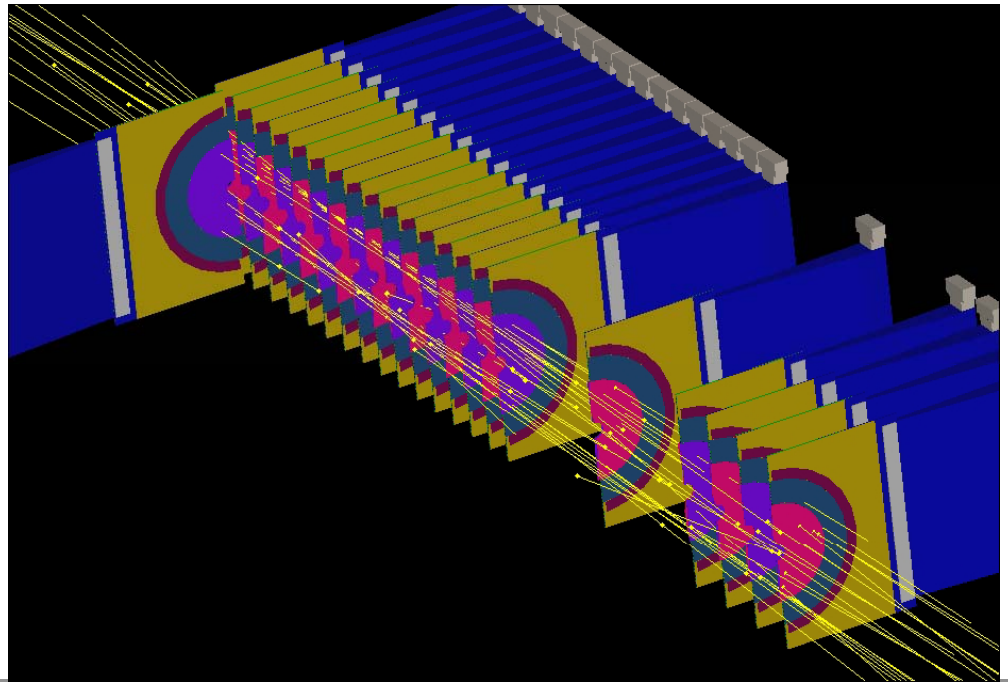
- **The whole detector is in place, aligned, ready**
  - Tested with cosmics, only for large detectors



◆Tested with TED events



- Large multiplicity, ~2/cm^2 useful for small precise detectors
- Several periods in 2008 and 2009
  - Very useful to get a first time and position alignment

