# Bilan of mimoStar’s Calibration

- Results of mimosa14 (mix2)
- Results for the three generations of mimosa20 (2006-2007-2008)
- Differences between Berkeley and Strasbourg and possible explanation

Mimosa14 (Mx2) serial output 50MHz Gain 5 RadTol matrix

| 20 °C | Noise Uadc | Pic Uadc | Noise e- |
|---|---|---|---|
| Chip 6 | 3.24 | 356 | 15.38 |
| Chip 4 | 3.24 | 356 | 15.38 |
| Chip 5 | 3.55 | 369 | 15.77 |

Pic position for calibration 20 % lower

Mimosa20 (Mx3) 2006 40 % of the chips with dead pixel

| 20 °C Gain5 | Noise Uadc | | Pic Uadc | | Noise e- | |
|---|---|---|---|---|---|---|
| | A0 | A1 | A0 | A1 | A0 | A1 |
| 2 | 2.81 | 2.70 | 290 | 290 | 15.9 | 15.3 |
| 3.1 | 2.81 | 2.78 | 295 | 290 | 15.6 | 15.7 |
| 2.1 | 2.61 | 2.6 | 280 | 292 | 15.3 | 14.6 |
| Chip 2.1 N | 2.68 | 2.71 | 276 | 288 | 15.9 | 15.4 |

Mimosa20 (Mx3) 2007 90 % of the chips with dead pixel

| 20 °C Gain5 | Noise Uadc | | Pic Uadc | | Noise e- | |
|---|---|---|---|---|---|---|
| | A0 | A1 | A0 | A1 | A0 | A1 |
| Chip 14 (E7) | 6.8 | 6.7 | 320 | 313 | 34.85 | 35.1 |
| Chip 16 (B3) | 6.71 | 6.53 | 303 | 296.6 | 36.3 | 36.1 |

