

Data Analysis From TrackerDB

Marco Meschini & Cristiano Marchettini

INFN Firenze



Introduction



- ♣ Aim of this presentation: TrackerDB as monitor (and reference) tool to evaluate the status of the module testing, globally per each subdetector (TEC, TOB, TIB)
- ♣ The analysis is based on DB data up to March 5th
- ♣ Mainly concentrated on ARC Modvalidation
- ♣ 2701 modules in DB, including versions 1, 2, 99 (old stuff)
- ♣ Next steps:
 - ♦ refine the analysis
 - ♦ study in detail centre by centre



Foreword (Prolusion) on "Numbers"



Which number of tested modules have to be believed?
A lot of care is needed when dealing with different sources (outside DB) and different versions inside DB!

An example ARC Modvalidation:

	ModProd Table	DB my query	DB report
TIB	1625	1412	(incl. Vers 99)
TEC	947	830	
TOB	207	344	
total	2779	2586	2701

CAVEAT: not all tested modules are in DB..... but more than this: where are the bad ones?



TIB Modvalidation Summary



♣ 1412 modules

- ◆ 880 4 APVs
- ◆ 532 6 APVs
- ◆ 1379 grade A
 - ♥ 3 grade AF
- ◆ 13 grade B

♣ 17 grade C

- ◆ 8 bad strips > 2%
- ◆ 6 Ileak > 10 μ A
- ◆ 2 Ileak AND #Bad
- ◆ 1 Mech. damage

FLAG

- 1
- 2
- 4
- 16

♣ 859136 strips

- ◆ 706 noisy
- ◆ 358 open
- ◆ 34 short
- ◆ 3 pinhole (44 phl-)
- ◆ 232 not clearly identified

Are these ones 3 real pinholes?
Have they been un-bonded or not?



TOB Modvalidation Summary



♣ 344 modules

- ◆ 243 4 APVs
- ◆ 101 6 APVs
- ◆ 336 grade A
- ◆ 5 grade B

♣ 3 grade C

- ◆ 2 bad strips > 2%
- ◆ 1 I_{leak} > 10 μA

FLAG

-1

-2

♣ 201984 strips

- ◆ 48 noisy
- ◆ 397 open
- ◆ 16 short
- ◆ 3 pinhole (1 phl-)
- ◆ 14 not clearly identified

- Possible explanations:
 - un-bonded pinholes
 - saturated channels
 - not repairable bonds

Almost perfect identification criteria in TOB!

TEC Modvalidation Summary

♣ 830 modules

- ◆ 526 APVs
- ◆ 304 6 APVs
- ◆ 796 grade A
- ◆ 13 grade B

♣ 21 grade C

- ◆ 19 bad strips > 2%
- ◆ 1 I_{leak} > 10 μA
- ◆ 1 No Readout

FLAG

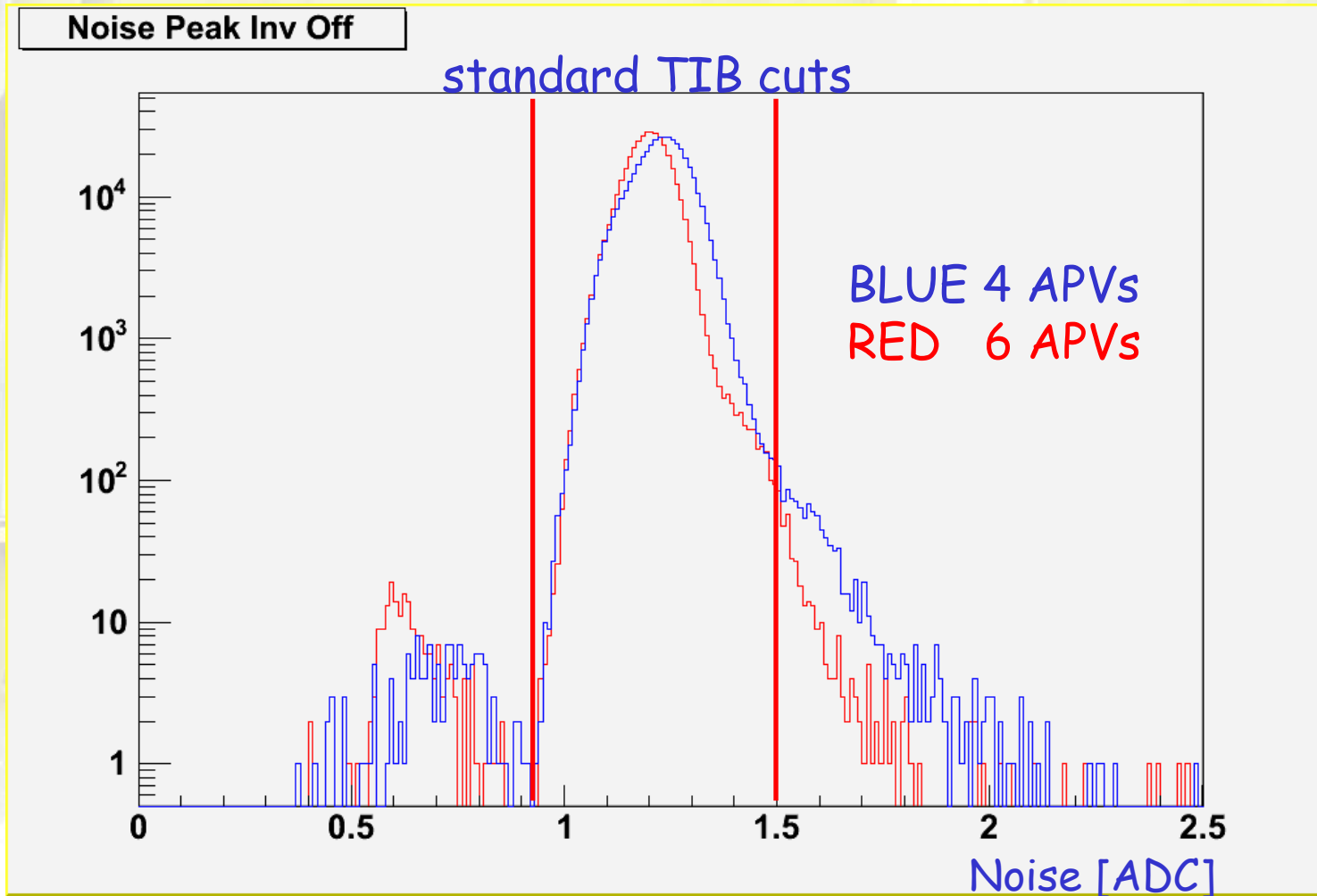
- 1
- 2
- 8

♣ 502784 strips

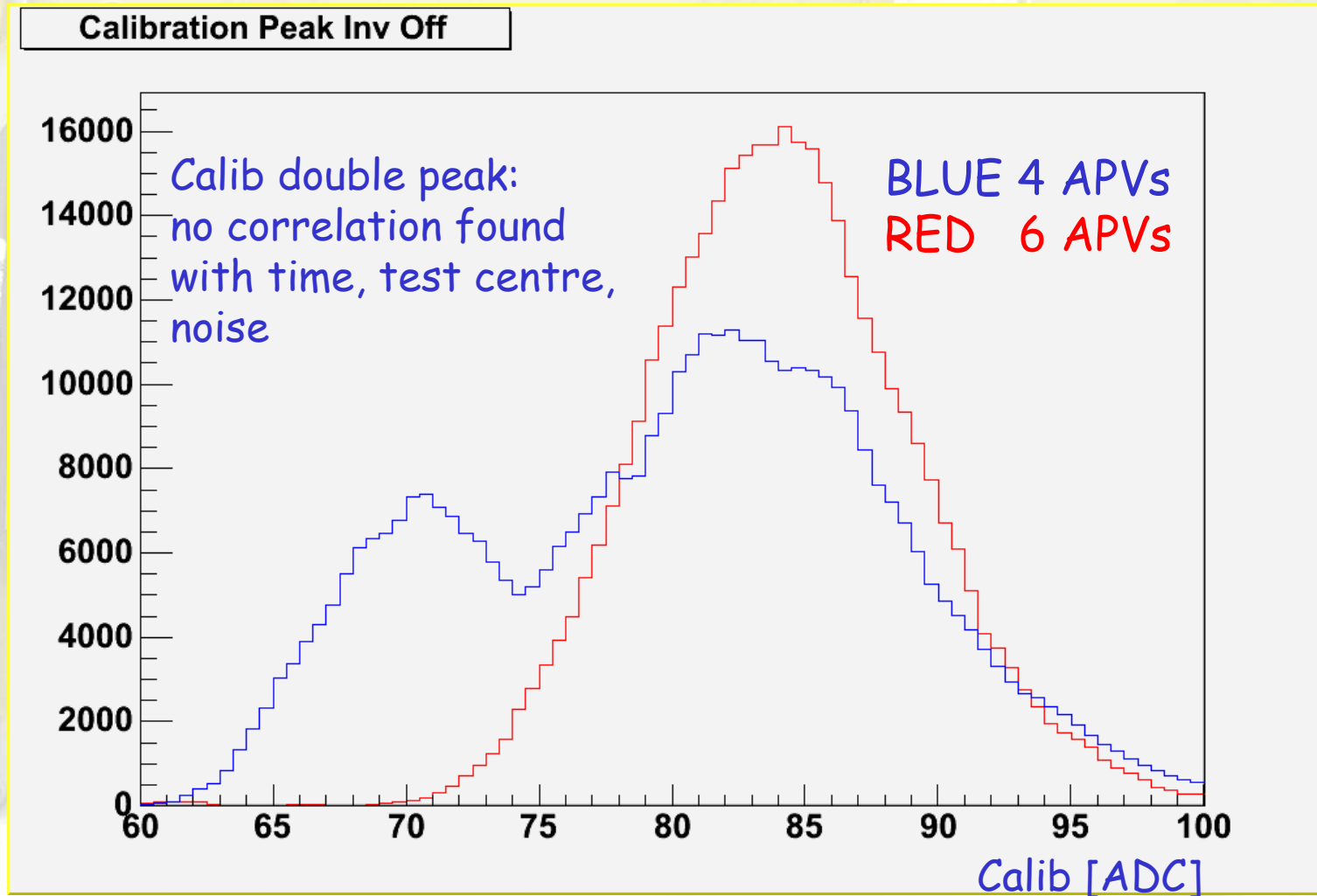
- ◆ 1348 noisy
- ◆ 591 open
- ◆ 101 short
- ◆ 6 pinhole (1015 phl-)
- ◆ 335 not clearly identified

