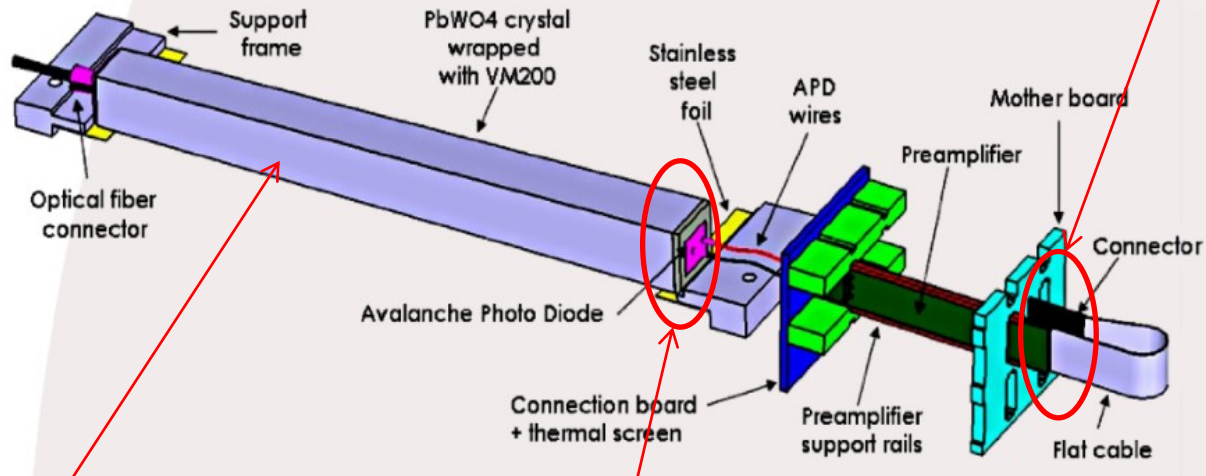


TESTS OF THE HPS PREAMPLIFIERS

INTRODUCTION



4.2 GeV max in one crystal for 6 GeV beam

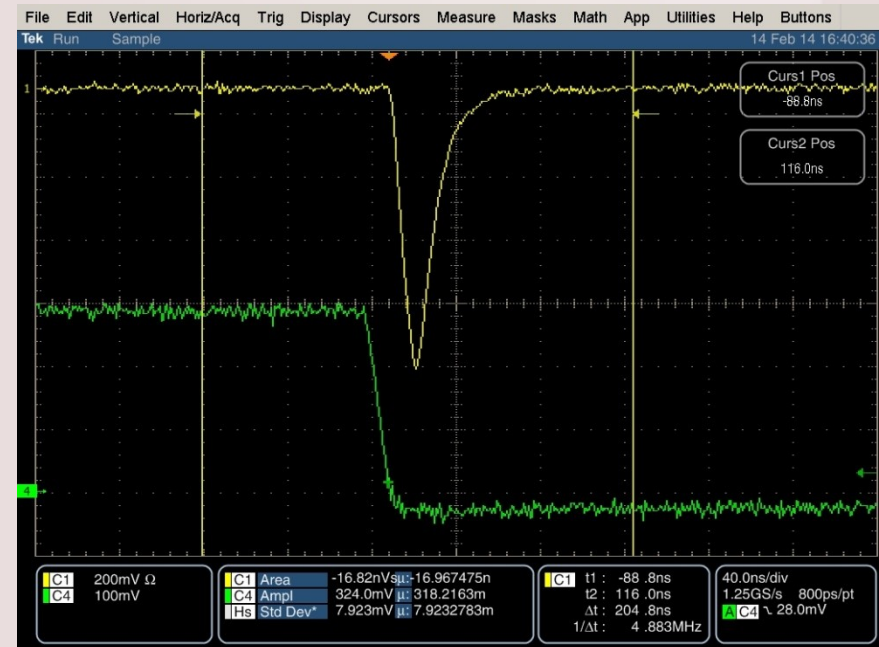
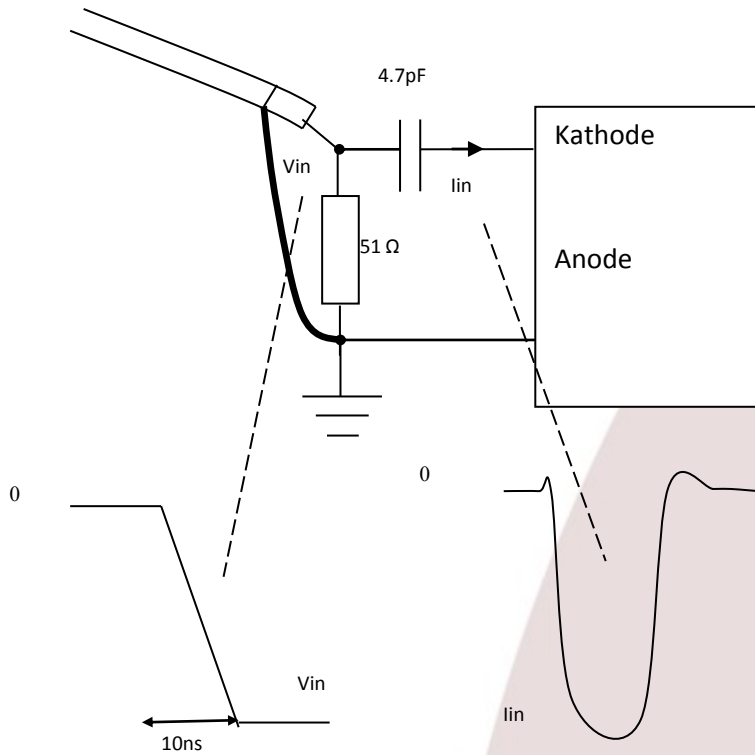
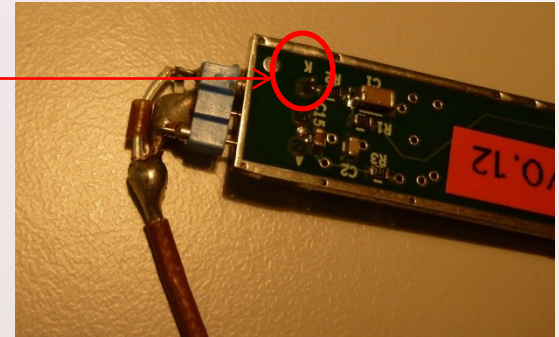
- 30 photo-electrons/MeV before multiplication
- 4500 electrons/MeV after multiplication (APD gain = 150)
- 0.72 fC/MeV (preamplifier's input)
- 3pC for 4.2 GeV