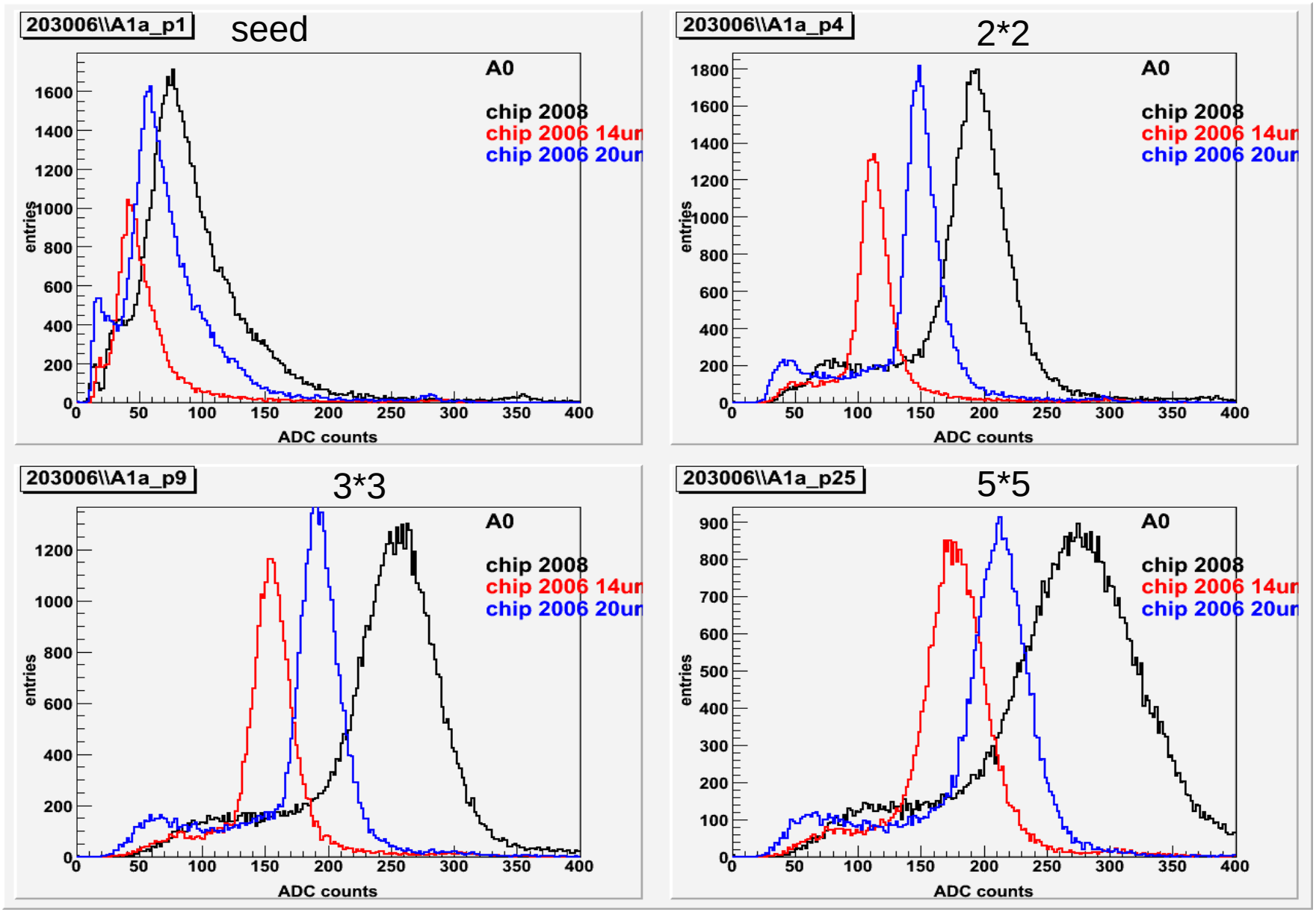
Mimosa20 (Mx3) 2008 no dead pixel

| Chip 18 (E5) 0°C | Noise Uadc | | Pic Uadc | | Noise e- | |
|---|---|---|---|---|---|---|
| | A0 | A1 | A0 | A1 | A0 | A1 |
| Gain 5 | 5.74 | 5.74 | 356.5 | 360.4 | 26.4 | 26.1 |

