

STUDI DI RUMORE SU DATI DA TEST BEAM

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Scopo dell'Analisi e Data Set

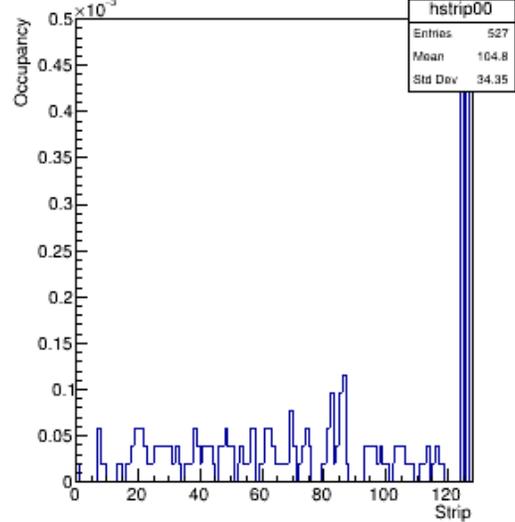
- Valutazione del livello di rumore, sotto forma di:
 1. Occupancy delle strip
 2. Rate medio delle singole strip per ogni vista e per ogni piano
- Data set utilizzati:
 1. RUN APV:
 - 5235 → HV 780V → Run di piedistallo di riferimento 5228
 - 5254 → HV 835V → Run di piedistallo di riferimento 5253
 2. RUN TIGER:
 - 326 → HV 835V → Soglie a 5kHz su ogni canale

Occupancy

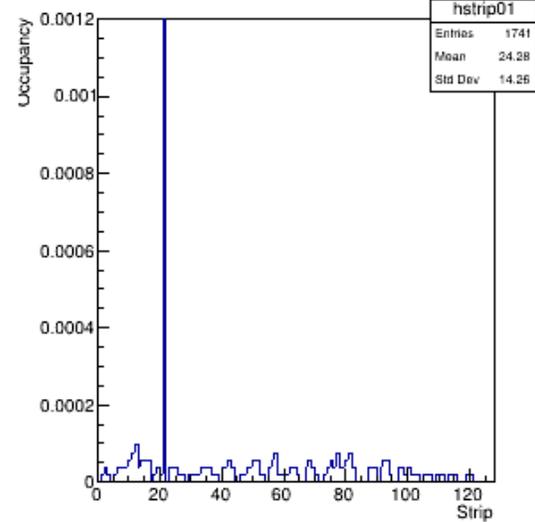
$$\frac{\textit{numero di hit per strip}}{\textit{numero di trigger}}$$

RUN 5235 APV HV = 780 V 52keventi

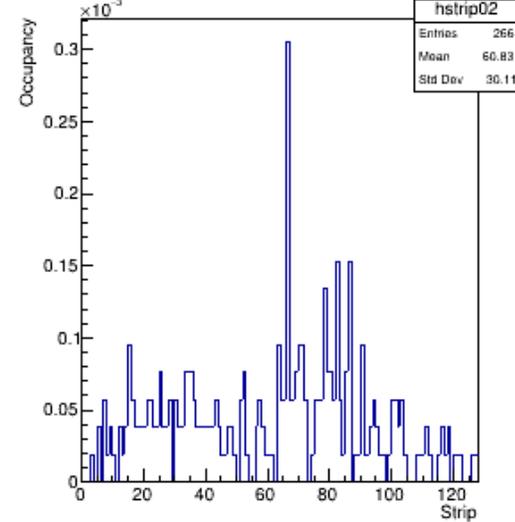
$\times 10^{-3}$ Strip Occupancy View 0 Plane 0



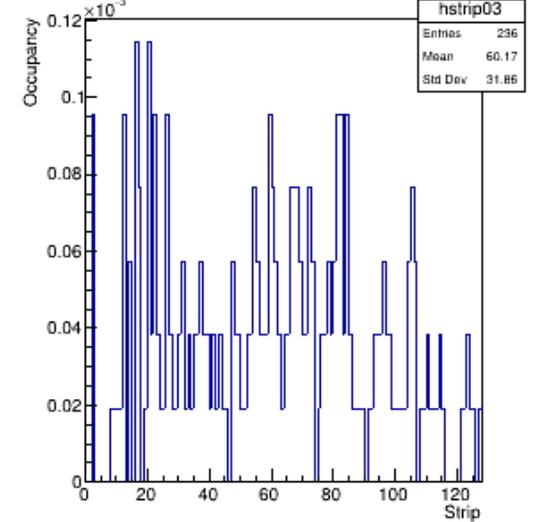
$\times 1$ Strip Occupancy View 0 Plane 1



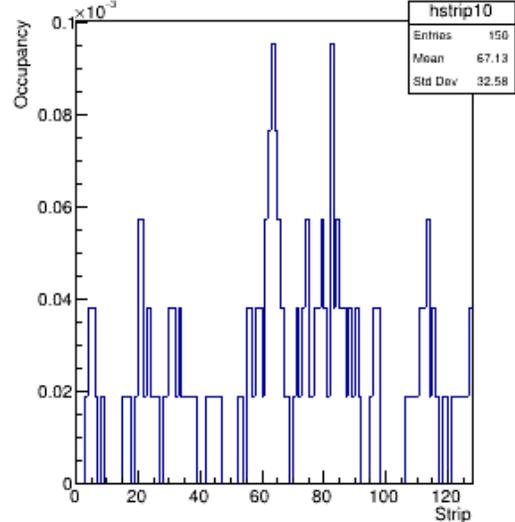
$\times 10^{-3}$ Strip Occupancy View 0 Plane 2



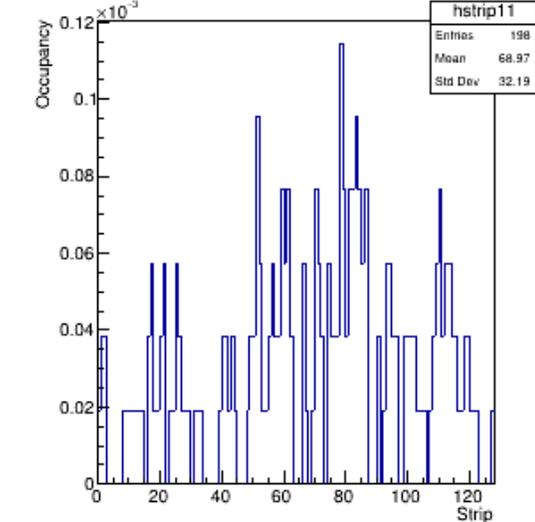
$\times 10^{-3}$ Strip Occupancy View 0 Plane 3



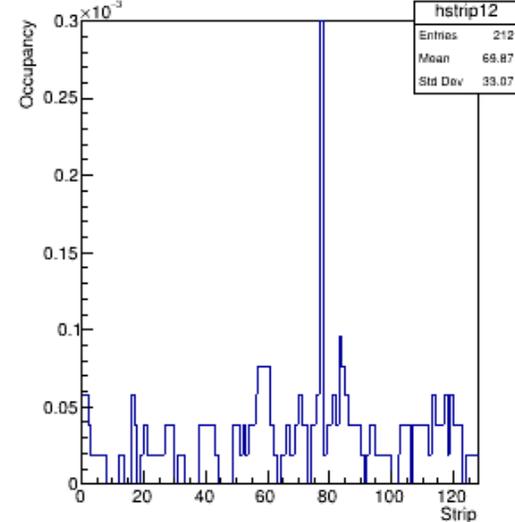
$\times 10^{-3}$ Strip Occupancy View 1 Plane 0



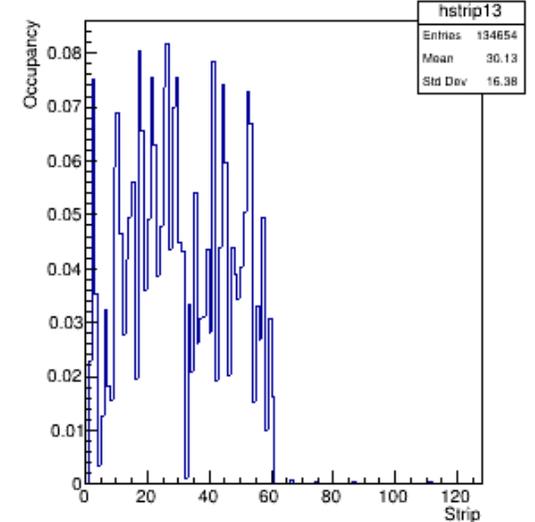
$\times 10^{-3}$ Strip Occupancy View 1 Plane 1



