BES-II电子学系统在线刻度

ONLINE GROUP，IHEP

- 电子学系统刻度的目的
- 智能A/D转换插件BADC7001
- 刻度过程
- 台阶，阈值的确定
- 操作规程

电子学系统刻度的目的

- 非线性修正，提高测量的精度。
- 定时刻度，校正电子学系统受温度等环 境因素的影响，确保系统长时间运行的 一致性。
- 随时检查电子学系统各道的状态，以去掉不正常的道或为电子学修复提供依据
- 在线刻度可以简化离线数据分析的处理 过程。

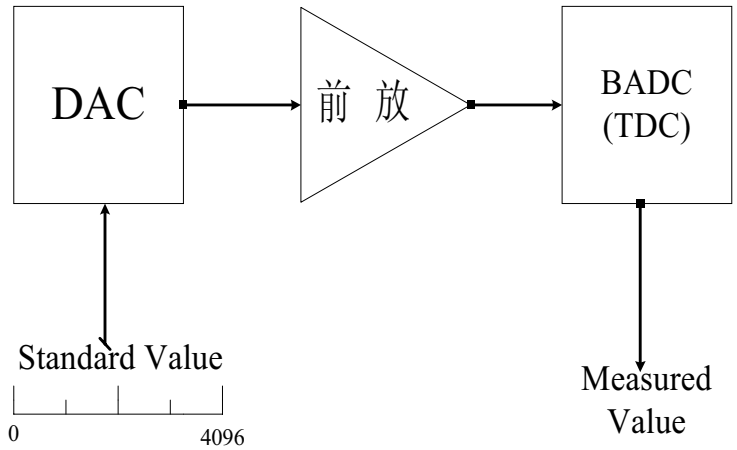
智能A/D转换插件BADC7001

- 刻度模式：对每一刻度点，给出平均值和 方差。
- A/D转换模式：
  - 台阶扣除和零压缩，台阶，阈值。
  - 非线性修正，修正因子。
  - VC /TDC1879在线刻度，离线校正。

$$X = \alpha(X - \delta) + \beta(X - \delta)^2$$

刻度过程

- 刻度取数，$X_i \Leftrightarrow \overline{X_i},\ \sigma_{\overline{X_i}}$



刻度过程示意图

系 统	刻度点数	测量次数(每点)
TOF(T, Q)	6	10
MDC(T, Q)	12	10
BSC	9	10
ESC	9	10
Mu	10	10
VC	14	10

刻度点数及测量次数

- 二次曲线拟合，α，β，δ

台阶，阈值的确定

- 台阶取数条件
  - 触发条件，高压状况。
  - BADC为非压缩取数。
- 台阶为20个事例各道平均值，即各道噪声的平均值。

$$\delta = \overline{ADC}$$

- 阈值

$$Threshold = N_\sigma \sigma_\delta$$

系 统	N_σ	阈 值 上 ， 下 限
TOF-Q	3	20-40
MDC-Q	7	100-200
BSC	3	20-40
ESC	3	20-40
Muon	3	20-40

刻度检查

以下文件（[run.cal.exe]）列出了各系统死道

系 统	刻 度 结 果	台 阶 结 果
VC	VCCAL.PARERR	
MDC_T	DC5CAL.PARERR	
MDC_Q	PRE_DC6CAL.PARERR	DC6CAL.PARERR
TOF_T & Q	PRE_TOFCAL.PARERR	TOFCAL.PARERR
BSC	PRE_SC8CAL.PARERR	SC8CAL.PARERR
ESC	PRE_SC9CAL.PARERR	SC9CAL.PARERR
Mu	PRE_M10CAL.PARERR	M10CAL.PARERR

电子学刻度操作

- 建立刻度环境

  键入命令　**$V CAL**
- 电子学刻度说明
  - 刻度时，要求没有束流，没有其他操作（取数、台阶）。
  - 可在任何终端上进行。
  - 在操作时，根据命令提示，分别键入Y，Return 或 q，对指定的电子学系统刻度取数。

- 刻度取数命令
  - 键入 $CALACQ命令，进行刻度取数。
    - 在sys$fast队列上，将递交相应的作业：subcal_tof, subcal_mdc, subcal_sc, subcal_mu_vtx。
- 刻度检查*（不能忽略）*
  - 键入 $ SH_CAL命令
    - 显示刻度进行状态。
    - 刻度作业完成后，应首先检查刻度取数是否有读出，各点的平均值是否等量递增。
  - 键入 $ SH_DEADNO命令，显示各系统死道总数。
    - 如果某一系统死道过多，需对该系统重新刻度，或找ON-CALL人员解决。

刻度检查正常后，通知中控室注入，注入成功后，加高压。进行台阶取数。

- 台阶取数
  - 键入**$ PEDACQ** 命令台阶取数。注意：高压，对撞
  - 键入**$ PEDUPD**命令，刻度常数更新。
- 刻度直方图
  - 键入**$ CALHBK** 命令, 产生HBOOK 文件。
  - 键入**$ HBKSCR**命令，屏幕出图。显示在 X_terminal。
  - 键入**$ HBKPLT**命令， 激光打印机打印出图。

刻度文件检查

- 刻度作业完成后，在[RUN]根目录下生成相应的LOG文件，可使用SH_CAL命令查看。 LOG文件如下：
  - SUBCAL_TOF.LOG
  - SUBCAL_MDC.LOG
  - SUBCAL_SC.LOG
  - SUBCAL_MU_VTX.LOG
- 检查要点
  - 网络连接正常
  - 测量点等差增长
  - 产生刻度常数文件

SUBCAL_TOF.LOG(文件)

Binary DATABASE successfully read

Please wait for NETWORK connection..

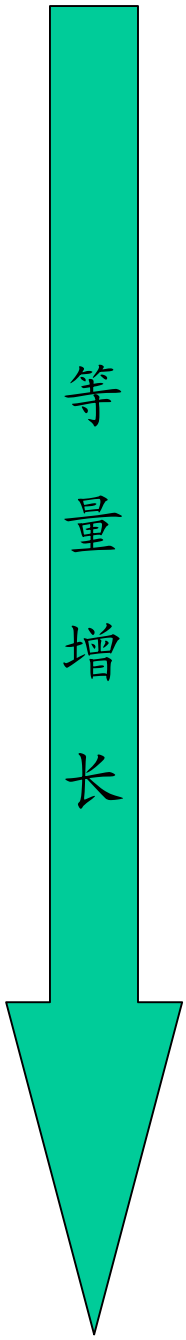
.

NETWORK connection ok, PORT = 5010

SYS = TOF CALACQ starting...

Begin TOF_T_Calibration Loop -- Mode= 0

PNT= 1 quad1 MEAN= 1257;	Worst ch: MEAN= 1117 DEV= 7 10TIMES
PNT= 1 quad2 MEAN= 1290;	Worst ch: MEAN= 1207 DEV= 2 10TIMES
PNT= 1 quad3 MEAN= 1310;	Worst ch: MEAN= 1047 DEV= 3 10TIMES
PNT= 1 quad4 MEAN= 1262;	Worst ch: MEAN= 1131 DEV= 3 10TIMES
PNT= 1 quad5 MEAN= 1371;	Worst ch: MEAN= 1248 DEV= 3 10TIMES
PNT= 1 quad6 MEAN= 1312;	Worst ch: MEAN= 1148 DEV= 4 10TIMES
PNT= 2 quad1 MEAN= 1684;	Worst ch: MEAN= 1545 DEV= 7 10TIMES
PNT= 2 quad2 MEAN= 1706;	Worst ch: MEAN= 1667 DEV= 2 10TIMES
PNT= 2 quad3 MEAN= 1744;	Worst ch: MEAN= 1519 DEV= 2 10TIMES
PNT= 2 quad4 MEAN= 1681;	Worst ch: MEAN= 1572 DEV= 3 10TIMES
PNT= 2 quad5 MEAN= 1800;	Worst ch: MEAN= 1686 DEV= 3 10TIMES
PNT= 2 quad6 MEAN= 1742;	Worst ch: MEAN= 1412 DEV= 4 10TIMES
PNT= 3 quad1 MEAN= 2122;	Worst ch: MEAN= 2319 DEV= 7 9TIMES
PNT= 3 quad2 MEAN= 2128;	Worst ch: MEAN= 2064 DEV= 1 10TIMES
PNT= 3 quad3 MEAN= 2179;	Worst ch: MEAN= 2212 DEV= 2 10TIMES
PNT= 3 quad4 MEAN= 2107;	Worst ch: MEAN= 2019 DEV= 2 10TIMES
PNT= 3 quad5 MEAN= 2228;	Worst ch: MEAN= 2330 DEV= 3 10TIMES
PNT= 3 quad6 MEAN= 2173;	Worst ch: MEAN= 2001 DEV= 4 10TIMES
PNT= 4 quad1 MEAN= 2574;	Worst ch: MEAN= 2477 DEV= 7 9TIMES
PNT= 4 quad2 MEAN= 2563;	Worst ch: MEAN= 2502 DEV= 1 10TIMES
PNT= 4 quad3 MEAN= 2625;	Worst ch: MEAN= 2608 DEV= 1 10TIMES
PNT= 4 quad4 MEAN= 2546;	Worst ch: MEAN= 2679 DEV= 1 10TIMES
PNT= 4 quad5 MEAN= 2668;	Worst ch: MEAN= 2758 DEV= 3 10TIMES
PNT= 4 quad6 MEAN= 2616;	Worst ch: MEAN= 2443 DEV= 4 10TIMES
PNT= 5 quad1 MEAN= 2994;	Worst ch: MEAN= 3122 DEV= 7 10TIMES
PNT= 5 quad2 MEAN= 2970;	Worst ch: MEAN= 2915 DEV= 1 10TIMES
PNT= 5 quad3 MEAN= 3037;	Worst ch: MEAN= 3034 DEV= 1 10TIMES
PNT= 5 quad4 MEAN= 2956;	Worst ch: MEAN= 3129 DEV= 1 10TIMES
PNT= 5 quad5 MEAN= 3078;	Worst ch: MEAN= 3151 DEV= 3 10TIMES
PNT= 5 quad6 MEAN= 3028;	Worst ch: MEAN= 2800 DEV= 4 10TIMES
PNT= 6 quad1 MEAN= 3397;	Worst ch: MEAN= 3499 DEV= 5 10TIMES
PNT= 6 quad2 MEAN= 3364;	Worst ch: MEAN= 3320 DEV= 1 10TIMES
PNT= 6 quad3 MEAN= 3434;	Worst ch: MEAN= 3446 DEV= 1 10TIMES
PNT= 6 quad4 MEAN= 3351;	Worst ch: MEAN= 3402 DEV= 1 10TIMES
PNT= 6 quad5 MEAN= 3472;	Worst ch: MEAN= 3528 DEV= 3 10TIMES
PNT= 6 quad6 MEAN= 3426;	Worst ch: MEAN= 3228 DEV= 4 10TIMES



Directory BESAXP$DKA300:[RUN.CAL.EXE]

TOFCAL.SAV;210 136 5-JAN-2000 14:16:10.81 (RWED,RWED,RE,)

Total of 1 file, 136 blocks.