PREAMPLIFIERS'S STATUS

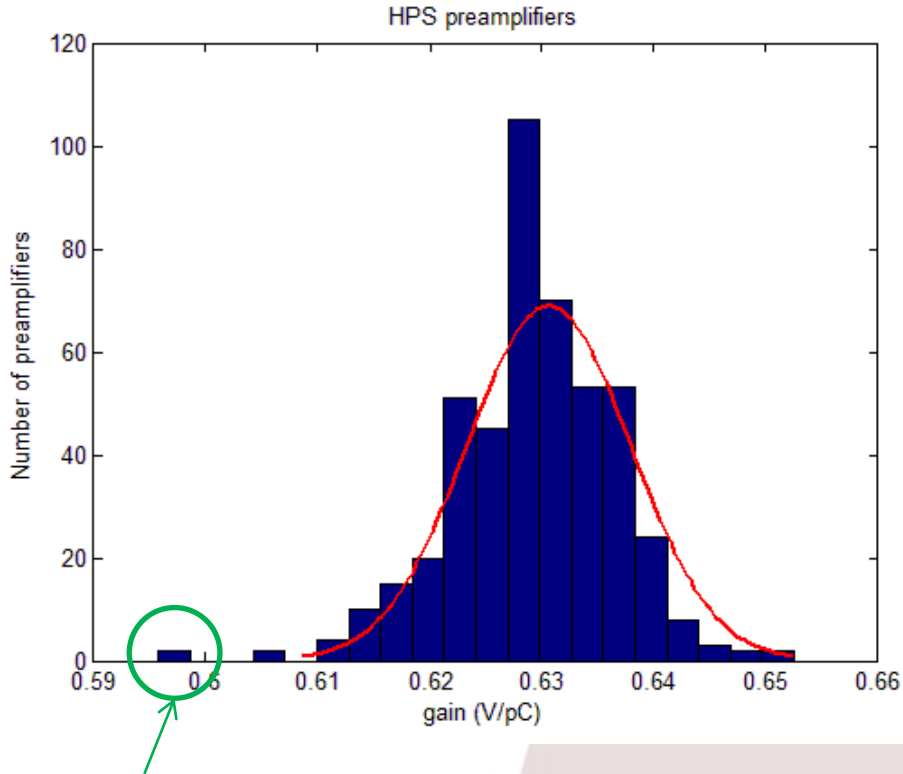
- 442 preamplifiers needed for the calorimeter
 - 468 preamplifiers tested and working
 - 26 preamplifiers as spares (about 6%)
 - 2 preamplifiers will stay at IPN Orsay : N055 is a reference preamplifier (cf october 2013 document) and the 467-red has a destroyed Kapton
 - 45 preamplifiers are missing compared to DVCS IC calorimeter experiment
 - Some preamplifiers are probably at INFN-Genova
 - Some preamplifiers are probably at JLAB
-
- The modification of the preamplifiers concerns 2 transistors ($Q1 = Q2 = \text{BFR182}$) and passive components ($R13 = 560\Omega$, $R12 = 220\Omega$, $R17 = 560\Omega$, $R16 = \text{NC}$ and $C2 = \text{NC}$)
 - The repair of preamplifiers (about 10) concerns operational amplifiers ($M2 = \text{OPA658}$ or OPA694), destroyed capacitances and Kapton (probably due to short circuits)

