RUN2 Data Taking Strategy

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ALICE Consolidation and Run Coordination
OFFLINE Week – November 2013

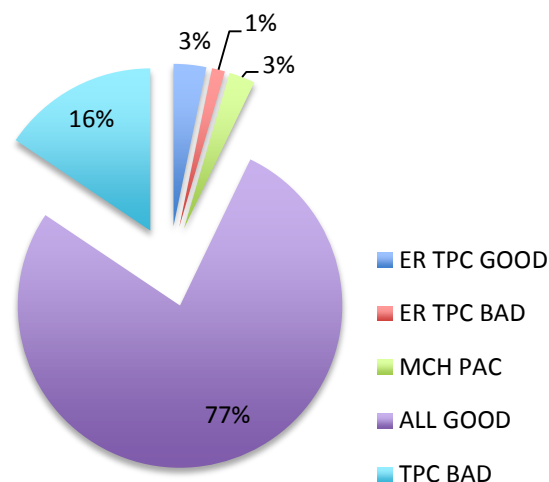# Analysis of pA 2013 Data

SB	197		
START/STOP	20.7	143	72.6%
RUN2RUN	19.2	119	60.4%
FIRST_RUN	2.4		
RUNNING	155		

		PAUSE
ER TPC GOOD	5	
ER TPC BAD	2	
MCH PAC	4	
TRIPS TPC BAD	24	
ALL GOOD	119	

RUN

143

Trip-net Running Time

- ER TPC GOOD
- ER TPC BAD
- MCH PAC
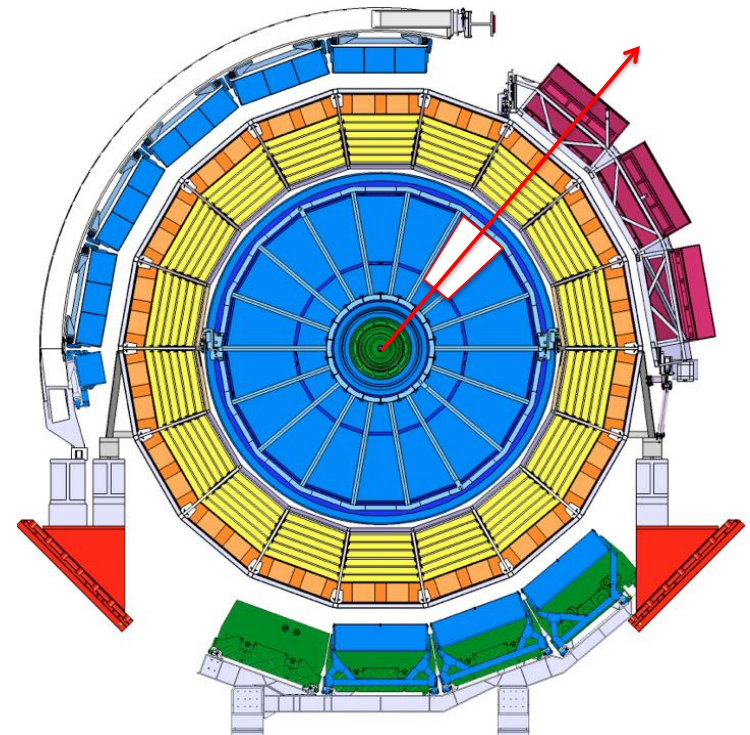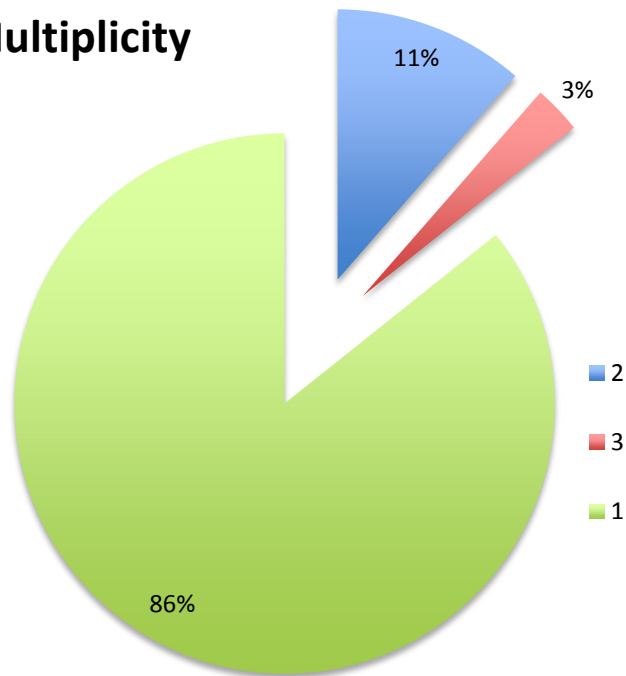- ALL GOOD
- TPC BAD

3% 1% 3% 16% 77%

Not being able to run over single or low multiplicity TPC trips cost us 1+ day of pA collisions or 19% of the running time.