Binary DATABASE successfully read

SYS = TOF CALUPD starting...

Directory BESAXP$DKA300:[RUN.CAL.DB]

PRE_TOF1.DAT;102 2 5-JAN-2000 14:16:16.97 (RWED,RWED,RE,)

Total of 1 file, 2 blocks.

5-JAN-2000 14:16:17

SC8CAL.PARERR

SYS = 8 CHAN= 1968 ALPHA overflow !
SYS = 8 CHAN= 2474 ALPHA overflow !
SYS = 8 CHAN= 4007 ALPHA overflow !
SYS = 8 CHAN= 4075 ALPHA overflow !
SYS = 8 CHAN= 6304 ALPHA overflow !

刻度情况

失败原因

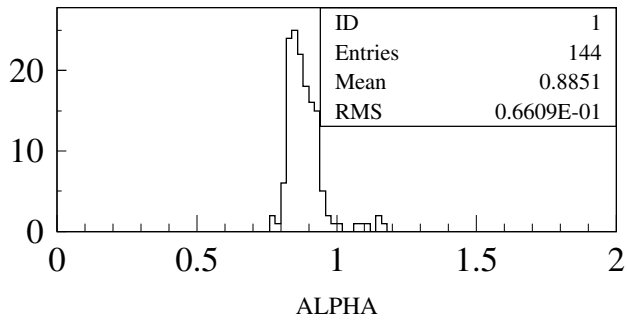
5 CHANs CAL_PARA_UPD failed
PED_UPD failed at SYS= 8 CHAN= 61 MEAN is zero or negative!
PED_UPD failed at SYS= 8 CHAN= 5299 MEAN is zero or negative!
PED_UPD failed at SYS= 8 CHAN= 5553 MEAN is zero or negative!
PED_UPD failed at SYS= 8 CHAN= 6233 MEAN is zero or negative!

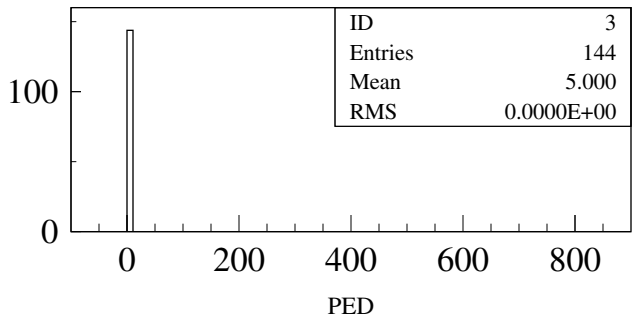
台阶情况

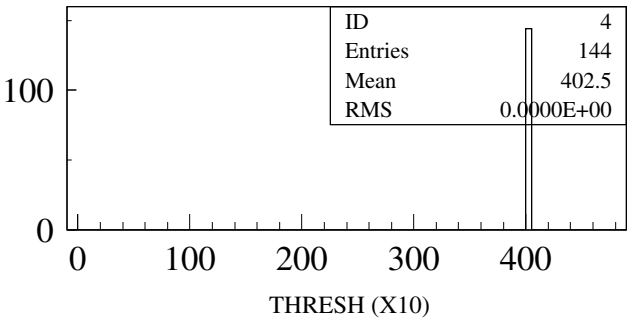
5 CHANs CAL_PARA_UPD failed
4 CHANs PEDESTAL_UPD failed
Totally 9 CHANs calibrating failed

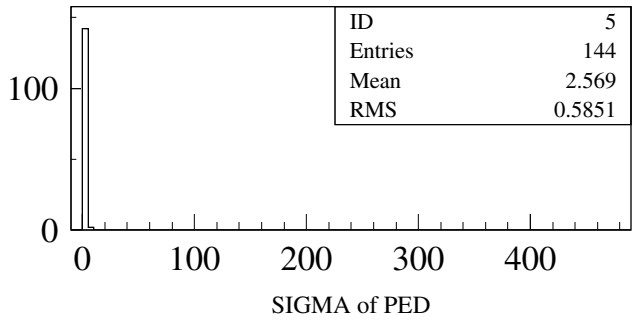
失败道数

Calibration of TOFT (25-FEB-1997 16:00)

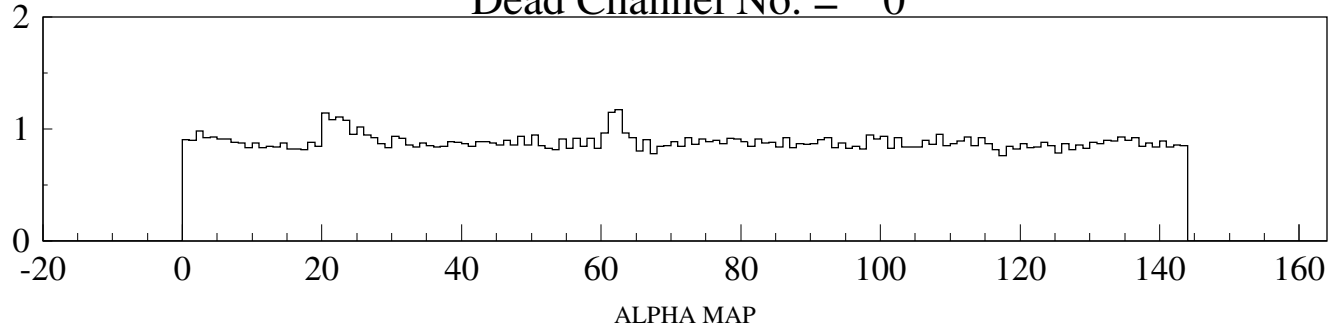


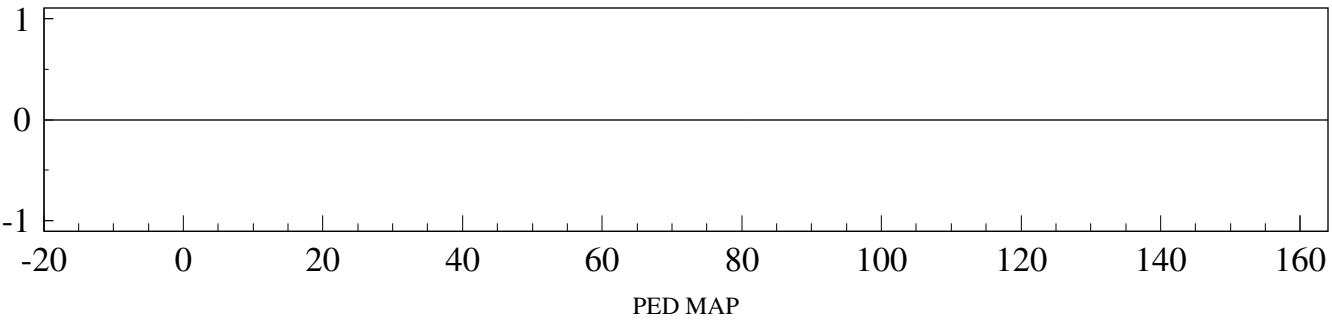


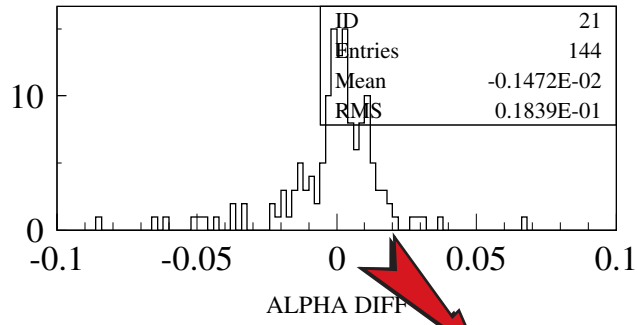


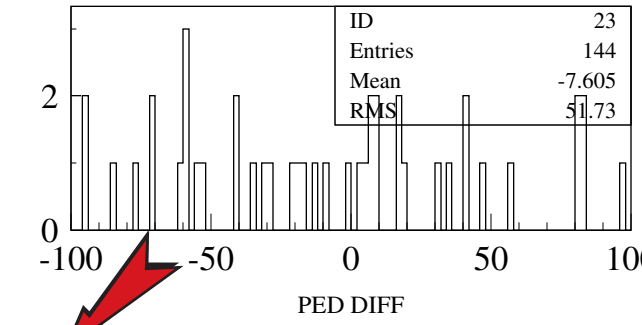


Dead Channel No. = 0



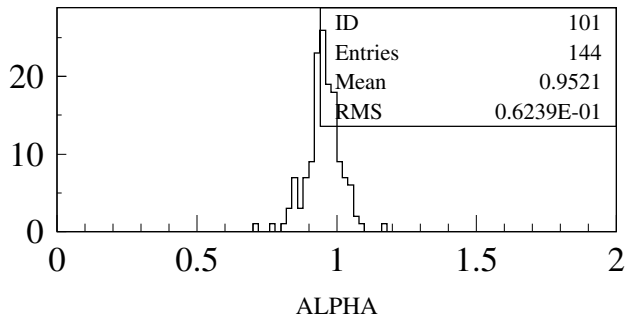


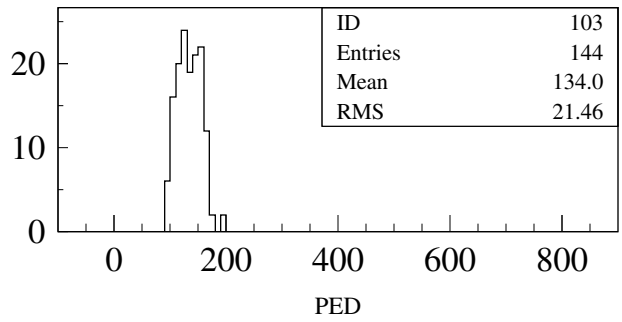


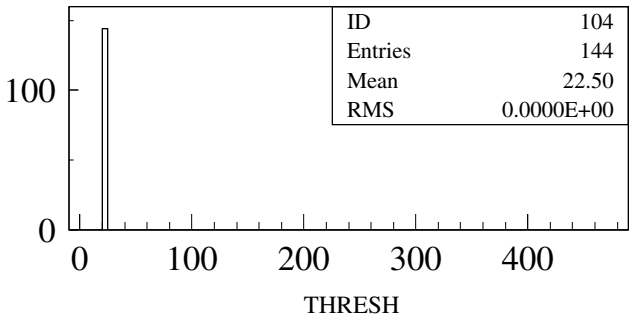


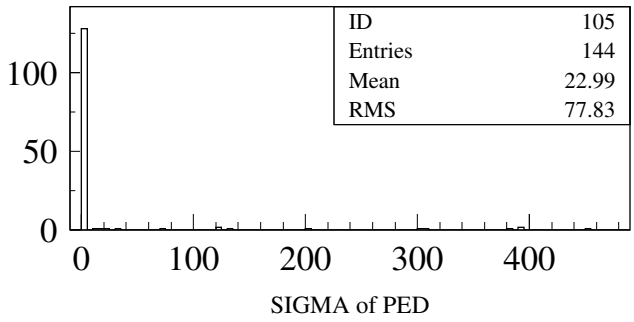
Compared with the standard value

Calibration of TOFQ (25-FEB-1997 16:00)