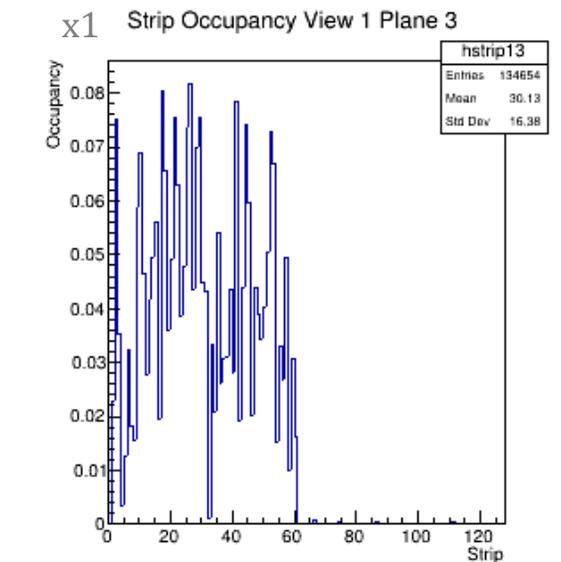
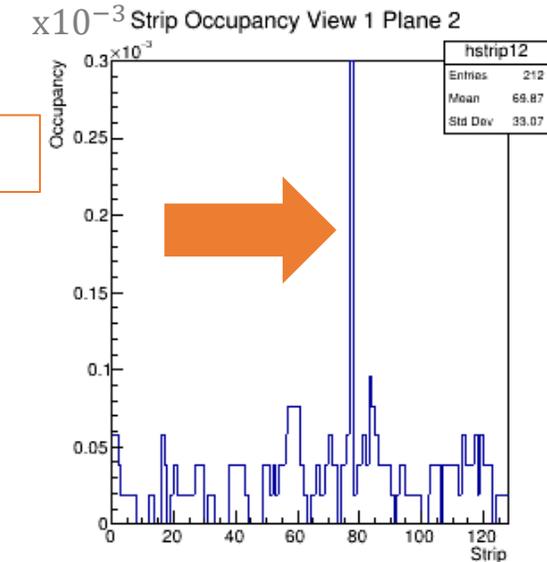
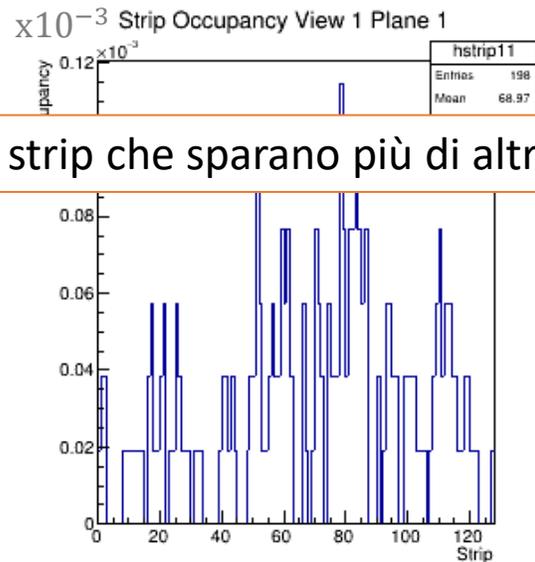
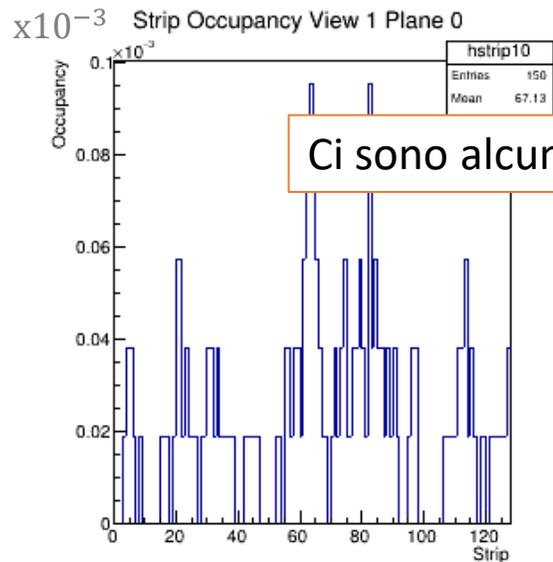
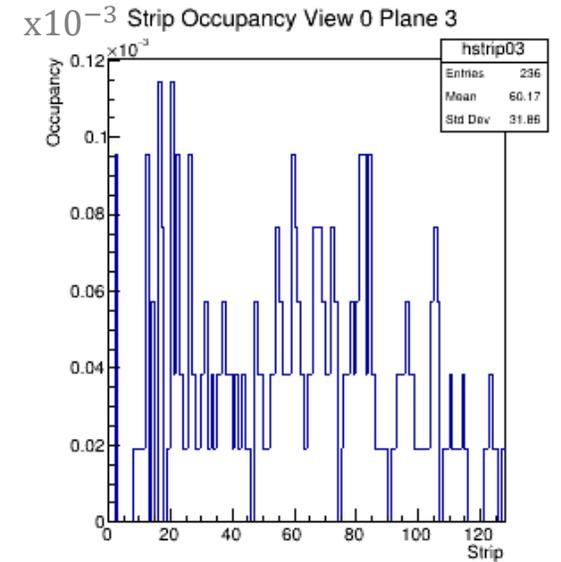
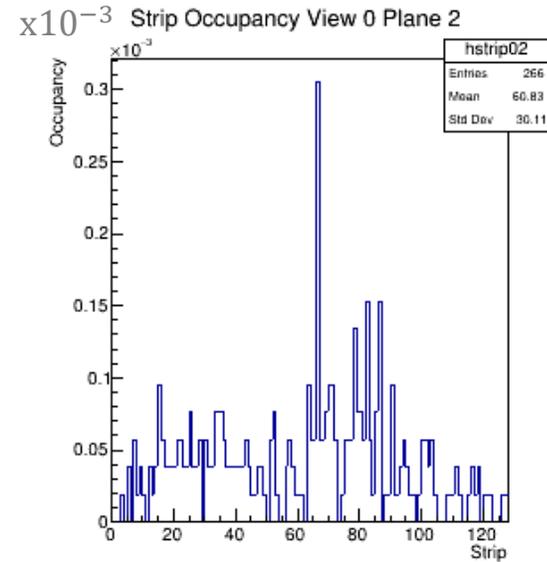
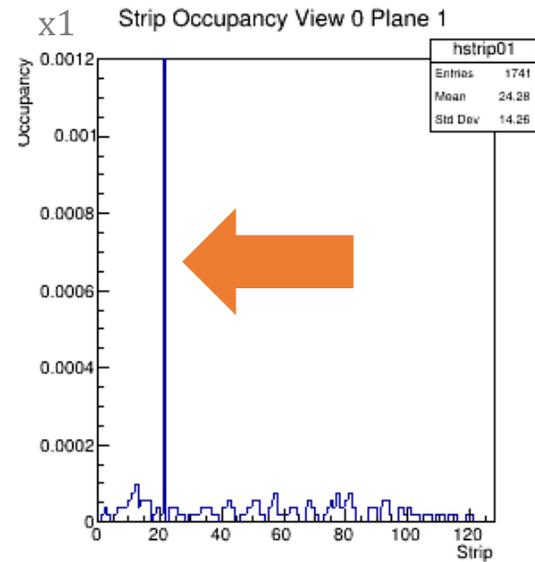
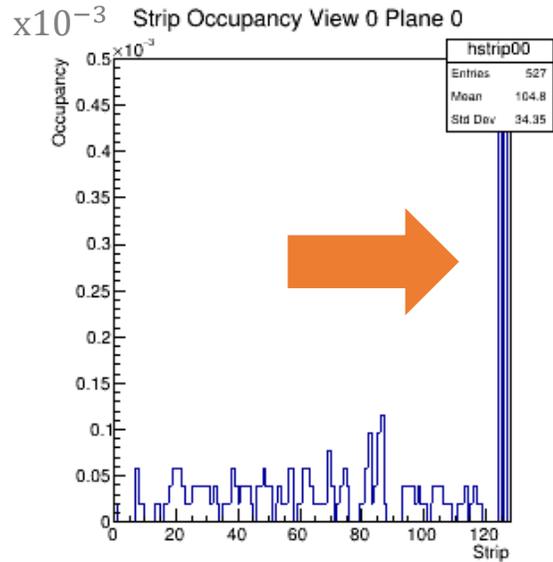
$\times 10^{-3}$ Strip Occupancy View 1 Plane 2



$\times 1$ Strip Occupancy View 1 Plane 3



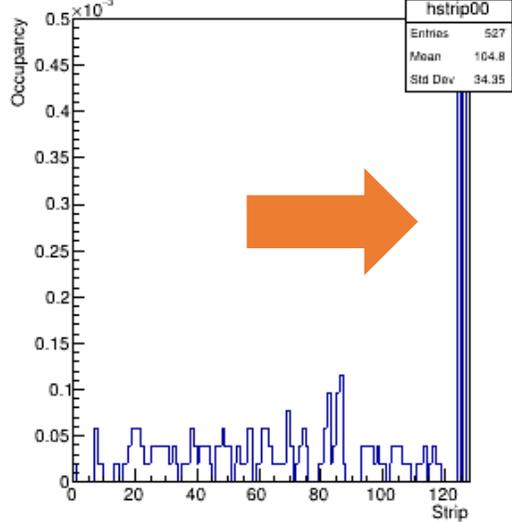
RUN 5235 APV HV = 780 V 52keventi



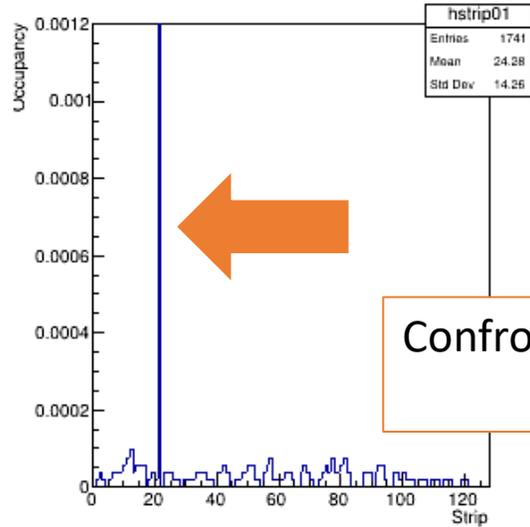
Ci sono alcune strip che sparano più di altre

RUN 5235 APV HV = 780 V 52keventi

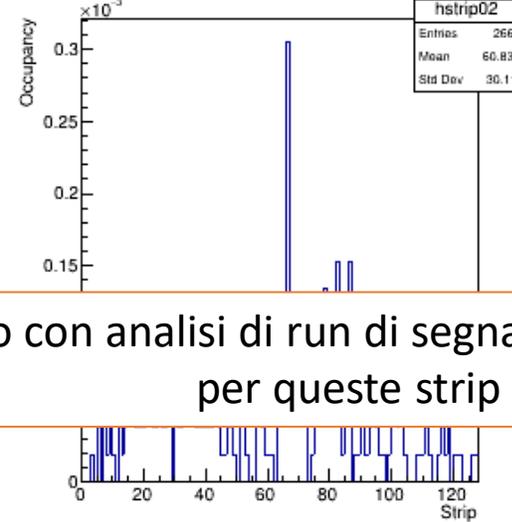
$\times 10^{-3}$ Strip Occupancy View 0 Plane 0



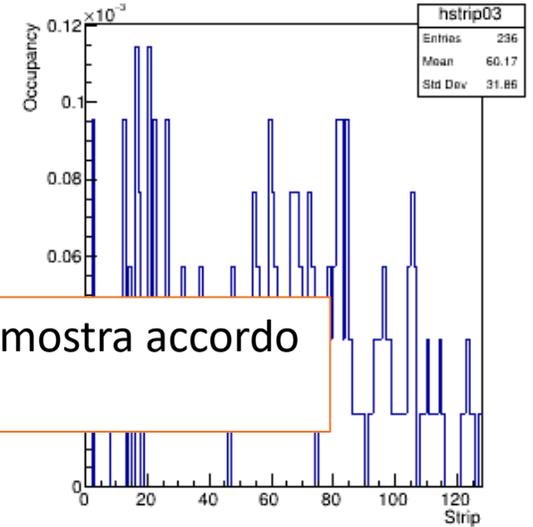
$\times 1$ Strip Occupancy View 0 Plane 1



$\times 10^{-3}$ Strip Occupancy View 0 Plane 2

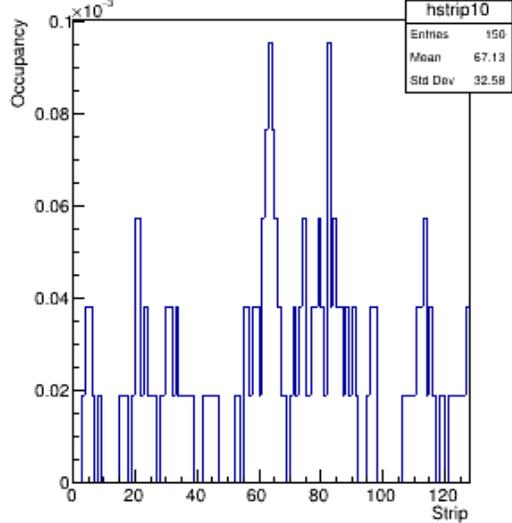


$\times 10^{-3}$ Strip Occupancy View 0 Plane 3

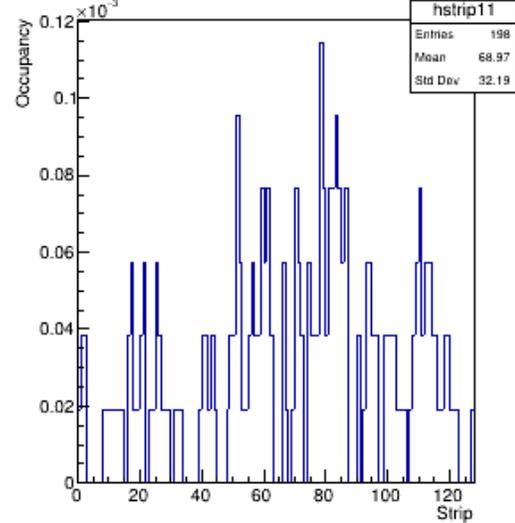


Confronto con analisi di run di segnale mostra accordo per queste strip

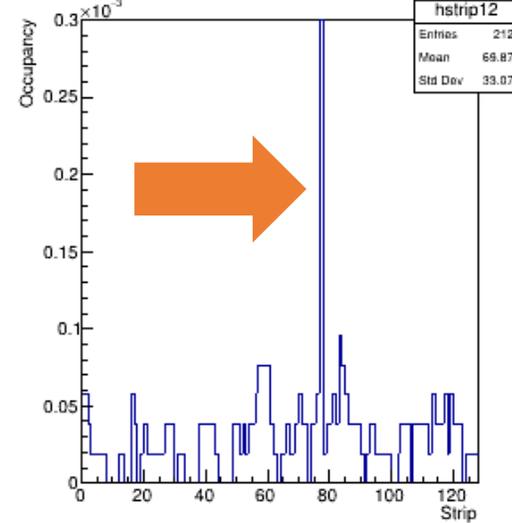
$\times 10^{-3}$ Strip Occupancy View 1 Plane 0



