PLUME Lab test : Summary of tests on CM01

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Contents

1 Characterization of the module

1.1 Smoke test

- Power On : 40 mA;
- RESET : 40 mA;
- ALL : 790 mA;
- READ : 790 mA, no error;
- START : 1205 mA.

1.2 Oscilloscope Output

- **Chip 1** : RESET and JTAG are working, able to control Header and Trailer and no dead pixel when threshold is fixed to 255;

- **Chip 2** : RESET and JTAG are working, able to control Header and Trailer and no dead pixel when threshold is fixed to 255;
- **Chip 3** : RESET and JTAG are working, able to control Header and Trailer and no dead pixel when threshold is fixed to 255;
- **Chip 4** : RESET and JTAG are working, able to control Header and Trailer and no dead pixel when threshold is fixed to 255;
- **Chip 5** : This chip is not working because the sensor was disconnected from VCLP at Strasbourg;
- **Chip 6** : RESET and JTAG are working, able to control Header and Trailer and no dead pixel when threshold is fixed to 255.

1.3 Sensor 1

- Estimation of the "middle points" :

V_{ref_2}	$V_{ref_{1A}}$	$V_{ref_{1B}}$	$V_{ref_{1C}}$	$V_{ref_{1D}}$
100	63	91	91	110

- Discriminators calibration:

V_{ref1_A} START	V_{ref1_B} START	V_{ref1_C} START	V_{ref1_D} START	V_{ref2}	V_{ref1_A} STOP	Step	Event nb / step	Number of Runs
35	63	63	82	100	91	2	500	29

- Temporal noise, fixed pattern noise and offset :

Matrix	TN	FPN	Offset
A	0,857	0,506	0,612
B	0,989	0,706	-0,187
C	0,865	0,971	-0,011
D	0,366	1,204	0,059

1.4 Sensor 2

- Estimation of the "middle points" :

V_{ref_2}	$V_{ref_{1A}}$	$V_{ref_{1B}}$	$V_{ref_{1C}}$	$V_{ref_{1D}}$
100	137	82	165	134

- Discriminators calibration:

V_{ref1_A} START	V_{ref1_B} START	V_{ref1_C} START	V_{ref1_D} START	V_{ref2}	V_{ref1_A} STOP	Step	Event nb / step	Number of Runs
109	54	137	106	100	165	2	500	29

- Temporal noise, fixed pattern noise and offset :

Matrix	TN	FPN	Offset
A	0,918	0,531	0,664
B	1,198	0,808	-0,173
C	1,223	0,783	-0,302
D	1,036	0,661	0,438

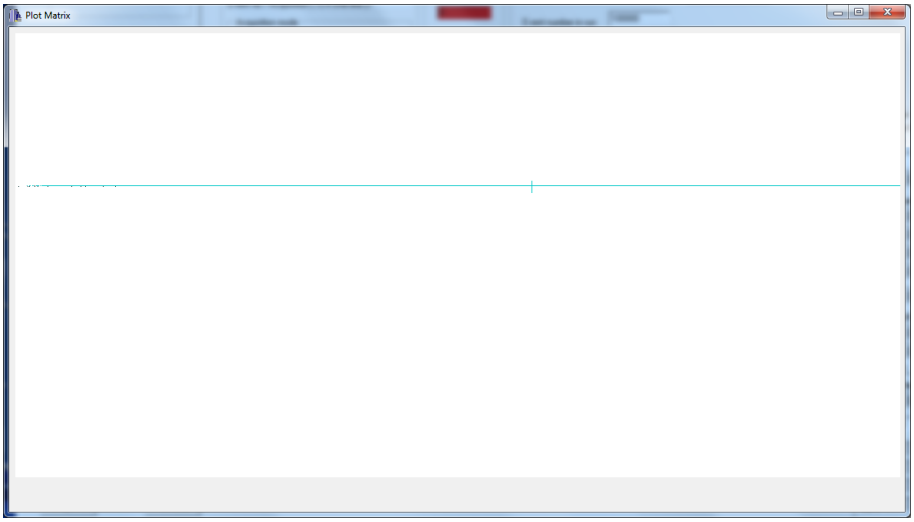

Figure 1: Pixels response when discriminators are closed.