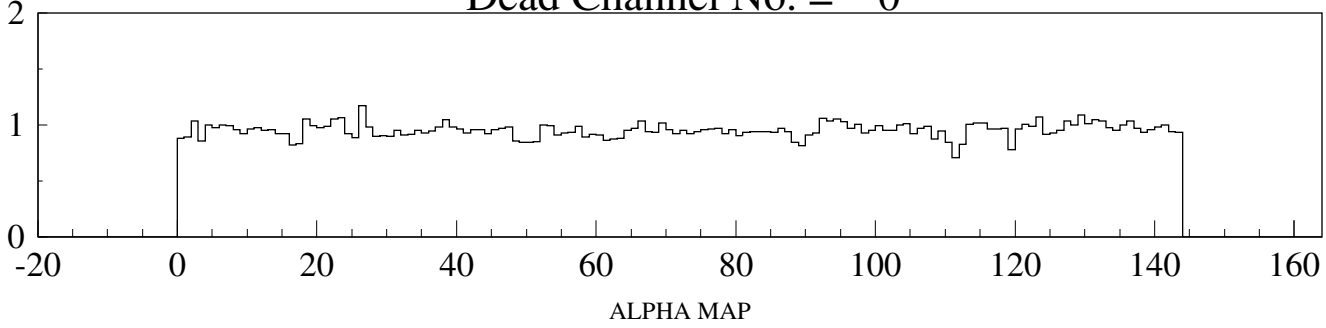


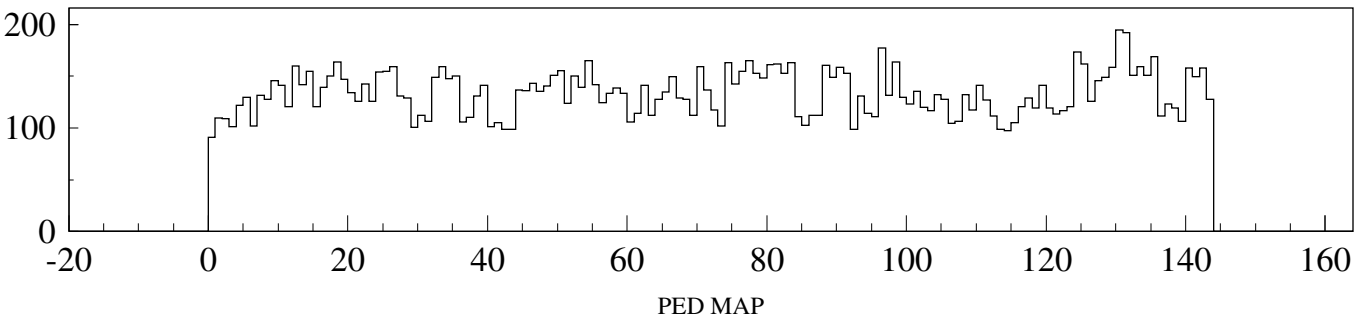


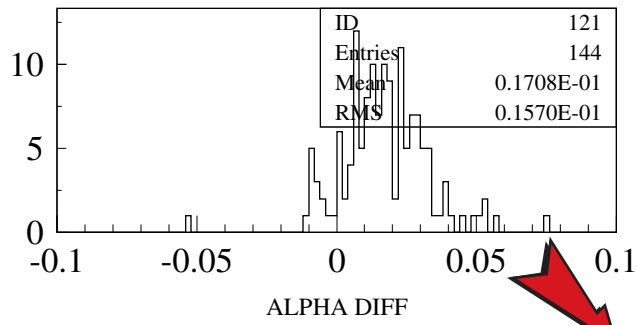


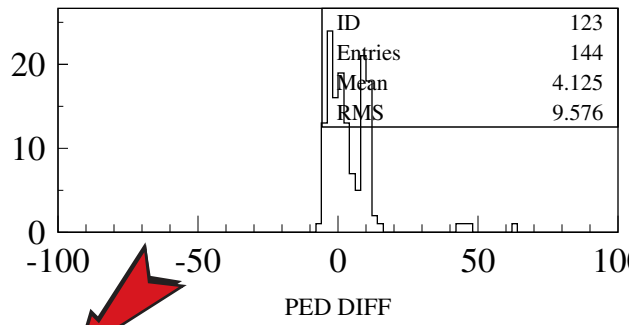


Dead Channel No. = 0



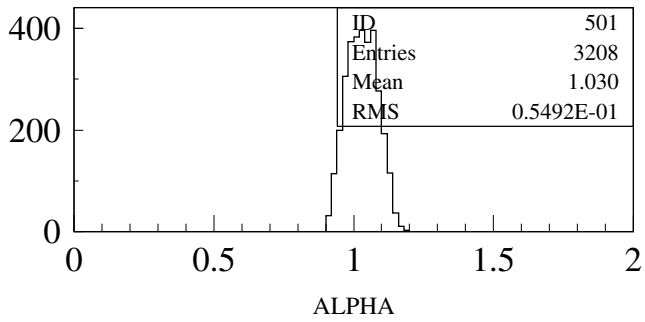


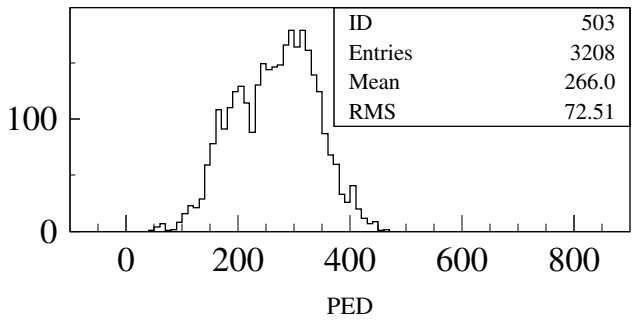


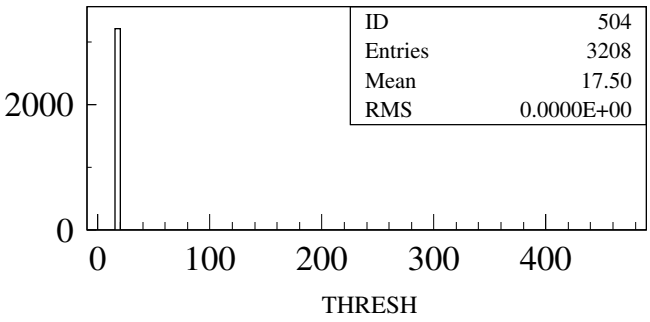


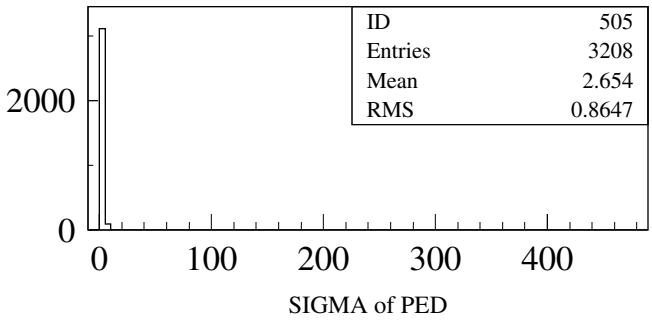
Compared with the standard value

Calibration of MDCT (25-FEB-1997 09:15)