Too high number of likely pinholes!
A problem in the cut criteria?

TIB Strip Noise Distribution

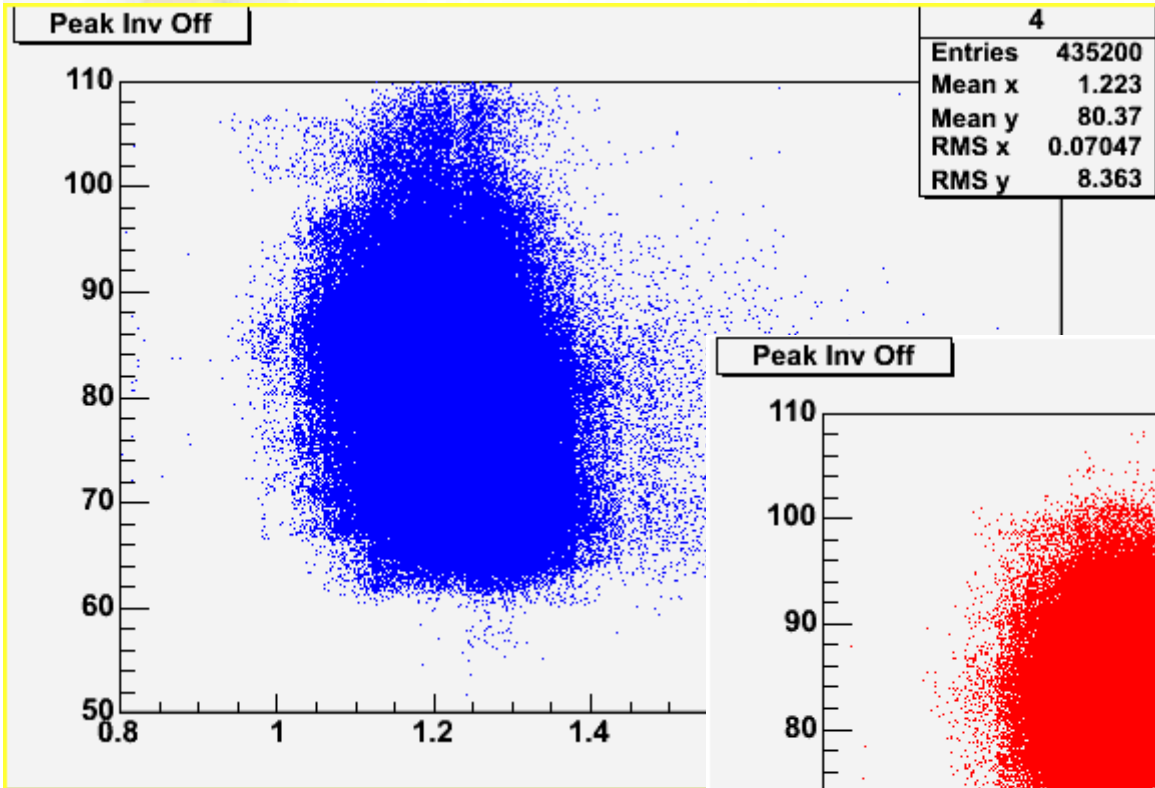


TIB Calibration Amplitude

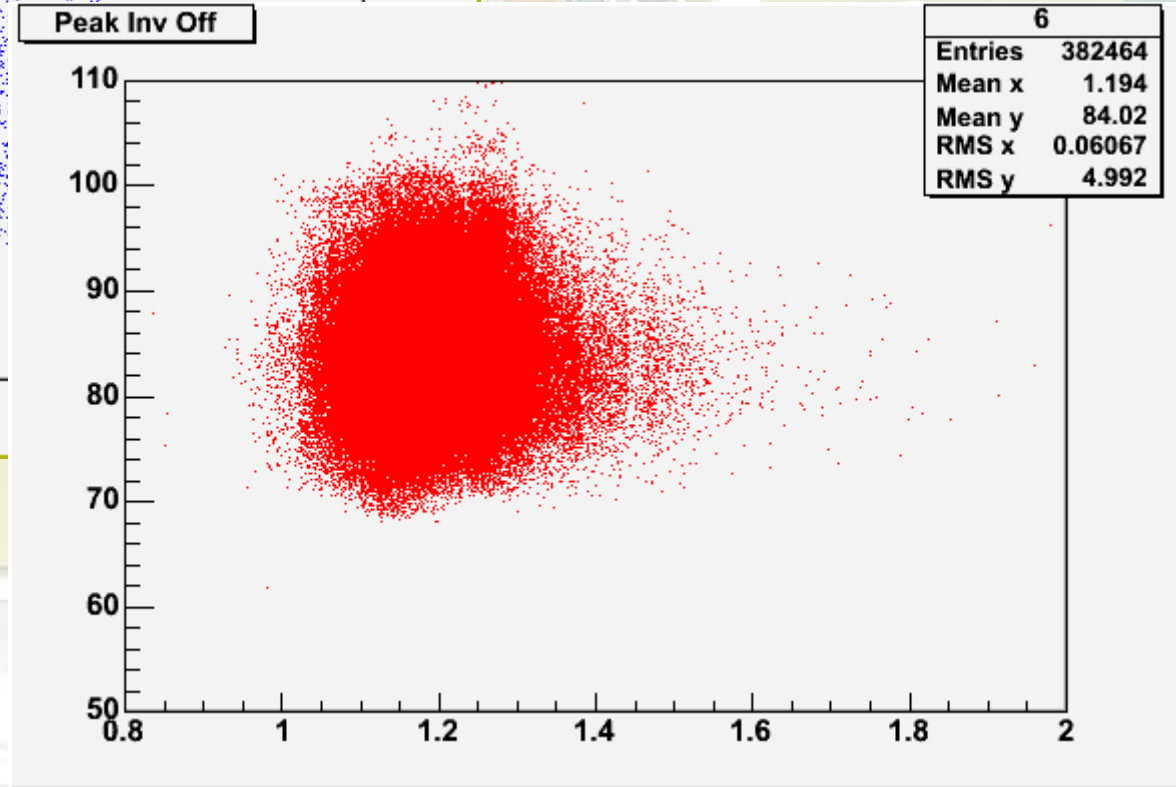




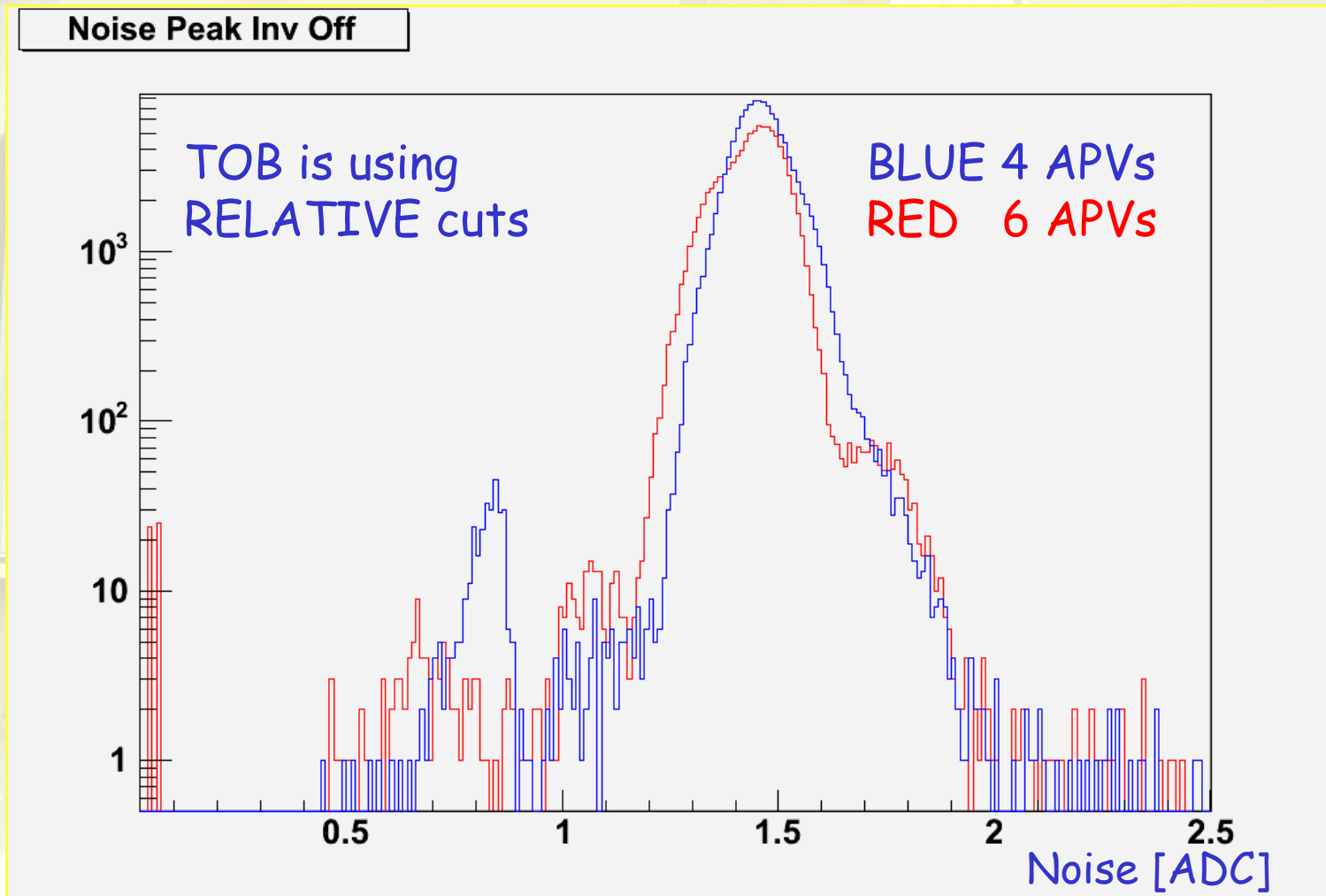
