Status of `hec_adc`

CERN
December 9th 1999

Current Version

- The current version of `hec_adc` is 3.8 prerelease of 99/12/03
- It has the status of prerelease. It will be finalised when we have a stable digital filtering weight and calibration treatment for 1998 and 1999 data.

New e-mail list

We have setup a new `hec_adc` e-mail list

`atlas-larg-hec-adc-sw@atlas-lb.cern.ch`

If you would like to subscribe send a mail to

`ListServer@atlas-lb.cern.ch`

containing the line

`subscribe atlas-larg-hec-adc-sw [mail address]`

New Features of the prerelease 99/12/03

```
1- Use of t0's:
   the code now allows the use of t0's with digital filtering
   weights, if desired by the experts producing the weights.

2- New weights files and calibration file generated by Pavol:
     calib/coeff_dig_aug99_991118.dat
     calib/dig_weights_amp_aug99_991118.dat
     calib/dig_weights_tim_aug99_991118.dat

3- Updated weights files generated by Eric, with preliminary t0's:
     calib/dig_weights_amp_aug99_990810.dat
     calib/dig_weights_tim_aug99_990810.dat

4- New implementation of the digital package datacard mkdig:
     mkdig  i  1= 1 find adc max using digital filtering, NOT USING t0's
               1> 1 find adc max using digital filtering, USING t0's
               1<= 0 do not find adc max using digital filtering
            i  2= print flag <1 printing disabled
                              1 only the t0's (if requested above)
                             >1 and the filtering coefficients

     Note that the first parameter may request the use of t0's (if
     available in the weights file used), while the second
     parameter is new and controls printing of the weights and
     t0's.
     See the file user/datacard.info for details.

5- Information about connected cells:
   The file inc/hec_geo.inc now contains the logical array
   ic_connected(ic).

6- New treatment of cells with bad weights:
   The file inc/hec_dig.inc now contains the logical arrays
   ic_has_amp_weights(ic) and ic_has_tim_weights(ic).

7- New treatment of cells with bad calibration:
   The file inc/hec_cal.inc now contains the logical array
   ic_has_calib(ic).

8- Cells in the ntuple:
   Improvement to the logic choosing the list of cells to include
   in the ntuple.  See src/ntuple/hec_ntuple_ini.f
```

```
 9- Slow Control PC information:
    it is now unpacked and available in a the
    common block hec_slow_pc.inc. SPS slow control information can be
    easily added upon request.  Such piece of code has been tested
    only for 1998 and 1999 test beam periods,
    so that slow control data is not unpacked for run period < 7 yet.
    In online mode, a preliminary set of Slow Control histograms is
    available (from ALL HISTOGRAM panel). Please consider if it might be
    useful to include some information in the run summary.
    Correspondance tables between HV channels and HEC cells still to
    be added.

10- The logic of passes over the data has been sligthly modified:
    two quick passes to get the run header and slow control information
    are done at initialisation time, and never again (previously,
    for each pass over the data the run header information was unpacked
    and overwritten)

11- the date and time of the run and of each event has been added in the
    hec_runh.inc and hec_evth.inc common blocks. Date and time of
    runs are printed in the runsheet for online mode.
```

SLOW CONTROL TESTBEAM DATA

- Slow Control PC data (1 record for each run) is now available in hec_adc
  (see include file hec_slow_pc.inc)
- Information from SPS standard data and H6C beamline data can be added upon request
- Online histograms for Slow Control PC data available from ALL HISTOGRAMS sub-menu
- Need some input from HV experts about disconnected channels, HV distribution tables and similar
- Need to think about Slow Control NTUPLE: usefulness, format...
- Any advice/comment welcome!