Analysis of pA 2013 Data

The single-chamber trip case is the most probable one

Trip Multiplicity

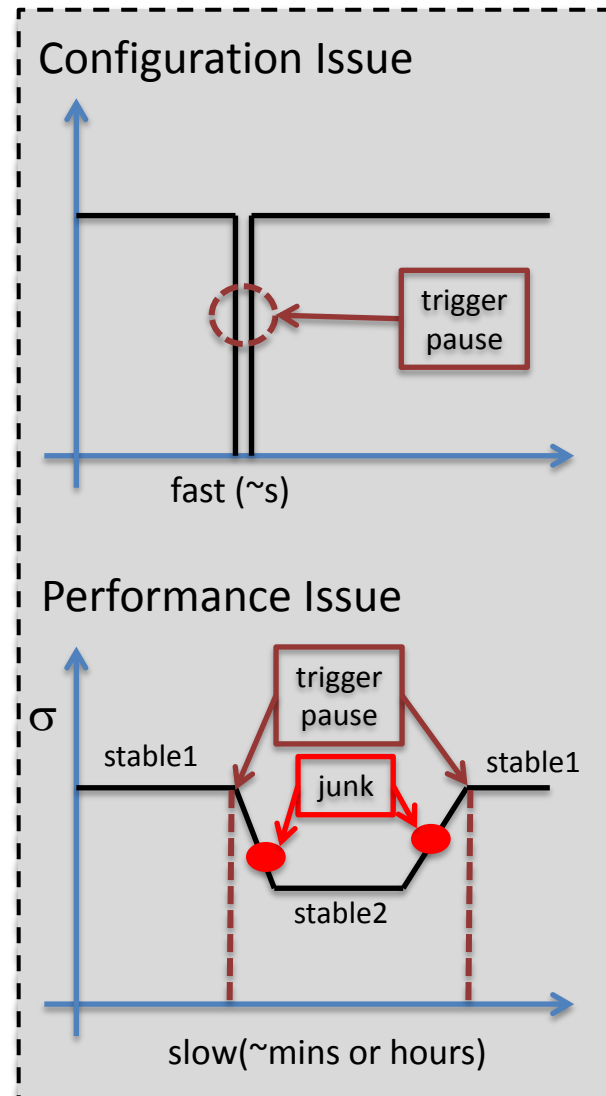
11%

3%

86%

- 2
- 3
- 1

It never happened that both the I and the O chamber of
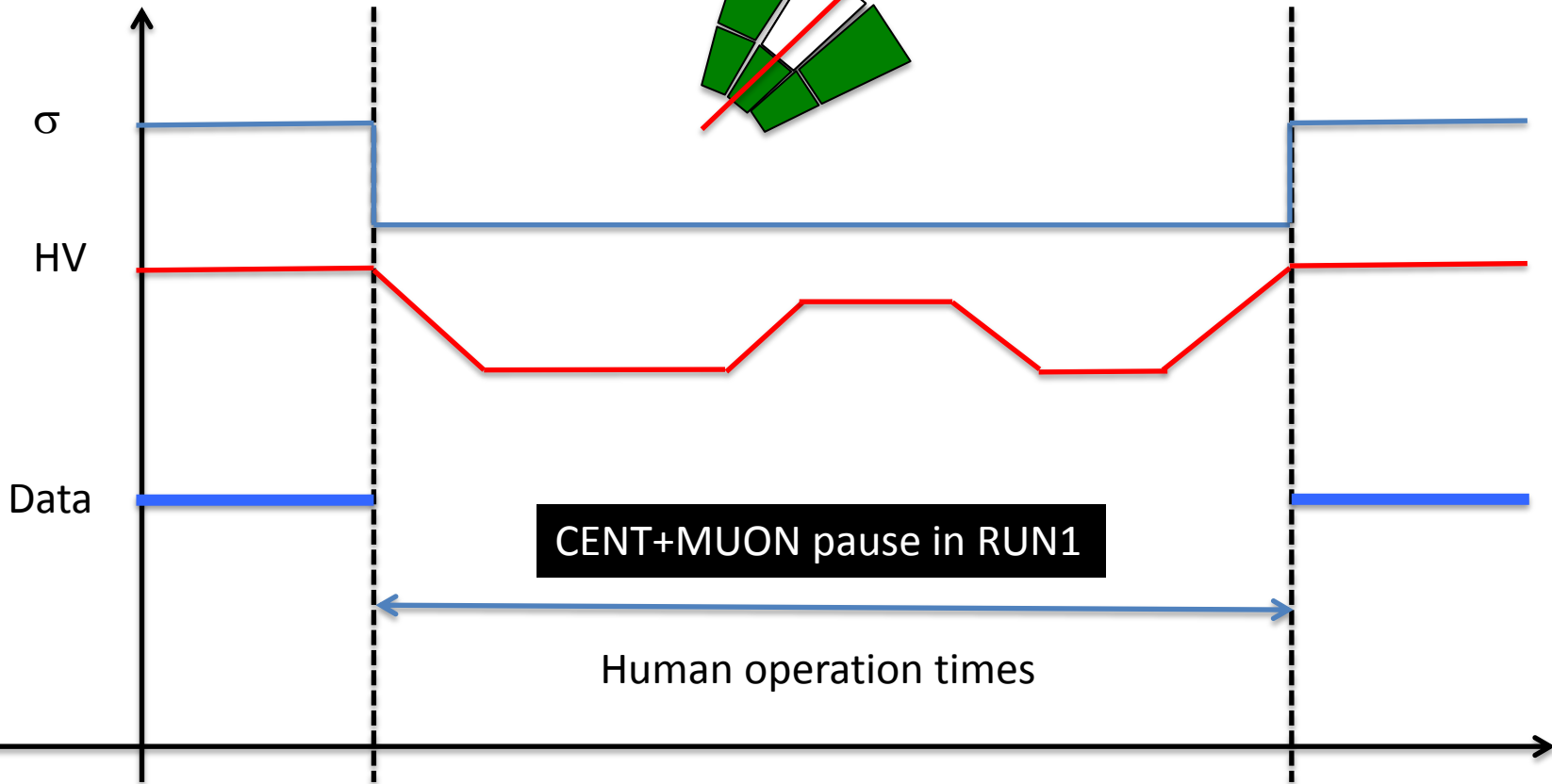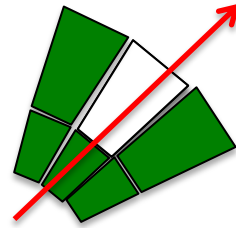a sector tripped at the same time (acceptance hole)

