ZDD status

BESIII Collaboration Meeting, September 2012

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Talk outline

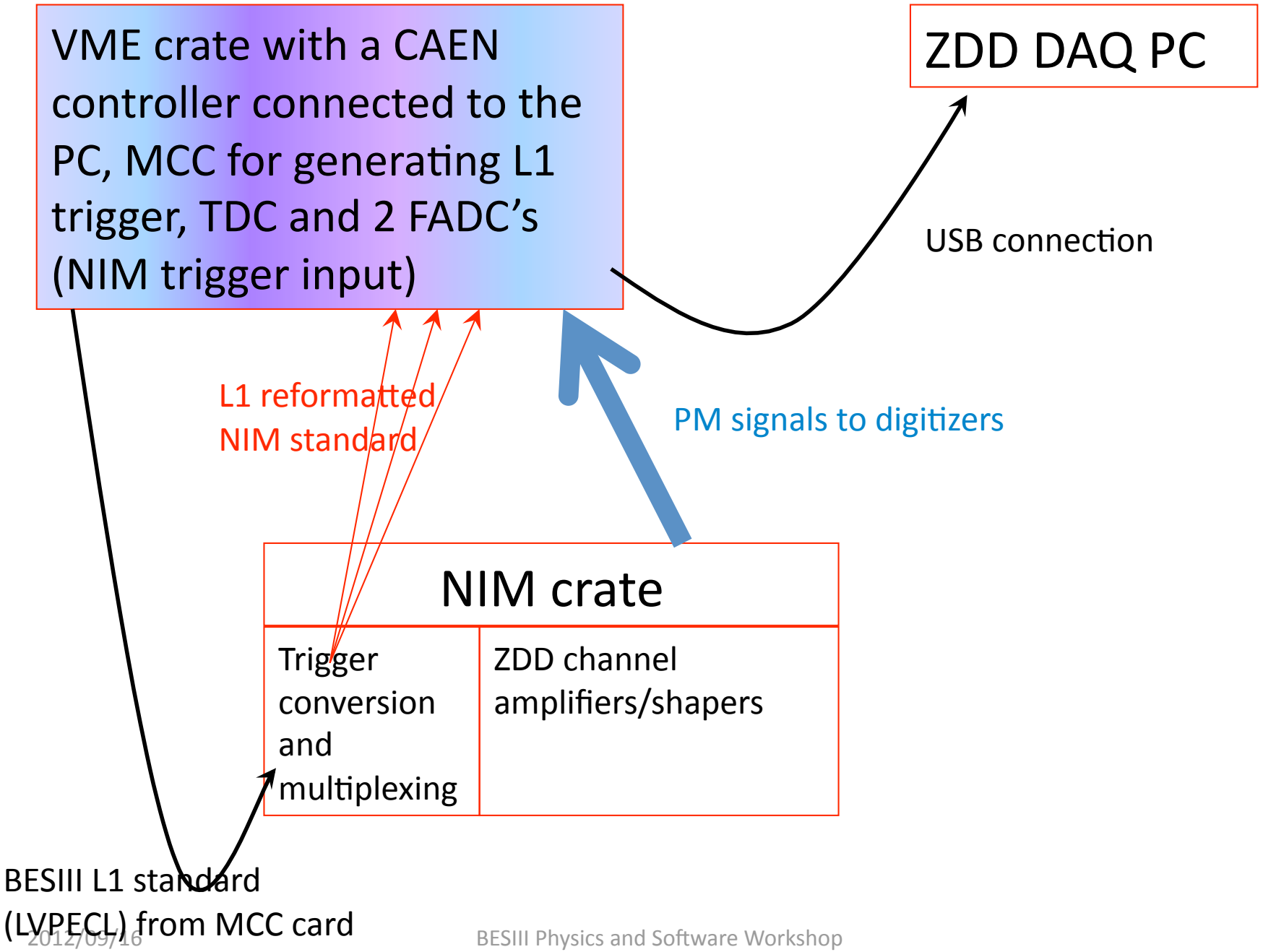
- ZDD performance in the 2011-2012 run
- Hardware problems
  - …and ways to solve them
- Software problems
  - …and ways to solve them
- Outlook on the future run

2011-2012 data taking ~OK

- ZDD took data most of the time, in automated way, at the same time with BESIII
- About 3000 runs on disk, for total of 1.8 TB
- DAQ run separately from BESIII, on a PC
- DAQ caught BESIII start-of-run and end-of-run, and closed/open files with the BESIII run number in the filename
- Thanks to Li Fei and the DAQ group for explanations about the DIM service!