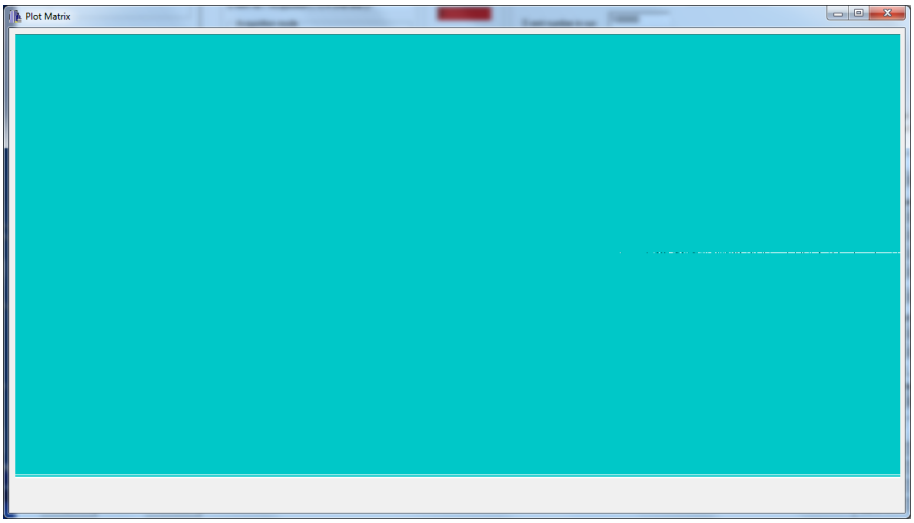

Figure 2: Pixels response when discriminators are opened.

1.5 Sensor 3

- Estimation of the "middle points" :

V_{ref_2}	$V_{ref_{1A}}$	$V_{ref_{1B}}$	$V_{ref_{1C}}$	$V_{ref_{1D}}$
100	193	113	113	63

- Discriminators calibration:

V_{ref1_A} START	V_{ref1_B} START	V_{ref1_C} START	V_{ref1_D} START	V_{ref2}	V_{ref1_A} STOP	Step	Event nb / step	Number of Runs
165	85	85	35	100	221	2	500	29

- Temporal noise, fixed pattern noise and offset :

Matrix	TN	FPN	Offset
A	1,073	0,472	0,531
B	1,056	0,675	0,065
C	1,100	0,804	0,055
D	0,930	0,717	0,401

1.6 Sensor 4

- Estimation of the "middle points" :

V_{ref_2}	$V_{ref_{1A}}$	$V_{ref_{1B}}$	$V_{ref_{1C}}$	$V_{ref_{1D}}$
100	151	194	160	49

- Discriminators calibration:

V_{ref1_A} START	V_{ref1_B} START	V_{ref1_C} START	V_{ref1_D} START	V_{ref2}	V_{ref1_A} STOP	Step	Event nb / step	Number of Runs
123	166	132	21	100	179	2	500	29

- Temporal noise, fixed pattern noise and offset :

Matrix	TN	FPN	Offset
A	1,112	0,616	0,552
B	1,171	0,510	0,292
C	1,101	0,511	0,796
D	1,077	0,754	0,379

1.7 Sensor 6

- Estimation of the "middle points" :

V_{ref_2}	$V_{ref_{1A}}$	$V_{ref_{1B}}$	$V_{ref_{1C}}$	$V_{ref_{1D}}$
100	159	85	180	145

- Discriminators calibration:

V_{ref1_A} START	V_{ref1_B} START	V_{ref1_C} START	V_{ref1_D} START	V_{ref2}	V_{ref1_A} STOP	Step	Event nb / step	Number of Runs
131	57	152	117	100	187	2	500	29

- Temporal noise, fixed pattern noise and offset :

Matrix	TN	FPN	Offset
A	0,857	0,472	0,167
B	0,892	0,621	0,038
C	0,850	0,749	0,018
D	0,729	0,853	-0,271

2 Test of the module in acquisition mode

2.1 Sensor 1

Run Number	Threshold	Average Fake Rate	Uncertainty from Poisson
7039	3	$1.02387\ 10^{-6}$	$5.5674\ 10^{-10}$
7040	4	$4.56894\ 10^{-7}$	$3.71095\ 10^{-10}$
7041	5	$9.79863\ 10^{-8}$	$1.71854\ 10^{-10}$
7042	6	$5.24149\ 10^{-10}$	$1.25691\ 10^{-11}$
7043	7	$7.47492\ 10^{-11}$	$4.74658\ 10^{-12}$
7045	8	$6.97371\ 10^{-8}$	$1.4498\ 10^{-10}$