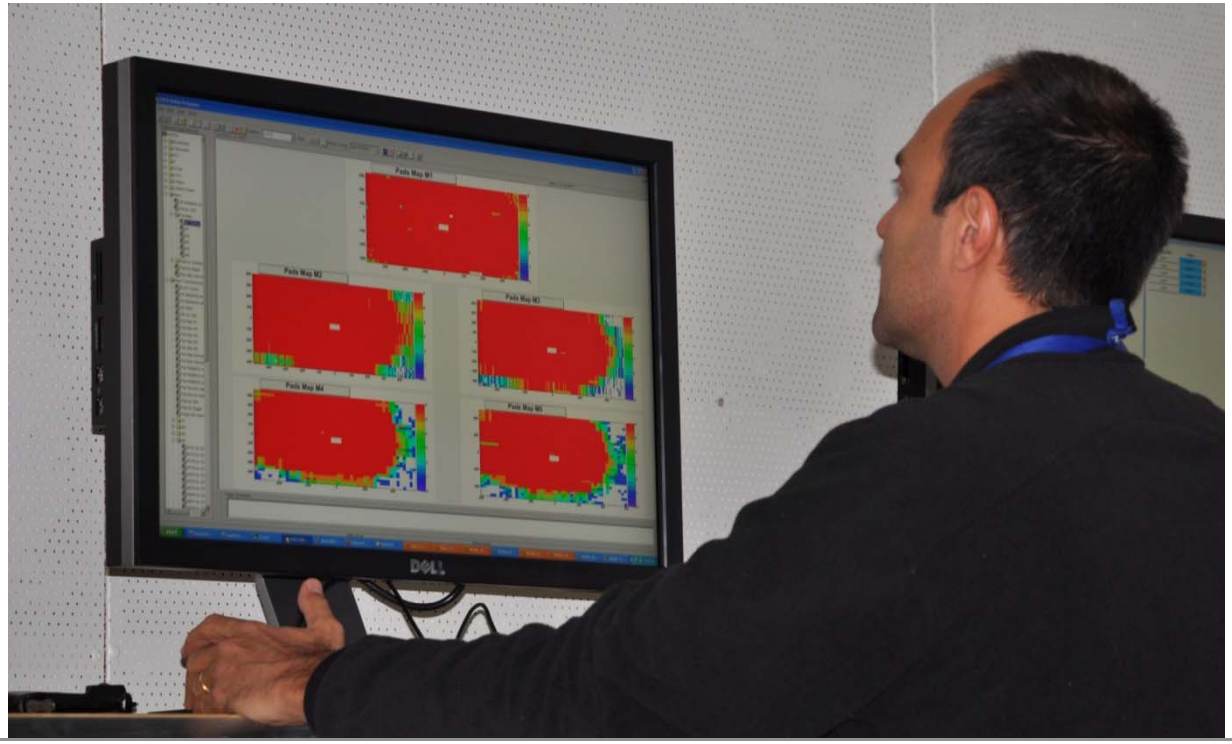


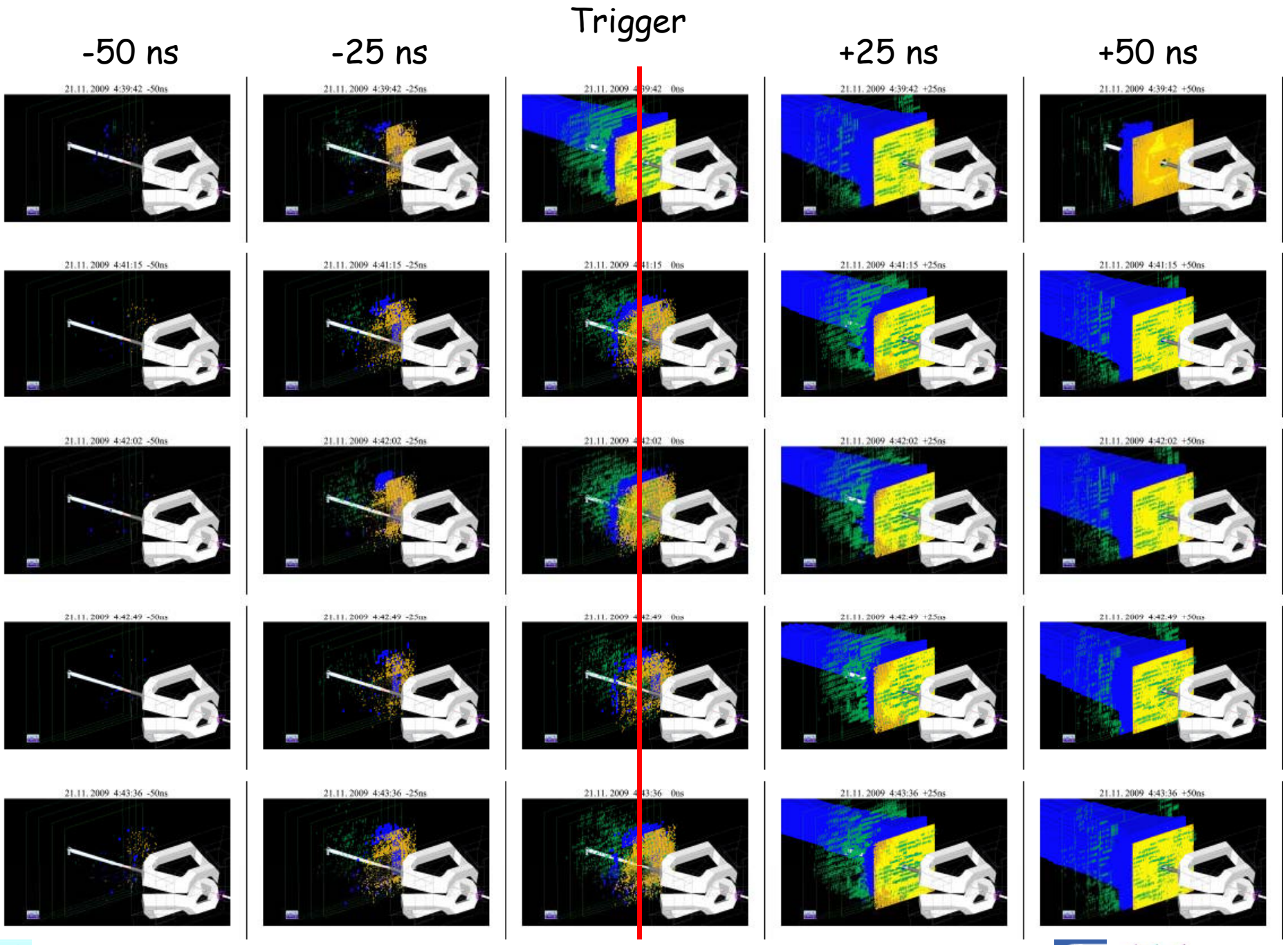
Trigger

- **Single trigger used for the whole commissioning**
  - Level 0 (hardware) : Minimum bias
    - Hadron:
      - → > 500 MeV Et in the hadron calorimeter AND
      - → > 2 hits in the SPD
    - Muon:
      - → Pointing coincidence of the 5 muon stations
    - The L0 trigger is the OR of these two lines
  - HLT (software)
    - Pass all events...
  - Offline reconstruction
    - Started automatically on the grid when a file was received
      - → Very small files

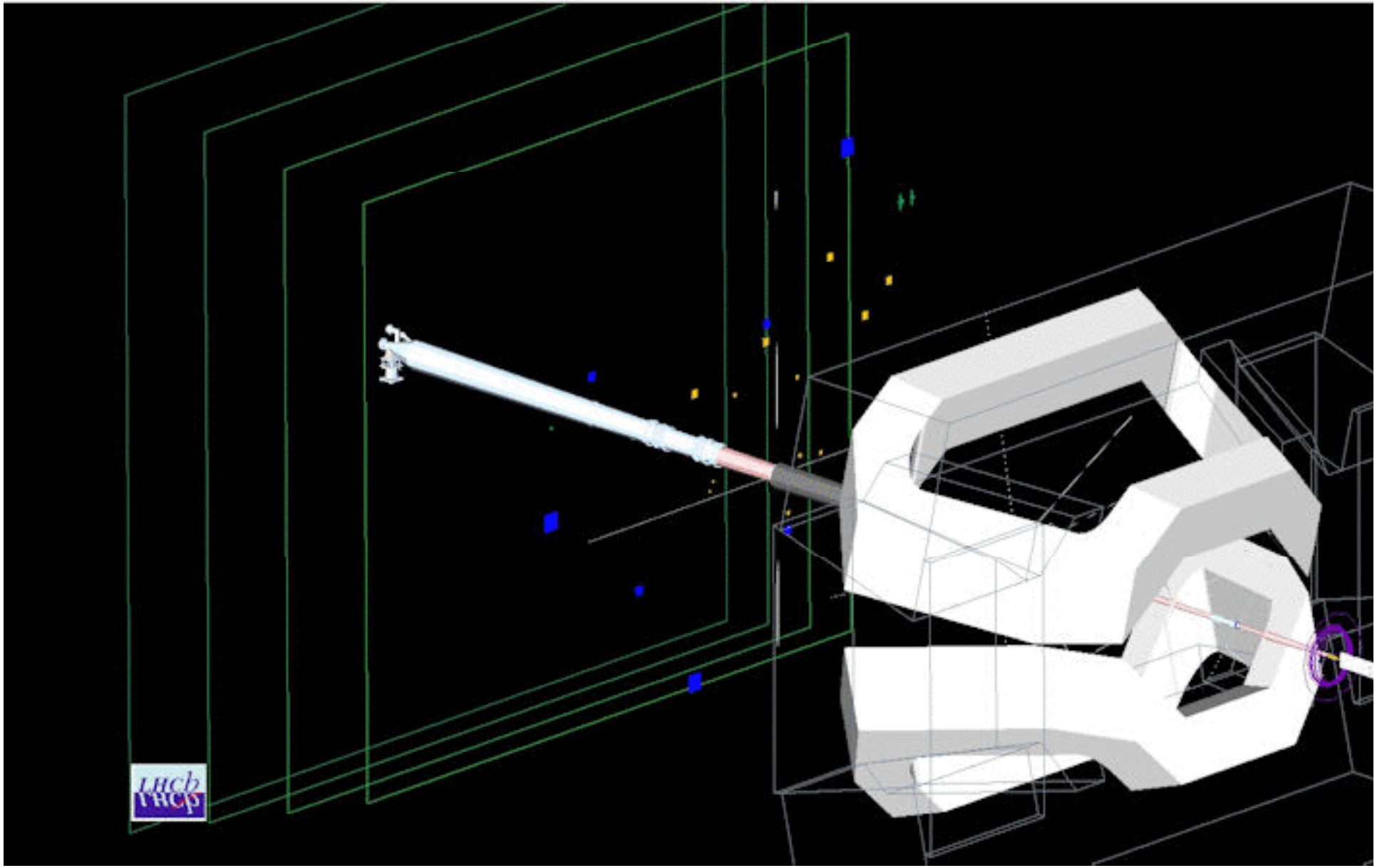
Splash events

- **Beam 1 into a tertiary collimator**
  - 4 shots on Friday 20 November evening, around 20:30
    - Recorded with calorimeter and muon detectors only...
  - Again Saturday morning 21/11 from 04:30 to 05:15
    - 41 events recorded