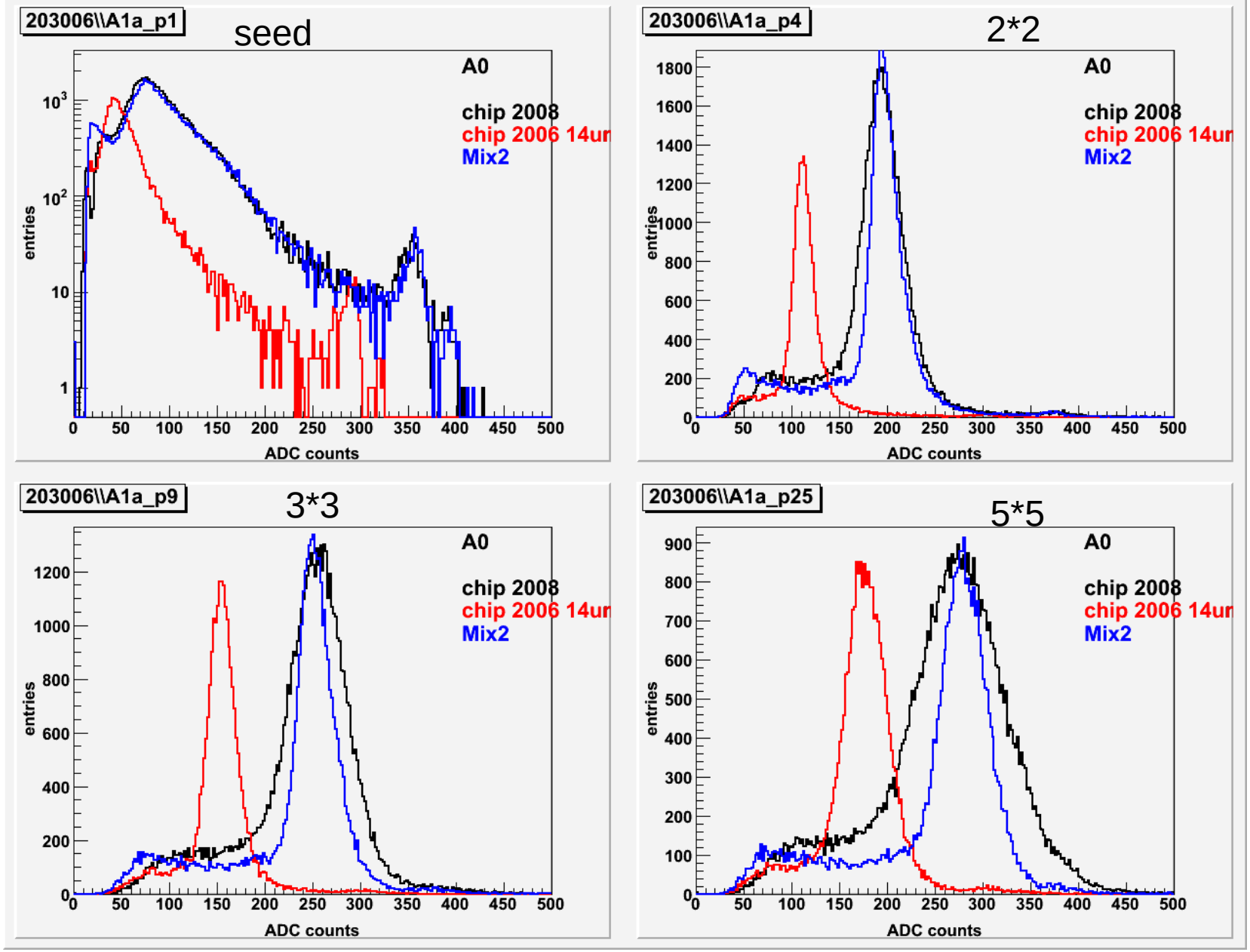
| Gain 5 20 °C | Noise Uadc | | Pic Uadc | | Noise e- | |
|---|---|---|---|---|---|---|
| | A0 | A1 | A0 | A1 | A0 | A1 |
| Chip 10 (E3) | 5.24 | 5.3 | 347.6 | 351.9 | 24.7 | 24.7 |
| Chip 11 (B4) | 5.61 | 5.51 | 357.1 | 360.3 | 25.7 | 25.1 |
| Chip 18 (E5) | 5.77 | 5.81 | 346.2 | 349.8 | 27.3 | 27.2 |
| Chip 17 (G4) | 5.24 | 5.14 | 346 | 346.7 | 24.8 | 24.3 |
| Chip 19 (D1) | 5.89 | 5.74 | 358.2 | 360.8 | 26.9 | 26 |

| Chip 18 (E5) 35°C | Noise Uadc | | Pic Uadc | | Noise e- | |
|---|---|---|---|---|---|---|
| | A0 | A1 | A0 | A1 | A0 | A1 |
| Gain 5 | 5.87 | 5.92 | 334.1 | 333.8 | 28.8 | 29.1 |