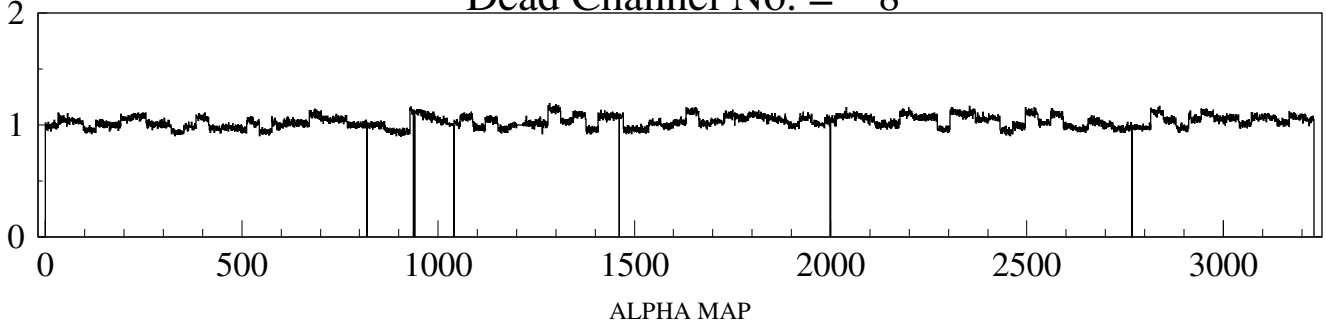


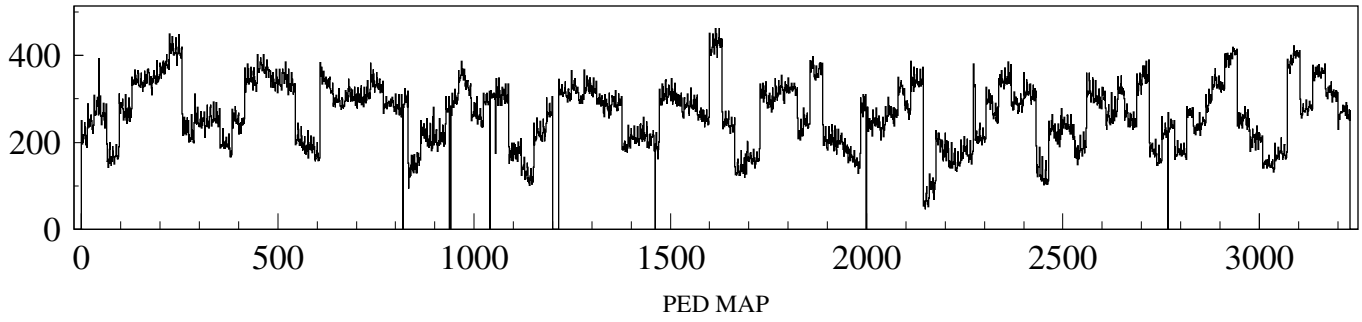


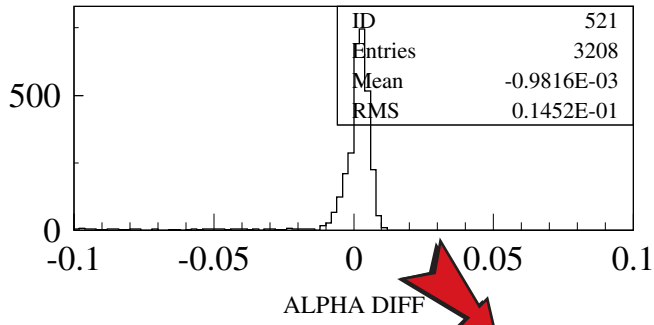


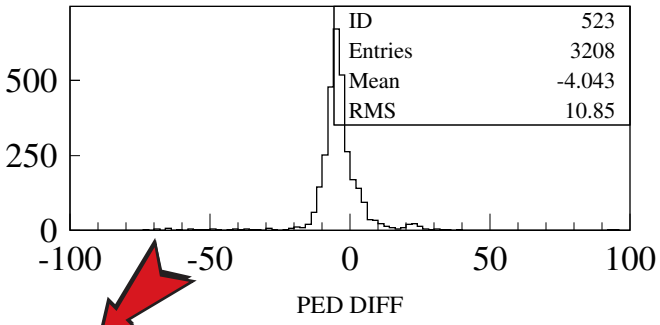


Dead Channel No. = 8





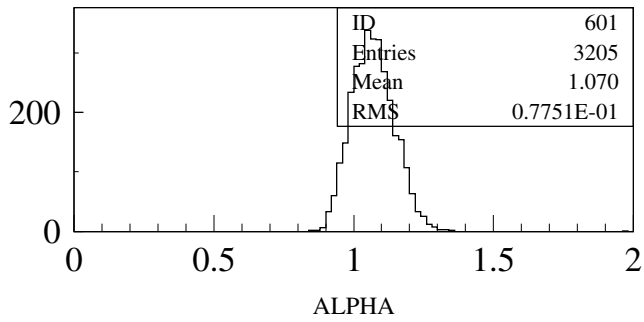


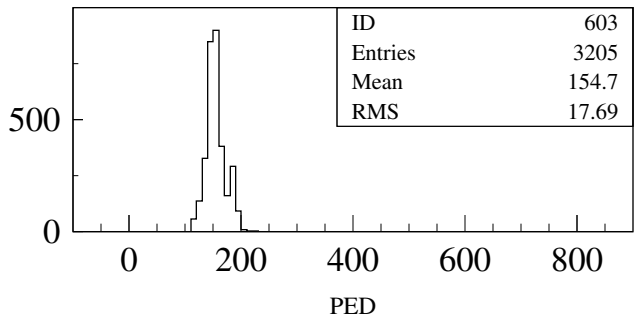


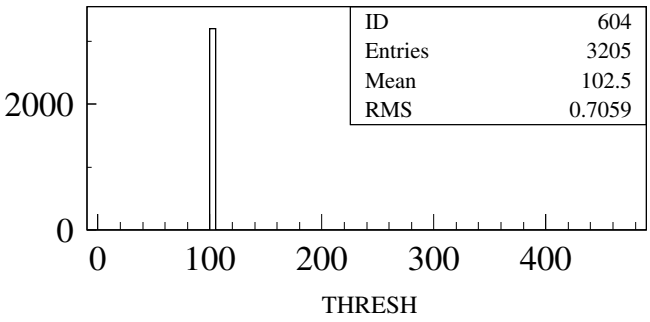
Compared with the standard value

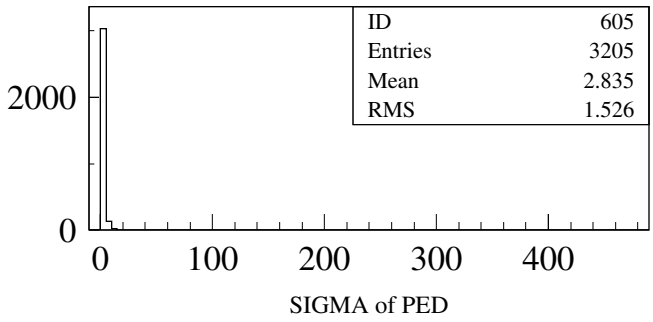
fig. 4

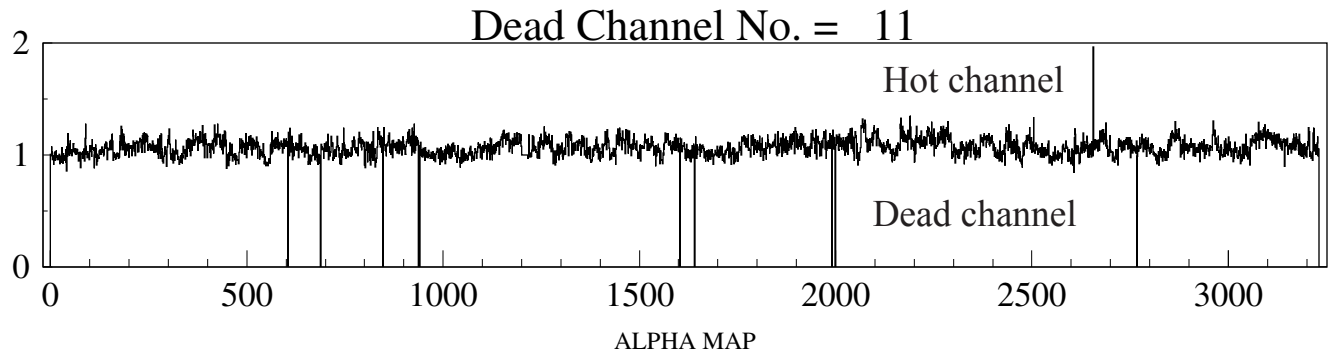
Calibration of MDCE (25-FEB-1997 16:01)