TIB Calibration Amplitude vs Noise



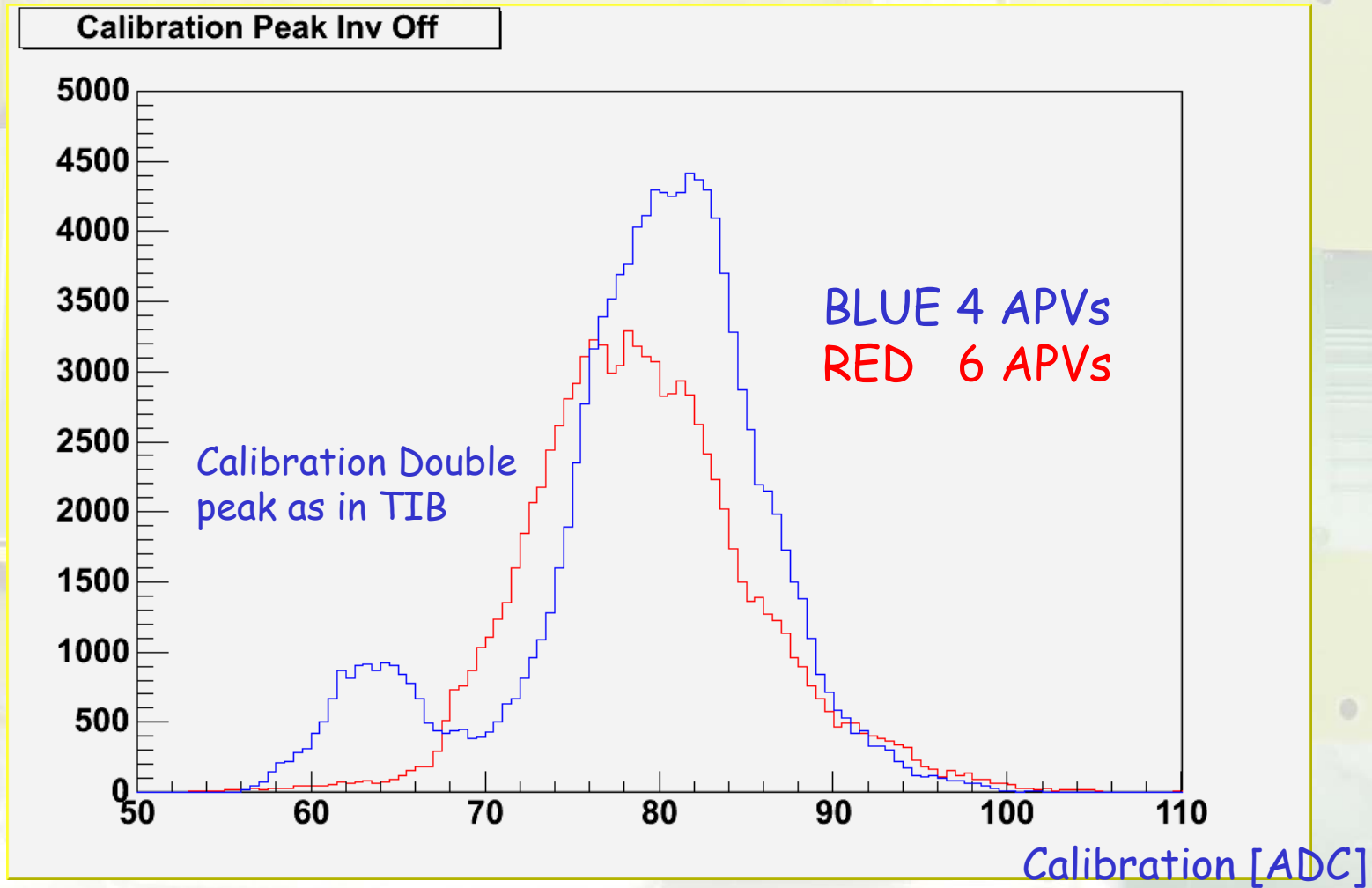
BLUE 4 APVs
RED 6 APVs



TOB Strip Noise Distribution

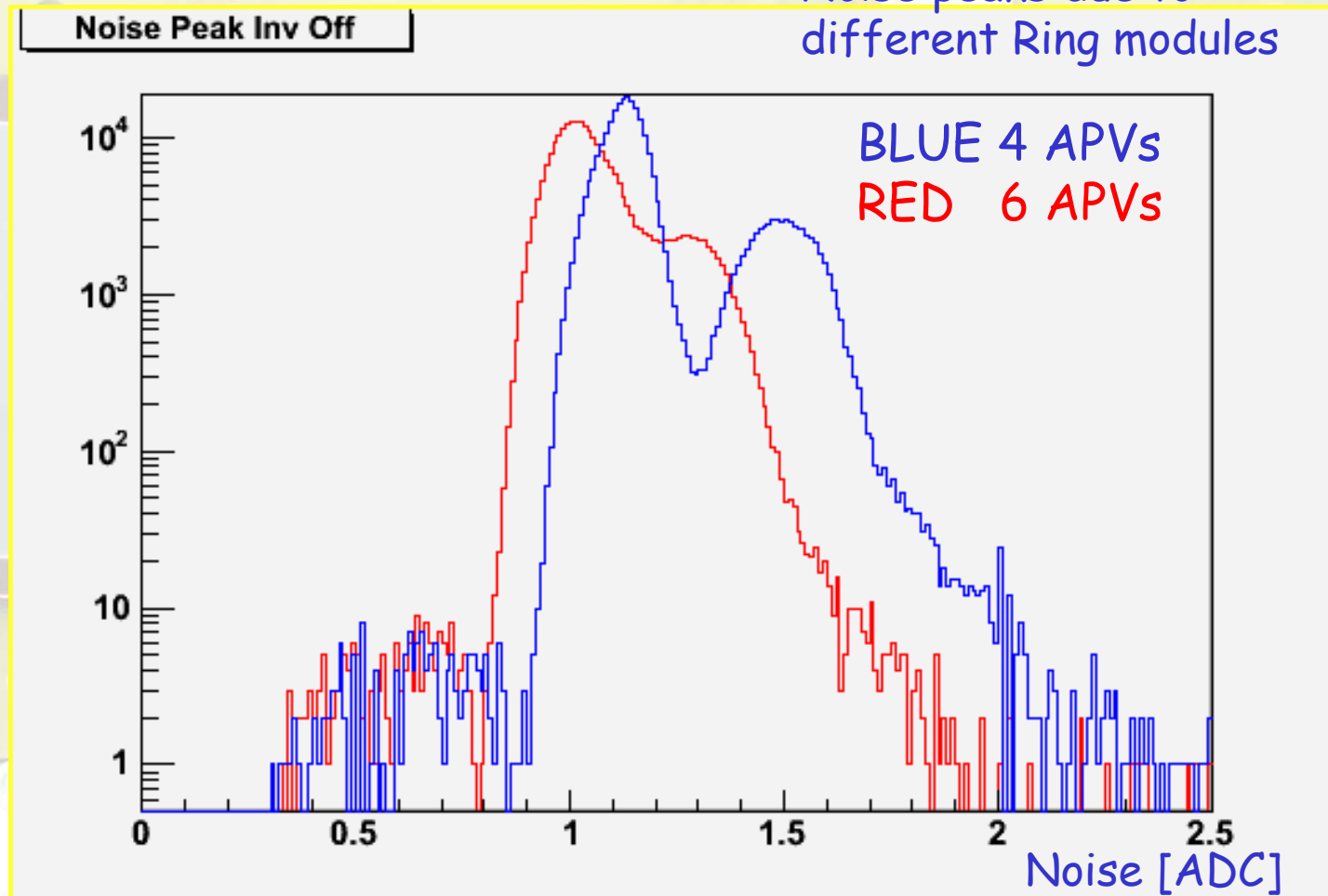


TOB Calibration Amplitude



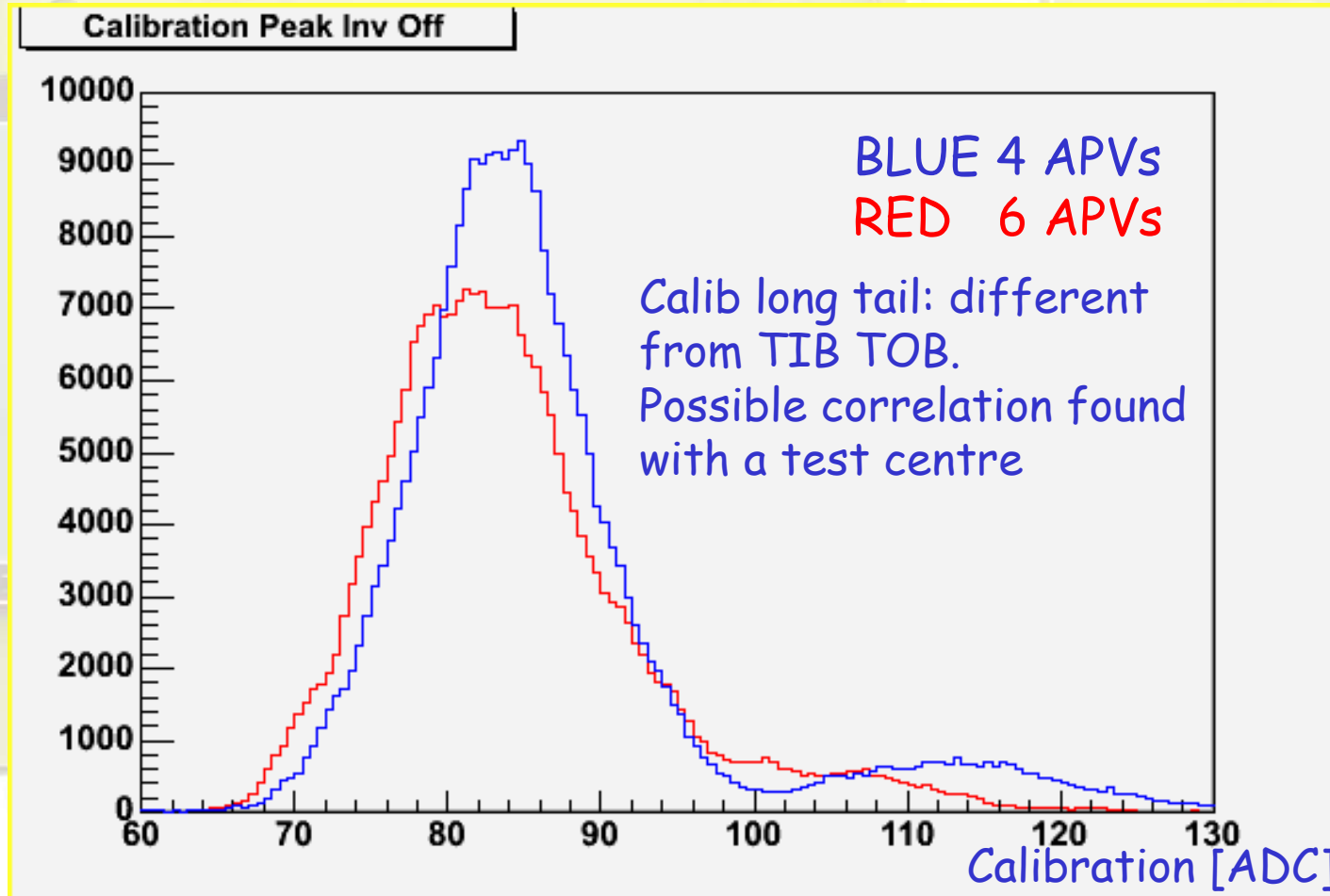