Not-so-good news

- All L1 triggers sent to the ZDD crate
- …but *disagreement* between BESIII and ZDD on the number of triggers in many runs
  - Most of this should be due to faults in the NIM crate (see next slide)
  - Also, 512-event pipe in the FADC fill-up if
    1) Slow reading caused by the USB connection
    2) Sometimes high backgrounds/trigger rate


VME crate with a CAEN controller connected to the PC, MCC for generating L1 trigger, TDC and 2 FADC's (NIM trigger input)
ZDD DAQ PC
USB connection
L1 reformatted NIM standard
PM signals to digitizers
NIM crate
Trigger conversion and multiplexing
ZDD channel amplifiers/shapers
BESIII L1 standard (LVPECL) from MCC card

Solving the trigger problem

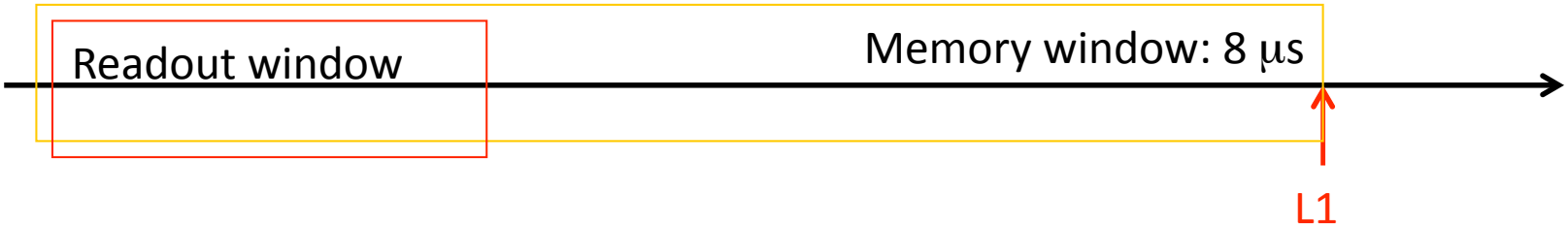
- The electronic LNF service designed and built a VME passive board that converts levels from the BESIII standard and serves the L1 trigger to the FADC digitizers in a NIM standard
- No more need for NIM converter and splitter