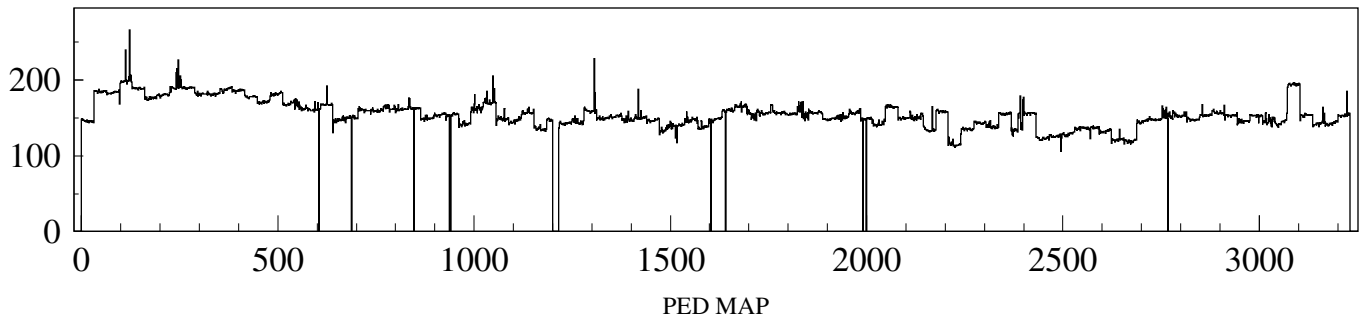


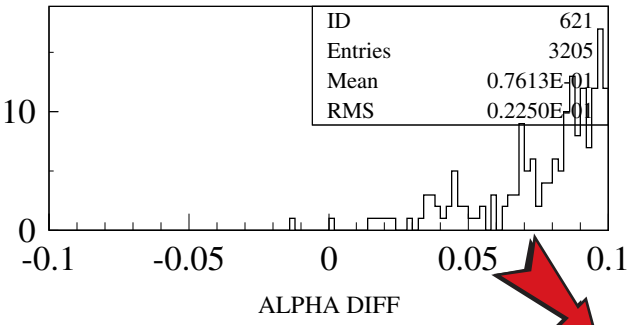


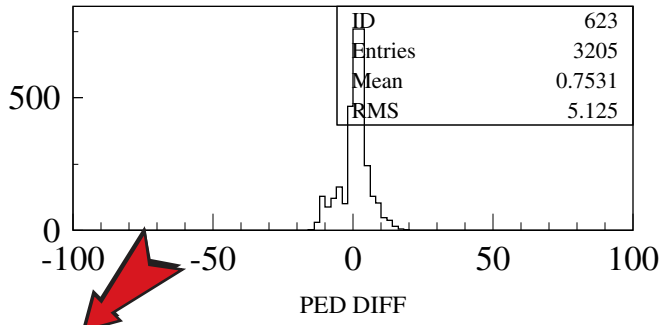








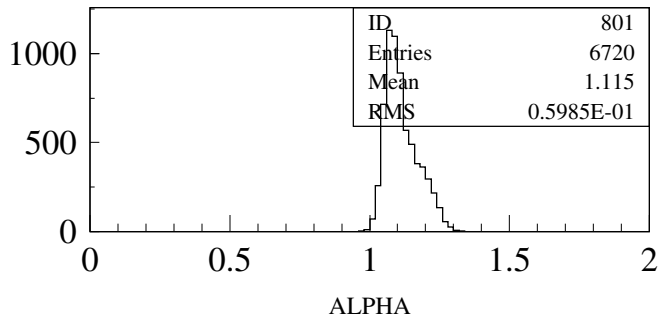


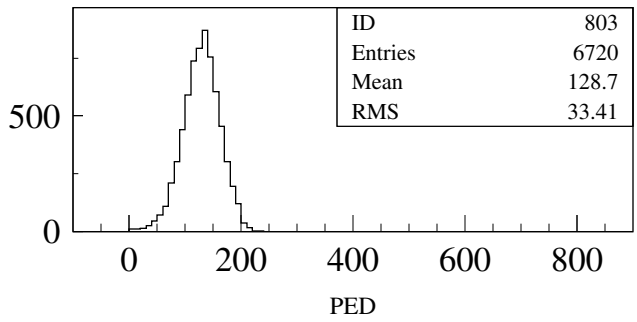


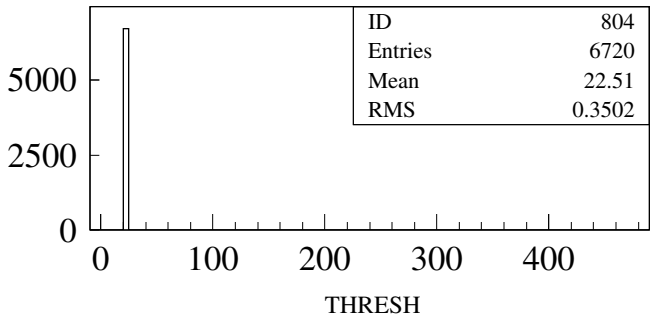
Compared with the standard value

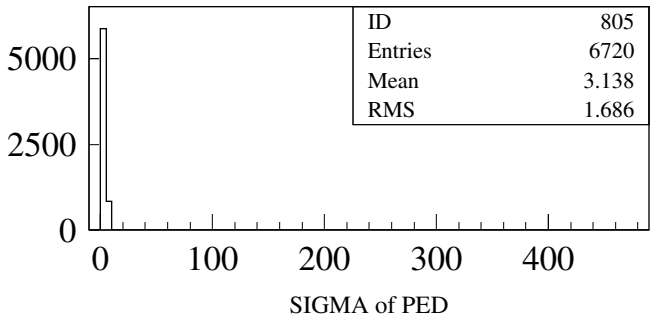
fig. 5

Calibration of BSC (25-FEB-1997 16:01)

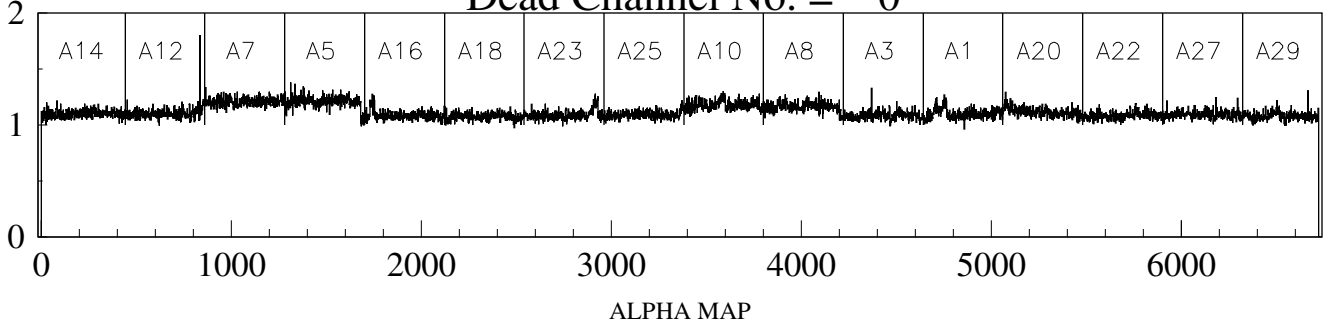


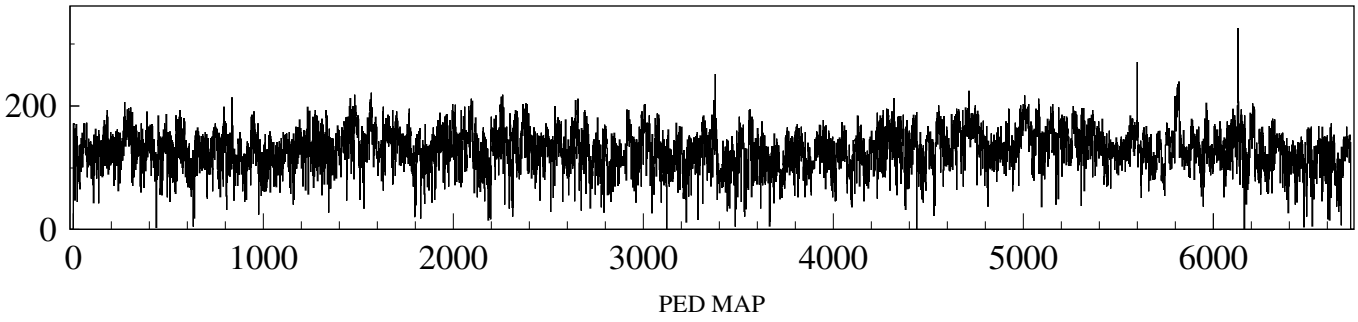


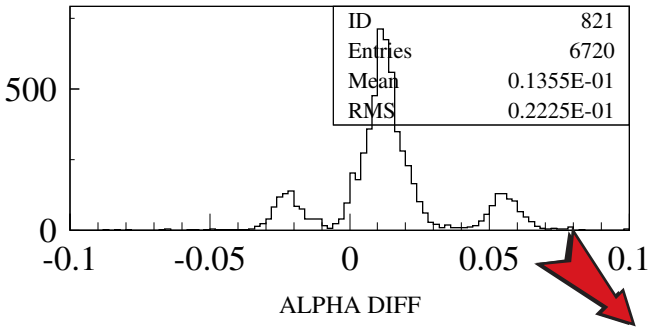


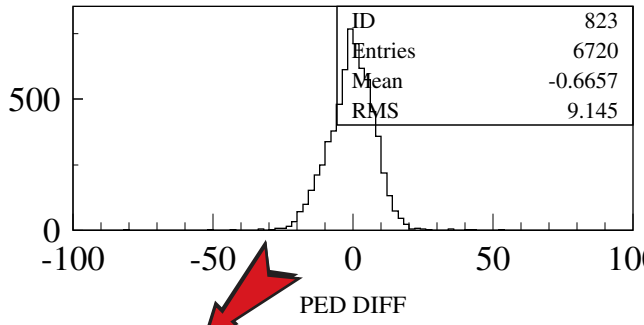


Dead Channel No. = 0





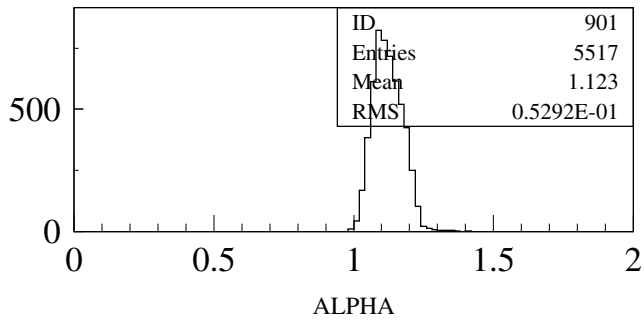


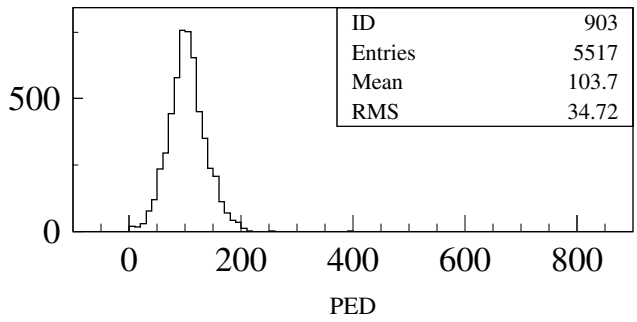


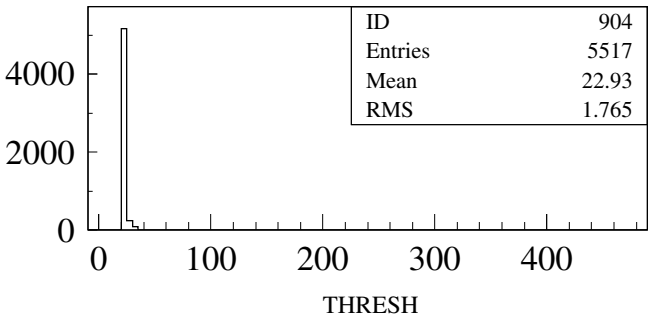
Compared with the standard value

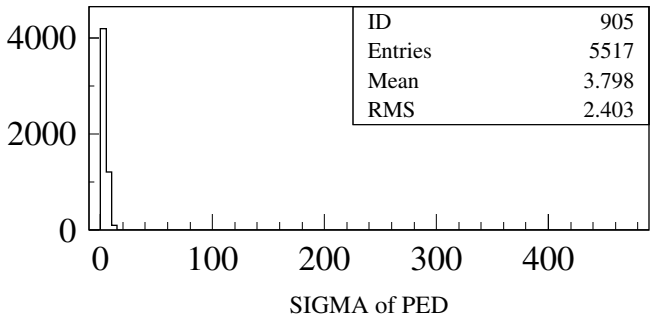
fig. 6

Calibration of ESC (25-FEB-1997 16:01)

