

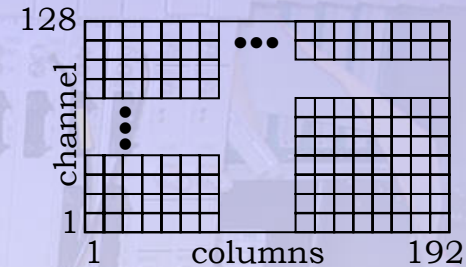
# Discussion on Results of the ARCS-APV-Pipeline-Test

Module Production Meeting  
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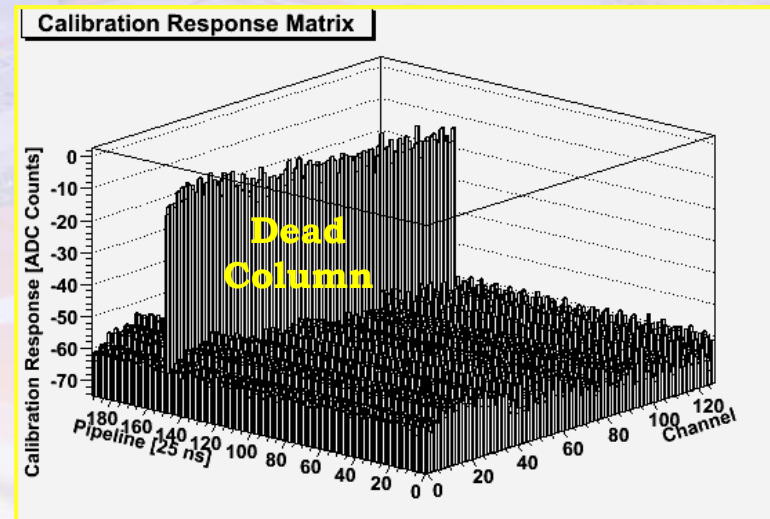
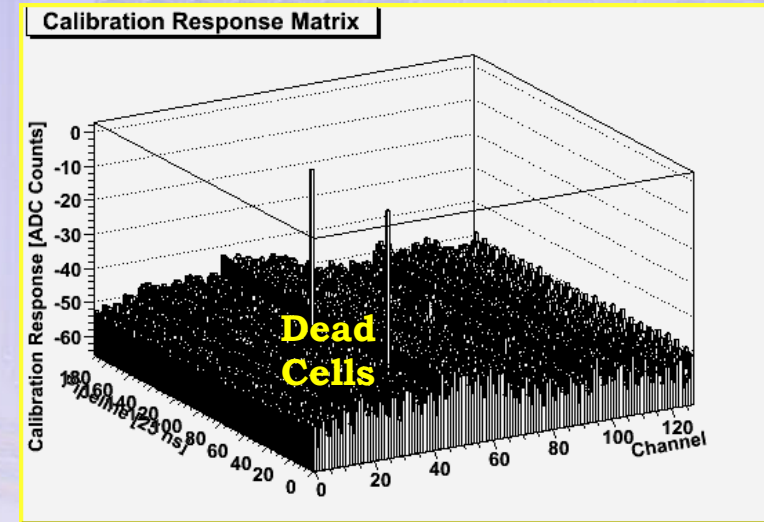
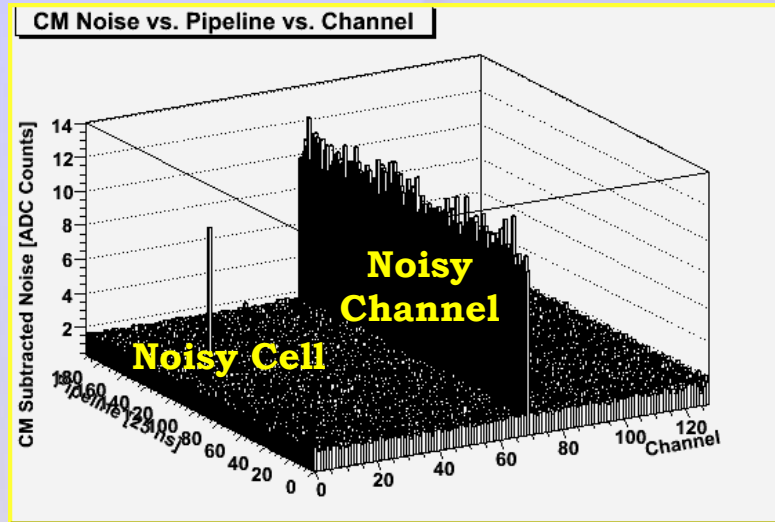
III. Physikalisches Institut B  
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- systematic scan of the APV storage matrix
  - examination of the pedestal structure
  - determination of the noise level
  - measurement of the amplitude of calibration signals