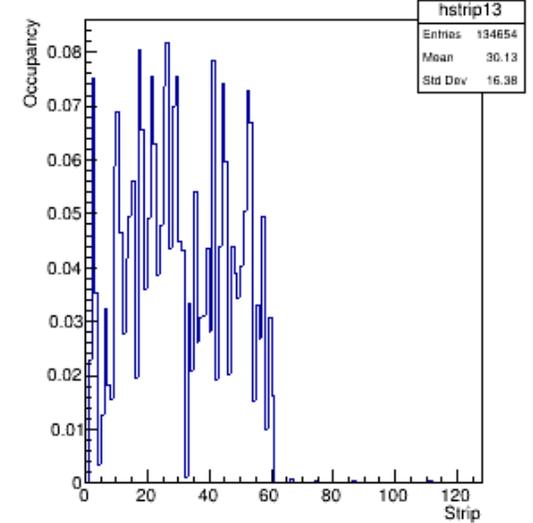
$\times 10^{-3}$ Strip Occupancy View 1 Plane 1



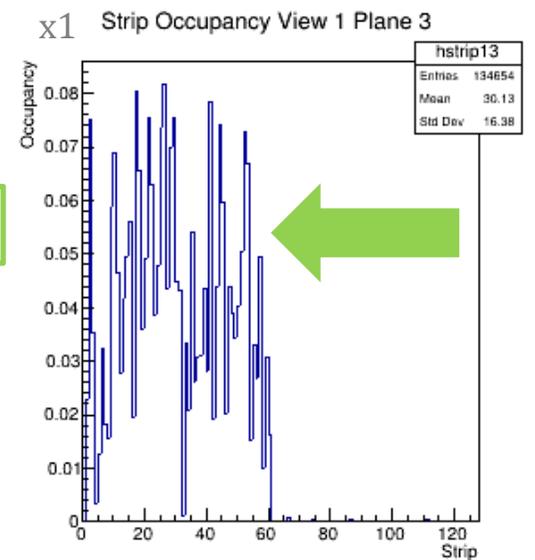
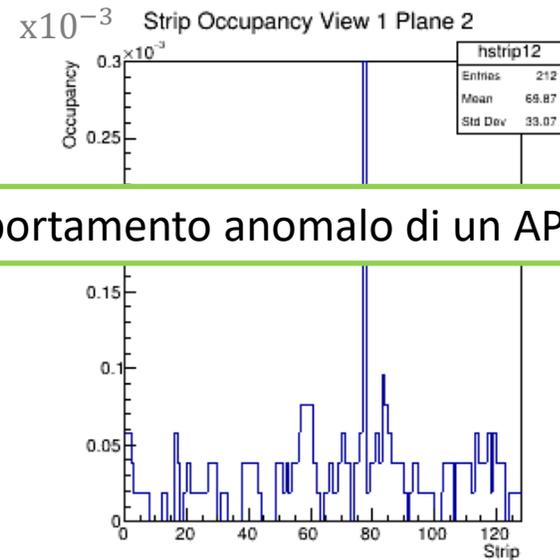
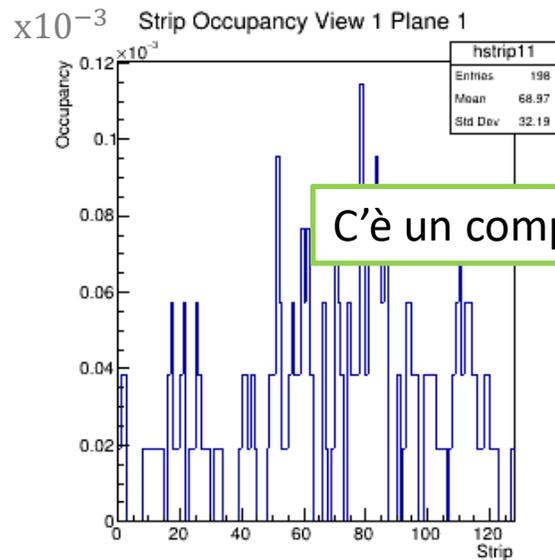
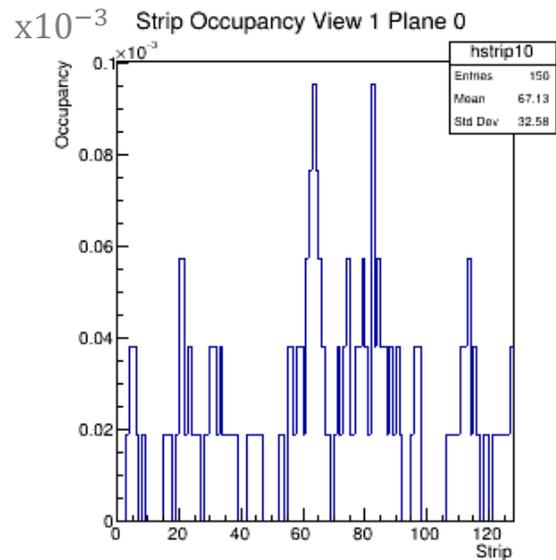
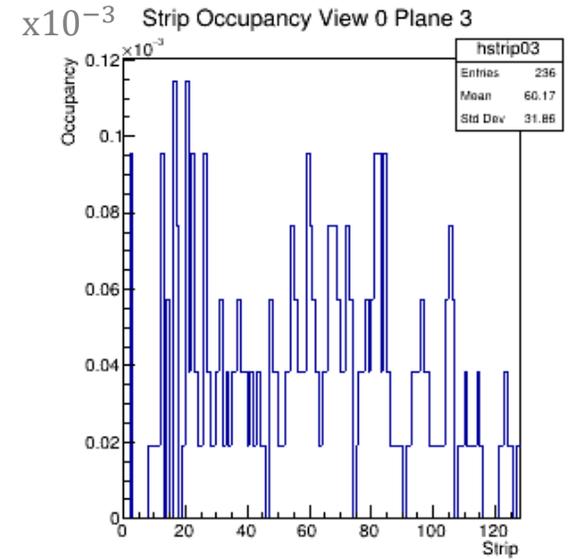
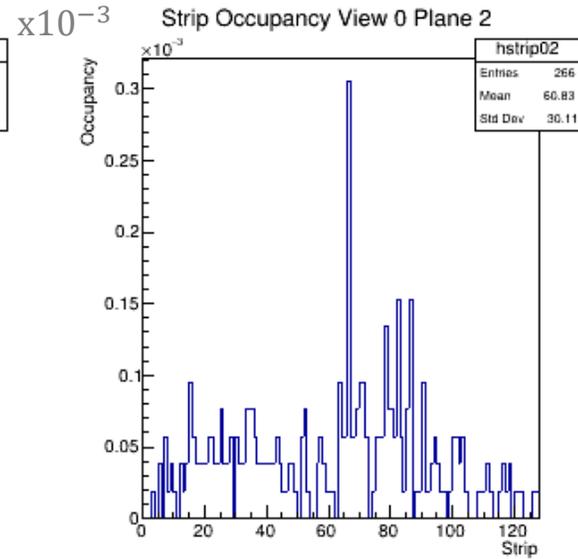
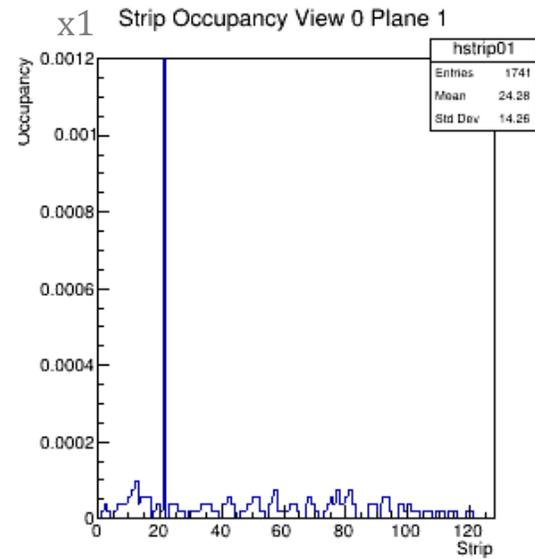
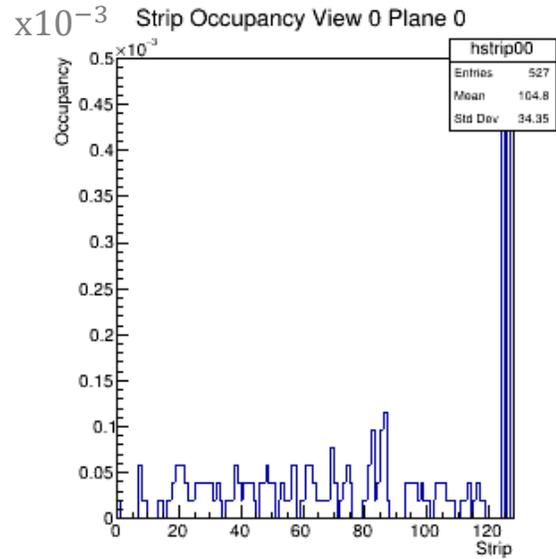
$\times 10^{-3}$ Strip Occupancy View 1 Plane 2



$\times 1$ Strip Occupancy View 1 Plane 3



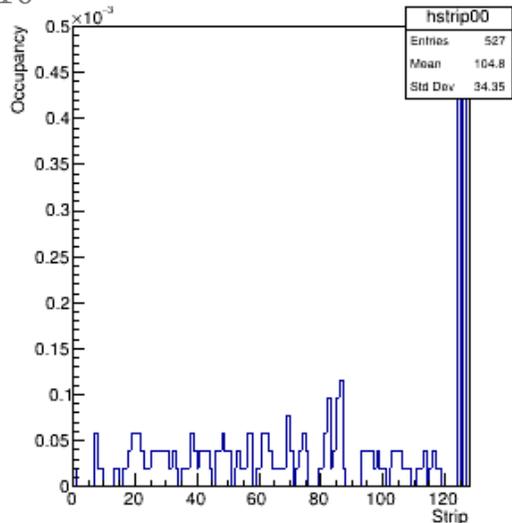
RUN 5235 APV HV = 780 V 52keventi



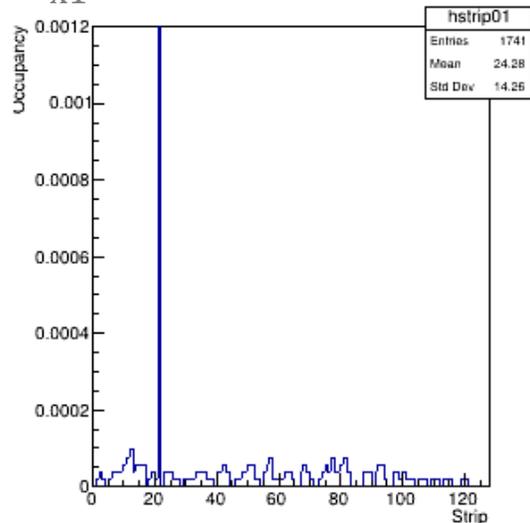
C'è un comportamento anomalo di un APV

RUN 5235 APV HV = 780 V 52keventi

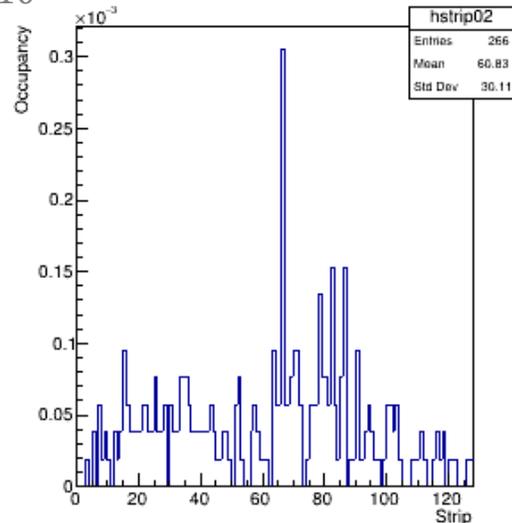
$\times 10^{-3}$ Strip Occupancy View 0 Plane 0