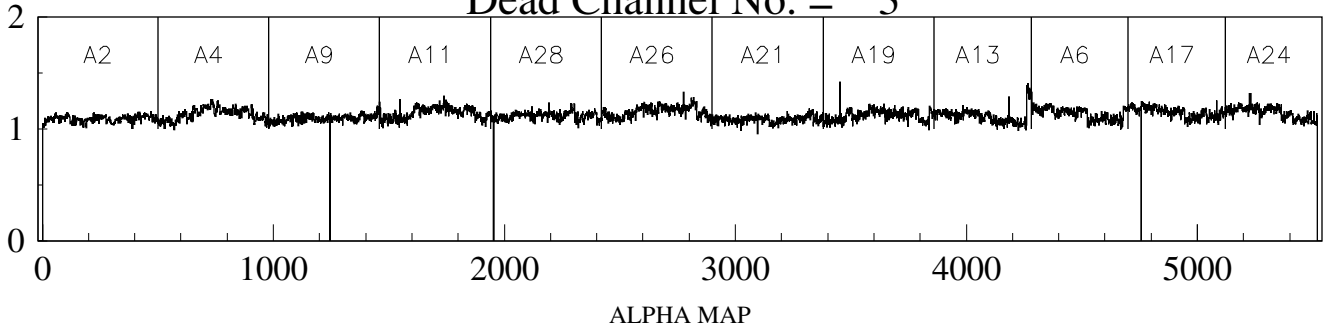


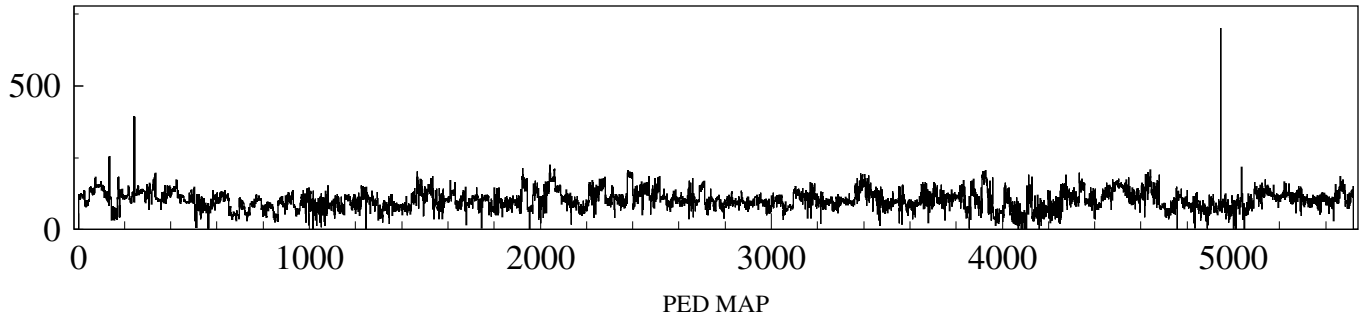


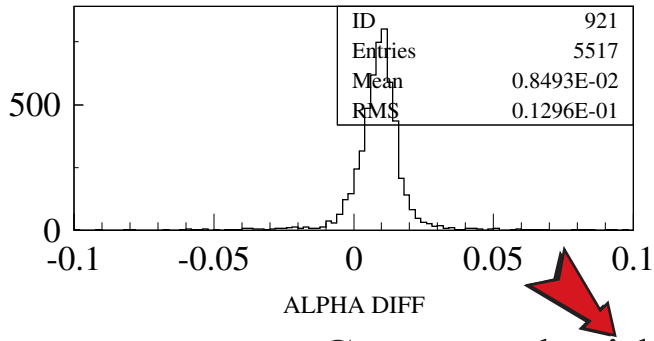


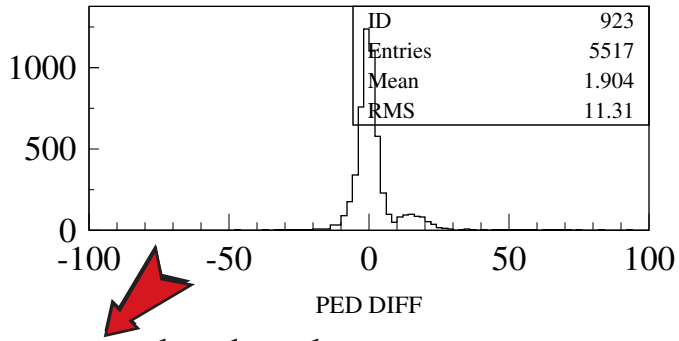


Dead Channel No. = 3



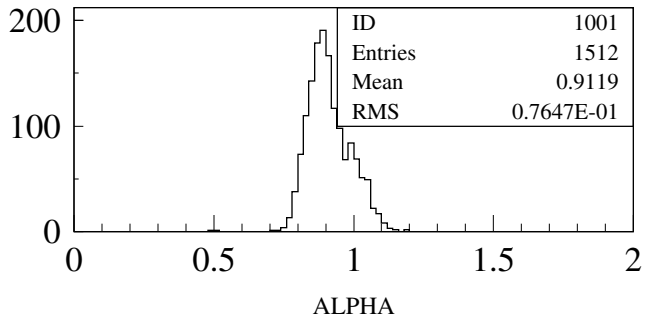


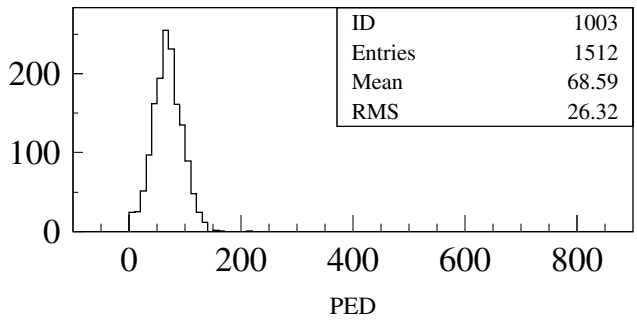


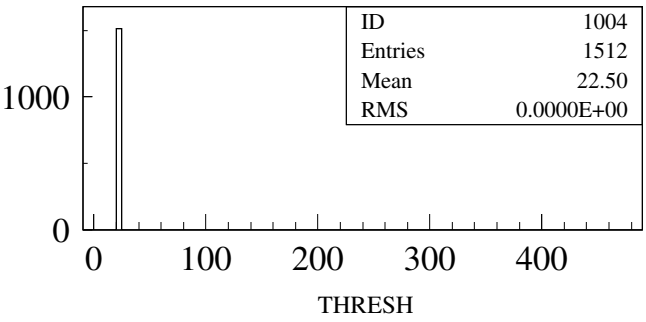


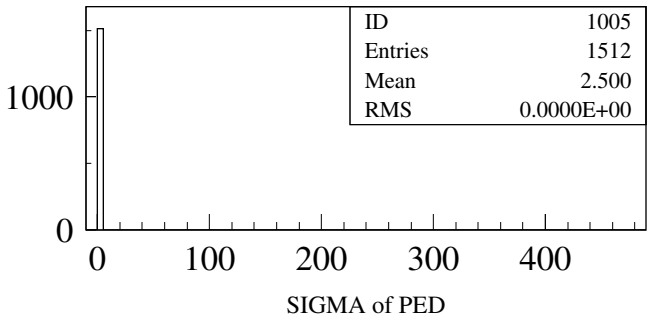
Compared with the standard value

Calibration of MU (25-FEB-1997 16:01)

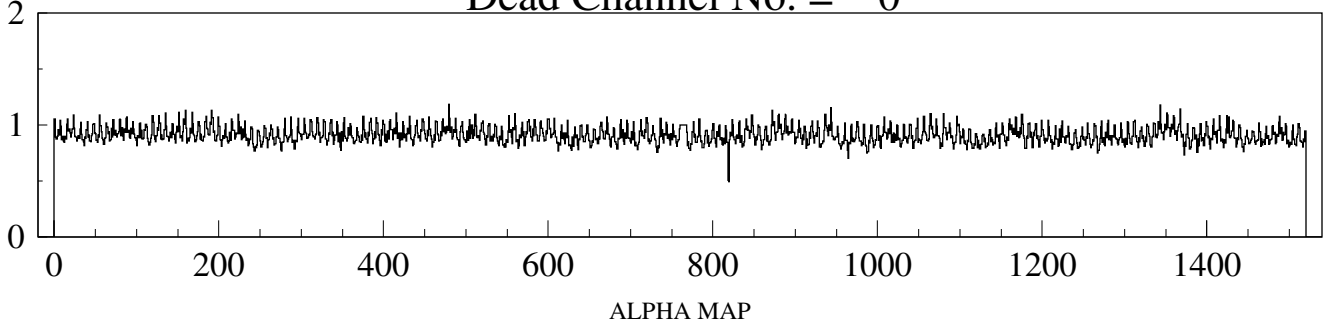


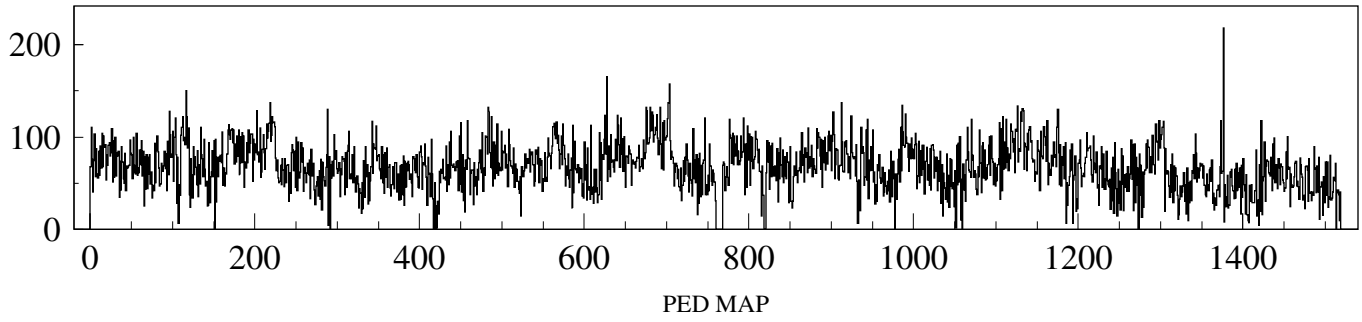


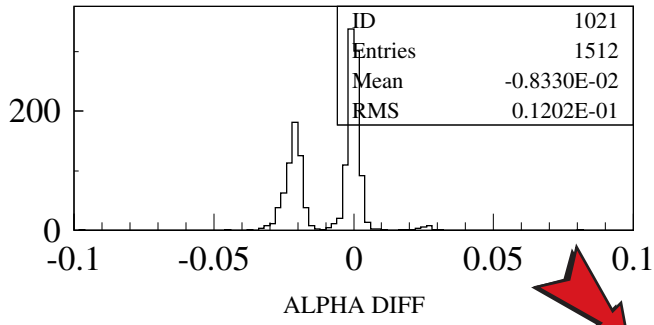


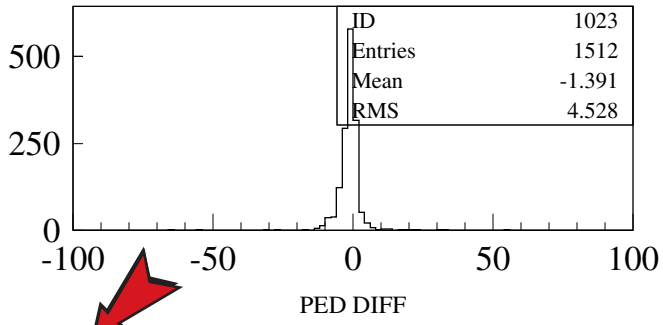


Dead Channel No. = 0





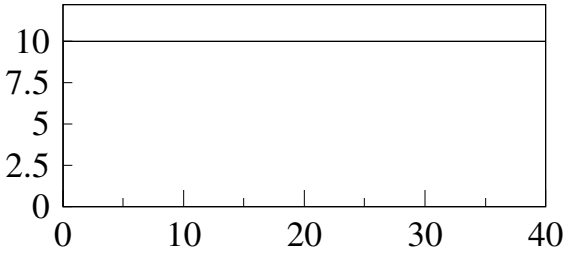




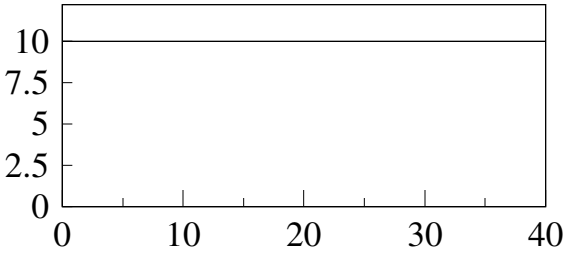
Compared with the standard value

fig.8

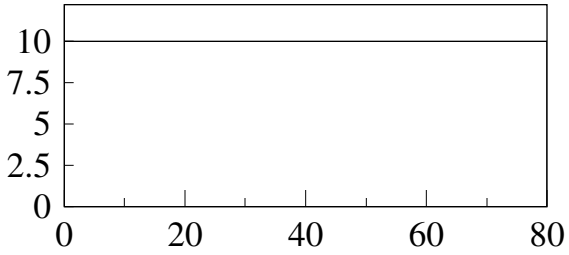
Calibration of VC (4-JAN-2000 13:49)