In-Run **Recovery**

- **Configuration type** (RUN1 PAC):
for example **front-end electronics hick-ups**:
no change of (acceptance/resolution)
  - **Fast** (seconds) automatic recovery.
  - May cause **incomplete/corrupted events** now correctly processed/eliminated
  - **Detector should perform proper cleanup in DET_SOR scripts (SOD called again in PAR)**

- **Performance type** (RUN1 ERROR_RECOVER)
for example TPC HV trip iROC/oROC:
change of acceptance/resolution
  - **Affect the detector conditions and data quality**.
  - Usually slow (manual) recovery
  - Detector setup is altered during the recovery phase
  - Junk (black events) are produced in the recovery
  - **protection mechanisms needed to avoid junk data injection into the HLT/DAQ/OFF stream**
  - **One run will still be "in stable conditions" however will contain different "stability intervals"**
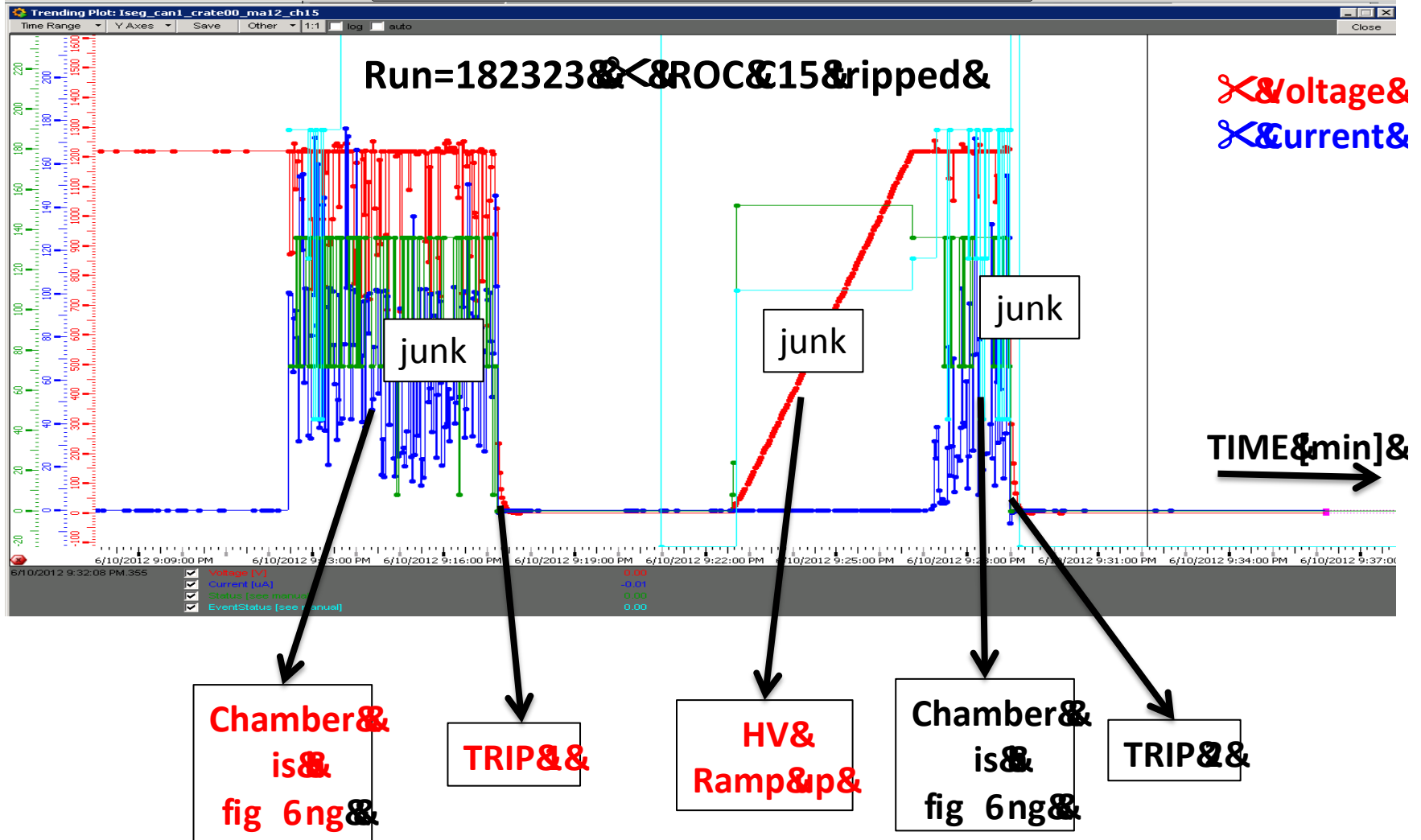