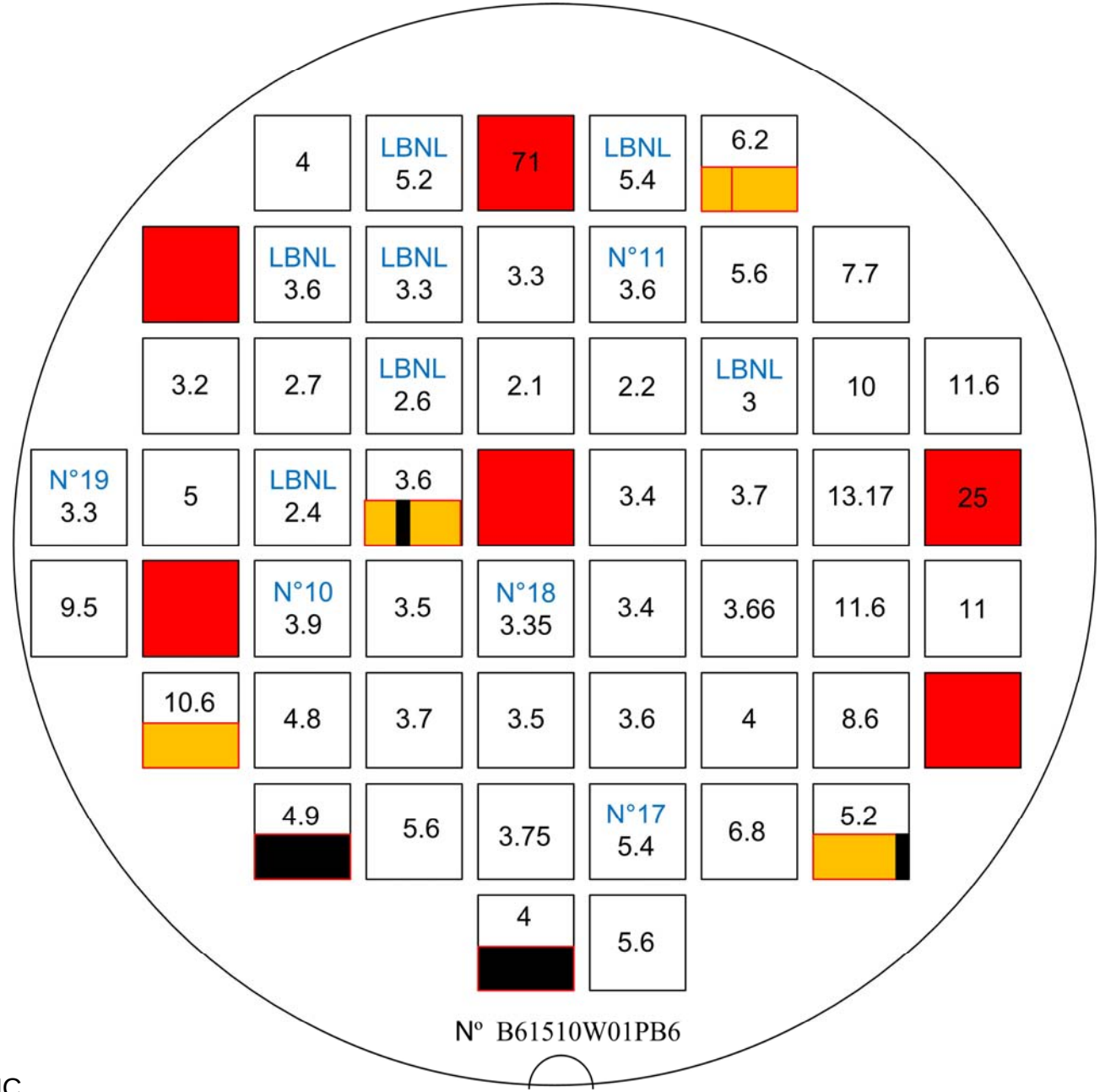
No problem with the ratio gain 3 / 5 on any chip




Comparaison of chip 2008 (14µm) with the two version of 2006 epi layer
For the clusterisation and calibration pic




Comparaison of chip 2008 (14µm) and with a mimostar2 (mi14)
For the clusterisation and calibration pic