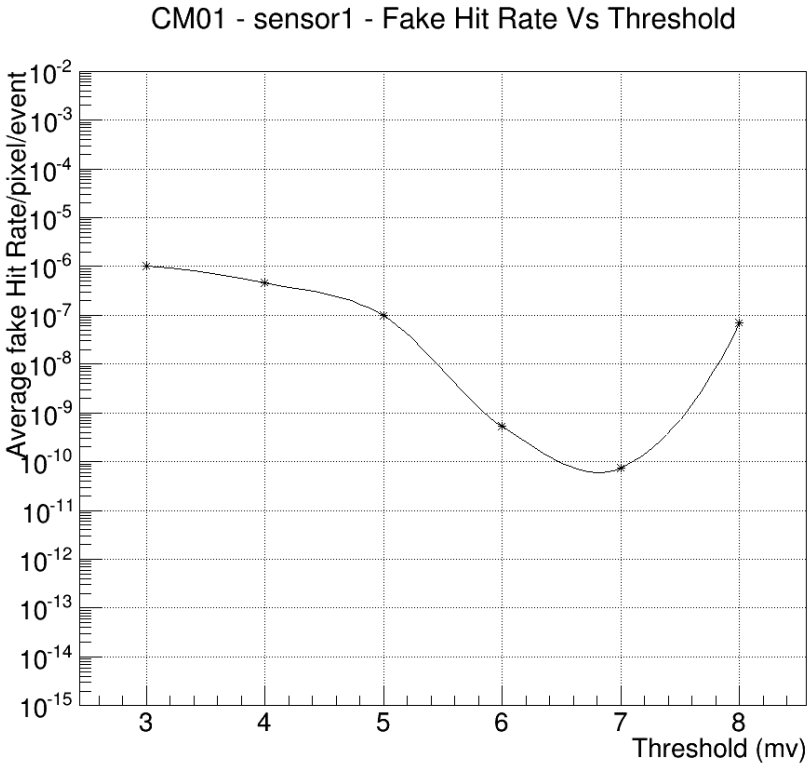

Figure 3: Average Fake Hit Rate per pixel per event as a function of the Threshold.

2.2 Sensor 2

Run Number	Threshold	Average Fake Rate	Uncertainty from Poisson
7039	3	$1.0808\ 10^{-4}$	$1.27625\ 10^{-8}$
7040	4	$7.39328\ 10^{-5}$	$1.05556\ 10^{-8}$
7041	5	$6.01577\ 10^{-5}$	$9.52156\ 10^{-9}$
7042	6	$6.01577\ 10^{-5}$	$9.52156\ 10^{-9}$
7043	7	$5.954\ 10^{-5}$	$9.47279\ 10^{-9}$
7044	8	$5.9325\ 10^{-5}$	$9.45543\ 10^{-9}$

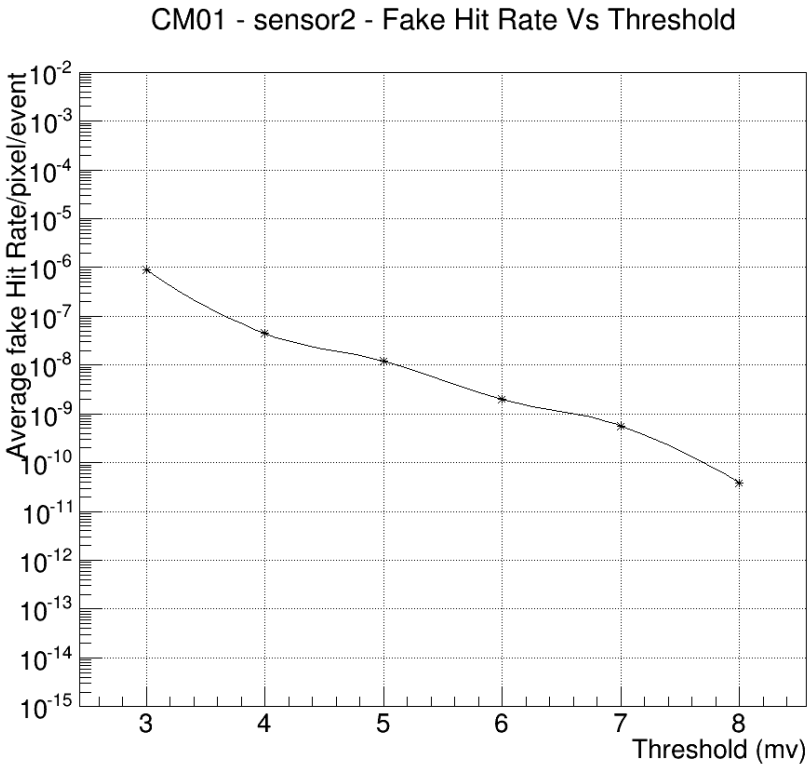

Figure 4: Average Fake Hit Rate per pixel per event as a function of the Threshold.