Configuration Issue

trigger pause

fast (~s)

Performance Issue

σ

trigger pause

stable1

junk

stable1

stable2

slow(~mins or hours)

RUN1: ALICE On Hold

σ

HV

Data

CENT+MUON pause in RUN1

Human operation times

# How a TPC Trip Looks in Reality

Online Junk Removal

- In case of **HV instabilities** (ROC trips or fights) the **baseline values are shifted** and the **ZS does not work properly** anymore

- **Black events** are **generated** and **injected** into the **data stream**
  - **the readout time increase**
  - **the HLT hardware cluster finder gets "clogged"** of fake clusters → **backpressure**

- Use **RCU(2) FPGA** to **remove abnormal data online**
  - **Check high-occupancy pads** (>940 tb → fullpads)
  - **If number of fullpads is more then a threshold for ALL RCU branches → flush out the data**

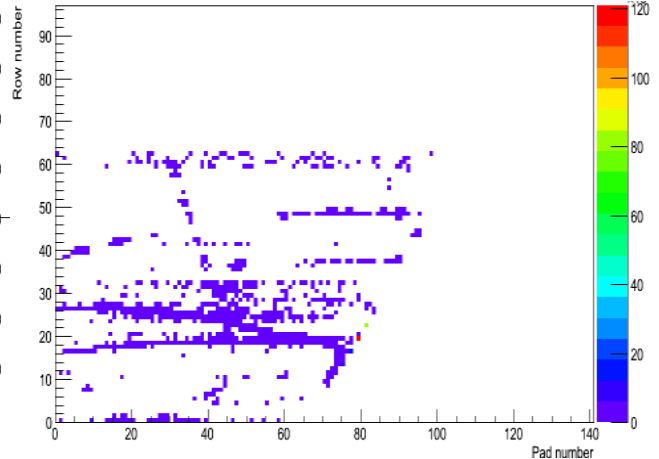# **Online** Junk Removal

- During **HV instabilities** of **tripping** or **fighting** ROCs, **three types of events** are readout:
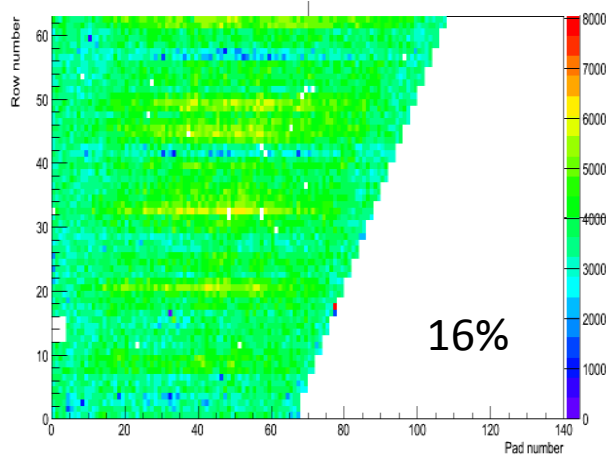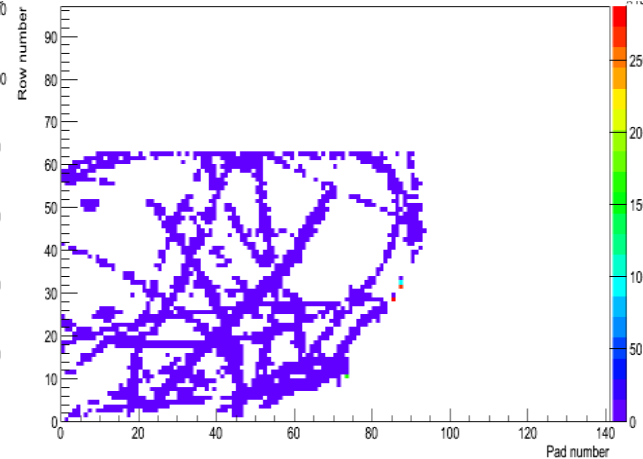