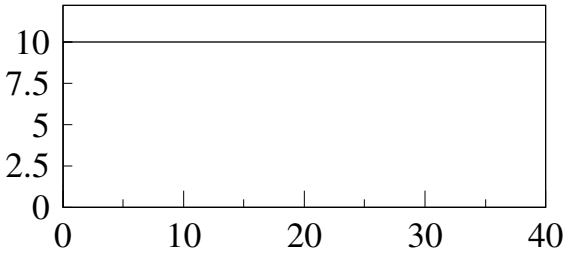
Hit Map of Layer 1



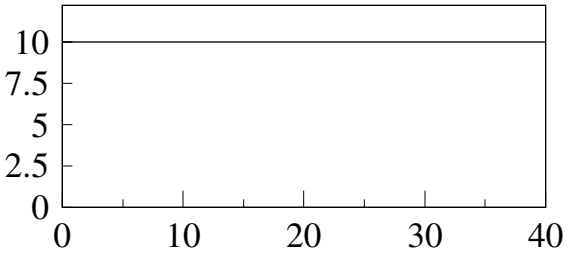
Hit Map of Layer 5



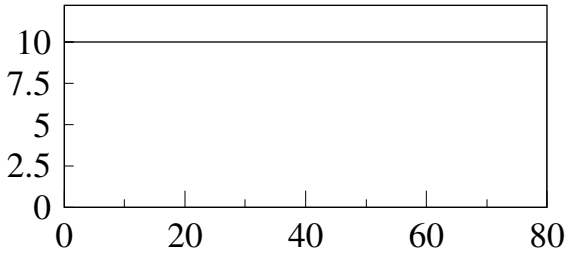
Hit Map of Layer 9



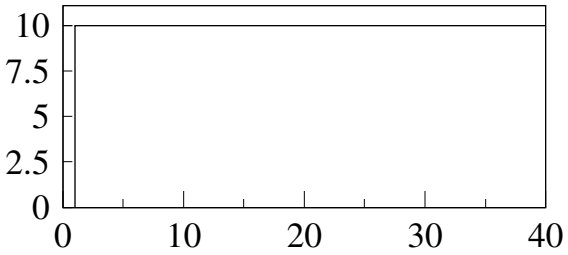
Hit Map of Layer 2



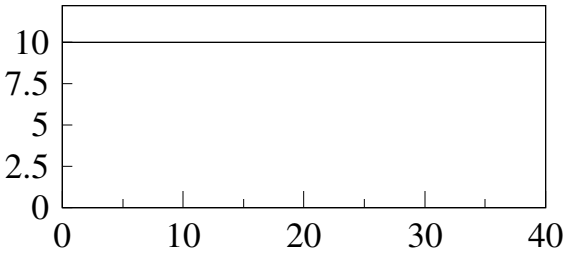
Hit Map of Layer 6



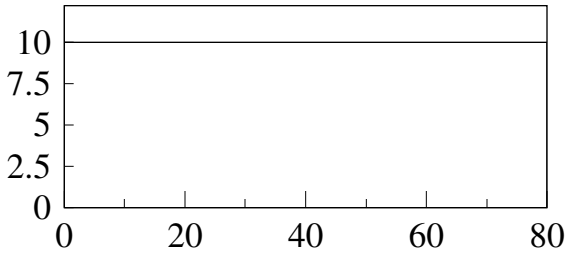
Hit Map of Layer 10



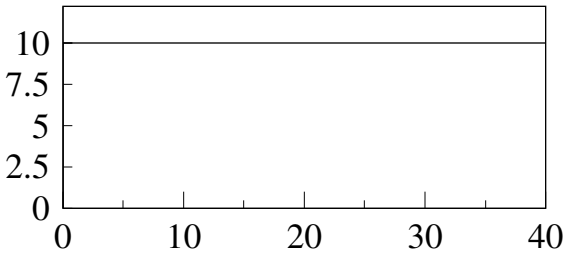
Hit Map of Layer 3



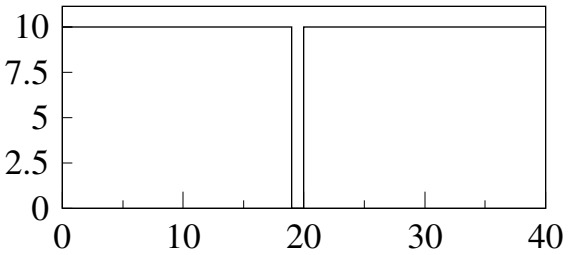
Hit Map of Layer 7



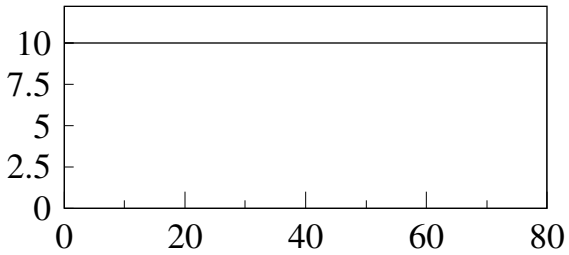
Hit Map of Layer 11



Hit Map of Layer 4



Hit Map of Layer 8

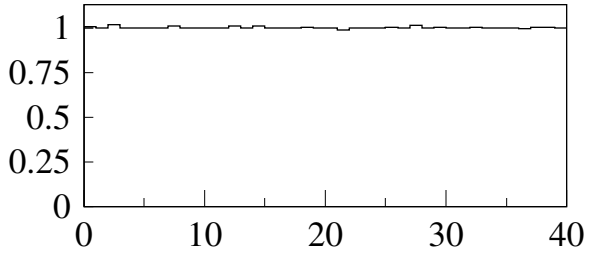


Hit Map of Layer 12

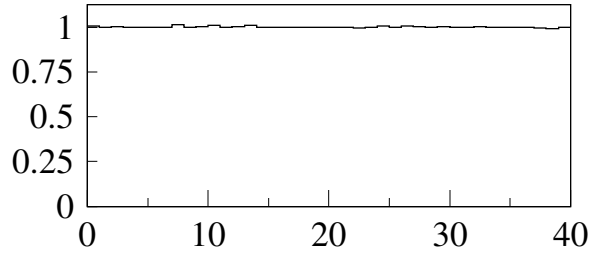
fig. 9

Calibration of VC (4-JAN-2000 13:49)