Include file hec_slow_pc.inc

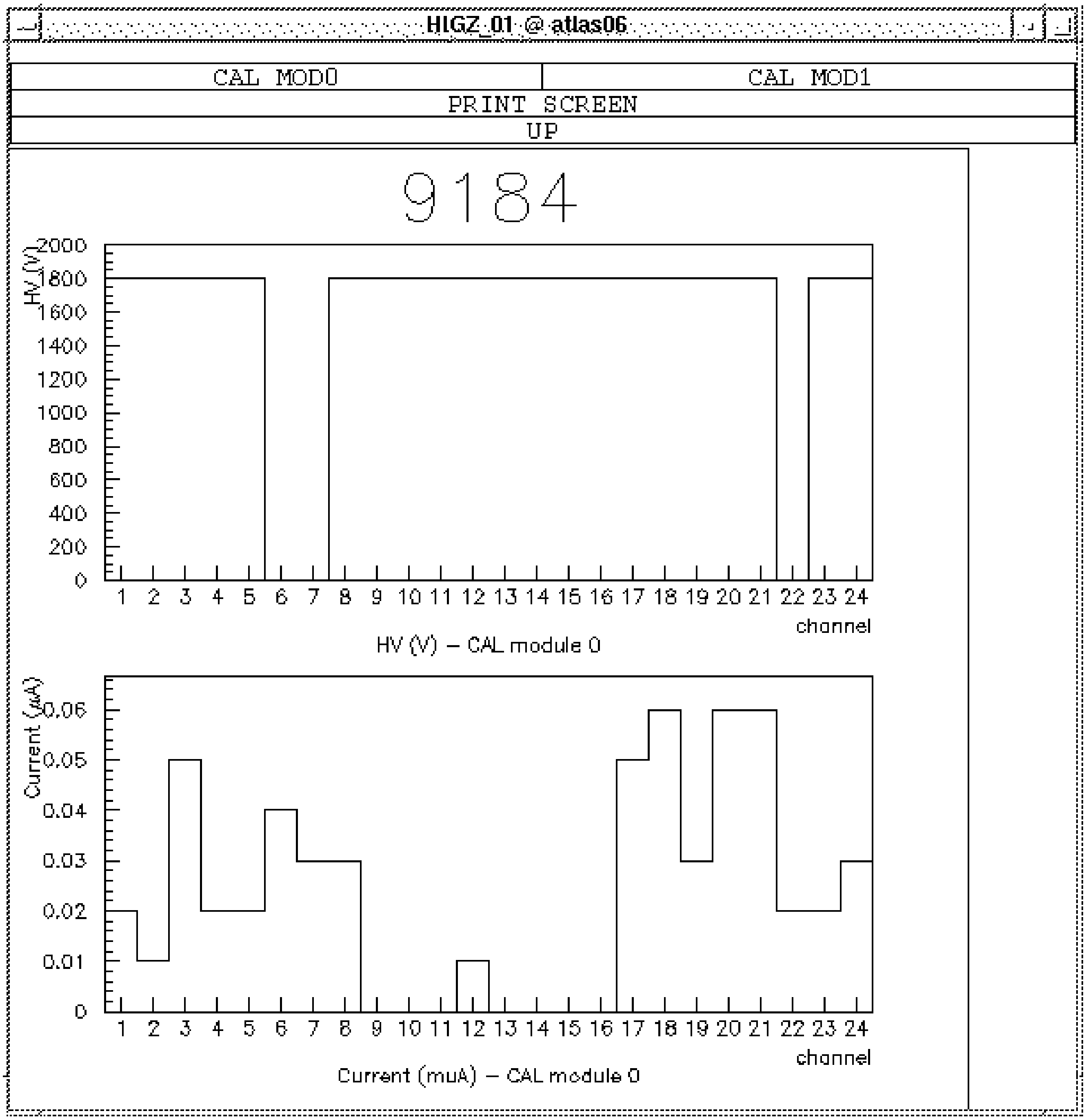
```
c
c SLOW CONTROL PC DATA
c
c --- High Voltage module for CALORIMETER:
c
c hv_cal_hv(i,j)
c      high voltage values (V) module i, channel j
c hv_cal_i(i,j)
c      current values (muA) module i, channel j
c
c --- High Voltage module for PM:
c
c hv_pm_hv(i,j)
c      high voltage values (V) module i, channel j
c hv_pm_i(i,j)
c      current values (muA) module i, channel j
c
c --- High Voltage module for MWPC:
c
c hv_mwpc_hv(i,j)
c      high voltage value (V) module i, channel j
c hv_mwpc_i(i,j)
c      current values (muA) module i, channel j
c
c --- Pressure (mbar) of LAr vapor
c
c cryo_press
c
c --- Temperature (K) in Cryostat (only 7 out of 8 points filled)
c
c cryo_temp(i)
c     temperature value
c
c
      integer nmod_cal_max, nmod_pm_max, nmod_mwpc_max
      parameter (nmod_cal_max = 3, nmod_pm_max = 4,
     +           nmod_mwpc_max = 3)
      integer nch_cal_max, nch_pm_max, nch_mwpc_max
      parameter (nch_cal_max = 24, nch_pm_max = 12,
     +           nch_mwpc_max = 6)
      integer nval_temp_max
      parameter (nval_temp_max = 8)
c
      real hv_cal_i( 0:nmod_cal_max-1 , nch_cal_max )
      real hv_cal_hv( 0:nmod_cal_max-1, nch_cal_max)
      real hv_pm_i( 0:nmod_pm_max-1 , nch_pm_max)
      real hv_pm_hv( 0:nmod_pm_max-1 , nch_pm_max)
      real hv_mwpc_i( 0:nmod_mwpc_max-1 , nch_mwpc_max)
      real hv_mwpc_hv( 0:nmod_mwpc_max-1 , nch_mwpc_max )
      real cryo_press
      real cryo_temp(nval_temp_max)
```

```
SPS STANDARD DATA
------------------

  SPS North area data (BID=73):
  (Index [1] is word 3 of block, the first data word.)
  [    1 ]   date in the form DDMMY
  [    2 ]   time in the form HHMMS
  [    3 ]   compteur
  [    4 ]   Slow information counter
  [    5 ]   ???
  [    6 ]   T2 TBIU
  [    7 ]   T2 TBID
  [    8 ]   T4 TBIU
  [    9 ]   T4 TBID
  [   10 ]   T6 TBIU
  [   11 ]   T6 TBID
  [   12 ]   T24 TBIU
  [   13 ]   T24 TBID
  [   14 ]   ?
  [   15 ]   ?
  [   16 ]   T10 TBIU
  [   17 ]   T10 symmetry
          error reports:
  [   18 ]   T2 error
  [   19 ]   T4 error
  [   20 ]   H2 error
  [   21 ]   K12 error
  [   22 ]   P4 error
  [   23 ]   H4 error
  [   24 ]   H6 error
  [   25 ]   H8 error
  [   26 ]   P0 error
  [   27 ]   M2 error
  [   28 ]   ?
  [   29 ]   ?
  [   30 ]   ?
```

```
The H6C SPS beamfile block (BID=74) contents :
(Index [1] is word 3 of block, the first data word.)

  [   1 ]               date in the form DDMMY
  [   2 ]               time in the form HHMMS
  [   3 ]               ??? spare ???
  [   4 ]               -32768 - first sub-block terminator
  [   5 ]       -
  [  21 ]               QUAD's 1-17 magnets file settings
                        multiplied by factor 10.
  [  22 ]       -
  [  30 ]               BEND's 1-9 magnets file settings
                        multiplied by factor 10.
  [  31 ]       -
  [  36 ]               TRIM's 1-6 magnets file settings
                        multiplied by factor 10.
  [  37 ]       -
  [  38 ]               6POLE's 1-2 magnets file settings
                        multiplied by factor 10.
  [  39 ]               -32768 - second sub-block terminator
  [  40 ]       -
  [  73 ]               magnets *CURRENT* readings at the
                        same order as at the previous block
                        and also multiplied by factor 10.
  [  74 ]               -32768 - third sub-block terminator
  [  75 ]       -
  [  96 ]               COLL's 1-11 down/up or left/right
                        pairs file settings multiplied
                        by factor 100.
  [  97 ]               -32768 - fourth sub-block terminator
  [  98 ]       -
  [ 119 ]               COLL's 1-11 down/up or left/right
                        pairs *CURRENT* readings at the
                        same order as at the previous block
                        and also multiplied by factor 100.
  [ 120 ]       -       -32768 - fifth sub-block terminator
  [ 121 ]               primary target head
  [ 122 ]       -       -32768 - sixth sub-block terminator
  [ 123 ]               absorber position (not scaled yet
                because now always reads as 0)
  [ 124 ]               -32768 - guess what is this (8->?
  [ 125 ]               secondary target position (also
                not scaled yet - always 0 for a while)
  [ 126 ]               -32768 as usual...
```


HIGZ_01 @ atlas06
CAL MOD0
CAL MOD1
PRINT SCREEN
UP
9184
HV (V)
channel
HV (V) – CAL module 0
Current (μA)
channel
Current (muA) – CAL module 0

New DAQ computer issue

Do not assume that the monitoring will run on the new DAQ machine without significant efforts.