Trigger
-50 ns
-25 ns
+25 ns
+50 ns

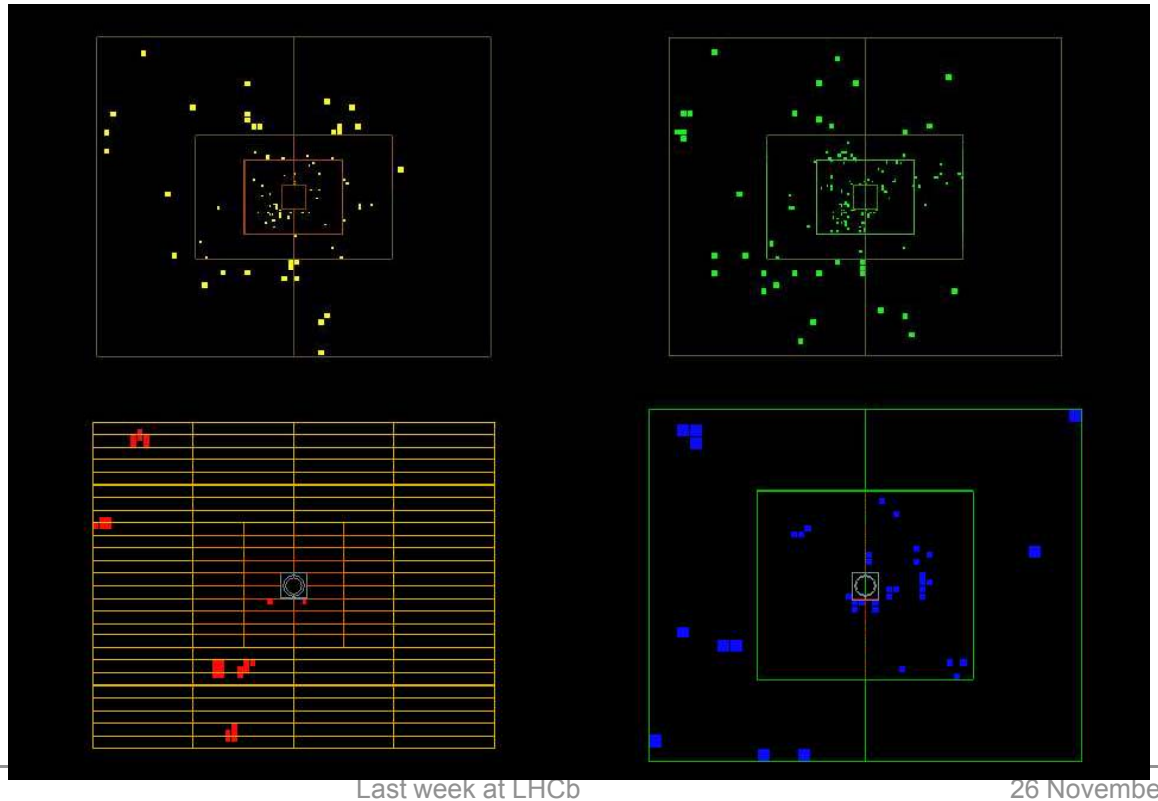
21.11. 2009 4:38:08 -50ns

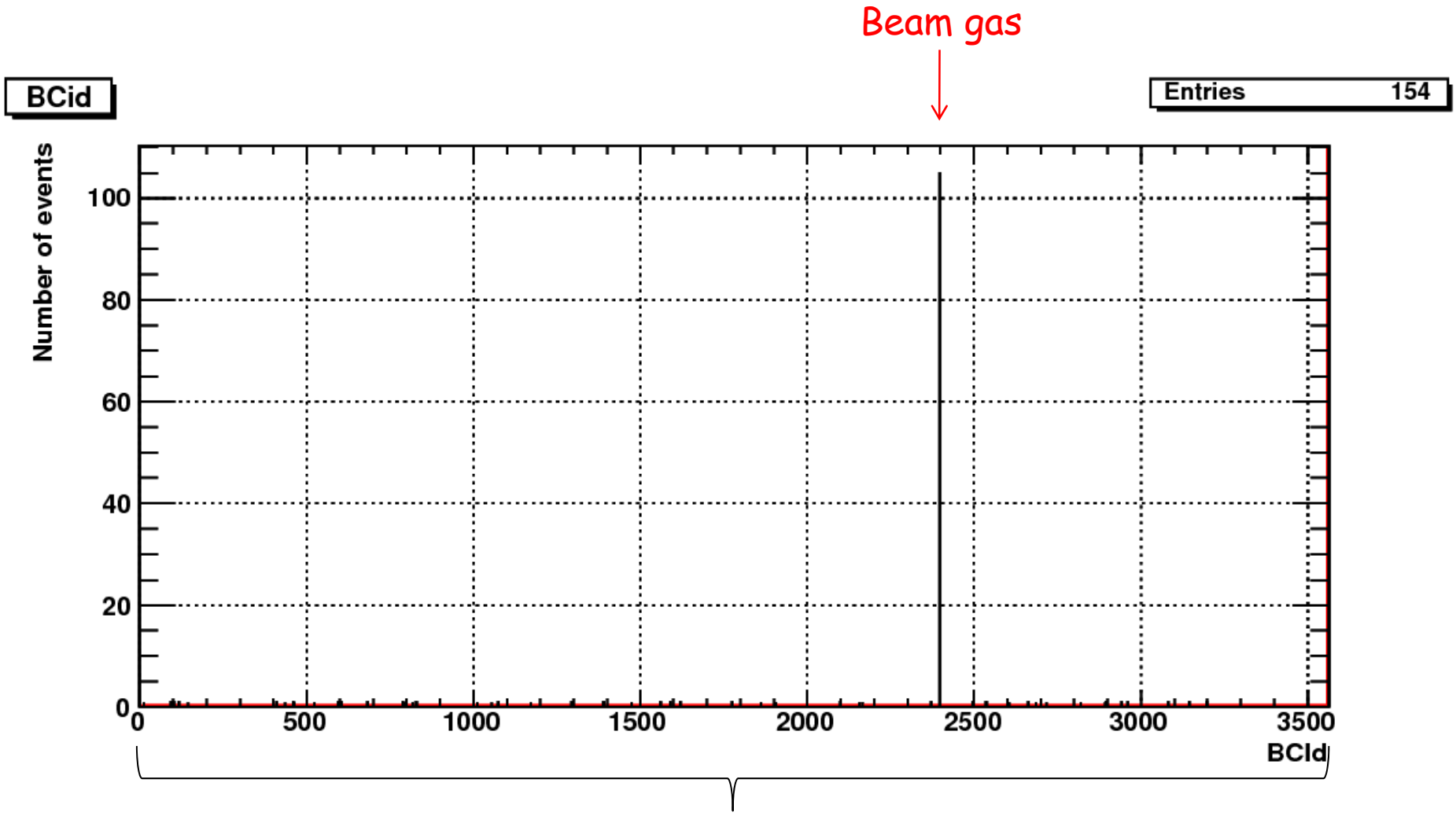


Beam Gas events

◆Beam 1 circulating, Beam 2 interlocked

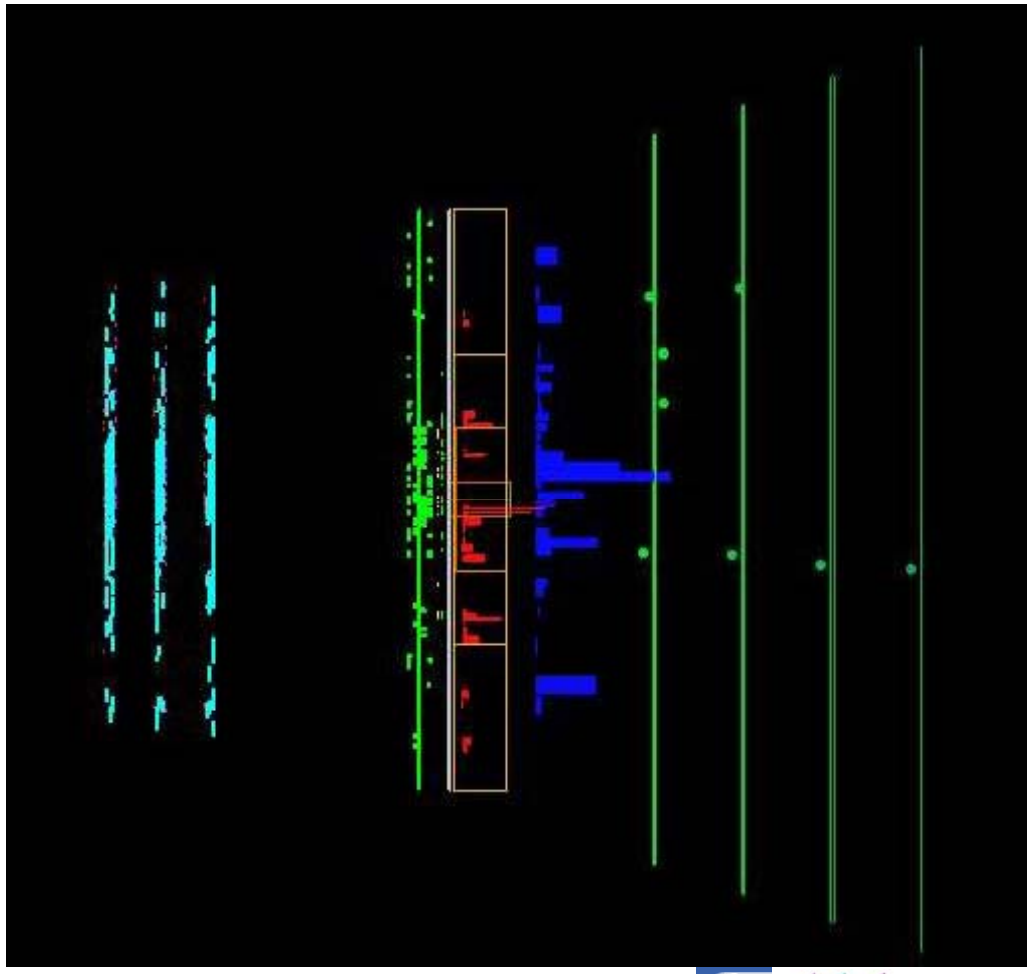
- This situation allows to turn ON some robust detectors
- Done on Saturday 21/11 afternoon around 18:00 with calorimeter
  - Very clean beam gas events seen
  - Rate is about 1 per minute (as expected), similar to the cosmics rate





Cosmics, i.e. not synchronous with LHC...