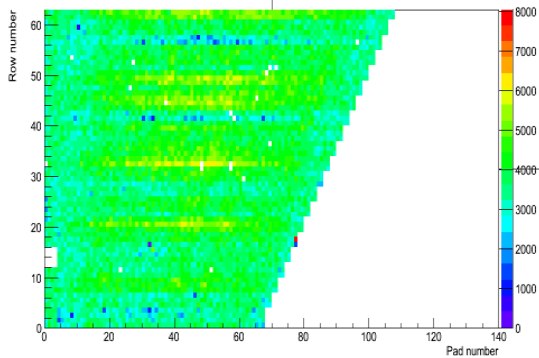**fullpads** · **semi-full** · **physics-like**

16%

black event junk → flush · **potential physics → keep for offline**

- All the above are correlated with some HV instability, however RCU cuts only the worst ones

Filtering Schema

IROC&

✂ #5504#eadout#channels#(pads)#n#total#
✂ #4#RCU#branches#now#(8#n#the#future)#
✂ #959#6mebins#per#channel##

Torsten A.

What&can&be&done&during&eadout:&
&
1) Count#number#of#6mebins#per#pad;#call#**fullpad&**&#number#of#
   6mebin#per#pad#arger#than#e.g.#940#

&
2)##Count#number#of#fullpads#per#eadout#branch;#call#**junk&par66on&**#f#number#of#fullpads#per#par66on#arger#than#e.g.#100.&

Algorithm parameters can be further tuned (RCU2)
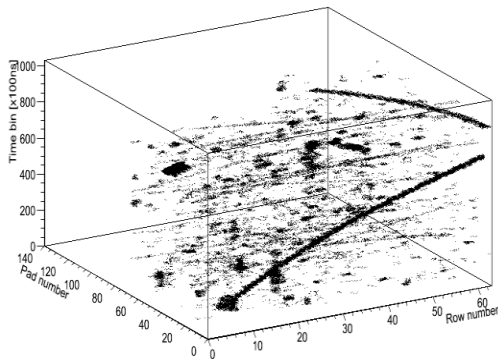
Good Data are Untouched

Mesut Arslandok, Christian Lippmann

A typical High Multiplicity PbPb Event (no fullpad)
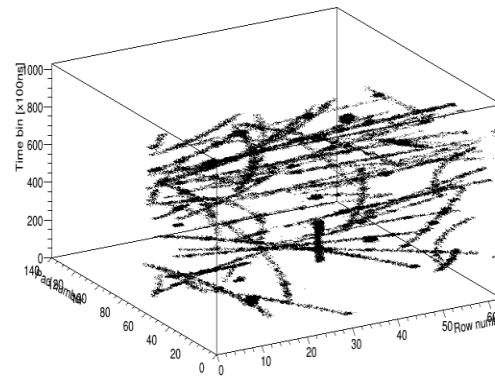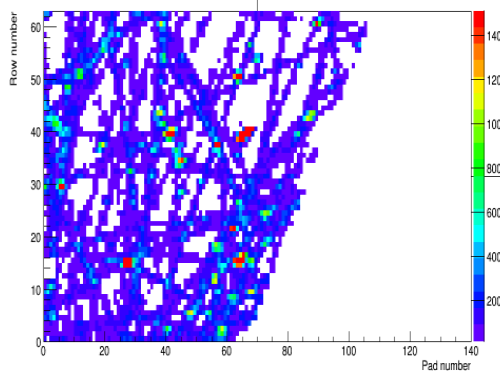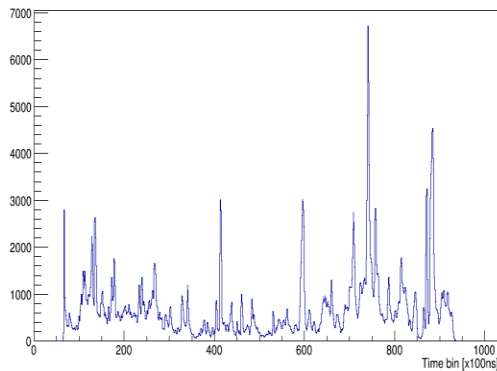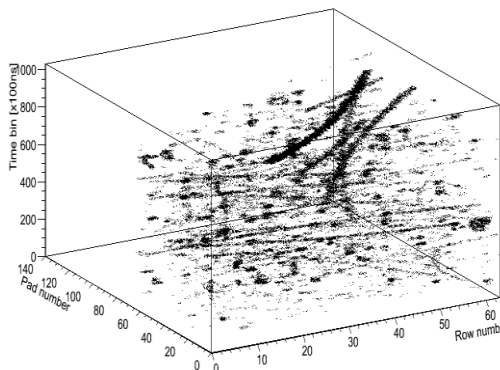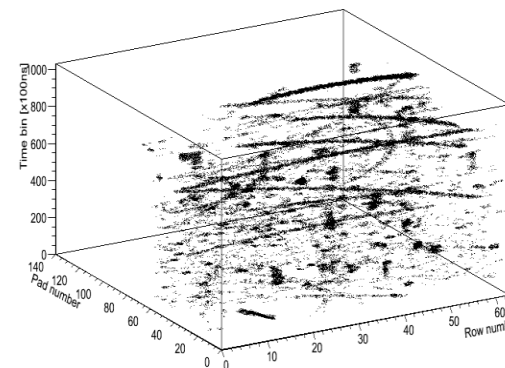