- compilation and linking;
- scripts;
- use of HPSS data storage;

Need to try all this as soon as possible!

Still to be done

- aim at finalizing version 3.8 in January 2000:
  - Futher timing corrections? For each depth? For each cell?
  - final weights for 1998 and 1999
  - Look at the effect of calibration (ADC to nA)
  - Update manual
  - bug fixes in pass logic
- for next version:
  - Update the monitoring package.
  - Complete the treatment of the slow control block.
  - Improve the Linux *.make files
  - Allow the dig package to run on the first 5 time slices

Data Quality Investigations

Dominique Fortin, University of Victoria

Dominique has looked at some data quality aspects

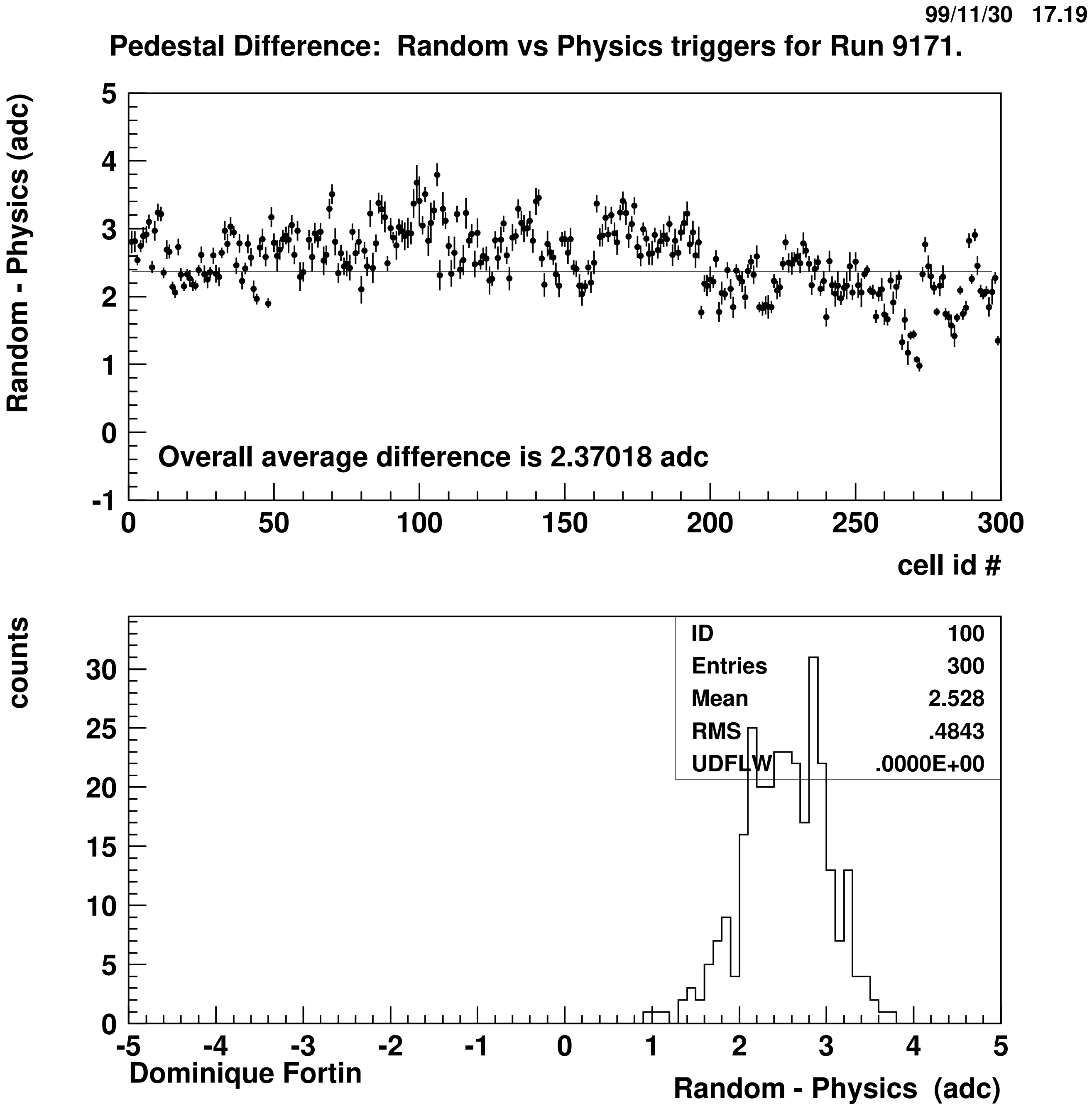
- pedestal value for various triggers
- electron response and resolution for various analysis parameters