TEC Strip Noise Distribution

Noise peaks due to different Ring modules



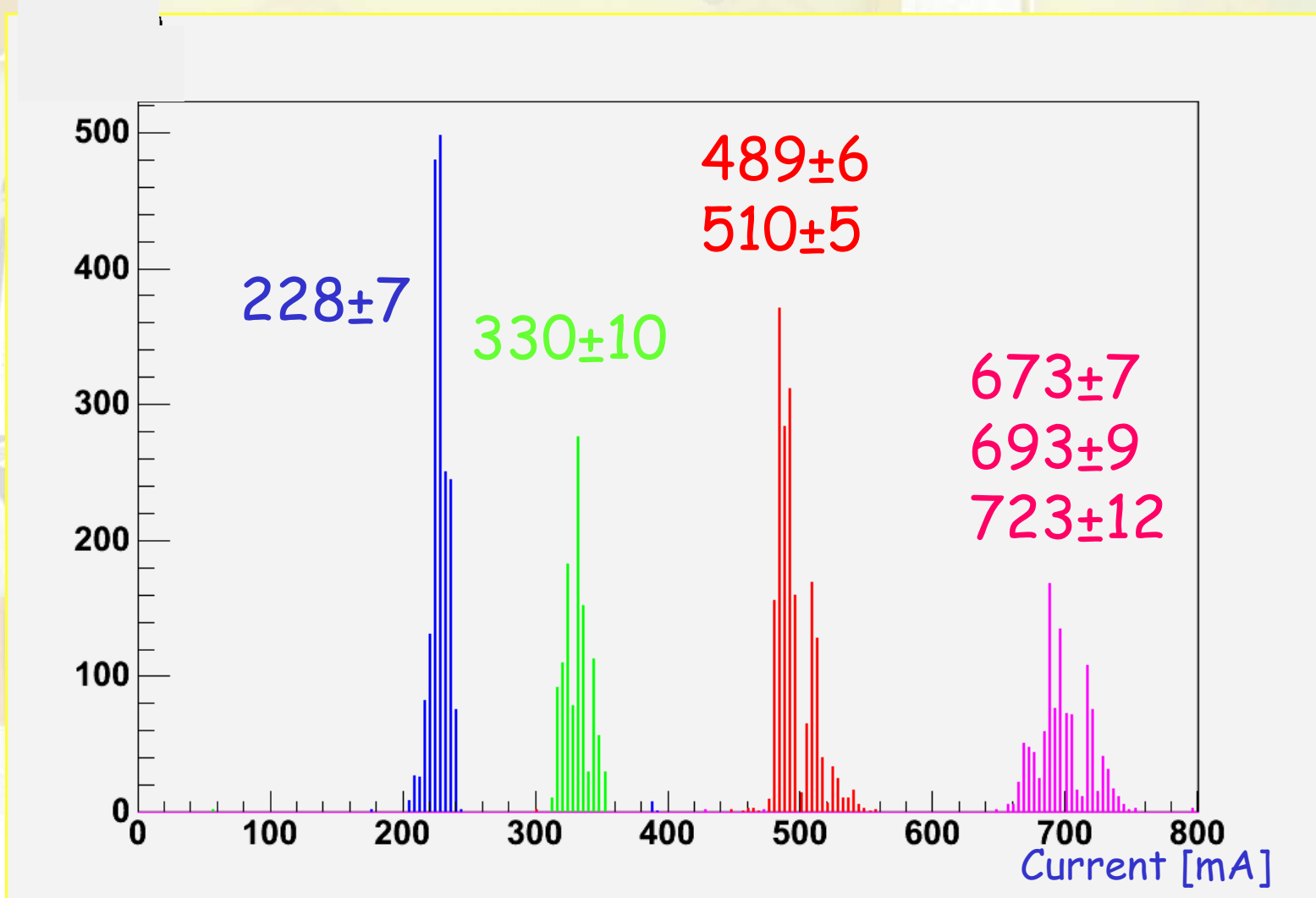


TEC Calibration Amplitude



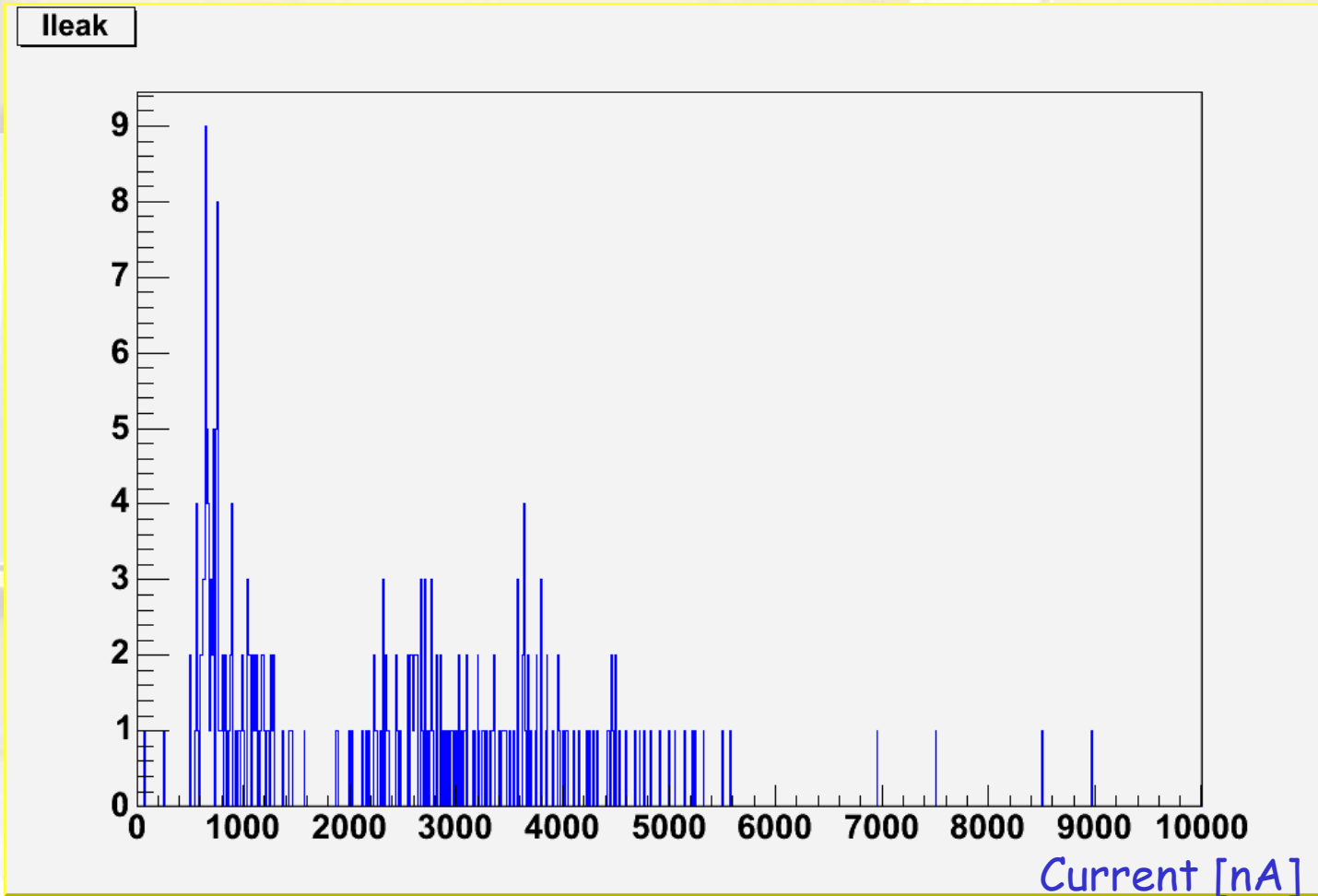


Low Voltage Currents: TOB TEC TIB Cumulative Distribution