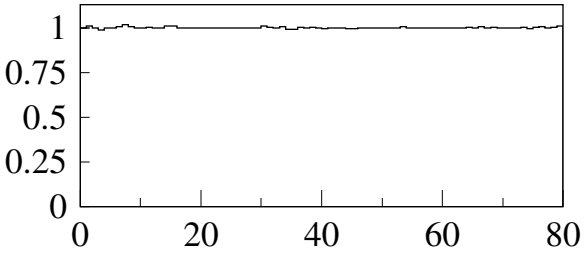
Calibration Failed No. = 2



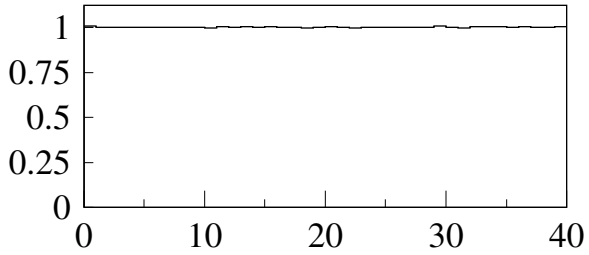
Alpha Map of Layer 1



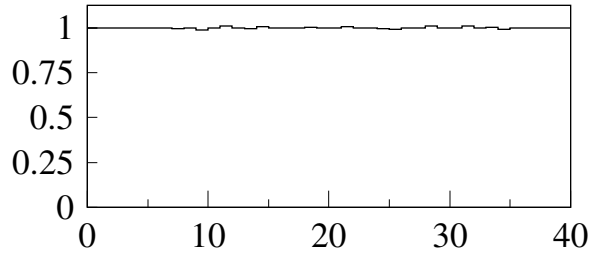
Alpha Map of Layer 5



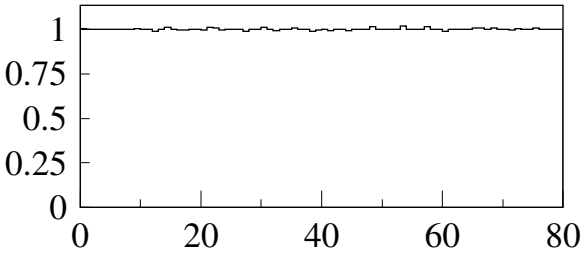
Alpha Map of Layer 9



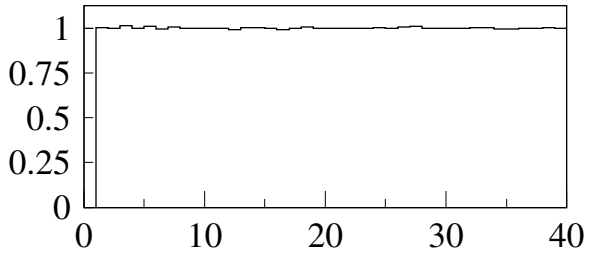
Alpha Map of Layer 2



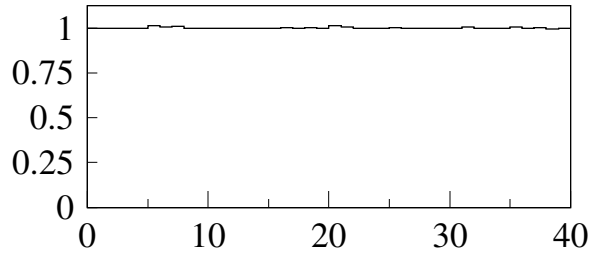
Alpha Map of Layer 6



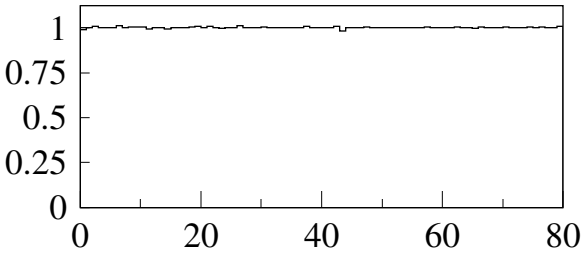
Alpha Map of Layer 10



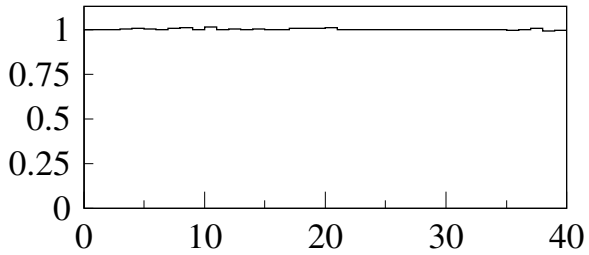
Alpha Map of Layer 3



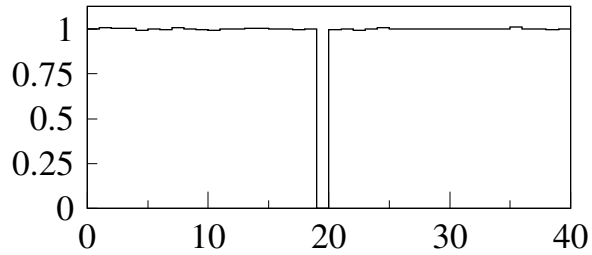
Alpha Map of Layer 7



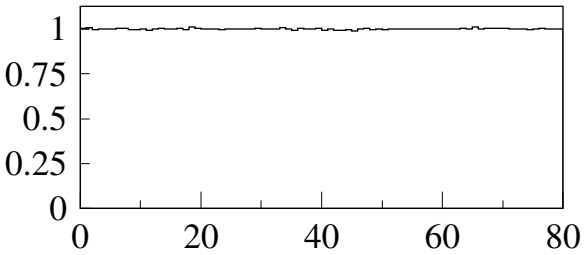
Alpha Map of Layer 11



Alpha Map of Layer 4



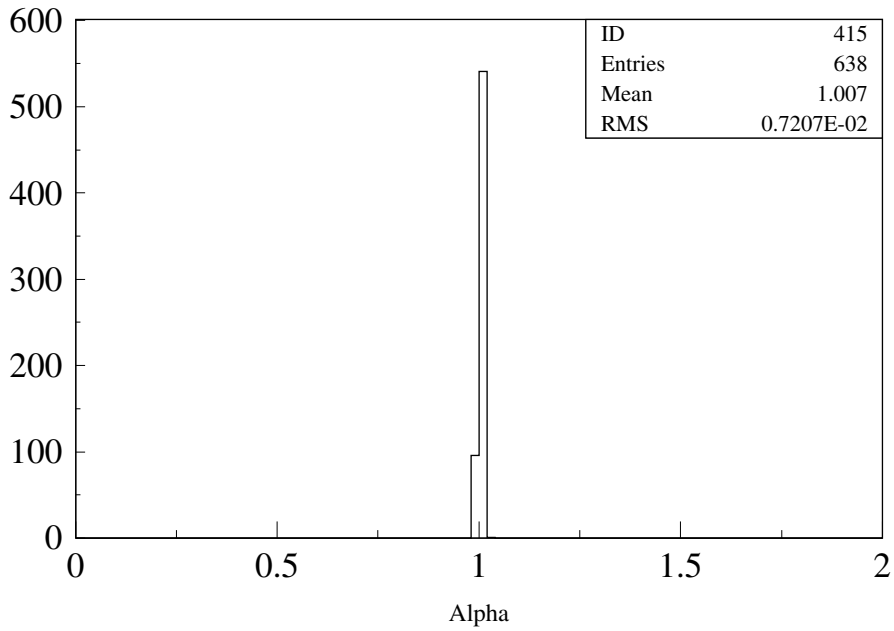
Alpha Map of Layer 8

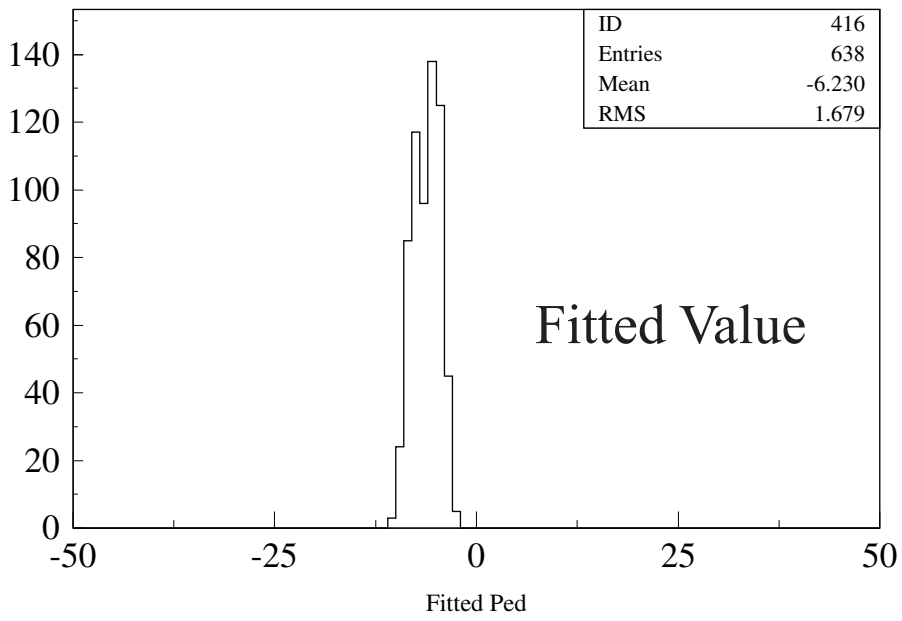


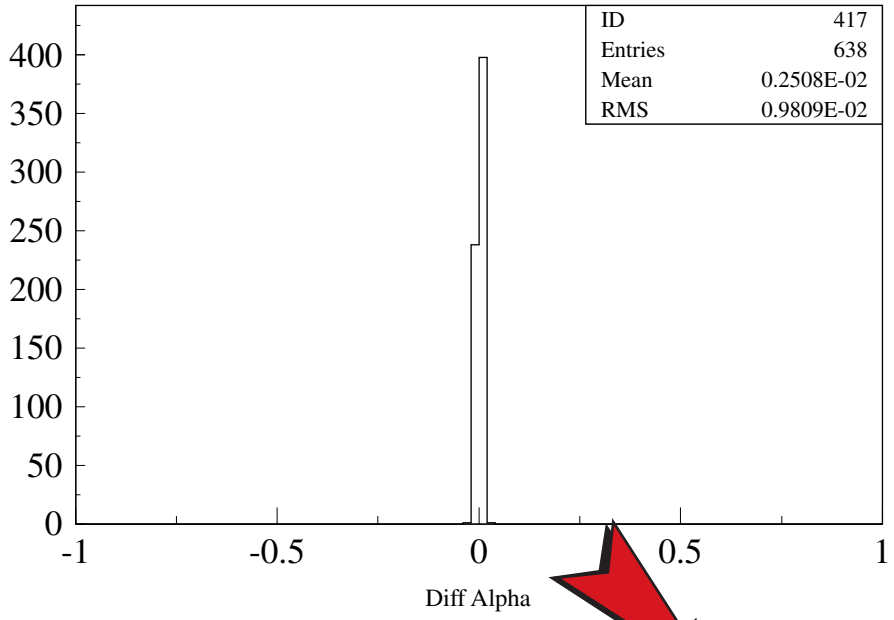
Alpha Map of Layer 12

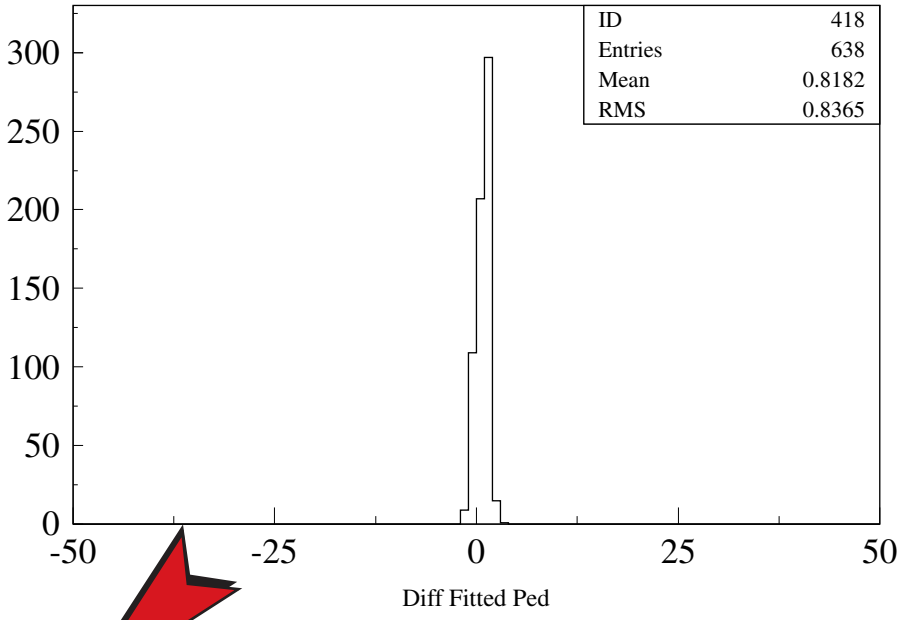
fig. 10

Calibration of VC (4-JAN-2000 13:49)









Compared with the standard value