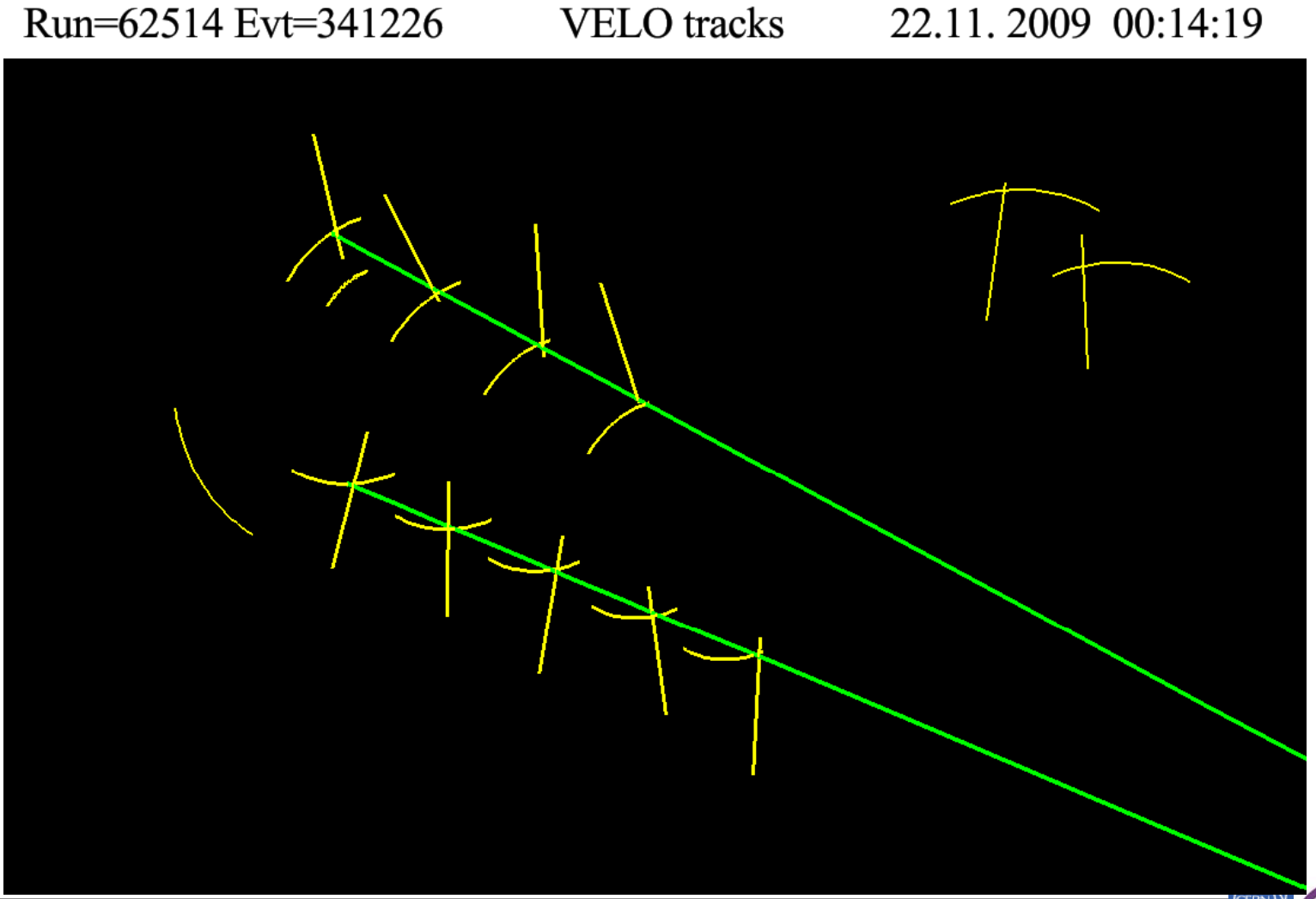
- Decided to ramp also the Muon detector, and later the Outer Tracker
  - Only 10^{-6} of the design energy stored in the beam...
- Period of “stable” beam (later called “quiet beam”) from 20:30



- Clearly this is not cosmics!
- Then turn ON few modules of the Velo and a small part of the Silicon Tracker

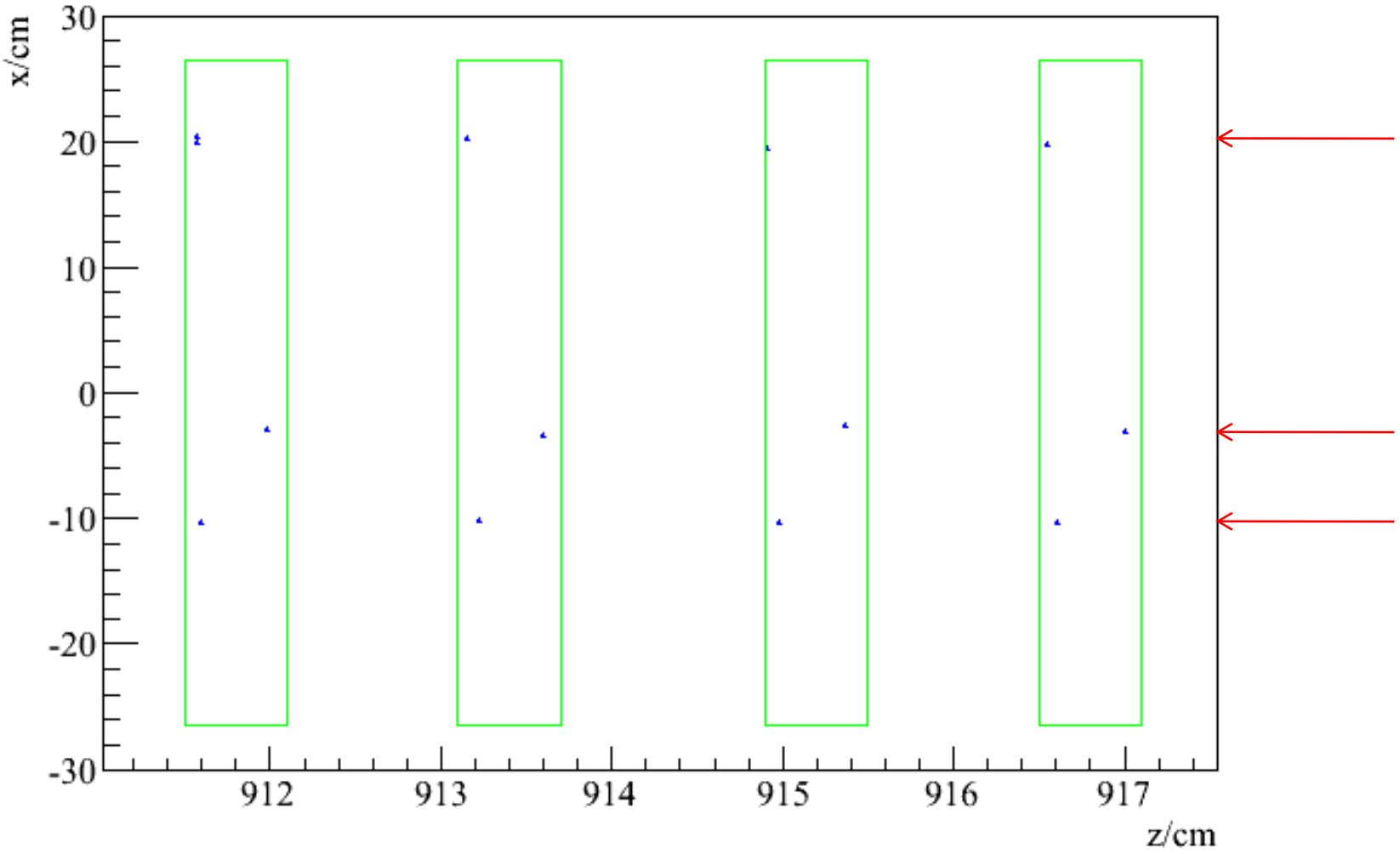
◆5 Velo modules on each side

- Clear tracks with R (circle) and Φ (line) sensors !
  - These tracks are even matching OT tracks...