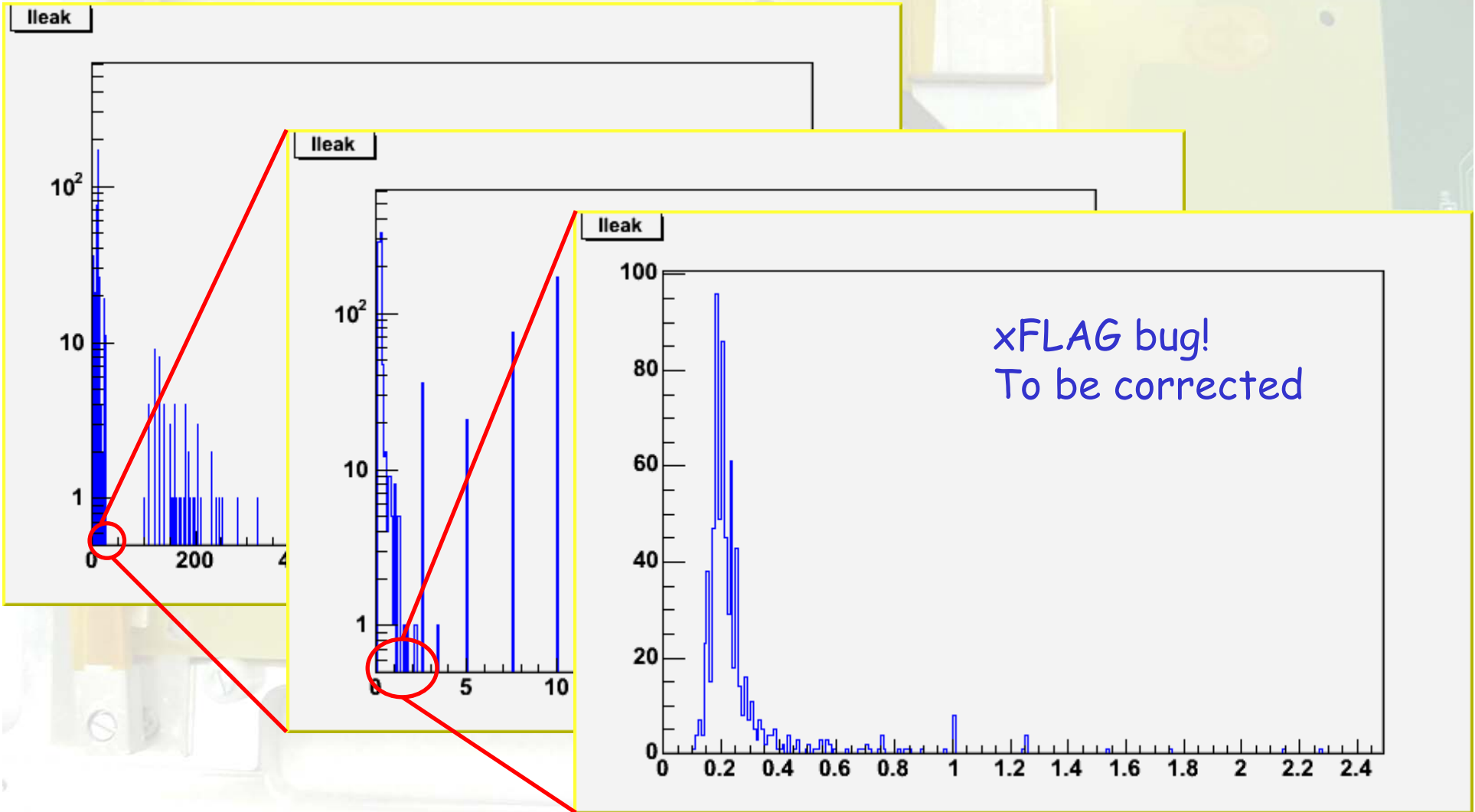


TOB HV I_{leak}



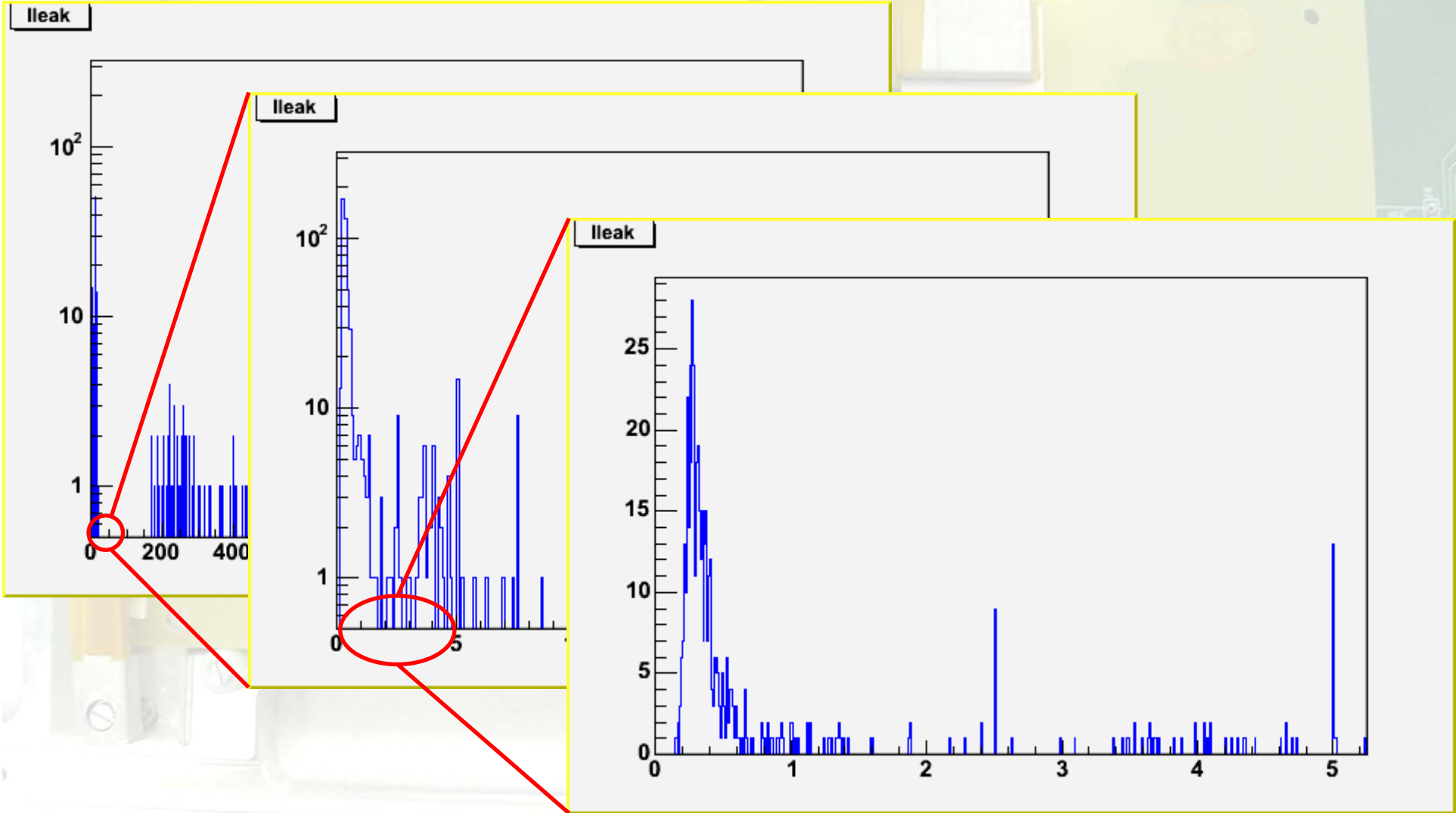


TIB ILeak



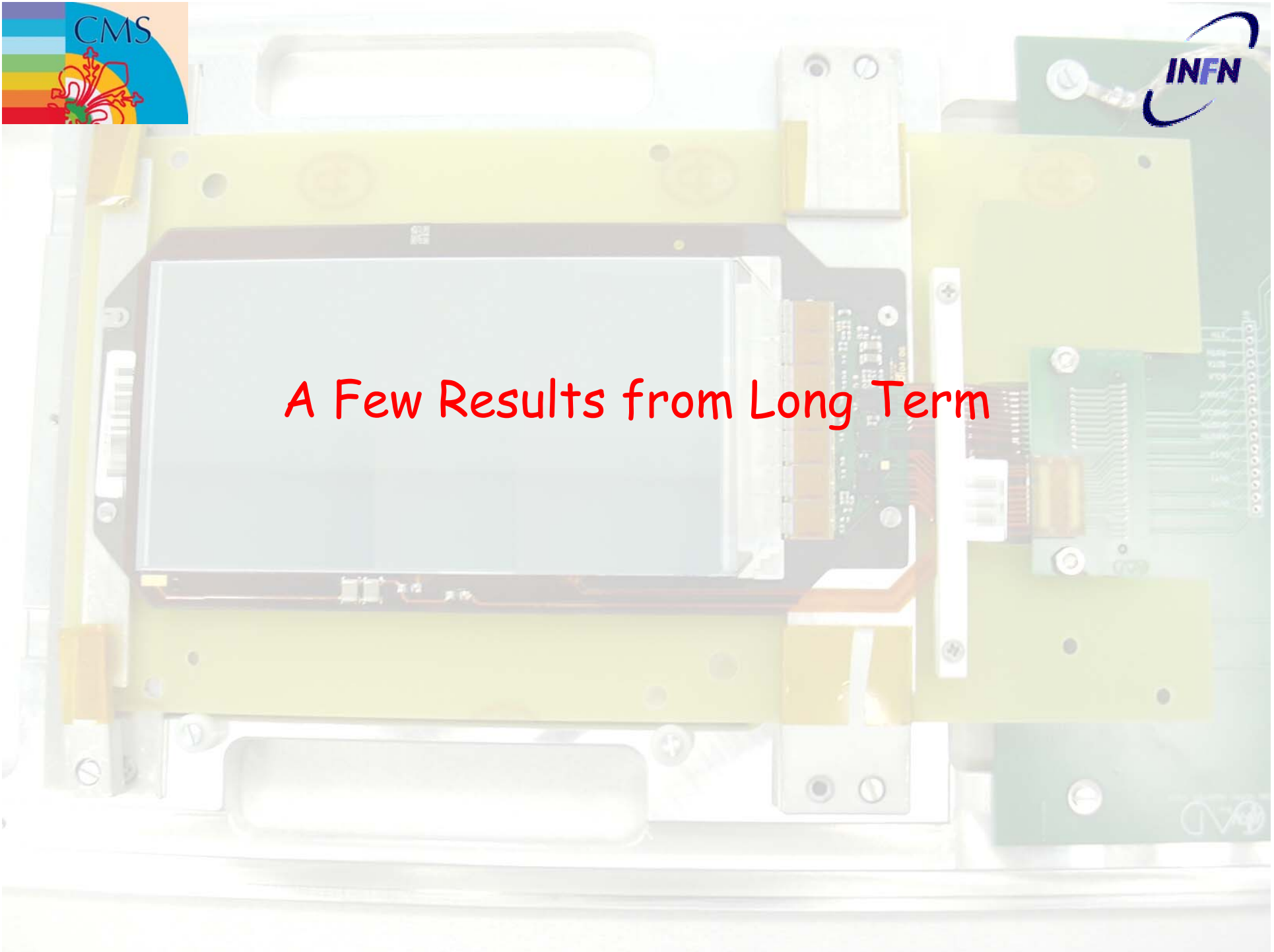


TEC ILeak





A Few Results from Long Term





TIB MODLT Summary



- ◆ 1372 modules
 - ♥ 855 4 APVs
 - ♥ 517 6 APVs
- ◆ 1362 grade A
- ◆ 8 grade B
- ◆ 2 grade C: 1 for bad strips (already accounted for in ARC), 1 for readout problems in cold
- ◆ 834816 strips
 - ♥ 121 noisy
 - ♥ 452 open
 - ♥ 53 short
 - ♥ 1 pinhole
 - ♥ 82 unidentified