The average fake hit rate is dominated by the dead line and few pixels dead in one column.

2.3 Sensor 3

Run Number	Threshold	Average Fake Rate	Uncertainty from Poisson
7006	3	$1.63559\ 10^{-5}$	$4.96477\ 10^{-9}$
7009	4	$7.15763\ 10^{-6}$	$3.28433\ 10^{-9}$
7003	5	$1.73221\ 10^{-6}$	$1.61571\ 10^{-9}$
7012	6	$3.3916\ 10^{-7}$	$7.14932\ 10^{-10}$
7015	7	$6.50288\ 10^{-8}$	$3.13051\ 10^{-10}$
7018	8	$7.52164\ 10^{-9}$	$1.06468\ 10^{-10}$

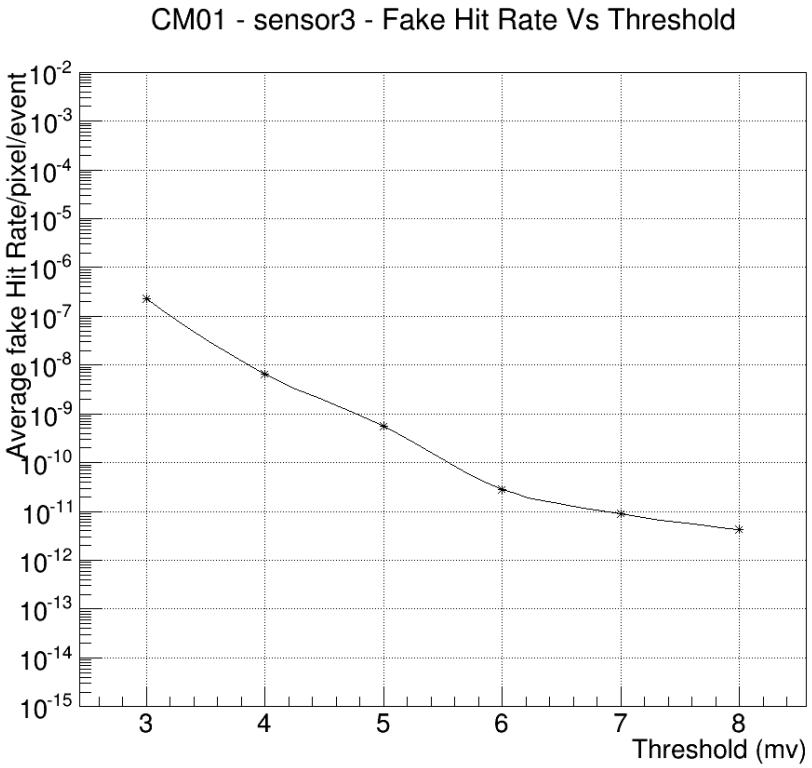

Figure 5: Average Fake Hit Rate per pixel per event as a function of the Threshold.

2.4 Sensor 4

Run Number	Threshold	Average Fake Rate	Uncertainty from Poisson
7006	3	$2.13599\ 10^{-5}$	$5.67364\ 10^{-9}$
7009	4	$1.14268\ 10^{-5}$	$4.14977\ 10^{-9}$
7003	5	$4.14364\ 10^{-6}$	$2.49893\ 10^{-9}$
7012	6	$8.91421\ 10^{-7}$	$1.15905\ 10^{-9}$
7015	7	$2.23366\ 10^{-7}$	$5.80191\ 10^{-10}$
7018	8	$4.96962\ 10^{-8}$	$2.73668\ 10^{-10}$