More work ongoing

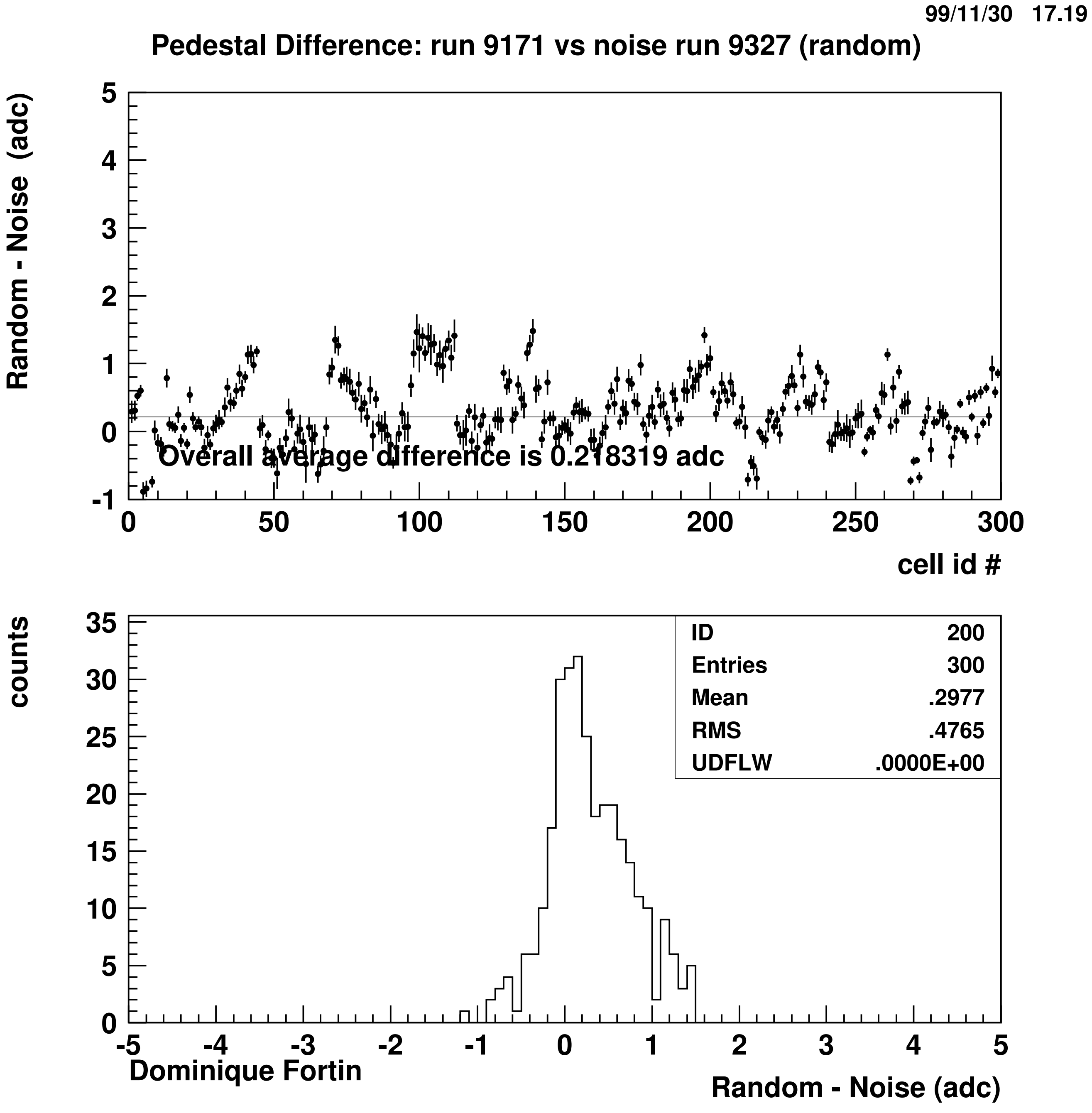
- noise estimates for clusters
- effect of resolution fit parameter assumptions

RUN 9171 (physics) peds(random) - peds(physics)

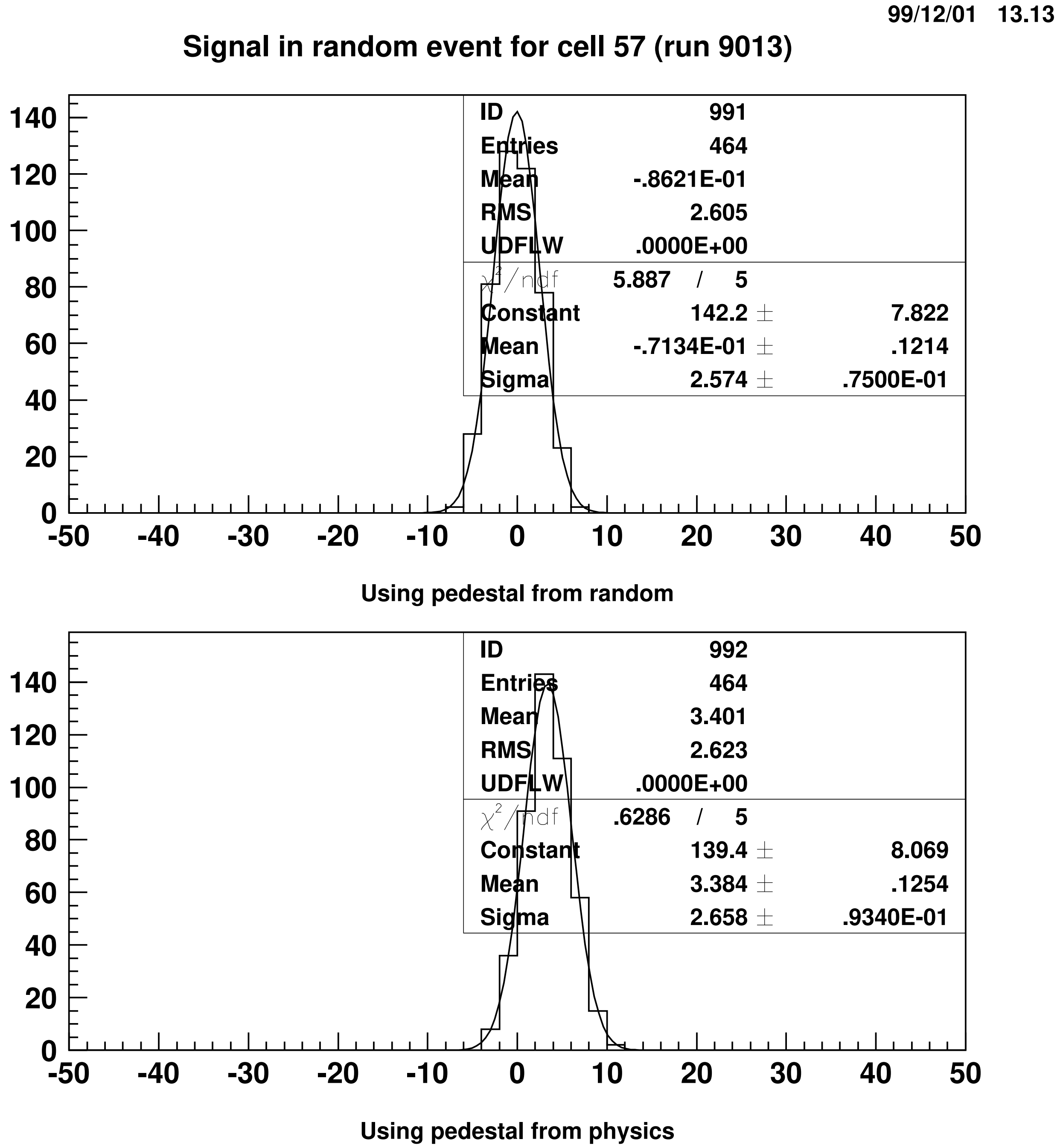
Dominique Fortin



RUN 9171 (physics) Dominique Fortin
RUN 9327 (noise)
peds(random 9171) - peds(noise 9327)