TOB MODLT Summary



- ◆ 277 modules
 - ♥ 214 4 APVs
 - ♥ 63 6 APVs
- ◆ 273 grade A
- ◆ 3 grade B
- ◆ 1 grade C

- ◆ 157952 strips
 - ♥ 9 noisy
 - ♥ 240 open
 - ♥ 4 short
 - ♥ 141 unidentified

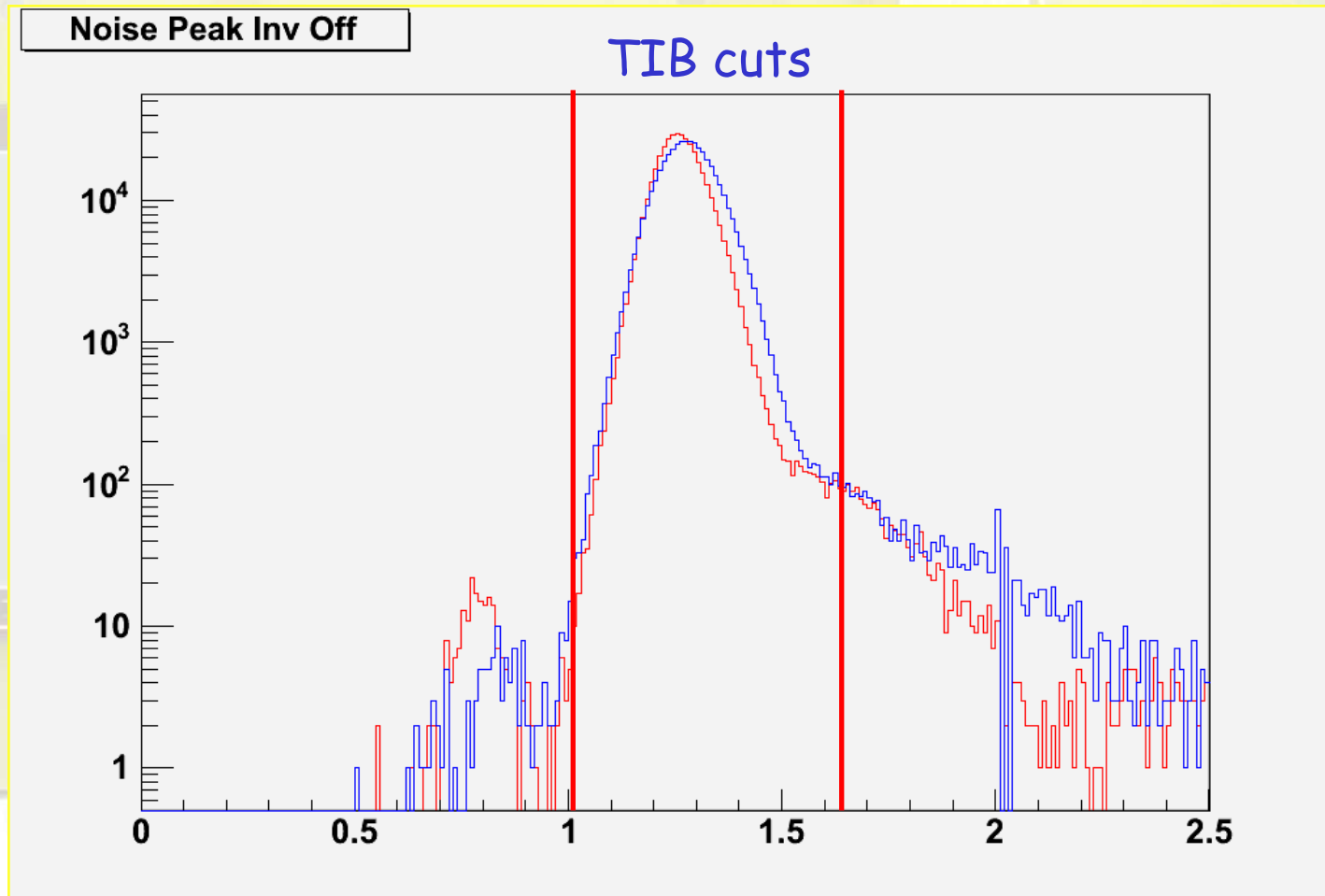


TEC MODLT Summary

- ◆ 262 modules
 - ♥ 196 4 APVs
 - ♥ 66 6 APVs
- ◆ 256 grade A
- ◆ 2 grade B
- ◆ 4 grade C

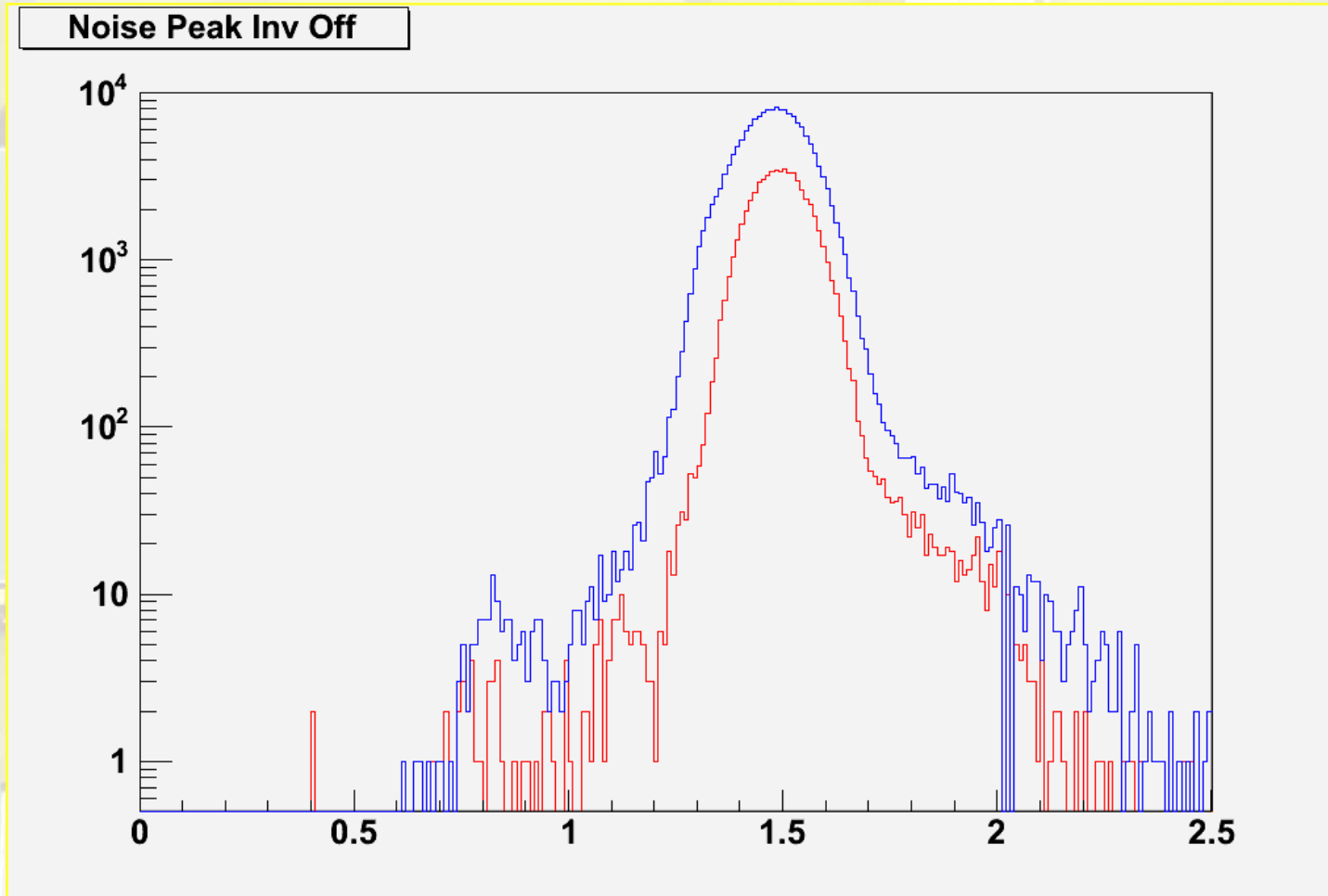
- ◆ 151040 strips
 - ♥ 25 noisy
 - ♥ 263 open
 - ♥ 44 short
 - ♥ 60 unidentified