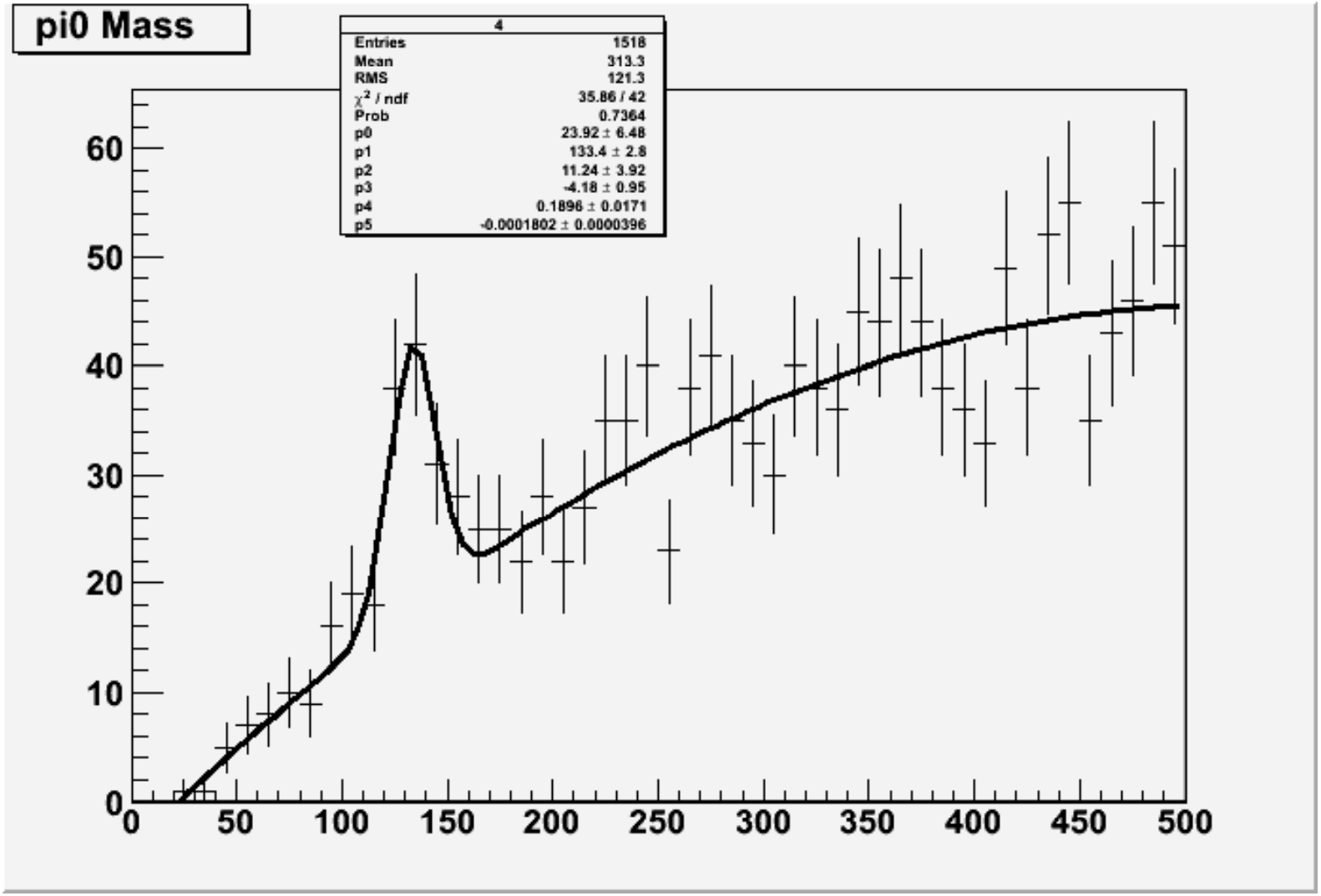


◆Also tracks in the ST

- One box, 4 layers

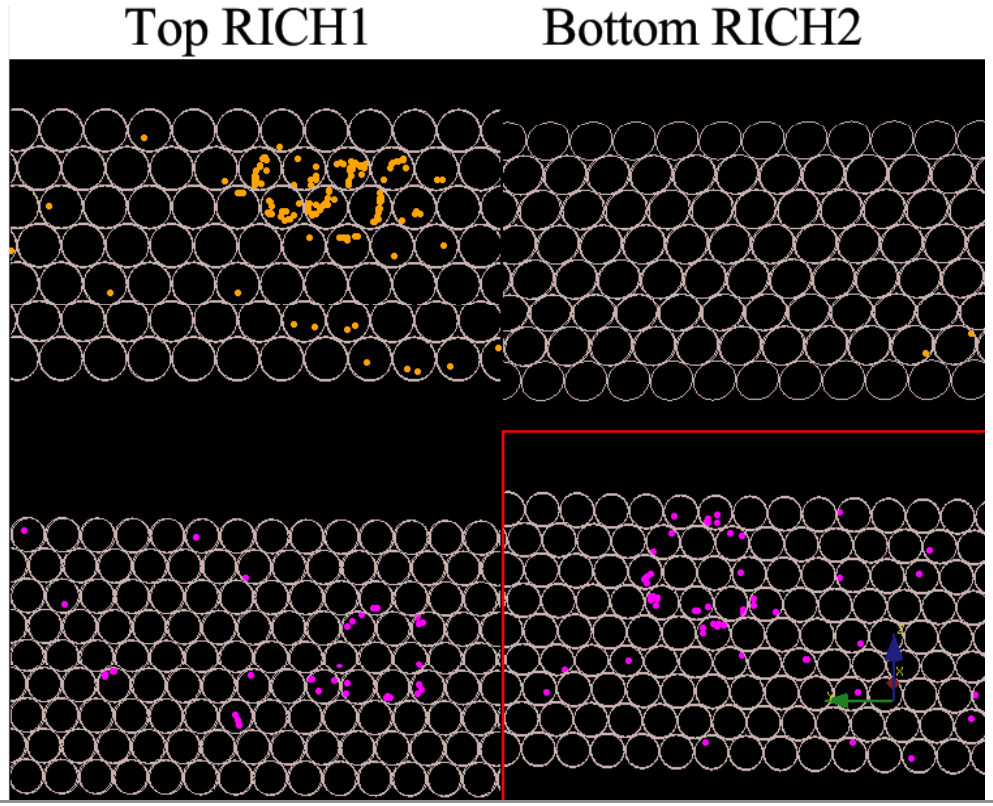


◆π^0 have been reconstructed in the calorimeter



Towards collisions

- **Monday 23 November afternoon was fantastic**
  - First some “quiet” beam while beams were colliding in Atlas and CMS, then when colliding in Alice
  - The RICH got its first rings due to beam-induced particles



◆Then around 17:45 it was our turn...

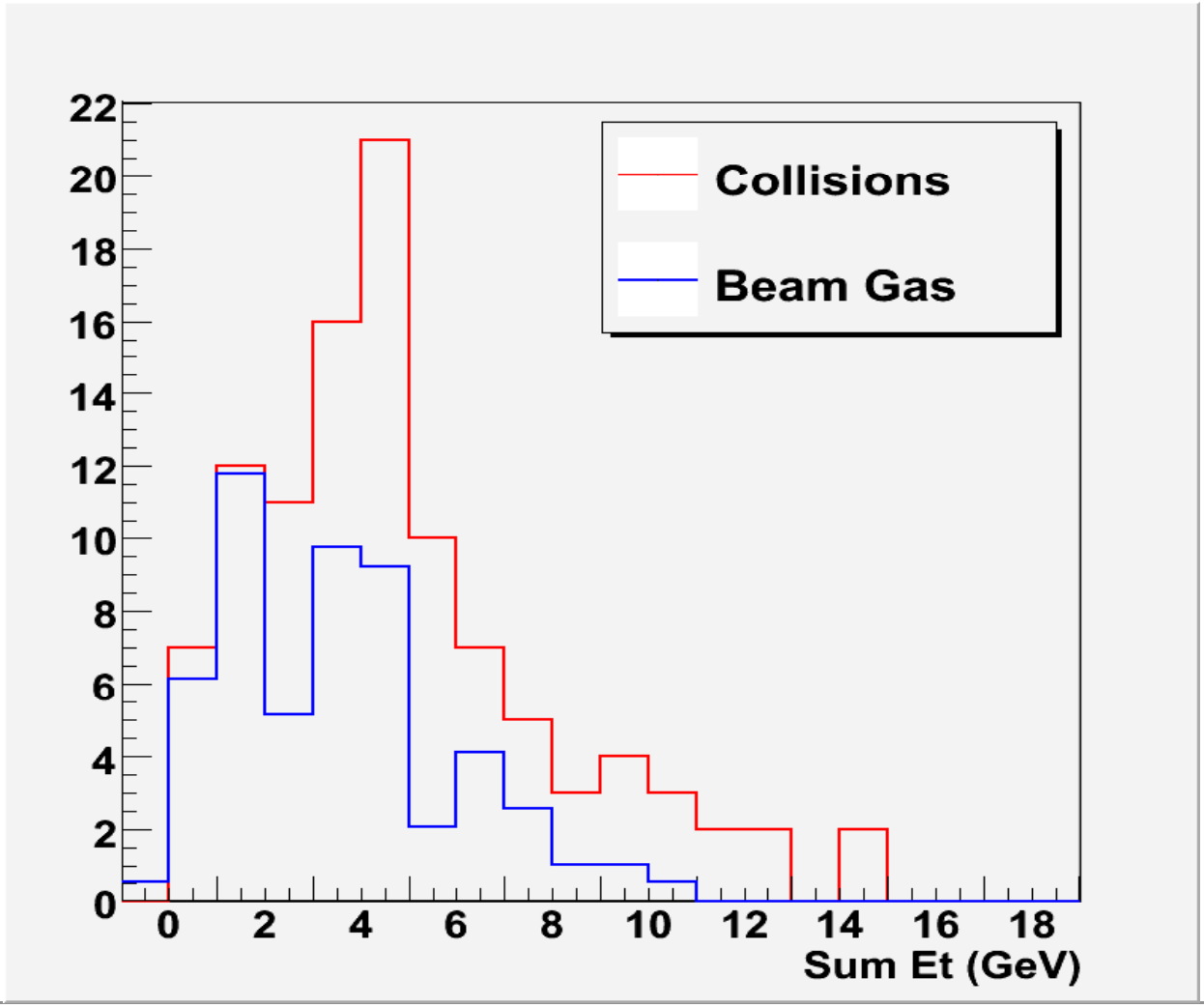
Were there really collisions?