Events above threshold

63 pads above 940 tbs   **189 pads above 940 tbs**   **315 pads above 940 tbs**

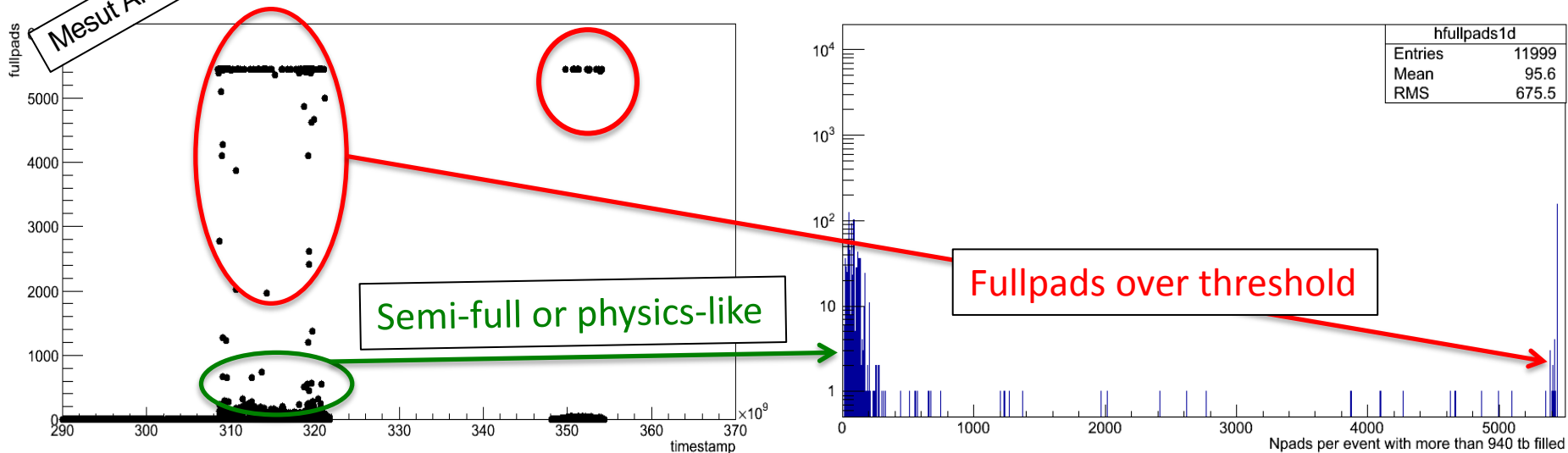Run 137161, no trips no fights, 176000 events, algo run only on IROC 15
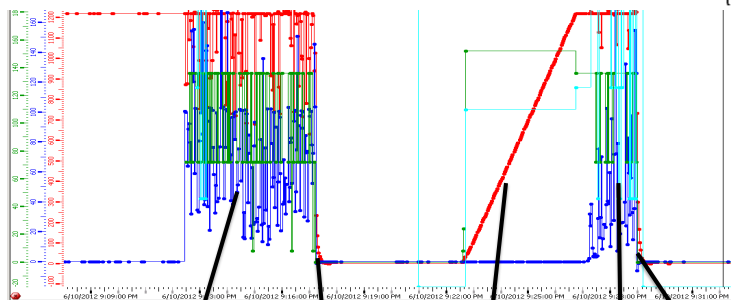Only 69 events have some fullpads → All events are kept