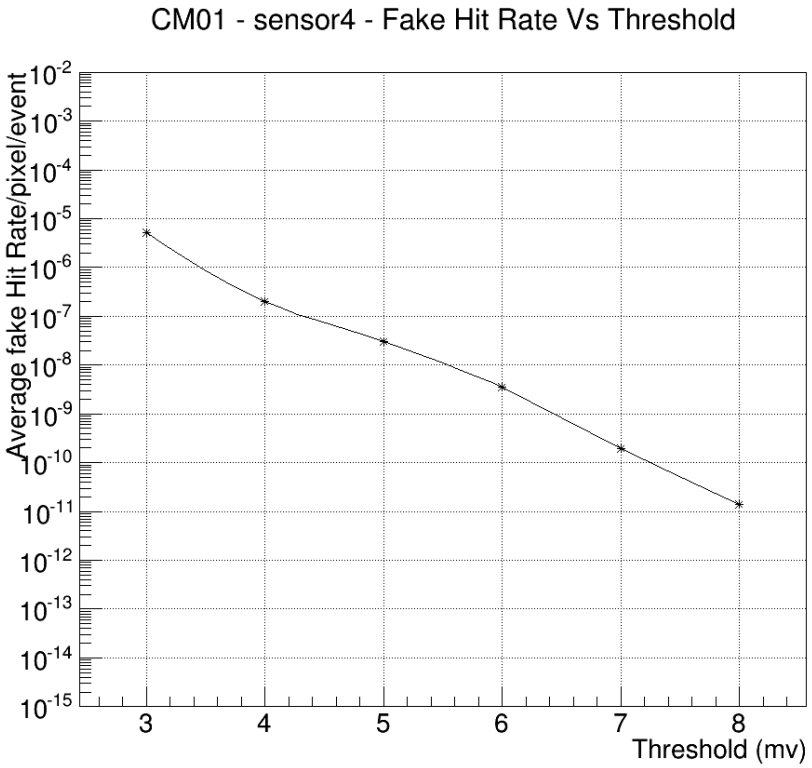

Figure 6: Average Fake Hit Rate per pixel per event as a function of the Threshold.

2.5 Sensor 6

Run Number	Threshold	Average Fake Rate	Uncertainty from Poisson
7007	3	$1.41348\ 10^{-5}$	$4.61538\ 10^{-9}$
7010	4	$6.8833\ 10^{-6}$	$3.22078\ 10^{-9}$
7004	5	$1.13499\ 10^{-6}$	$1.30785\ 10^{-9}$
7013	6	$2.92517\ 10^{-7}$	$6.63954\ 10^{-10}$
7016	7	$3.46665\ 10^{-8}$	$2.28569\ 10^{-10}$
7019	8	$2.31029\ 10^{-9}$	$5.9006\ 10^{-11}$

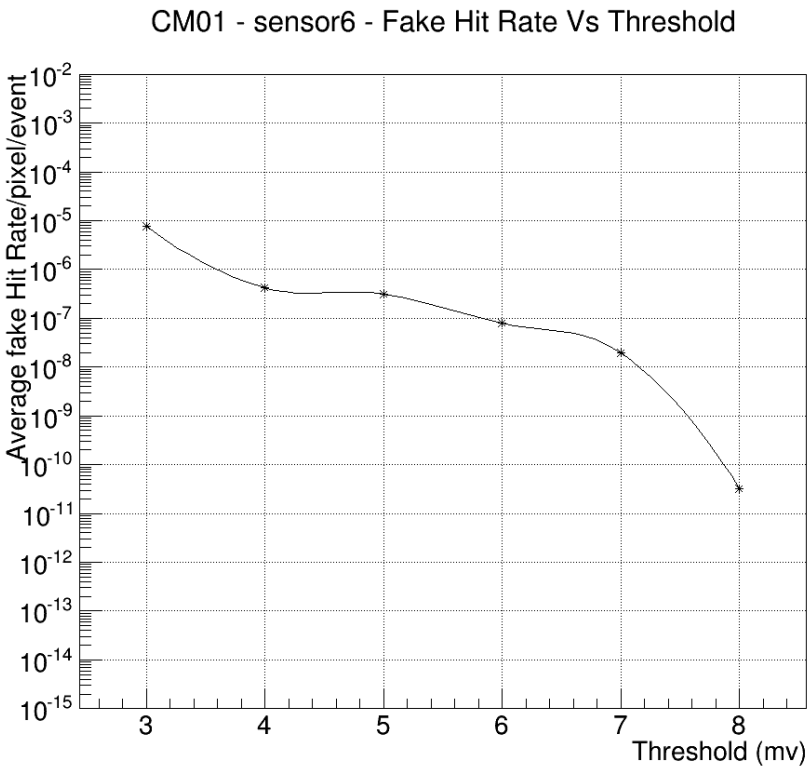

Figure 7: Average Fake Hit Rate per pixel per event as a function of the Threshold.