TIB Strip Noise Distribution in cold

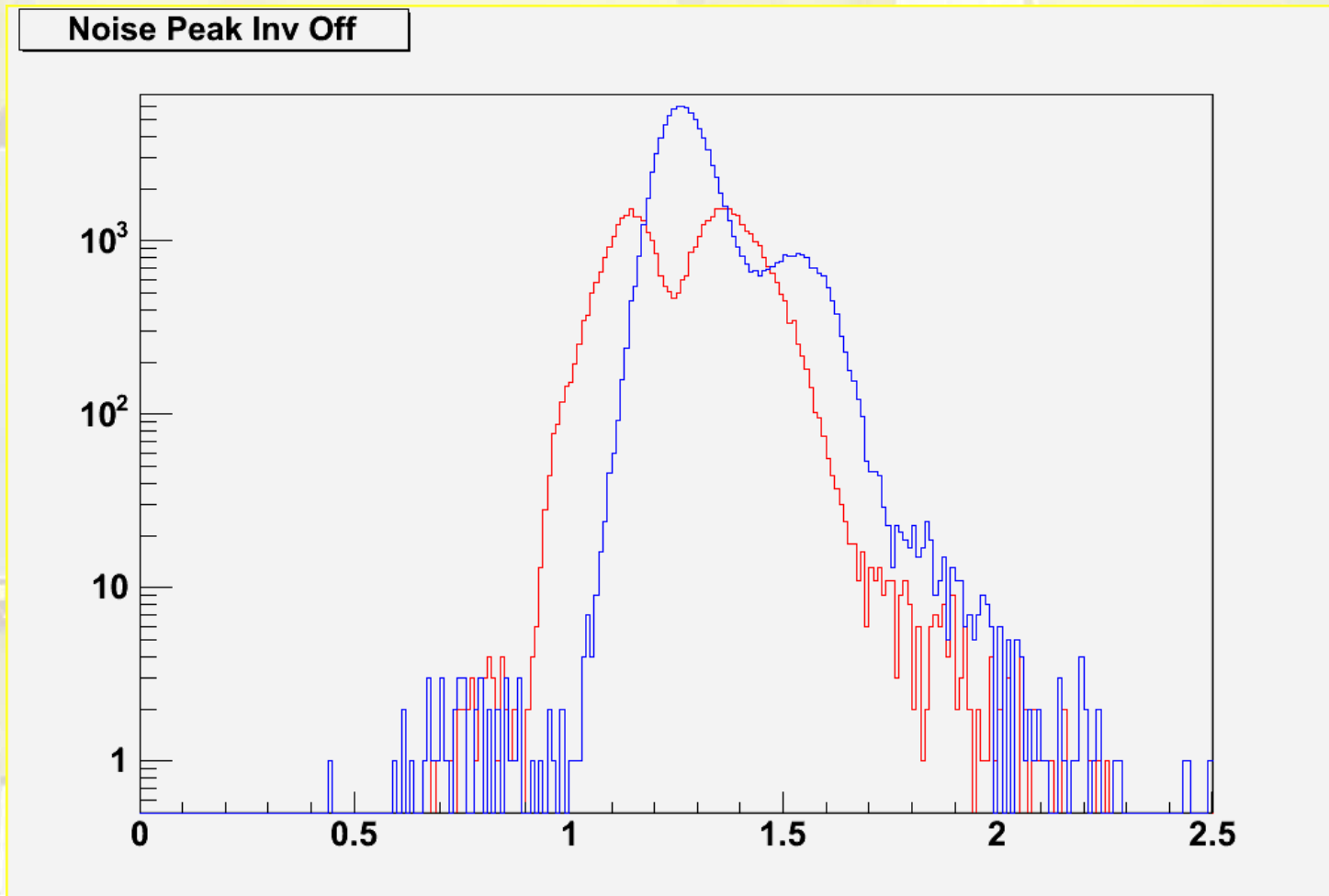




TOB Strip Noise Distribution in cold

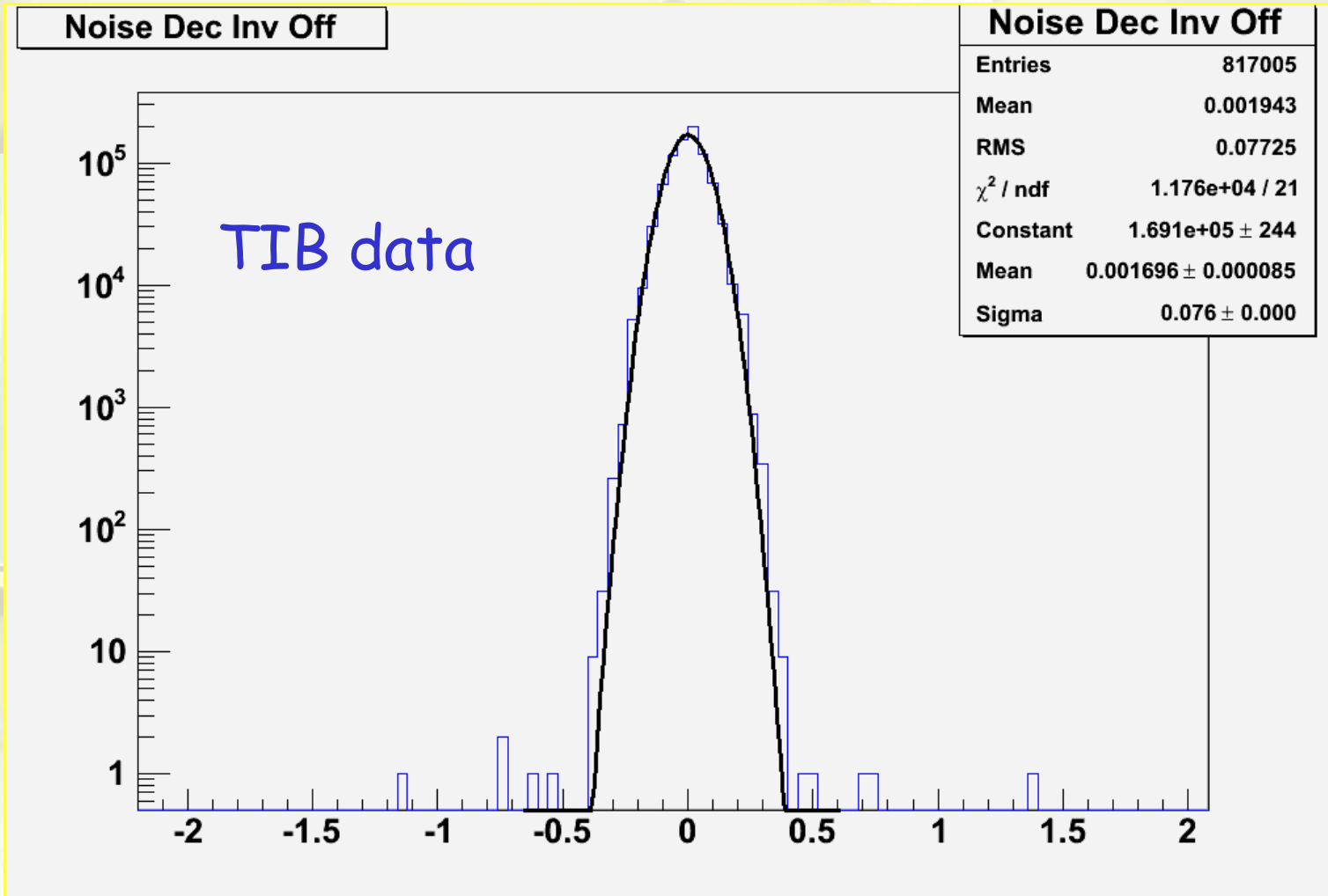


TEC Strip Noise Distribution in cold





Strip Noise Difference First-Last Record in LT





Some Problems Seen in this Analysis



- ♣ **LV records** not always properly filled or $I=0$
- ♣ **Ileak=0** in 177 TIB, 88 TEC and 66 TOB modules
- ♣ **WRONG TOOL_ID**: a lot of TEC modules have `tool_id=202` which belongs to Firenze!
- ♣ The number of bad modules (grade C) in DB is underestimated:
 - ♦ I found only 48 "bad" in DB and 128 from weekly Production summary...
 - ♦ 1.9% from DB, 4.6% from Production

Summary

- ♣ $4517 / 1597696 = 0.28\%$ Percentage of bad strips including faulty modules!
- ♣ This is an extremely good result, meaning our modules are of excellent quality
- ♣ **BUT:**
 - ♦ more care is needed before uploading to DB; check data quality, L3 managers are responsible for that
 - ♦ **PLEASE** insert ALL bad modules in DB...