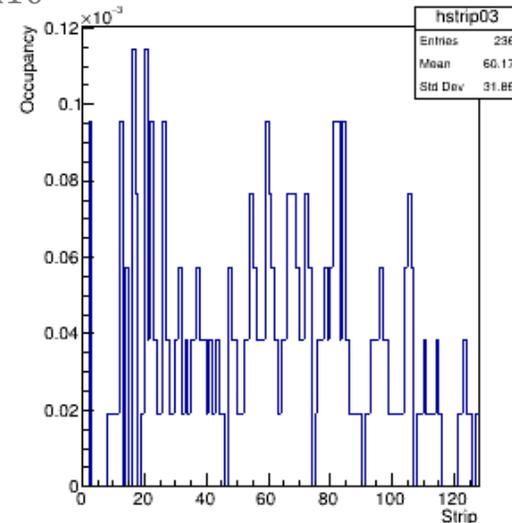
$\times 1$ Strip Occupancy View 0 Plane 1



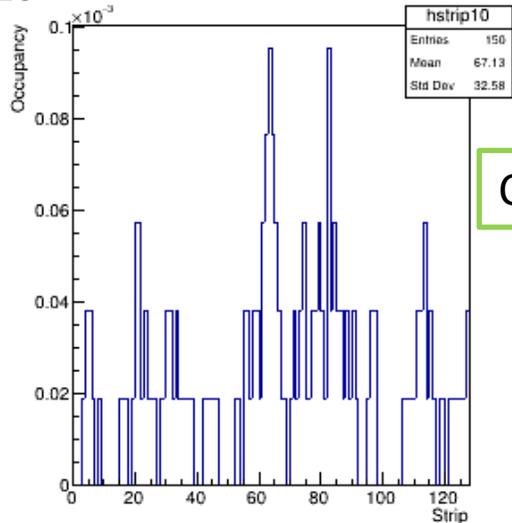
$\times 10^{-3}$ Strip Occupancy View 0 Plane 2



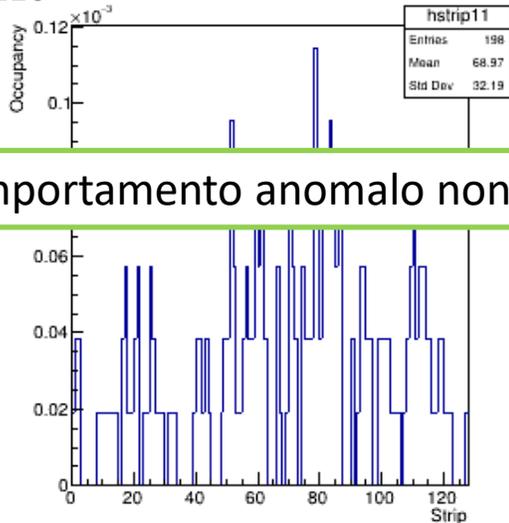
$\times 10^{-3}$ Strip Occupancy View 0 Plane 3



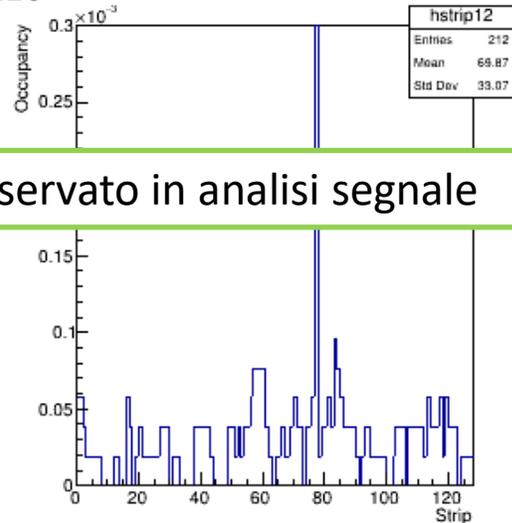
$\times 10^{-3}$ Strip Occupancy View 1 Plane 0



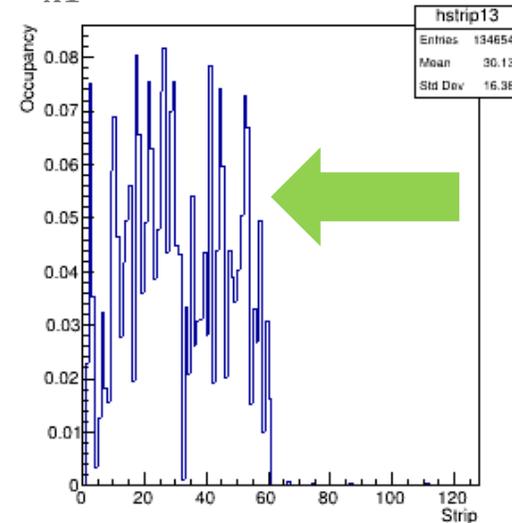
$\times 10^{-3}$ Strip Occupancy View 1 Plane 1



$\times 10^{-3}$ Strip Occupancy View 1 Plane 2



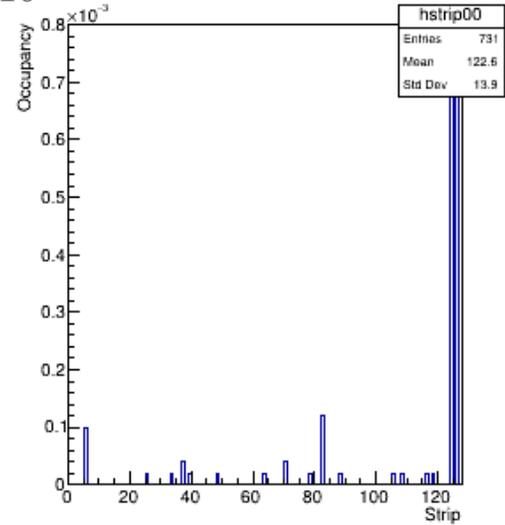
$\times 1$ Strip Occupancy View 1 Plane 3



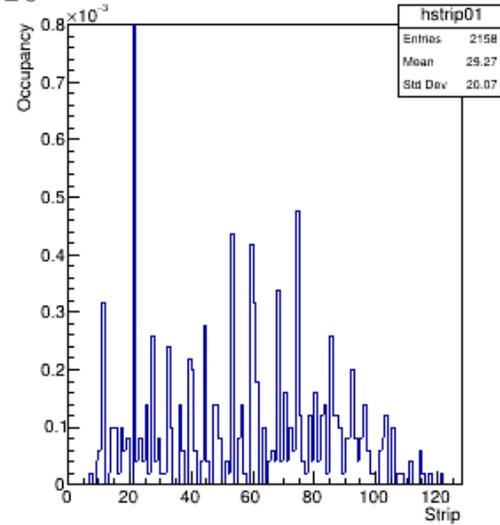
Comportamento anomalo non osservato in analisi segnale

RUN 5254 APV HV = 835 V 50keventi

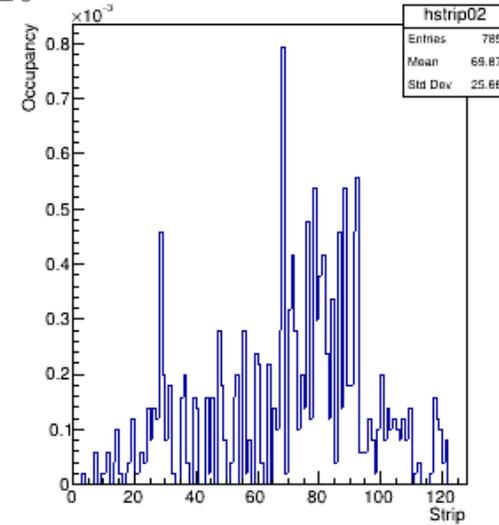
$\times 10^{-3}$ Strip Occupancy View 0 Plane 0



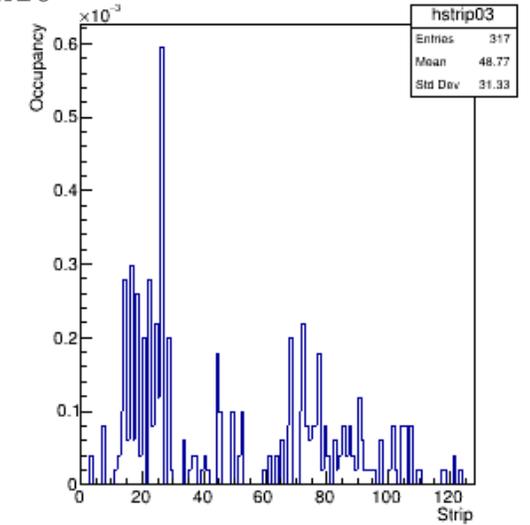
$\times 10^{-3}$ Strip Occupancy View 0 Plane 1



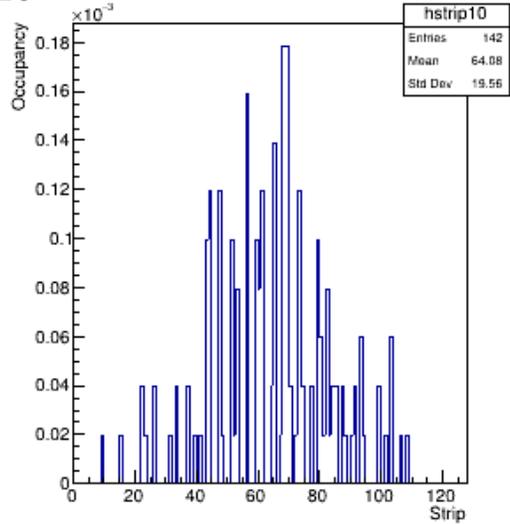
$\times 10^{-3}$ Strip Occupancy View 0 Plane 2



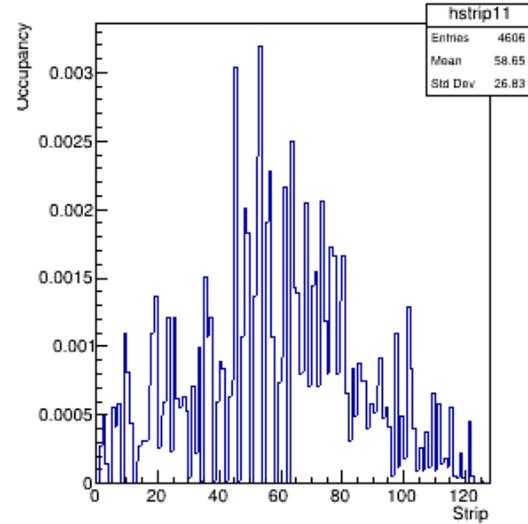
$\times 10^{-3}$ Strip Occupancy View 0 Plane 3