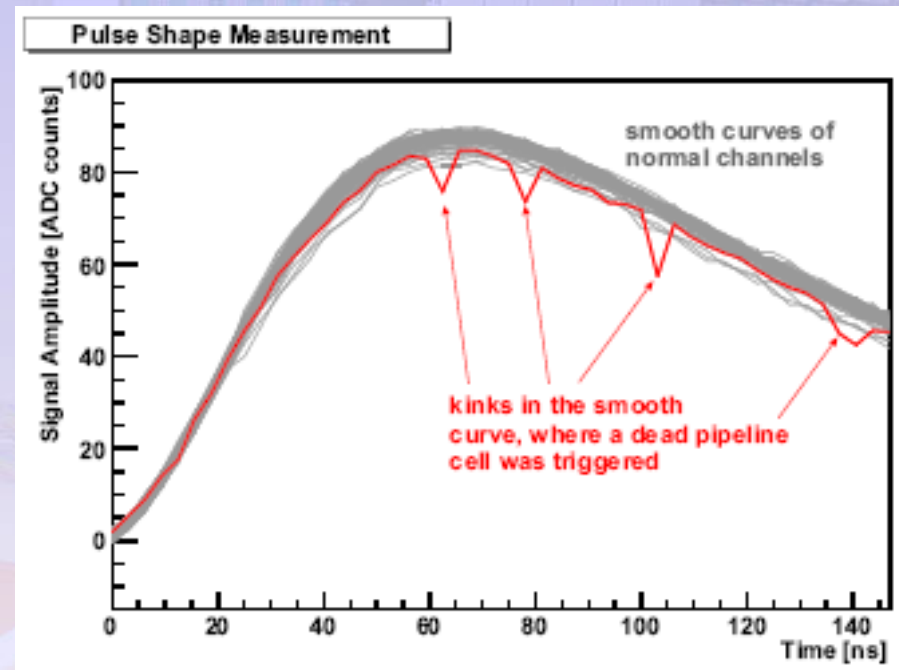
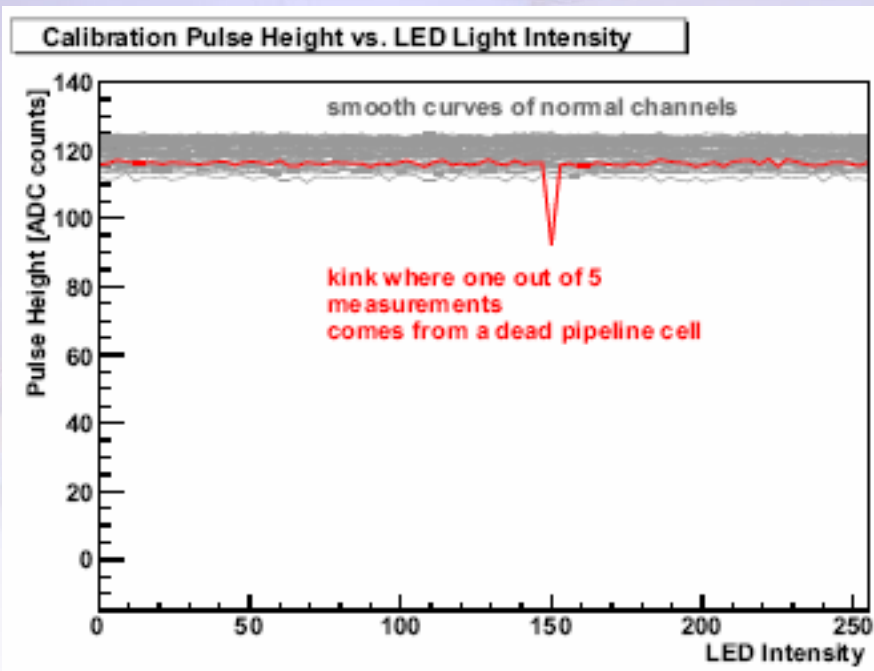


- 100 events/cell:  $\approx 5$  min for the whole test (Peak, Inv On)
- cuts of the pipeline test (XML Parser 8.1, TEC\_testsettings0.6.xml)
  - related to the median value per channel
  - flagging of single cells
  - calibration amplitude matrix: deviation of a factor of 2
  - noise matrix: excess of a factor of 2.5
- more details (e.g.): PhD Thesis by Torsten Franke, July 2005  
<http://www.physik.rwth-aachen.de/group/IIIphys/CMS/tracker/en/papers.html>

# Some Test Results of Defective Pipeline Cells



- tests with randomly triggered cells
- small number of events
- averaging over the events does not smear out the effect of the defective cell



- **If you observe strange test results have a look at the pipeline histograms!**

- investigation of several 100 modules (Aachen-3B and Aachen-Repair Centre)
  - 69 modules with any flag from the pipeline test
  - more detailed analysis:
    - 54 modules flagged at channels with other defects (shorts, pinholes, ...)
    - 5 times when the edge channels of an APV-chip were flagged
  
    - 7 modules with only single defective cells (calibration amplitude flag: 3, noise flag: 4 )
  
    - 2 modules where a larger cluster of cells is noisy
    - 1 module with a whole dead column
- **There do not exist any serious or not understood problems with the APV storage matrix!**
- **But there exist some aspects which are worth to be shortly discussed!**

- simple APV-mathematics
  - loss of a complete column:  $1/192$  of the whole APV storage matrix
  - loss of a channel:  $1/128$  of the whole APV storage matrix
    - ⇒ modules with only a defective column are better than ones with e.g. an open channel
  
- small number of affected modules
  - defect mostly detected at the hybrid quality assurance
  - number of hybrids (at CERN) with that defect:  $10 + n(?)$ 
    - $\approx 100$  still to be examined, but further contributions very questionable
  
- masking of defective columns in a tracker readout software?
  - possibility of implementing not only bad channels but also columns?
  - sorted out hybrids back to the production line for building modules?
  - only textual output at the end of the ARC-test
    - by hand analysis on only a small fraction of modules necessary
    - result could be added by a comment to the xml-file
    - more sophisticated solution?