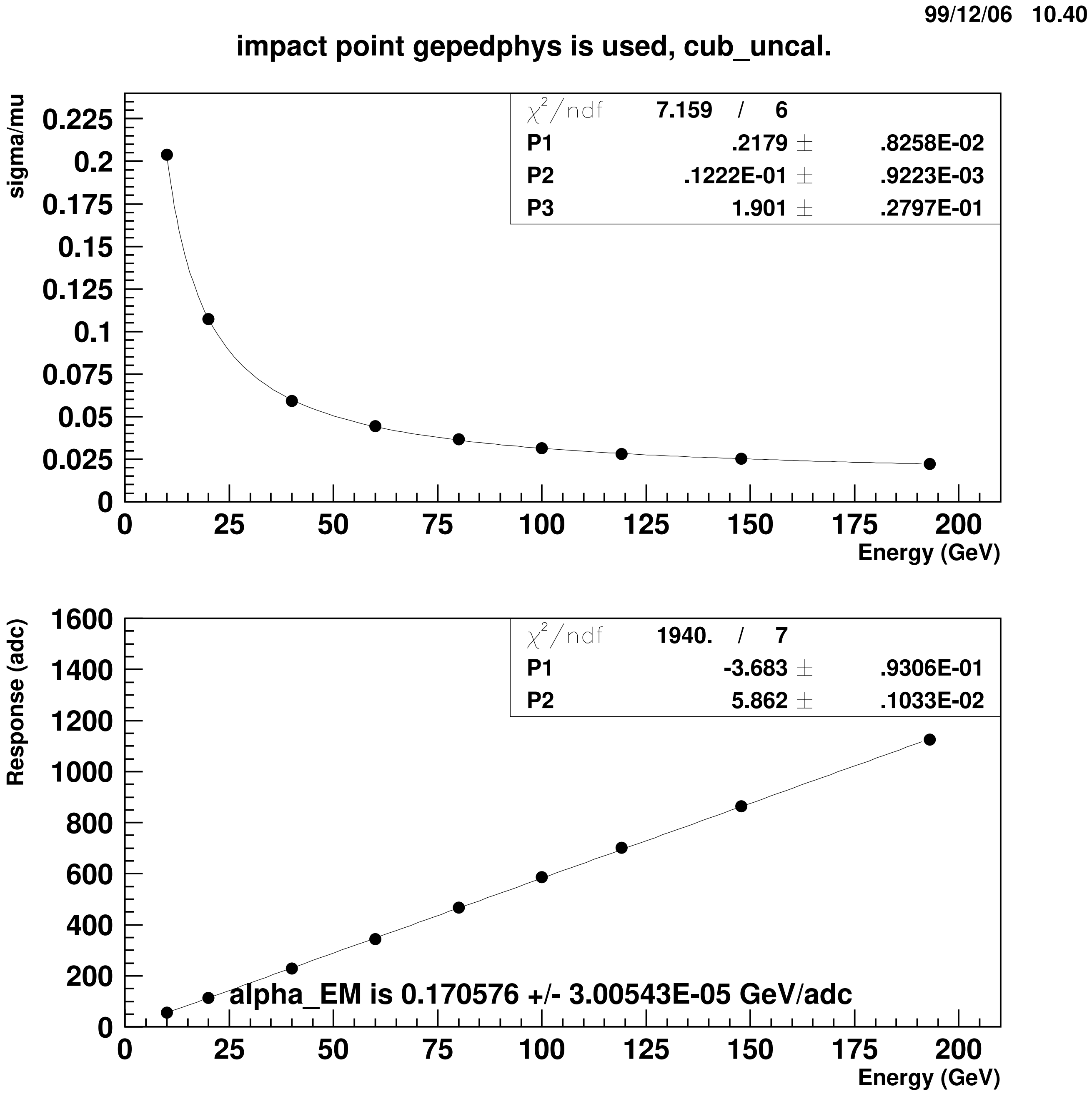


Dominique Fortin



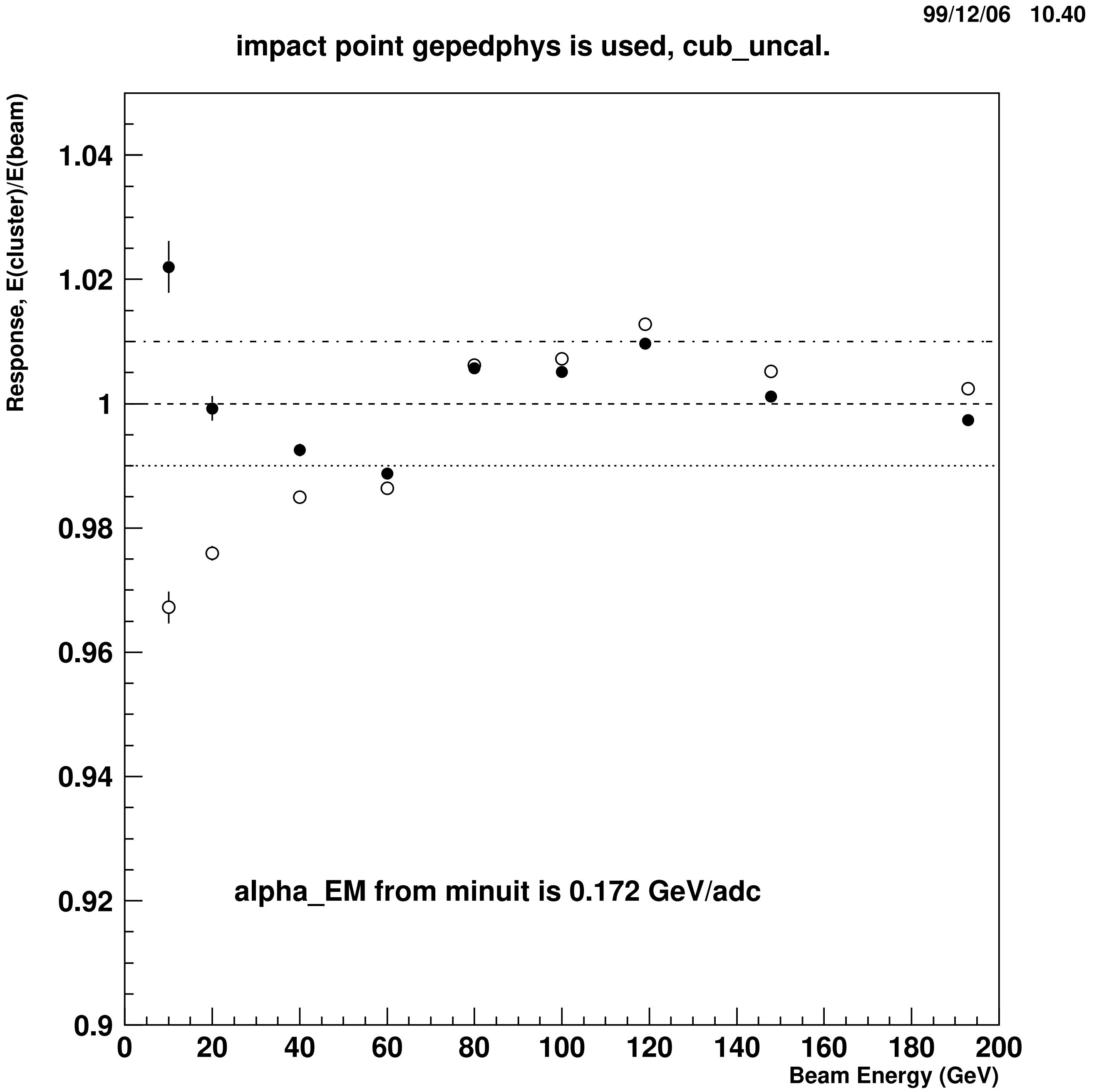
Need to use peds from trigger type under analysis