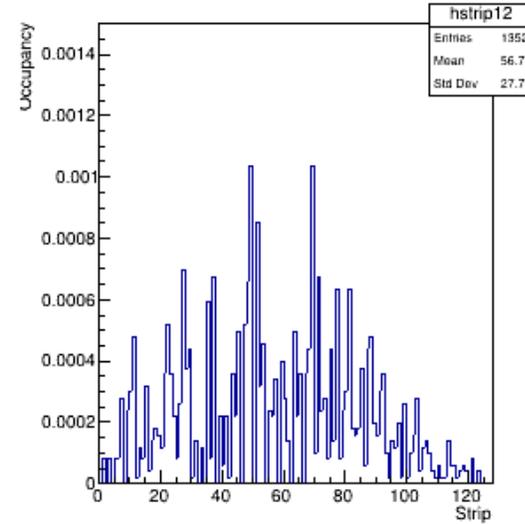
$\times 10^{-3}$ Strip Occupancy View 1 Plane 0



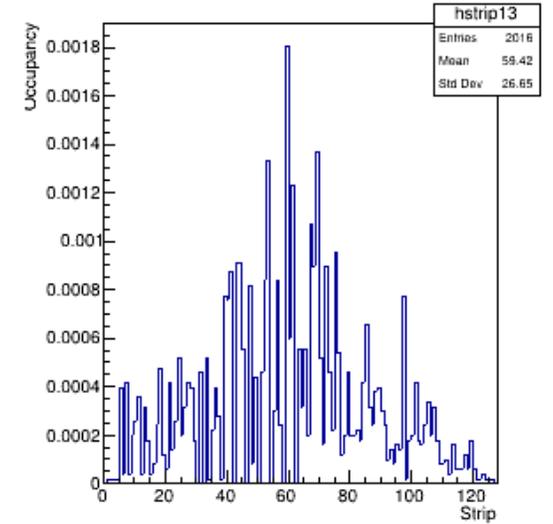
$\times 1$ Strip Occupancy View 1 Plane 1



$\times 1$ Strip Occupancy View 1 Plane 2

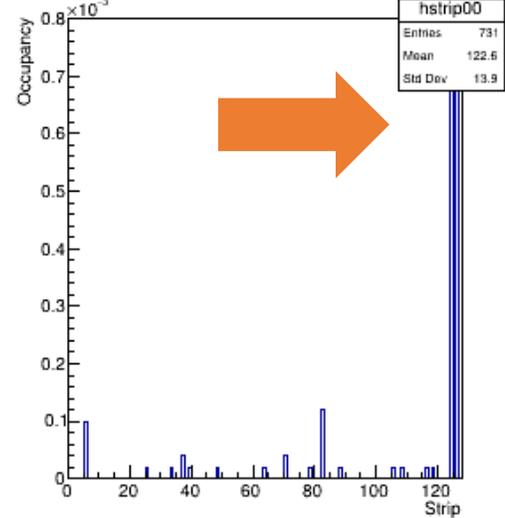


$\times 1$ Strip Occupancy View 1 Plane 3

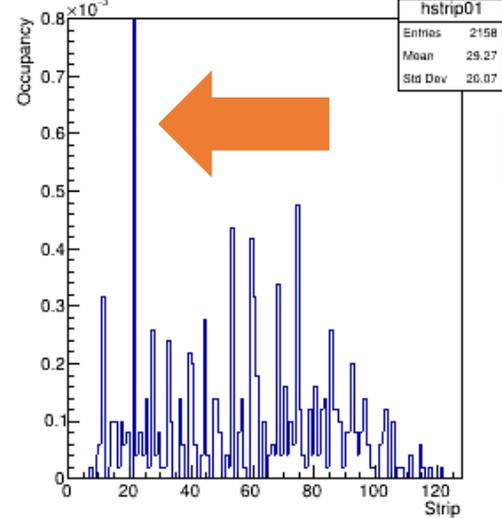


RUN 5254 APV HV = 835 V 50keventi

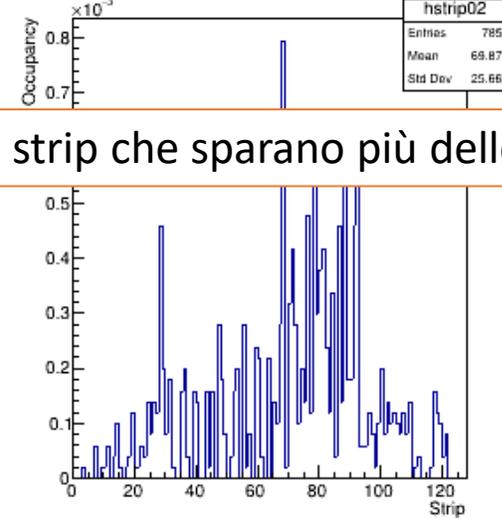
$\times 10^{-3}$ Strip Occupancy View 0 Plane 0



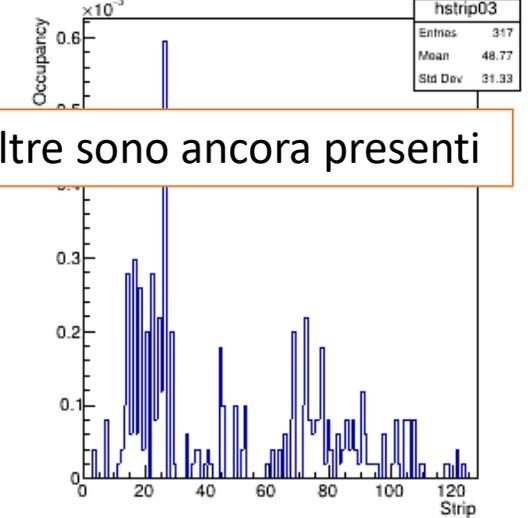
$\times 10^{-3}$ Strip Occupancy View 0 Plane 1



$\times 10^{-3}$ Strip Occupancy View 0 Plane 2

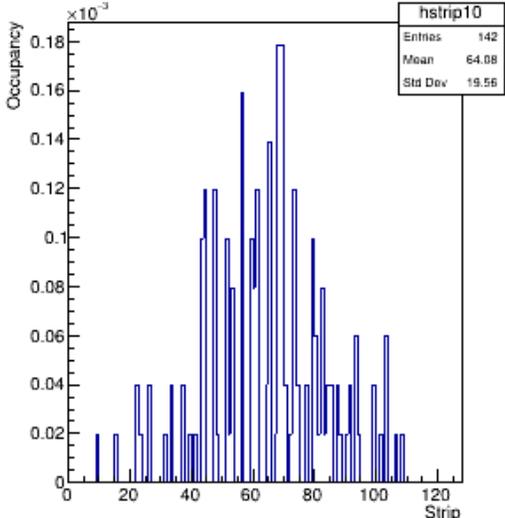


$\times 10^{-3}$ Strip Occupancy View 0 Plane 3

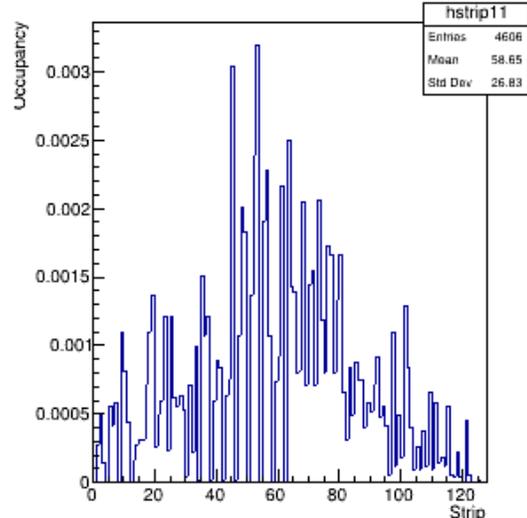


Le strip che sparano più delle altre sono ancora presenti

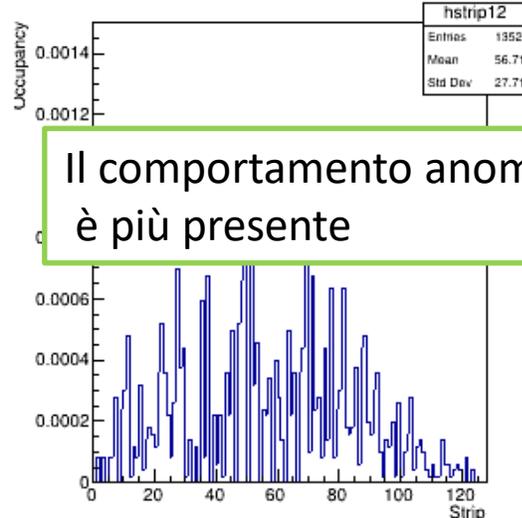
$\times 10^{-3}$ Strip Occupancy View 1 Plane 0



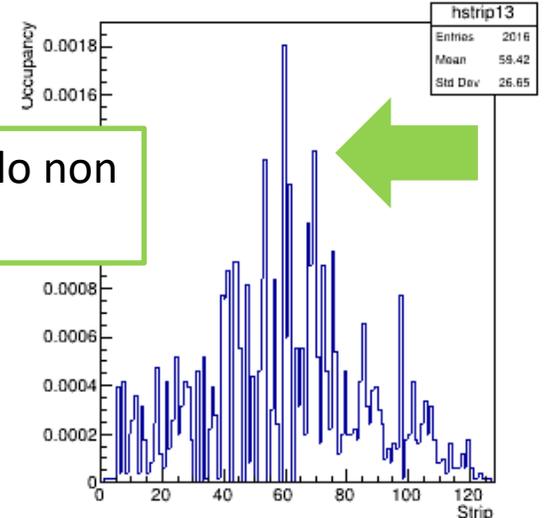
$\times 1$ Strip Occupancy View 1 Plane 1



$\times 1$ Strip Occupancy View 1 Plane 2



$\times 1$ Strip Occupancy View 1 Plane 3



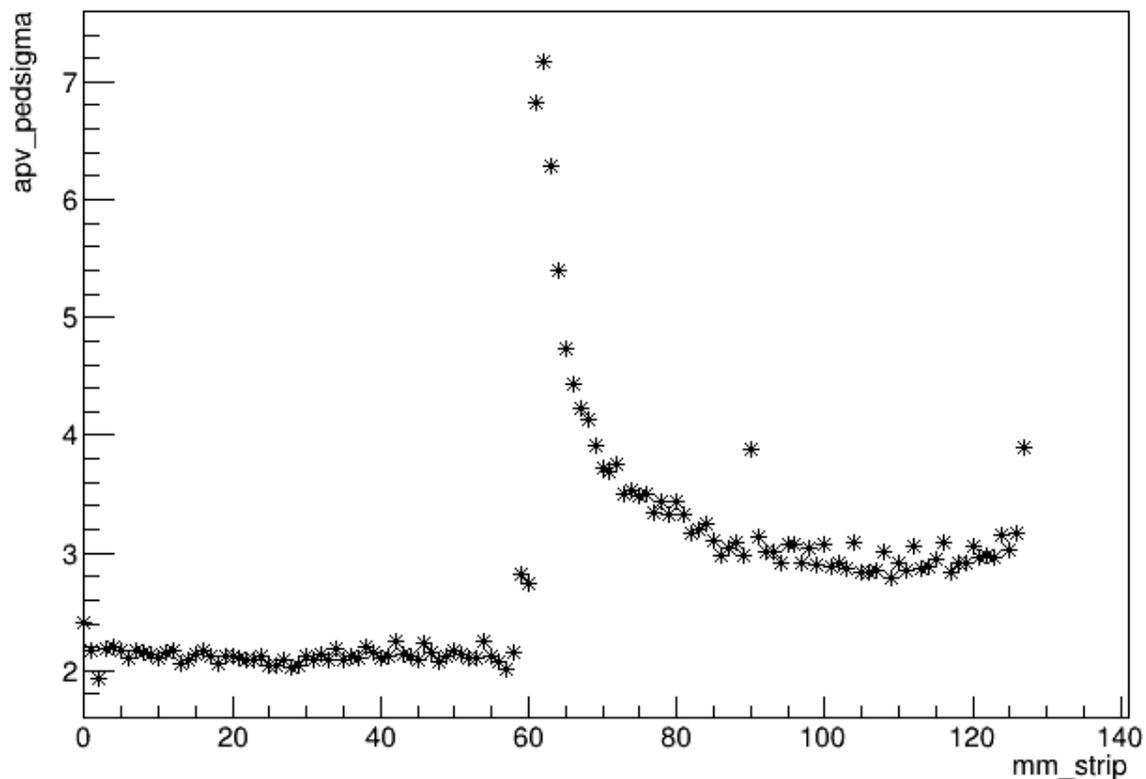
Il comportamento anomalo non è più presente