- **Difficult as only large and far detectors were ON**
  - Some events looked 'more dense'
  - The event rate was higher, ~5 per minute instead of ~2
    - Only 10^{-7} of the capacity of the online system, designed for 1 MHz.

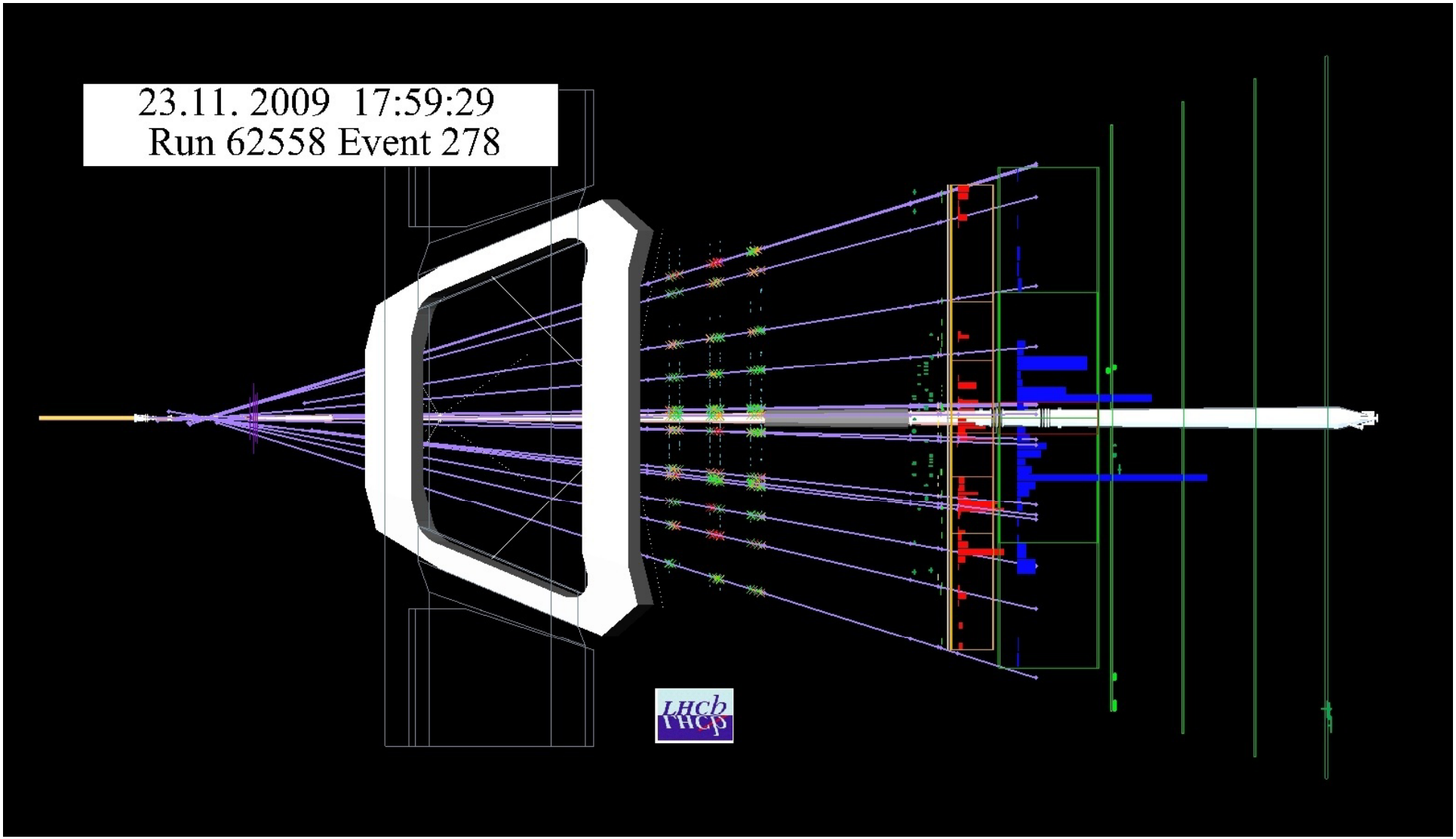
We were 99.9% convinced online

Offline analysis answered

- The calorimeter energy distribution is different

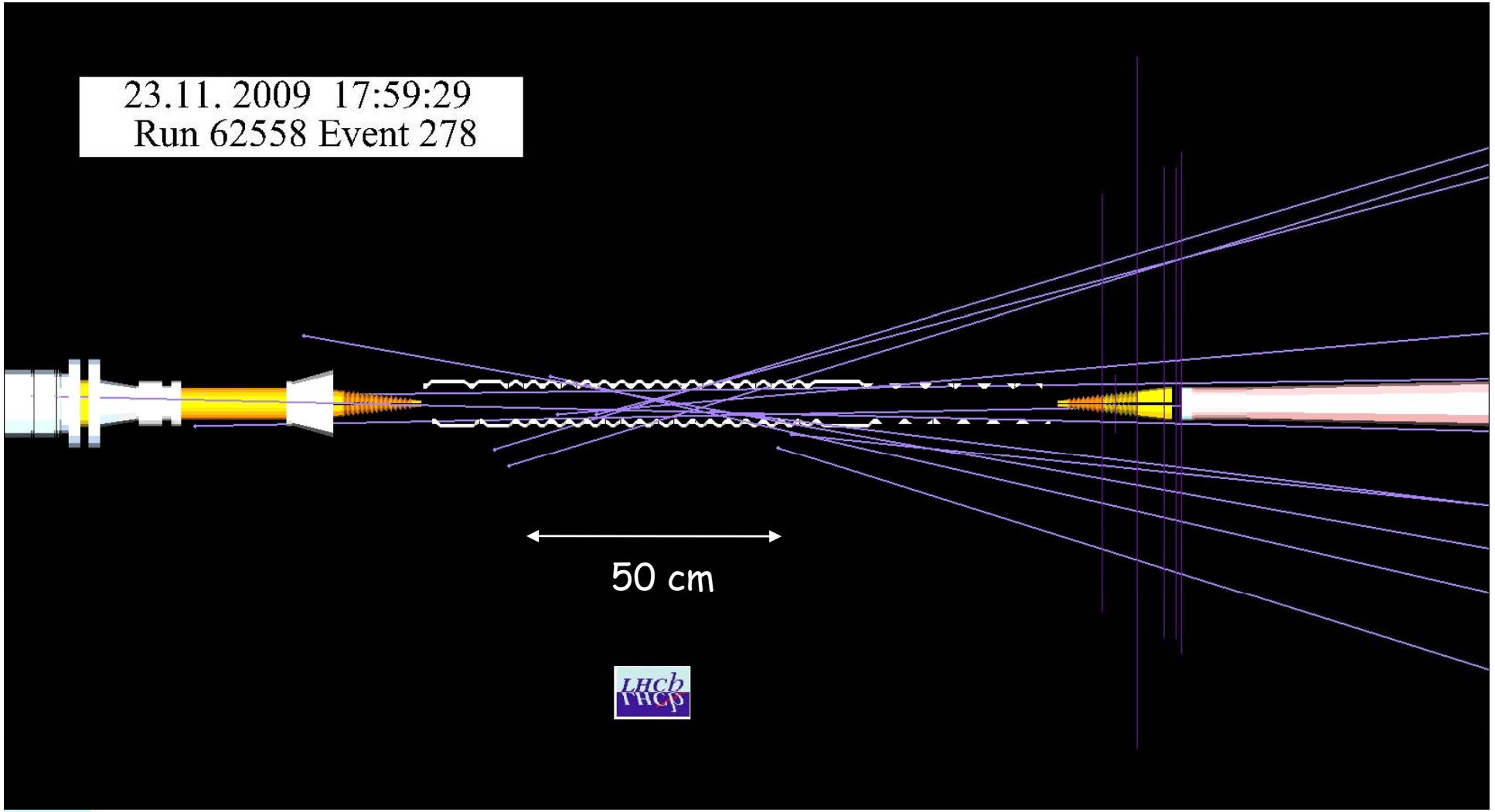


◆Events have nice vertices (extrapolating OT tracks)



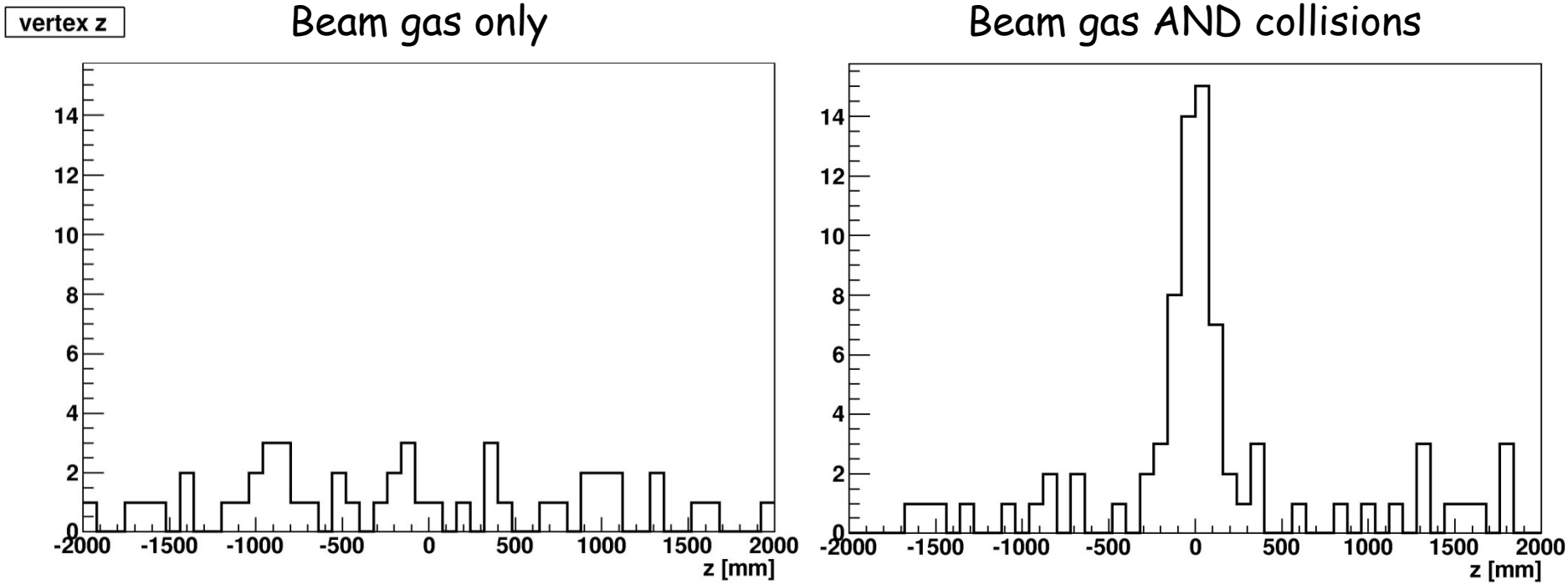
◆Zoom in the Velo area

- Velo detector was OFF. Only the RF foil envelope is drawn



Vertices are clustered

- **Measured only with OT track**
  - 7 to 9 meters downstream
    - Would be better with Velo and Silicon Tracker on, but this requires Stable Beam