Electrons Aug 99 — Dominique Fortin
Cubic fit, Uncalibrated



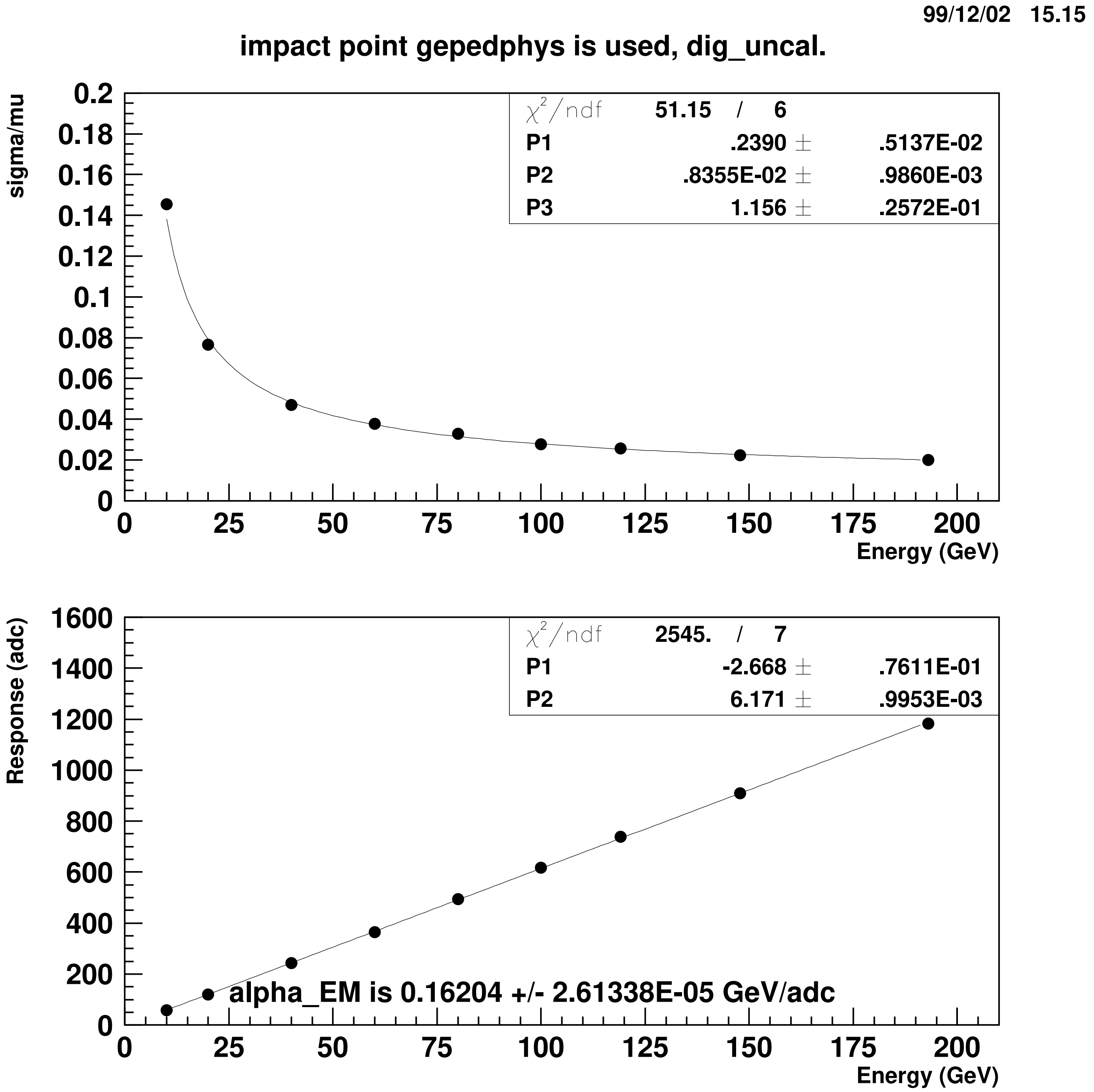
Resolution Plot: large σ/μ but good χ^2
Response Plot: offset = -3.7 adc = 630 MeV