Piedistallo di riferimento per
run 5235

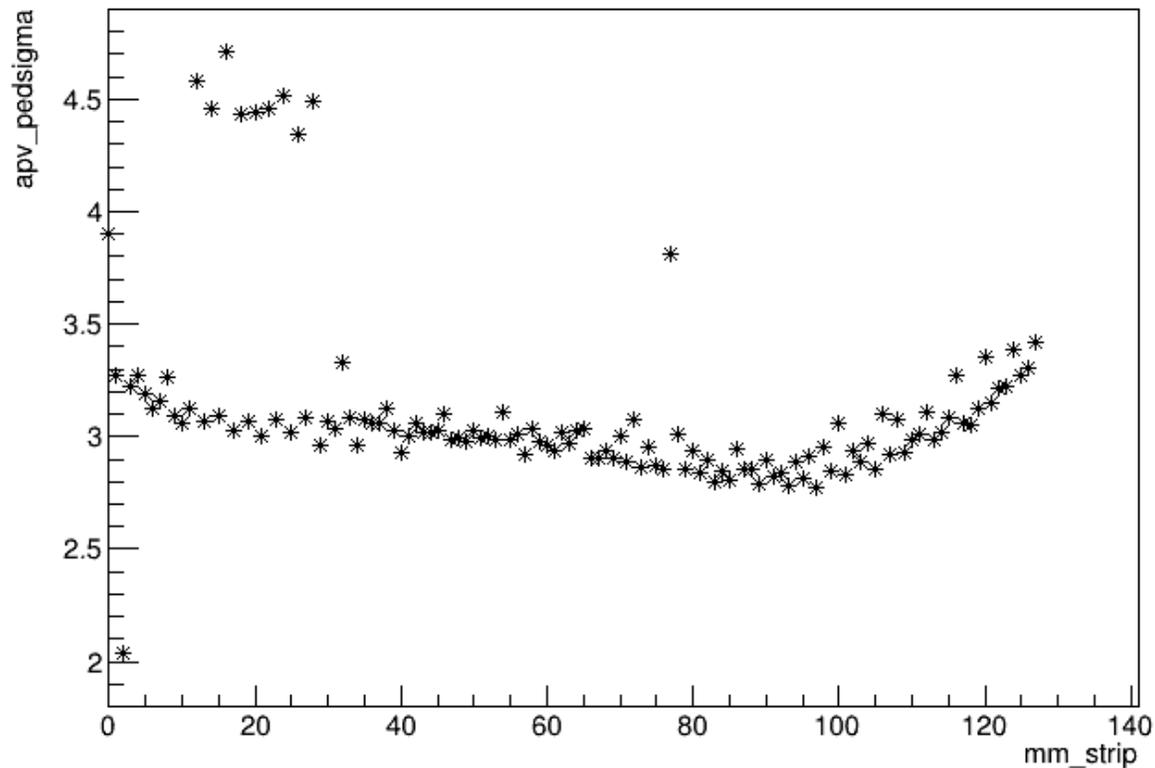
Ped 5228

Il comportamento anomalo evidenziato
precedentemente per il run 5235
è dovuto al suo piedistallo

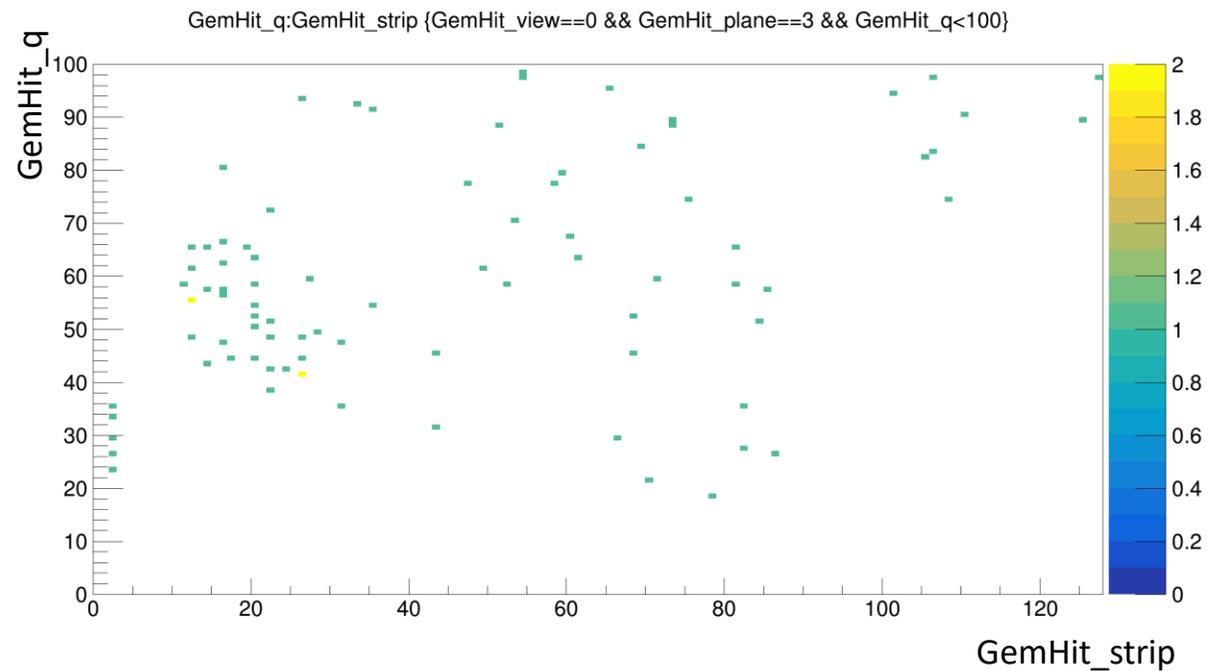
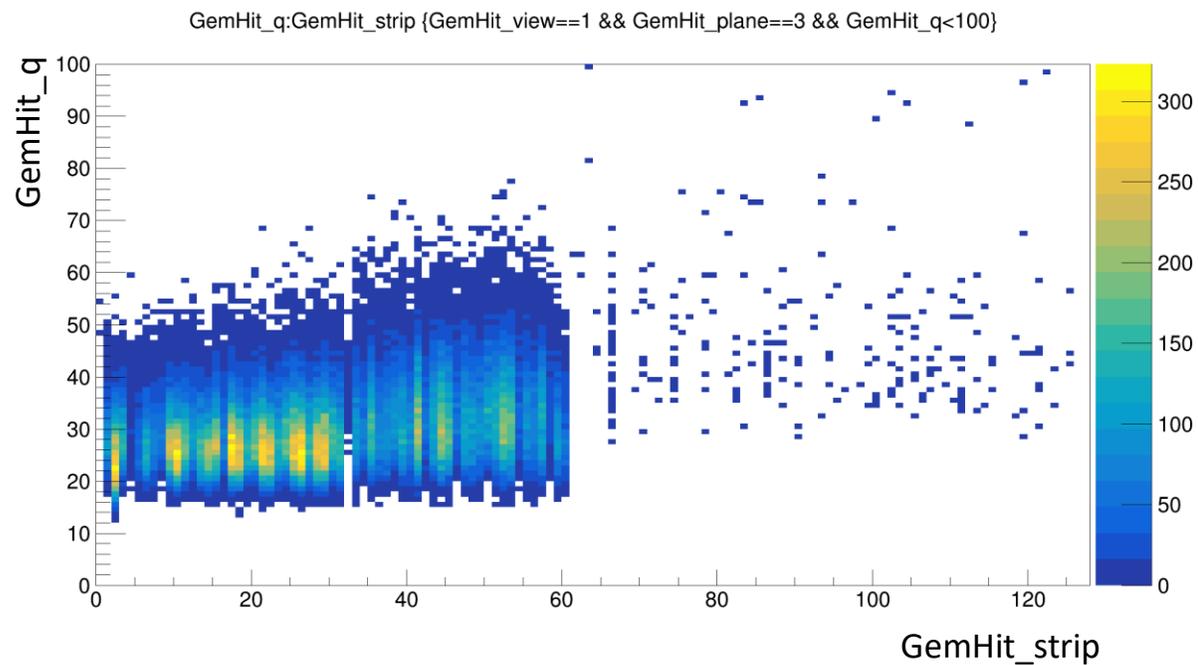
apv_pedsigma:mm_stripe {apv_id==6}