Chips measure at LBNL and at IPHC
With value of leakage current in nA

Results of LBNL

| chip | output | Peak [ADC] | Sigma [ADC] | Noise [ADC] | ENC [e-] |
|---|---|---|---|---|---|
| Ch1(A2) G=3 | 1 | 156 | 9.8 | 4.62 | 48.5 |
| | 2 | 155 | 9.5 | 4.52 | 47.8 |
| Ch1(A2) G=5 | 1 | 274 | 14.9 | 7.93 | 47.4 |
| | 2 | 270 | 15.3 | 7.51 | 45.6 |
| Ch2(A4) G=3 | 1 | 153 | 8.8 | 4.31 | 46.2 |
| | 2 | 151 | 9.2 | 4.01 | 43.5 |
| Ch2(A4) G=5 | 1 | 268 | 14.3 | 7.51 | 45.9 |
| | 2 | 257 | 9.7 | 7.12 | 45.4 |
| Ch6(D3) G=3 | 1 | 158 | 8.8 | 4.30 | 44.6 |
| | 2 | 153 | 7.9 | 4.13 | 44.3 |
| Ch6(D3) G=5 | 1 | 276 | 13.5 | 7.68 | 45.6 |
| | 2 | 263 | 14.5 | 7.30 | 45.5 |
| MS2 G=3 | S0 | 233 | 5.5 | 3.19 | 22.5 |
| | S1 | 205 | 6.6 | 3.27 | 26.1 |
| MS2 G=5 | S0 | 401 | 10.9 | 4.02 | 16.4 |
| | S1 | 352 | 9.4 | 4.13 | 19.2 |

# Not the same value of JTAG parameters at Berkeley and Strasbourg

DAC Values used at Strasbourg:

| | |
|---|---|
| I4FASTBUF: | 100 |
| V4FASTBUF0: | 92 |
| V4FASTBUF1: | 92 |
| I4FASTINTBUF: | 100 |
| I4AMP: | 100 |
| I4REG1: | 33 |
| V4REG0-9: | 49 |
| V4TEST0-1: | 150 |
| I4PIX: | 10 |
| IKIMO: | 0 |

Different values than from the documentation

have to be adjust in function of the chip

| **Values used at LBNL** | **beginning** | **117** | **119** | **121** | **129** | **131** | **133** | **135** |
|---|---|---|---|---|---|---|---|---|
| I4FASTBUF | 40 | 40 | 40 | 40 | 40 | 40 | 40 | 40 |
| V4FASBUF0 | 110 | 70 | 85 | 85 | 95 | 90 | 90 | 100 |
| V4FASBUF1 | 110 | 85 | 100 | 90 | 110 | 100 | 90 | 100 |
| I4FASTINTBUF | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| I4AMP | 100 | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| I4REG1 | 33 | 33 | 33 | 33 | 33 | 33 | 33 | 33 |
| V4REG0 | 70 | 70 | 70 | 70 | 67 | 67 | 73 | 73 |
| V4REG1-9 | 70 | 70 | 70 | 70 | 70 | 70 | 73 | 73 |
| V4TEST0-1 | 160 | 160 | 150 | 150 | 150 | 150 | 150 | 150 |
| I4PIX | 33 | 33 | 33 | 33 | 33 | 33 | 33 | 33 |
| Gain | | 3 | 5 | 5 | 5 | 3 | 3 | 5 |

| Chip 18 (E5) JTAG défaut | Noise Uadc | | Pic Uadc | | Noise e- | |
|---|---|---|---|---|---|---|
| | A0 | A1 | A0 | A1 | A0 | A1 |
| Gain 5 | The outputs are satured | | | | | |
| Gain 3 | 3.52 | 3.52 | 162.5 | 163.4 | 35.6 | 35.3 |

With using the default values of the manual

| Chip 18 (E5) 20 °C | Noise Uadc | | Pic Uadc | | Noise e- | |
|---|---|---|---|---|---|---|
| | A0 | A1 | A0 | A1 | A0 | A1 |
| Gain 5 | 6.99 | 7.06 | 280 | 282 | 40.9 | 41.1 |
| Gain3 | 3.61 | 3.61 | 164 | 165 | 36.1 | 35.9 |

With using the Berkeley values

Conclusion :

• with Dac values optimize, we obtain the same calibration pic than with mimoStar2 chip, but we still have an important noise of 25 electrons in case of 15 e- (not see in 2006, pb HiRes layer??? )
This noise can not be explain by leakage current problem

• The chip is operational, no dead pixel.

• The problem of telegraphic noise has been also see but no yet study because it will need a major modification of the test bench and ask lots of time.