Electrons Aug 99 — Dominique Fortin
Cubic fit, Uncalibrated



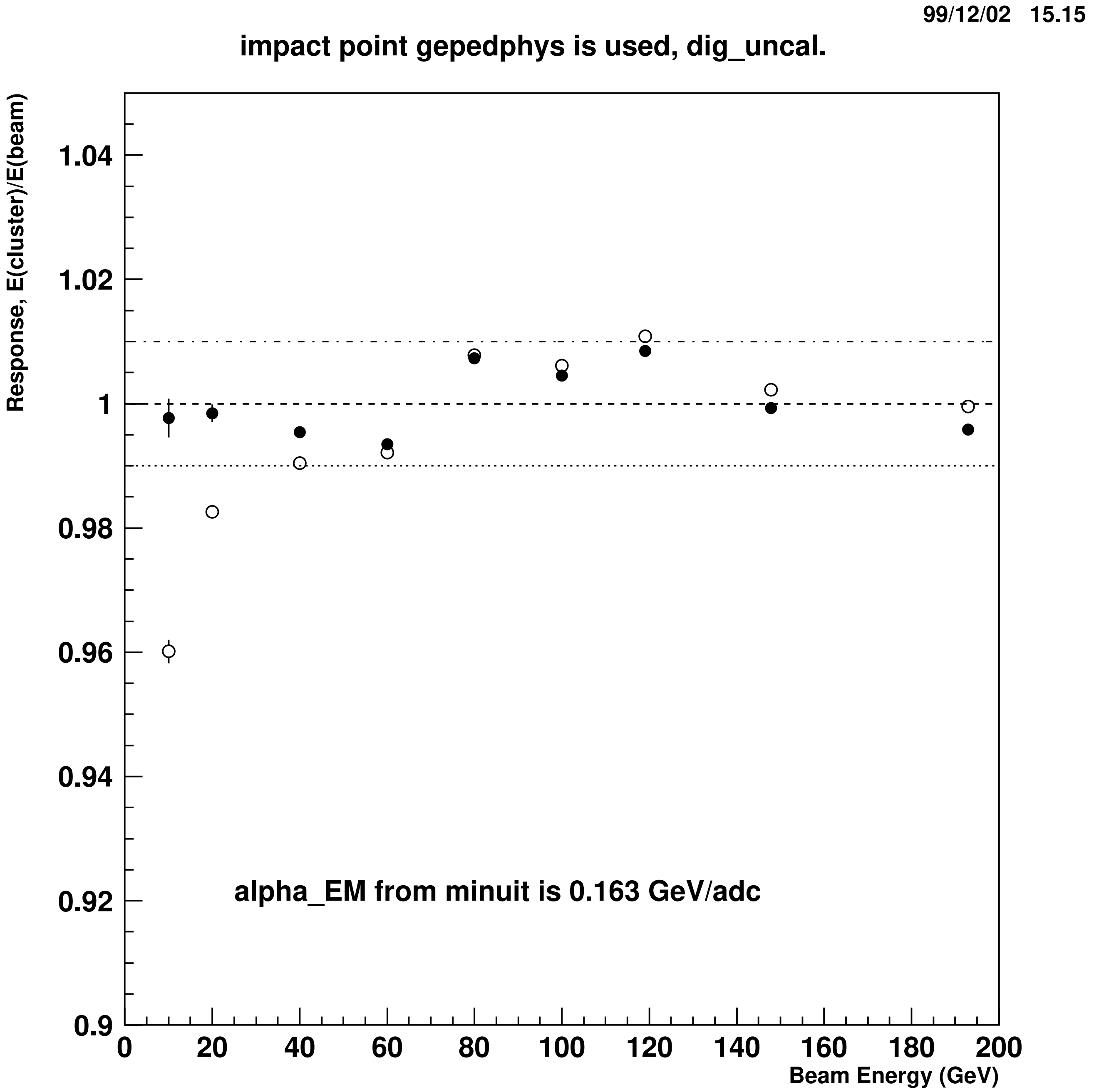
open circles: signal(adc) $= \alpha_{\mathbf{em}} E_\circ$ where $\alpha_{\mathbf{em}} = 0.172$ GeV/adc
full circles: signal(adc) $= \alpha_{\mathbf{em}} E_\circ + \delta$ where $\alpha_{\mathbf{em}} = 0.171$ GeV/adc

Electrons Aug 99 — Dominique Fortin
Digital Filtering 991118, Uncalibrated



Resolution Plot: better σ/μ but bad χ^2
Response Plot: offset = -2.2 adc = 365 MeV

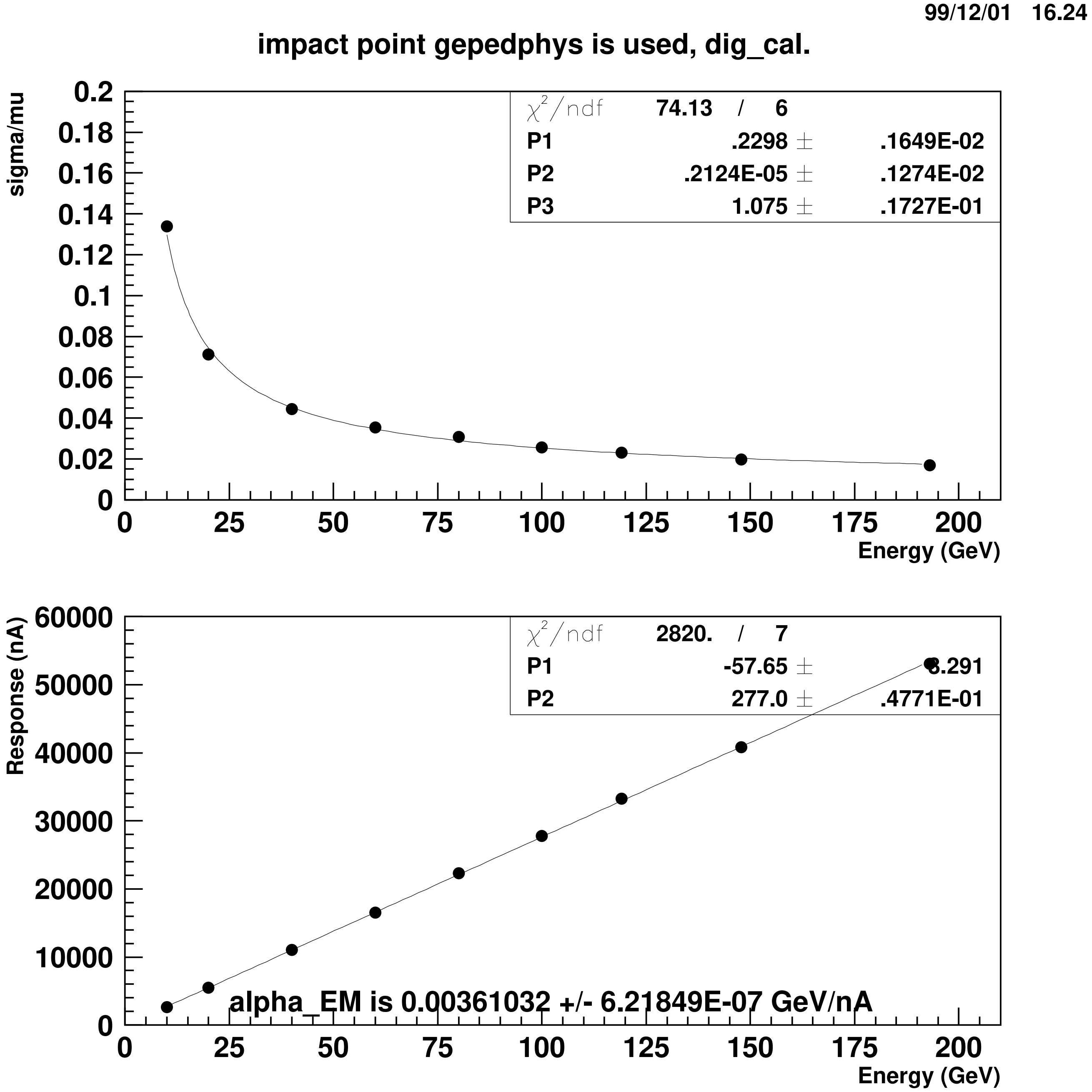
Electrons Aug 99 Dominique Fortin
Digital Filtering 991118, Uncalibrated