apv_pedsigma:mm_stripe {apv_id==7}



Rnd Trg 5235

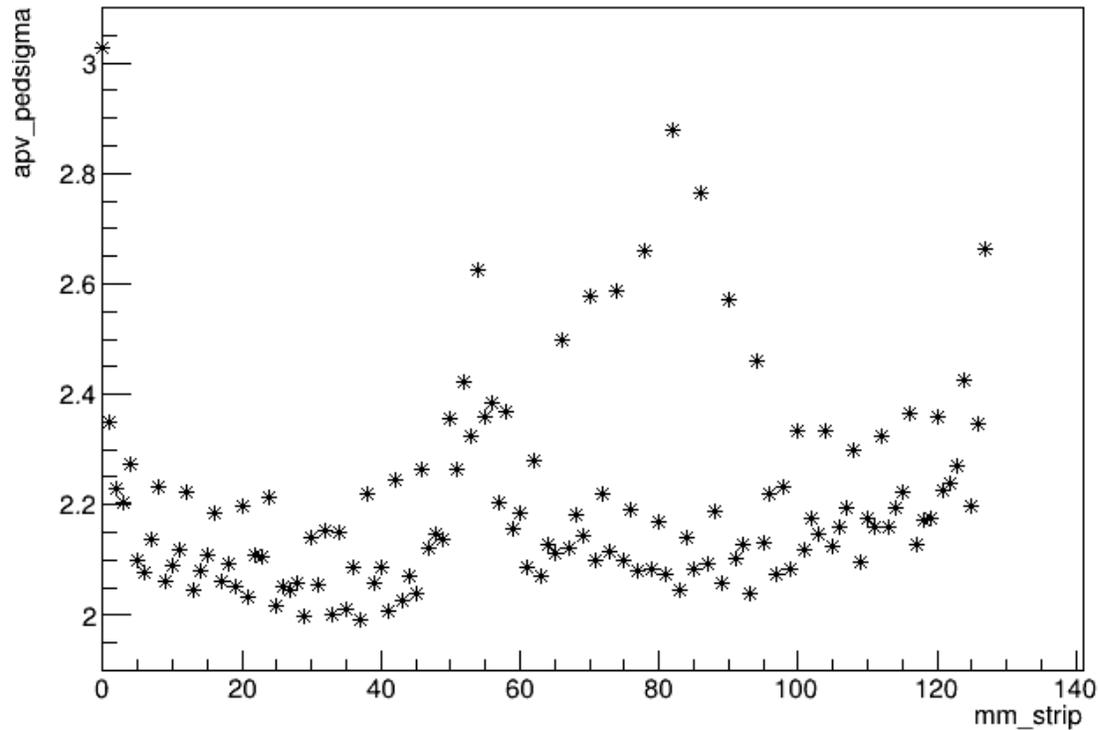


Piedistallo di riferimento
per run 5254

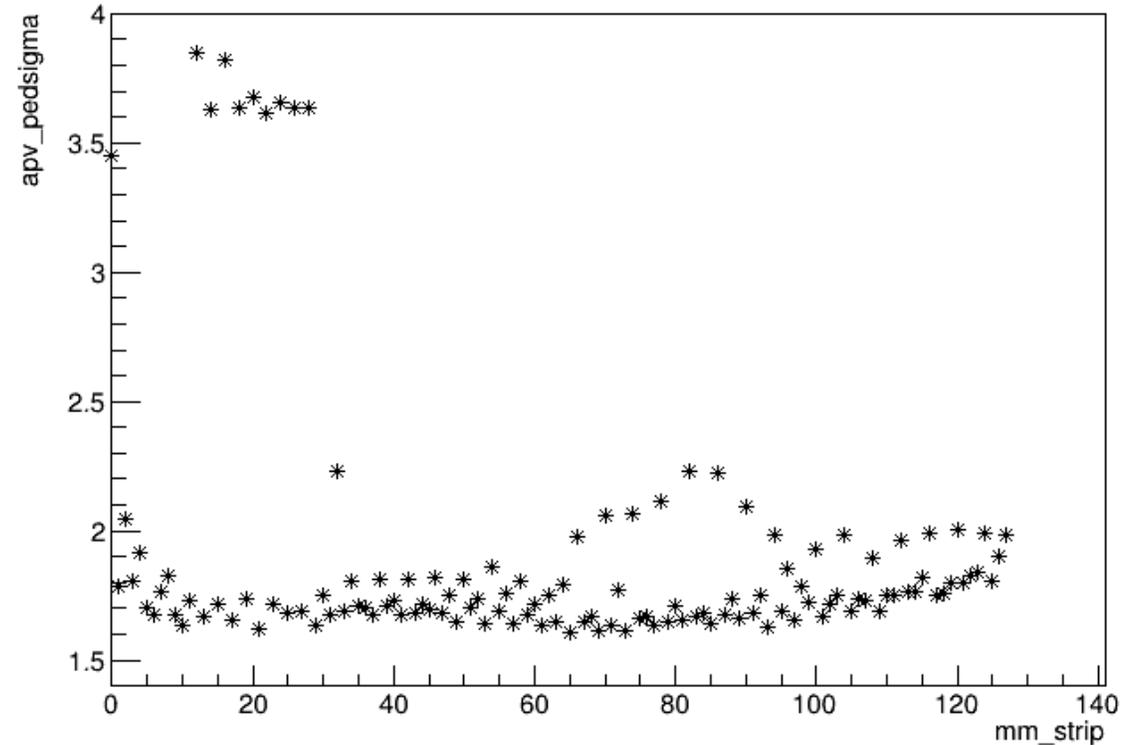
Ped 5253

Il comportamento anomalo sparisce invece
per il run 5254, che ha un piedistallo di
riferimento migliore

apv_pedsigma:mm_stripe {apv_id==6}

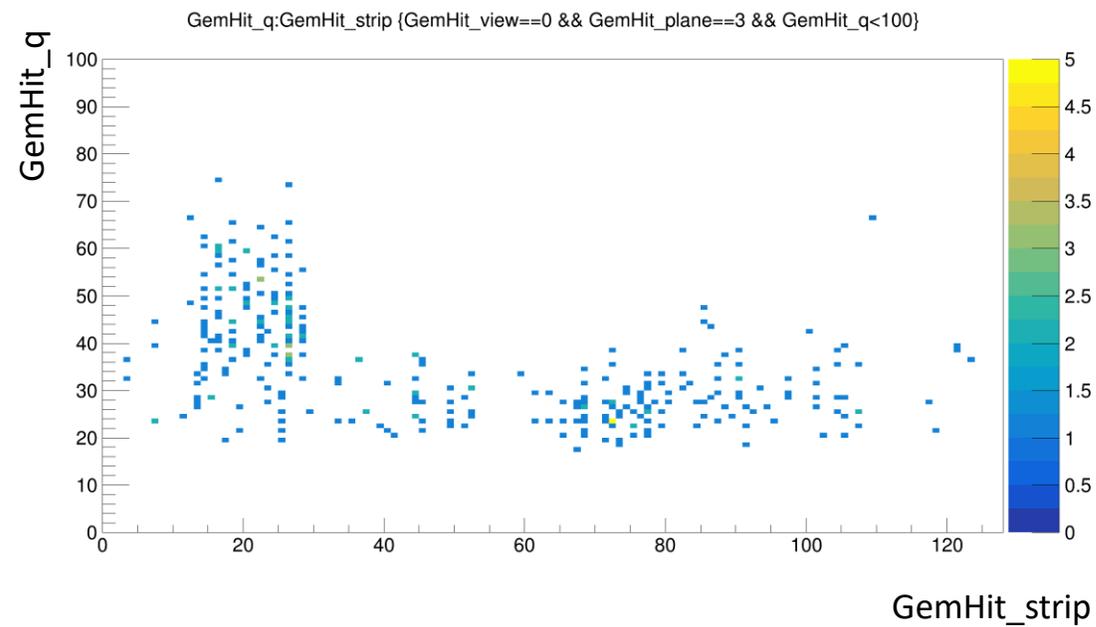
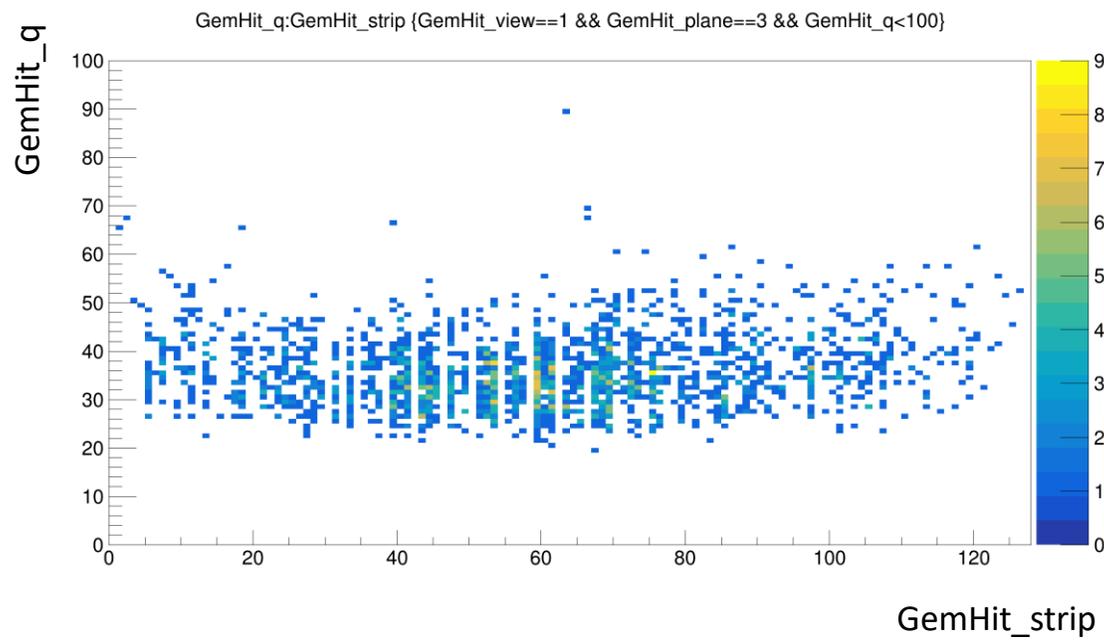


apv_pedsigma:mm_stripe {apv_id==7}

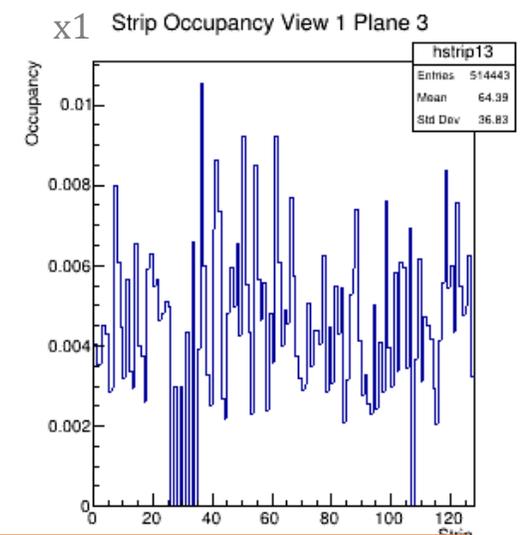
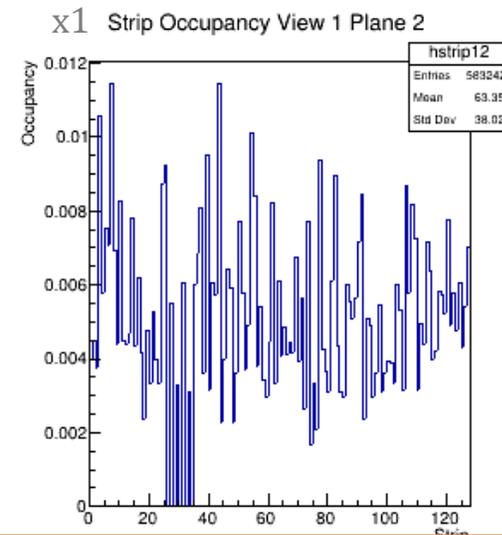
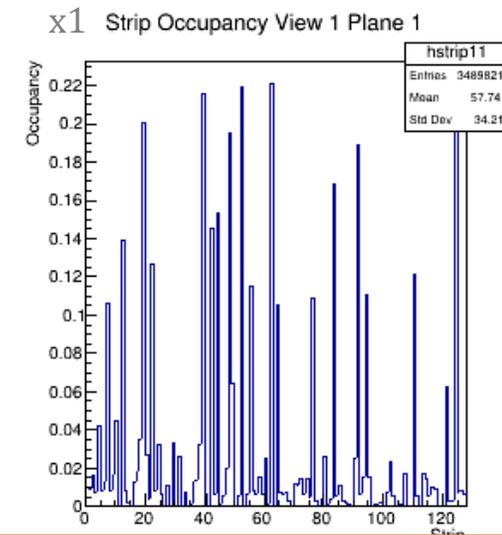
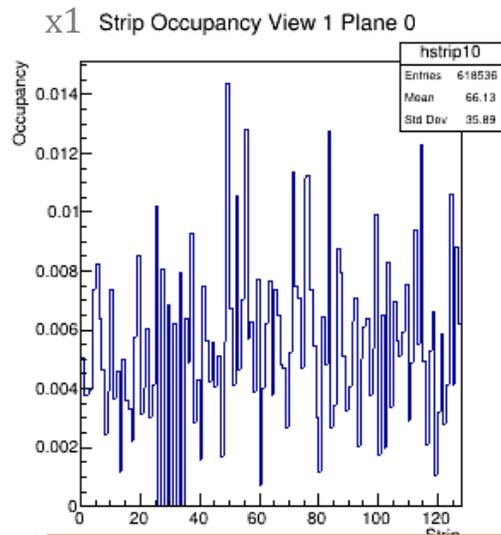
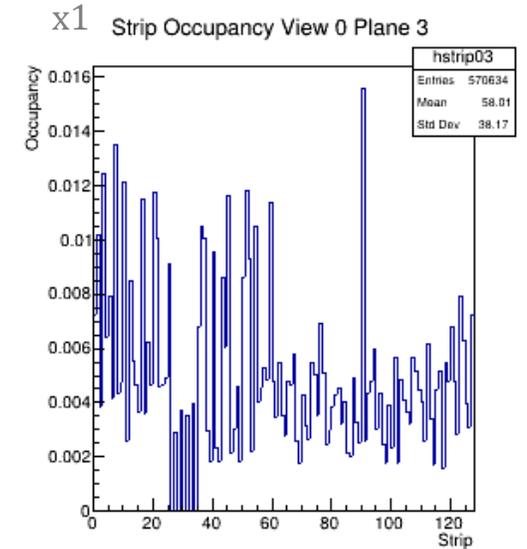
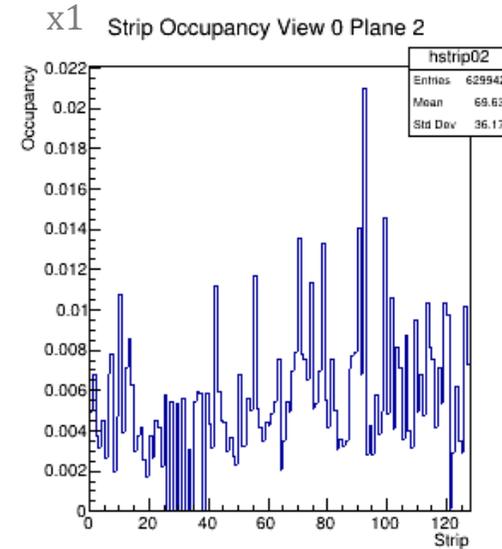
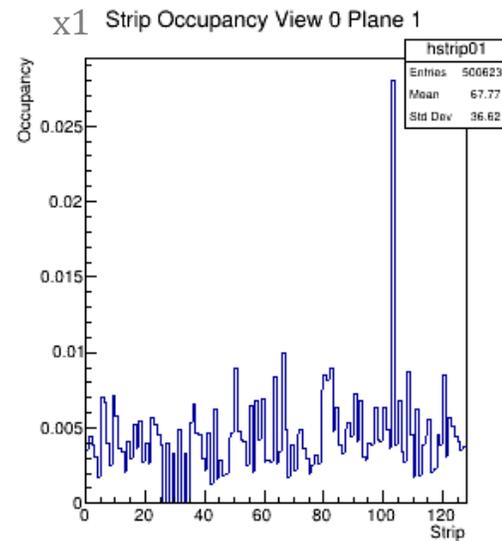
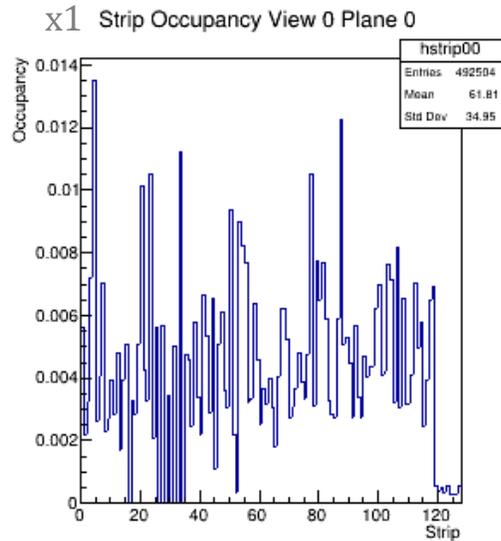