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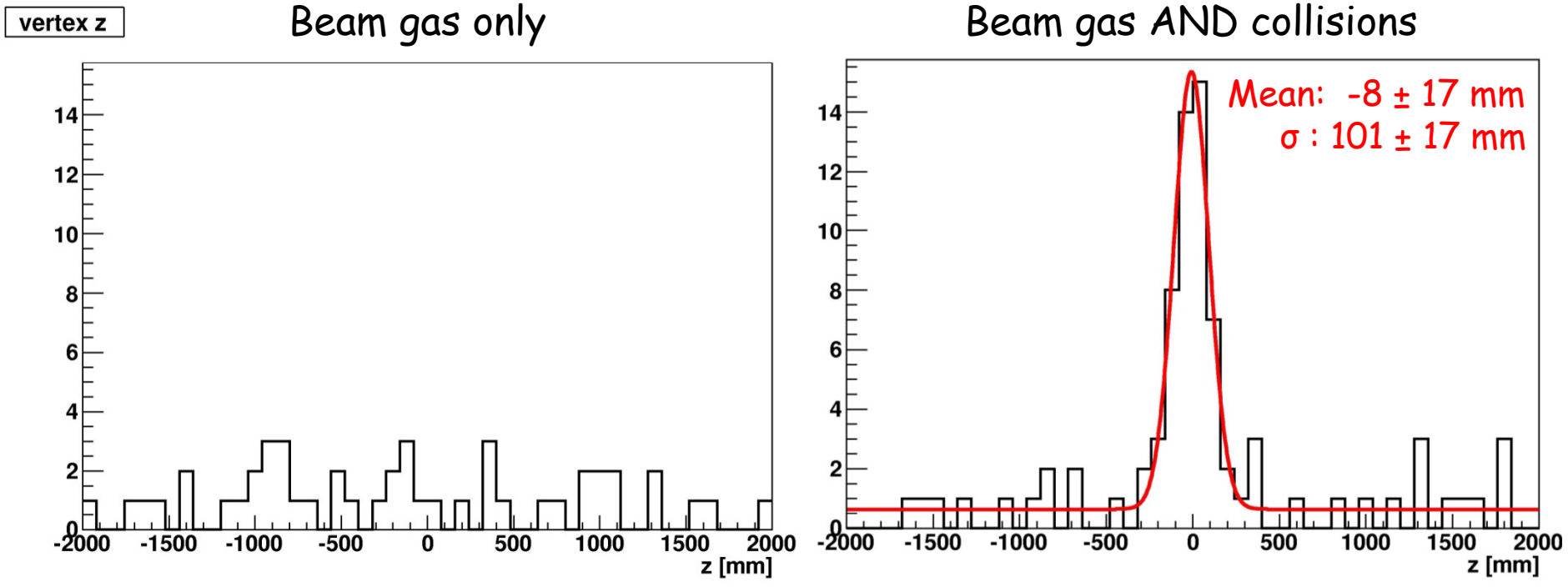


Experts had three very busy days

- Coordinating the activities and following the extremely fast LHC progresses
- Intense work in tight contact with the machine experts for the cogging of the beams
  - Finding the proper bucket for the collision to be at the expected location
- Many persons were in the control room for a large part of these 72 hours
  - Exhausted but immensely happy
- Celebration at the pit with LHCb, with CCC and also with the family!
- Now back to quiet state

A big THANK YOU to the LHC

To all the people who contributed to the design, construction, installation, commissioning and operation of the LHC