TEST BENCH

cathode



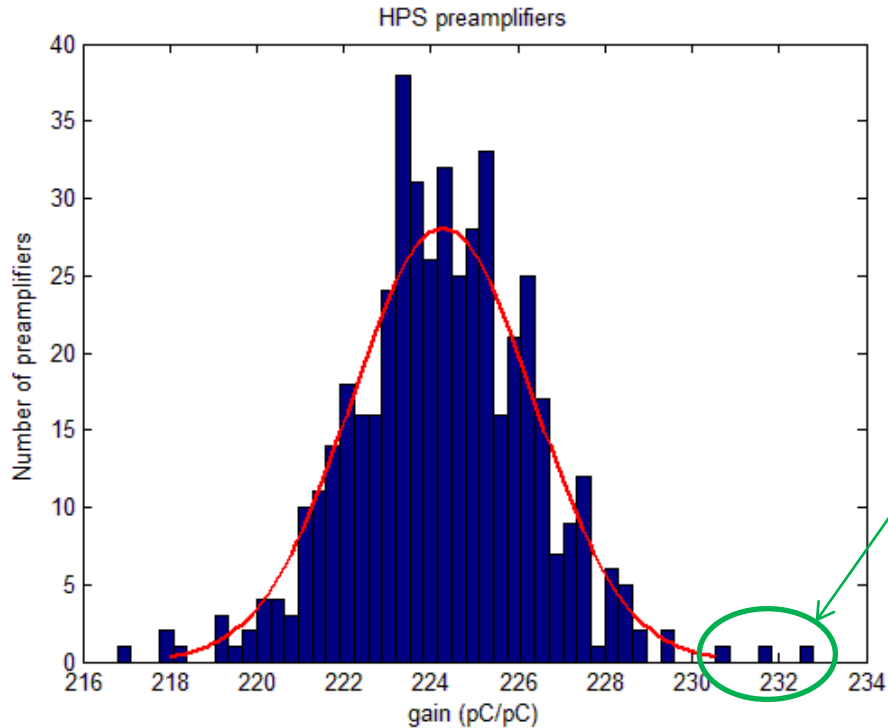
RESULTS (1) : GAIN



Preamplifiers 464-red
and 467-red

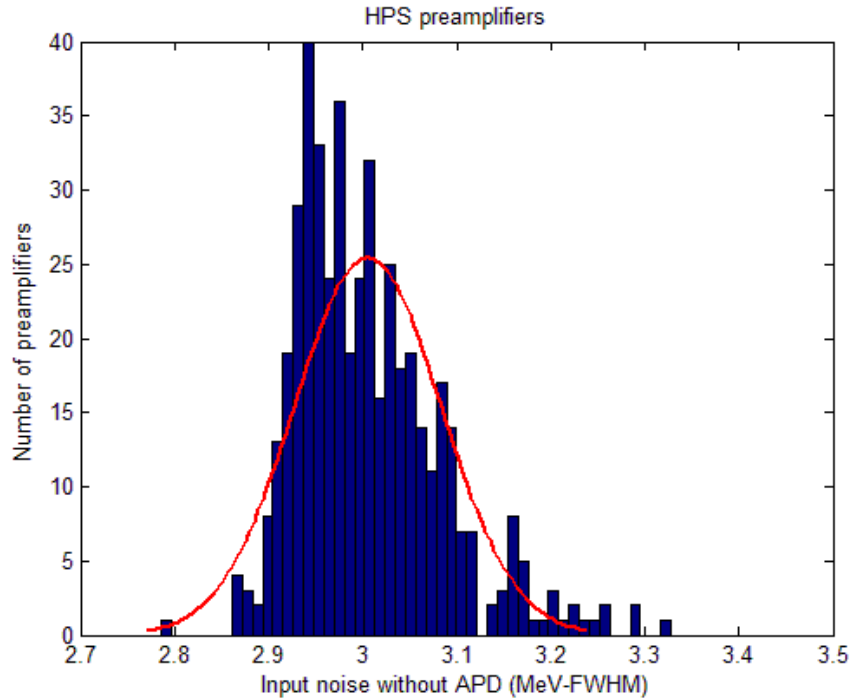
- Mean gain = 0.63 V/pC
- Standard deviation = 0.0073 V/pC or 1.16 %
- With a MATLAB program, we can identify the gains by groups
- Output dynamic for 4.2 GeV input = 1.9V

RESULTS (2) : INTEGRATED GAIN



- Measurement of the output charge with an oscilloscope (50 Ω input impedance)
- Mean gain = 224.27 pC/pC
- Standard deviation = 2.08 pC/pC or 0.93 %
- Gain superior to 230 for preamplifiers N187, N213 and N273
- Output charge for 4.2 GeV input = 672 pC

RESULTS (3) : NOISE



- Mean input noise without APD = 3 MeV-FWHM
- Standard deviation = 0.08 MeV-FWHM or 2.6 %

- Mean input noise with 220 pF capacitance (APD capacitance = 270 pF) = 4.4 MeV-FWHM