open circles: signal(adc) $= \alpha_{\mathbf{em}} E_\circ$ **where** $\alpha_{\mathbf{em}} = 0.163$ **GeV/adc**
full circles: signal(adc) $= \alpha_{\mathbf{em}} E_\circ + \delta$ **where** $\alpha_{\mathbf{em}} = 0.162$ **GeV/adc**

Electrons Aug 99 Digital Filtering 991118, Calibrated

Dominique Fortin

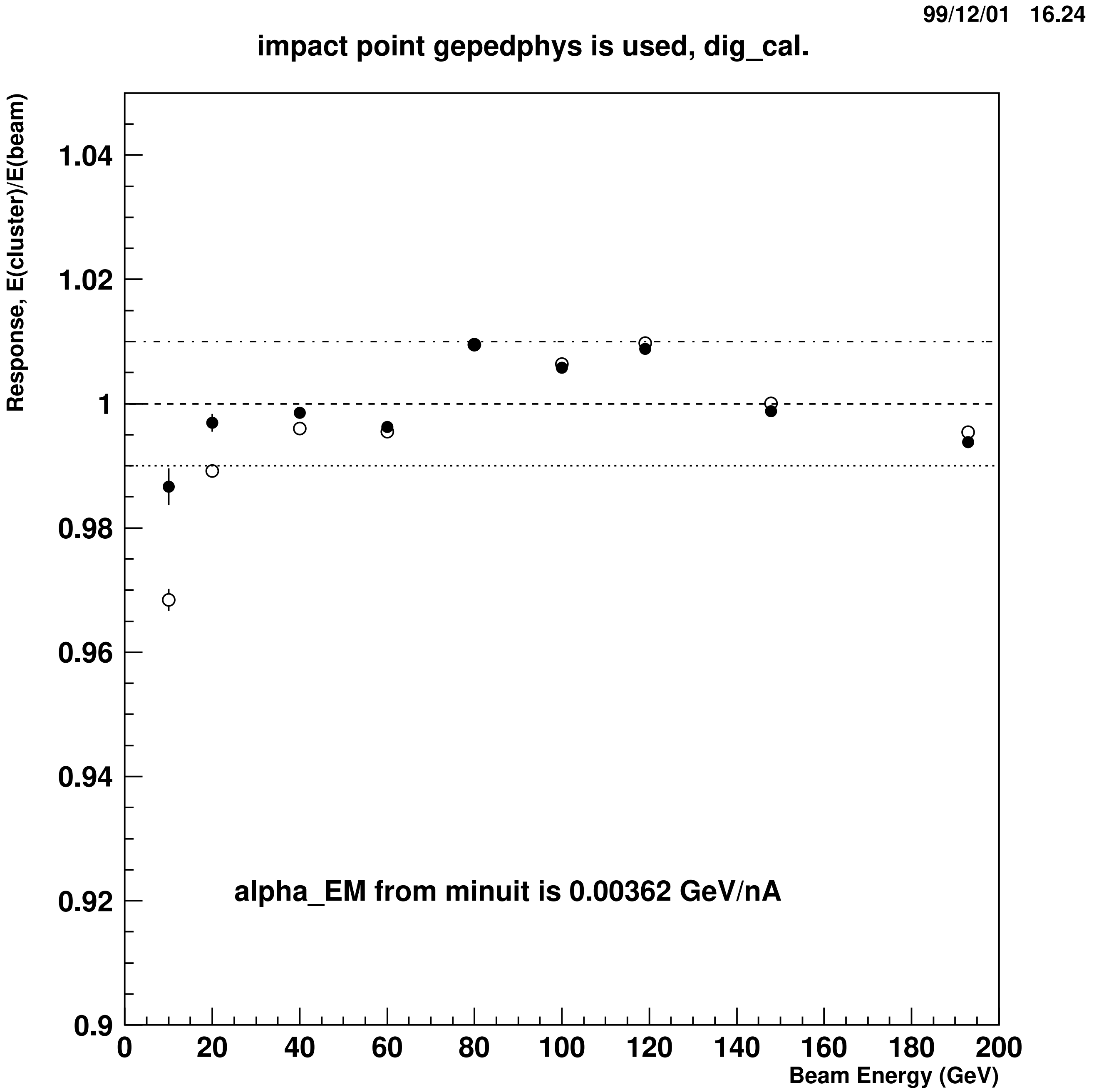


Resolution Plot: best σ/μ but worse χ^2
Response Plot: offset = -57.7 nA = 208 MeV

- the noise depends on run number or time?
- are we sensitive to a natural offset of order of a few $E_{\text{critical}} = 20$ MeV?

Electrons Aug 99 Digital Filtering 991118, Calibrated

Dominique Fortin



open circles: signal(adc) $= \alpha_{\mathbf{em}} E_{\circ}$ **where** $\alpha_{\mathbf{em}} = 3.61$ **GeV/**μ**A**
full circles: signal(adc) $= \alpha_{\mathbf{em}} E_{\circ} + \delta$ **where** $\alpha_{\mathbf{em}} = 3.62$ **GeV/**μ**A**