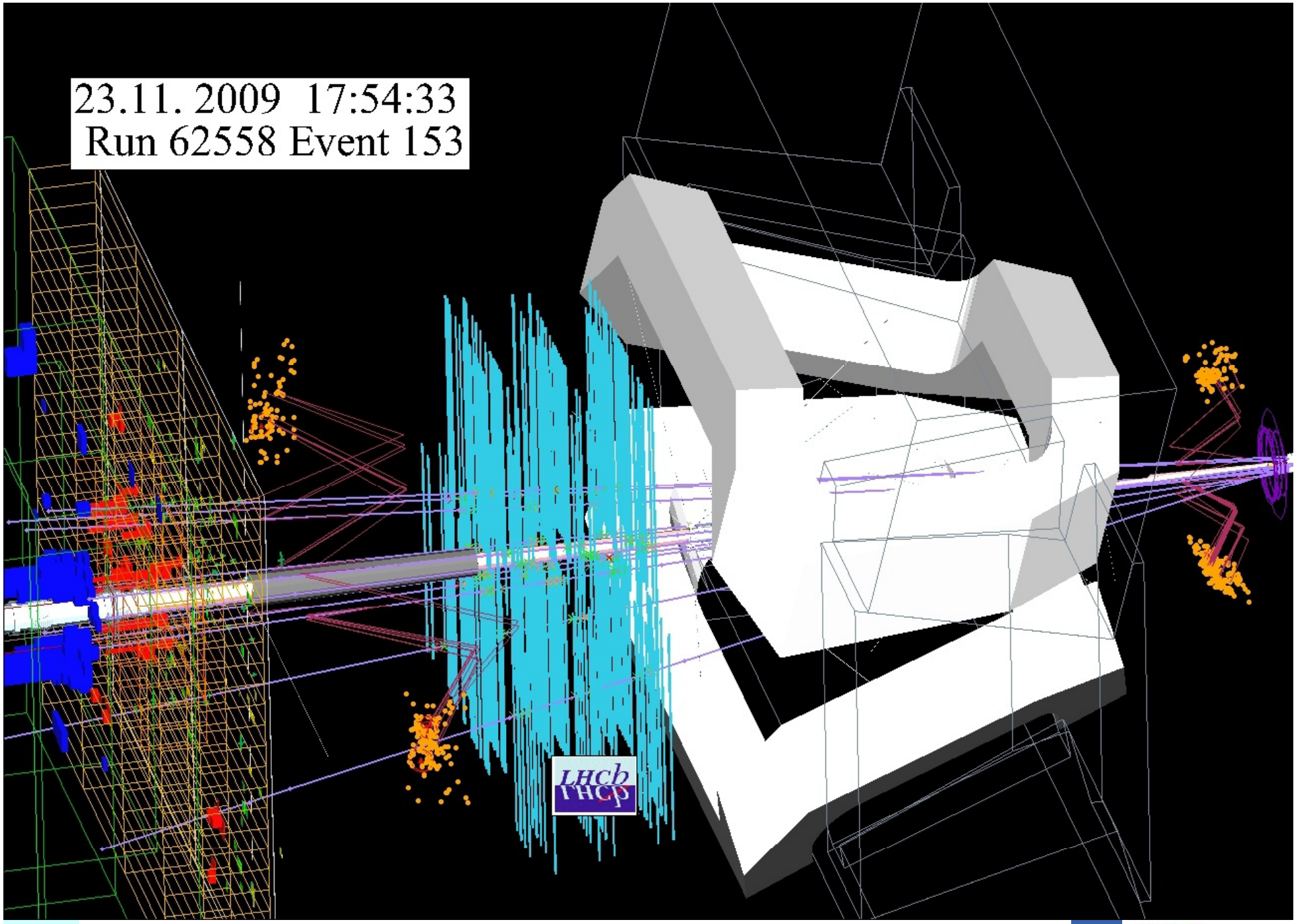
This machine is fantastic

Collisions were delivered already after 72 hours!!!

- **LHCb was ready for the first particles**

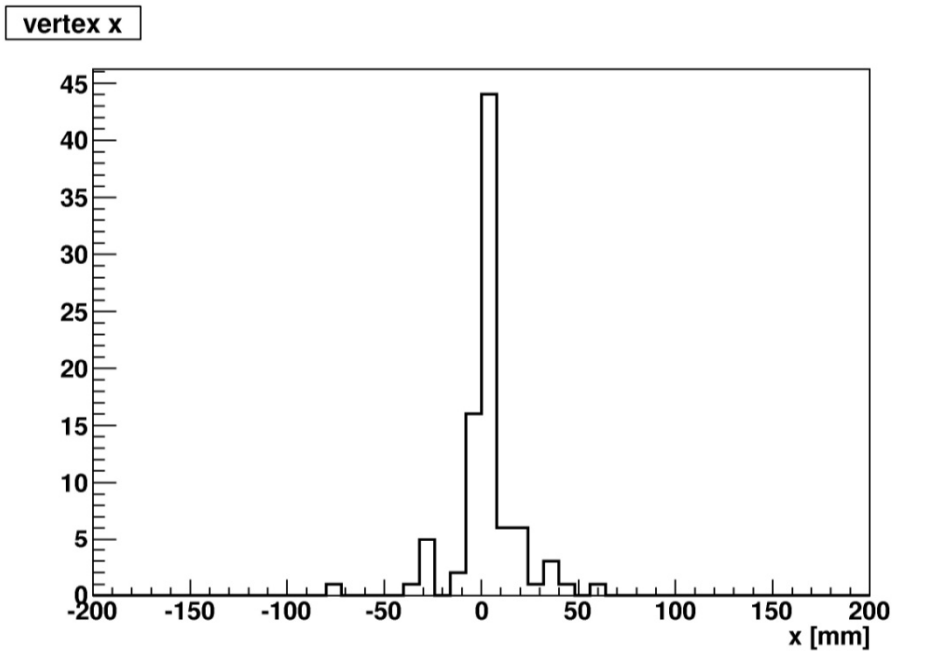
- **We are ready for more**
  - We wait for Stable Beam collisions
  - And later for higher energy
    - When you want !

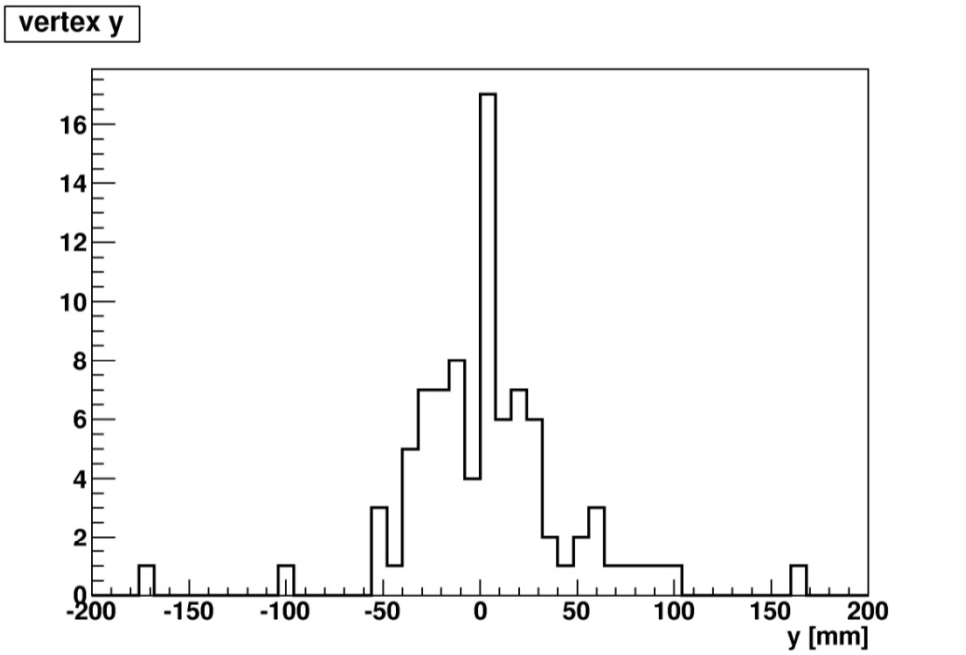
Backup slides


23.11. 2009 17:54:33
Run 62558 Event 153
LHCb

◆Transverse vertex position

- OT measures X precisely, Y by 10° stereo wires
  - This means a factor ~10 less precise in the Y coordinate.





◆MIP are measured in the pre-shower