Junk is Filtered

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pp data, run 182323, 12000 events

Semi-full or physics-like

Fullpads over threshold

hfullpads1d	
Entries	11999
Mean	95.6
RMS	675.5

1500 events affected

5439 fullpads

1200 fullpads

570 fullpads
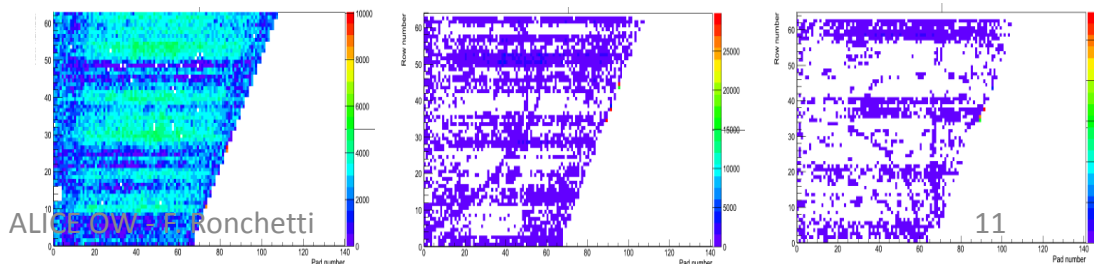
→ **all are discarded**

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Running it on Real Trips

With&<940&b"&&100x4&ullpads"&ut&&

&
✂ #Whole#176000&bPb&events#are#**kept&**

#
✂ #Events&ull&of&noise#are#**discarded&**(pp)

#
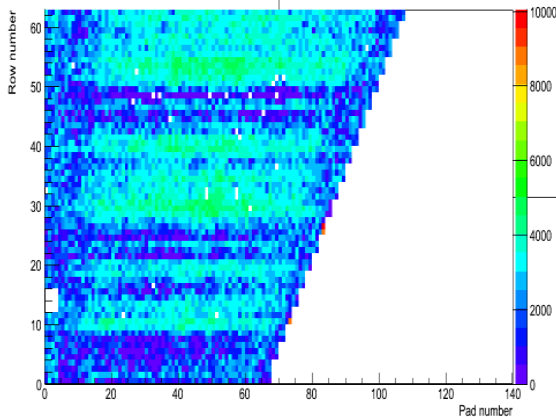
Trip ✂ **Discard&** **pp** ✂ **Keep&or&fflie** **PbPb** ✂ **Keep&or&fflie**
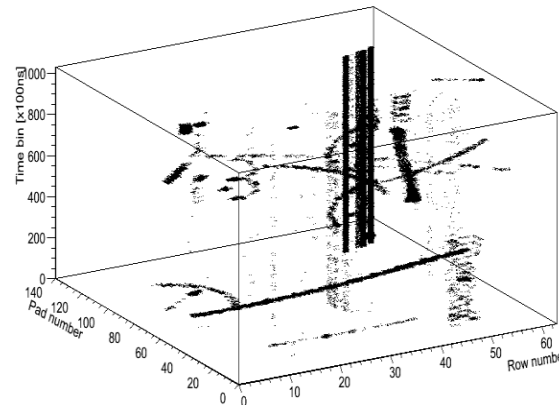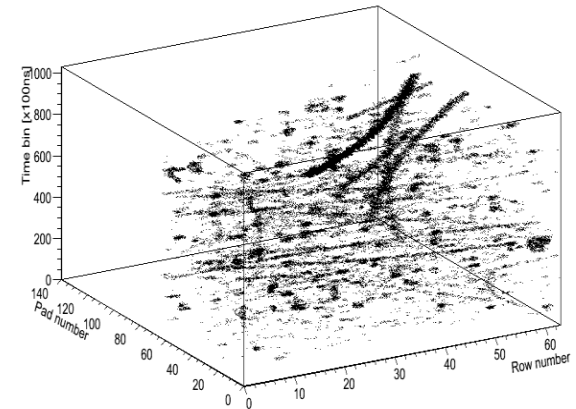
- Fully local, no latency due to communication with ECS/DCS
- Data stream protected from HLT to OFFLINE