The NIM crate itself is a problem

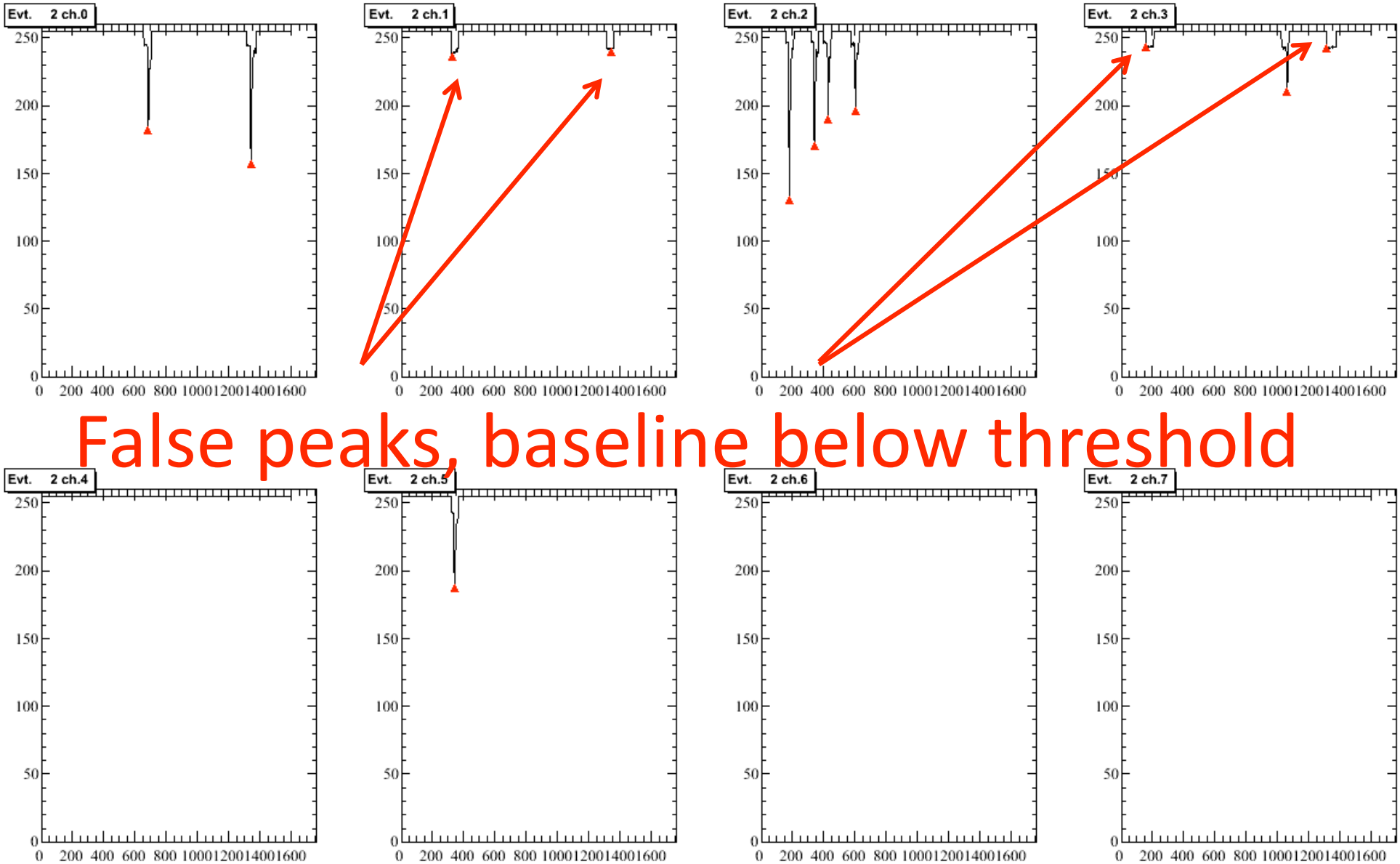
- Quite old, very “tired”
- Repaired many times already
- Could die anytime!
- We want to eliminate it altogether
- The LNF electronics service is redesigning the ZDD amplifiers/shapers in a new format, to fit the (newer) VME crate

Firmware problem 1 (small)

- One year ago, CAEN made a change for BESIII
- Introduced a “readout window” in addition to a “memory window”. This was tested OK.



- Soon after run start, we found out that CAEN data compression (ZLE) was needed . This did not work, creating “spurious” data.



False peaks, baseline below threshold

Firmware problem 2 (big)

- The “compressed” mode is *delicate*
- Under some (combination of) conditions some individual bytes are not read out
  - High rates?
  - Problematic run startup?
  - The event can not be reconstructed and is lost!
- CAEN finally produced a new firmware in which this problem is eliminated

Is data compression needed?

- In our PC-based DAQ yes
  - Without it we could not follow the L1 trigger rate, because of the USB connection
- In a future VME-only, BESIII standardized way, also yes
  - Because of data size

At the end of past run

- Both Flash ADCs from CAEN were handed to the DAQ group in BESIII
- There is ongoing work on integrated DAQ between BESIII and ZDD

For next run

- Trigger problem should be fixed
- If we are fast (and lucky) the NIM crate will not be there anymore
- DAQ will be integrated in the general BESIII data stream
- To be done: ZDD offline event reconstruction

Conclusion

- The ZDD group thanks everybody in BESIII for the help given on installation of ZDD detector and electronics, and on DAQ software
- …will ask for more help later ;-)
- Hopefully, will start next run to use the ZDD in BESIII analyses

Why separate DAQ's in 2011-2012?

- Most important reason: lack of time
  - ZDD was installed during August 2010
  - A few tests in cosmics rays were needed, and were done in September/October
  - It simply could not be done in time
- Also important: we felt at the time that not enough was known on the V1721 Flash Digitizer to ask for an effort by DAQ group