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Running Over Errors

σ

HV

Data

stable

stable-1

stable
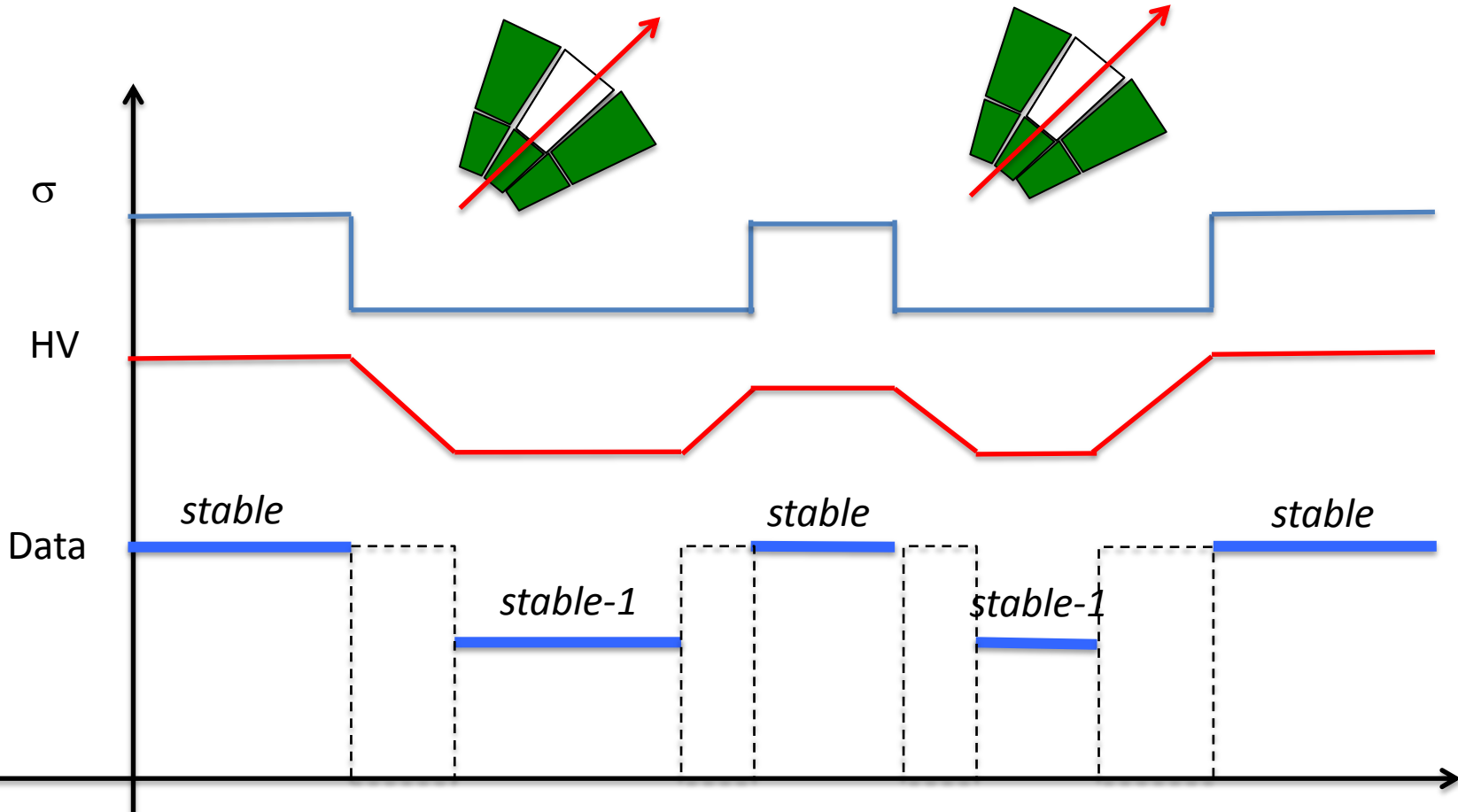
stable-1

stable

No CENT trigger pause – keep running with the rest of TPC and ALICE
Algorithm (fast) or human (slow) restores the chamber
Junk generated by HV insanities is removed by TPC Readout electronics

Impact On Data Taking / 1

DAQ

- **Data taking will be still be run based**
  - **In a fill we can still start an arbitrary number of runs**
  - **However we will try to minimize the number of runs per fill (1 at the theoretical limit)**
- **Sustain the current run as much as possible**
  - **No trigger pause**
  - **Configuration issues → front end recovery**
  - **Performance issue → trips → Run Over Errors**

PAR

- **What as much as possible means**
  - **The number of missing chambers must be less than a majority (to be defined)**
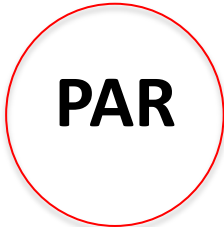
Impact On Data Taking / 2

A run will contain events in different stability conditions.

- Events created during trips (black events) will be removed online (R/O level) and marked in the event trailer (not CDH)
- Protect HLT HW CF and OFFLINE

OFFLINE

1. Reconstruction will have to operate on stability intervals within the run applying proper calibrations
2. Intervals may have "full or semi-full resolution/acceptance"
3. Offline software should be adapted to provide a flag on ESD and AOD level
4. Anchoring for simulations has to become aware of run sub-structure containing different calibrations.

ANALYSIS

- *Proper tools to analyze partial data should be provided to end users*

Summary

Thanks!