La *APV_pedsigma* ha valori inferiori rispetto al piedistallo precedente. Per il run 5254 non si osserva alcun comportamento anomalo.

Rnd Trg 5254

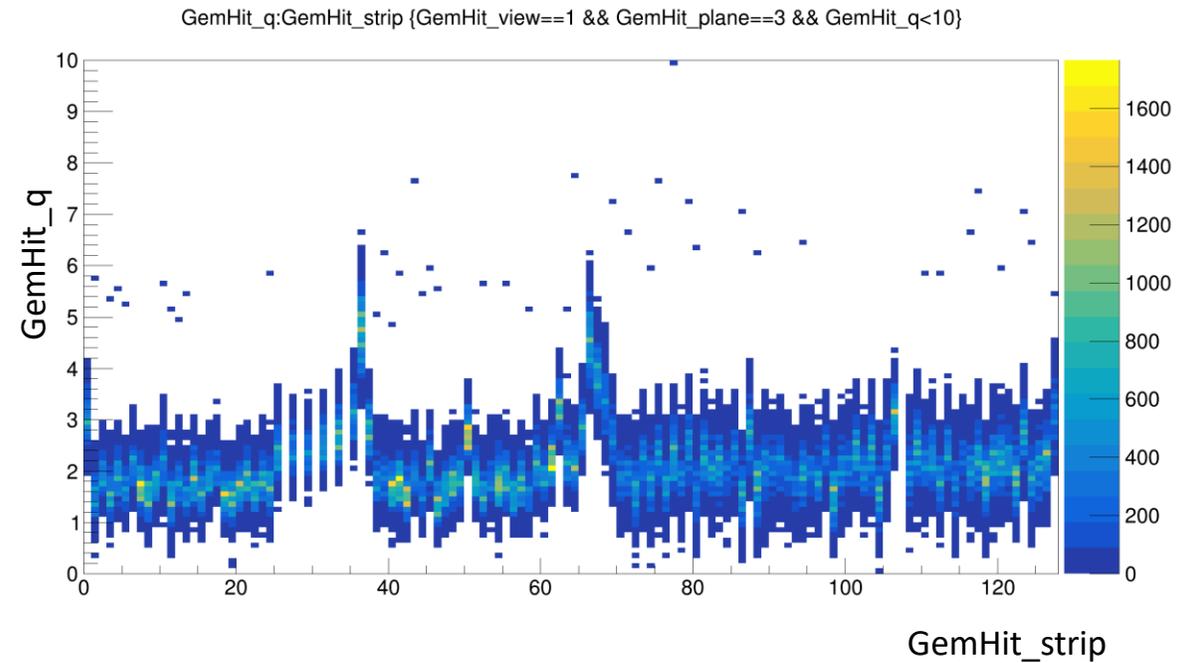
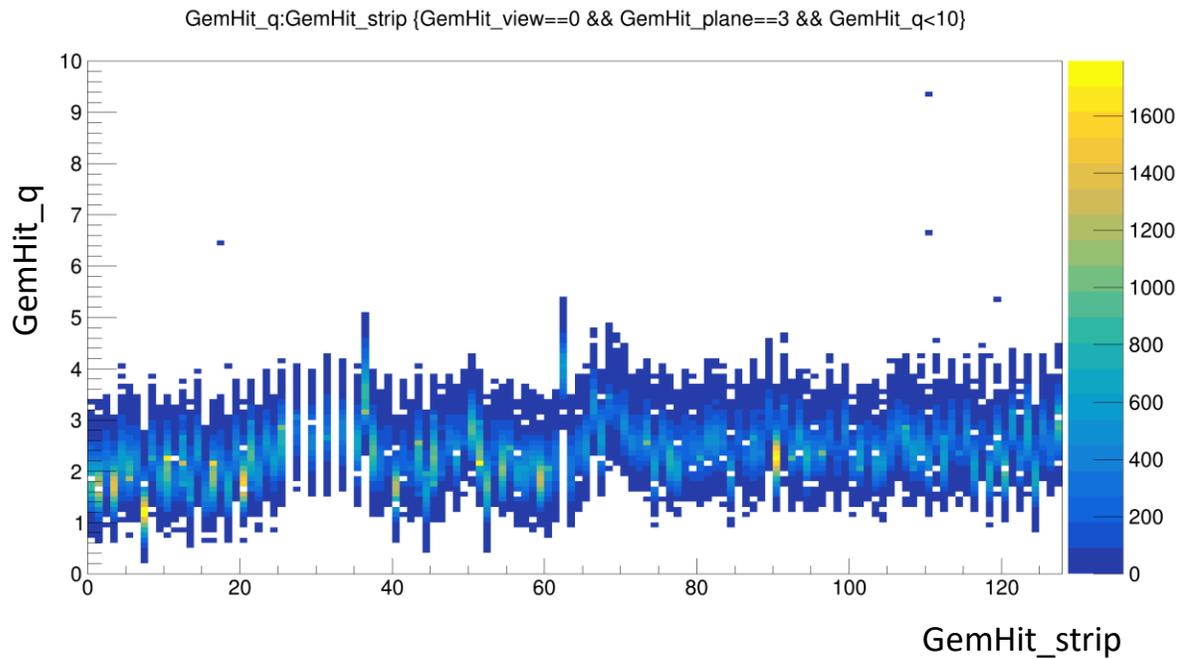


RUN 326 TIGER HV = 835V 890keventi



Le grandi differenze in occupancy sono dovute alle diverse impostazioni di soglia delle due elettroniche, al diverso livello di rumore intrinseco e al loro diverso funzionamento

Rnd Trg 326



La soglia efficace del TIGER è circa la stessa dell'APV nei run mostrati

Rate

Il rate medio per ogni vista e per ogni piano è dato da:

- **APV** $\rightarrow \frac{\text{conteggi}[v][p]}{128 * \text{trigger} * 675 * 10^{-9}}$

Strip Finestra di acquisizione

Tempo totale di acquisizione

- **TIGER** $\rightarrow \frac{\text{conteggi}[v][p]}{128 * \text{trigger} * 1675 * 10^{-9}}$

Strip Finestra di acquisizione

Tempo totale di acquisizione

Errore Rate

L'errore sul rate medio è calcolato come:

- **APV** $\rightarrow \frac{\sqrt{\text{conteggi}[v][p]}}{128 * \text{trigger} * 675 * 10^{-9}}$

dell'ordine dei 50keventi

- **TIGER** $\rightarrow \frac{\sqrt{\text{conteggi}[v][p]}}{128 * \text{trigger} * 1675 * 10^{-9}}$

dell'ordine dei 900keventi

Rate di Rumore

		Run APV 5254 HV 835V					Run TIGER 326 HV 835V				
Vista	Piano	Conteggi / Trigger		Rate (Hz)	Errore Rate (Hz)	Occupancy media	Conteggi / Trigger		Rate (Hz)	Errore Rate (Hz)	Occupancy media
0	0	731 /	50354	168	6	1,13E-04	492504 /	890275	2580	4	4,32E-03
0	1	2158 /	50354	496	11	3,35E-04	500623 /	890275	2623	4	4,39E-03
0	2	785 /	50354	180	6	1,22E-04	629942 /	890275	3300	4	5,53E-03
0	3	317 /	50354	73	4	4,92E-05	570634 /	890275	2990	4	5,01E-03
1	0	142 /	50354	33	3	2,20E-05	618536 /	890275	3241	4	5,43E-03
1	1	4606 /	50354	1059	16	7,15E-04	3489821 /	890275	18283	10	3,06E-02
1	2	1352 /	50354	311	8	2,10E-04	583242 /	890275	3056	4	5,12E-03
1	3	2016 /	50354	463	10	3,13E-04	514442 /	890275	2695	4	4,51E-03

Conclusioni

- Sono stati estratti i primi valori di rate di rumore e prodotti i primi grafici di occupancy su run di random trigger presi all'ultimo Test Beam sia per APV che per TIGER
- A parte un comportamento anomalo dovuto alla qualità del piedistallo i rate di rumore rimangono contenuti
- I rate di rumore e l'occupancy per le due elettroniche non sono comparabili, dati: le differenti impostazioni di soglia, il diverso livello di rumore intrinseco e il diverso funzionamento. A parità di soglia efficace il rate di rumore del TIGER è superiore a quello dell'APV
- Lo studio in corso è volto soprattutto ad indagare un possibile effetto del rumore sull'efficienza
- I risultati mostrati sono molto recenti e quindi da considerarsi preliminari

Outlook

- Estendere lo studio a più run di TIGER e APV
- Estrazione del rate medio da distribuzione dei rate delle singole strip e non da semplice media aritmetica
- Studi del rate in funzione dell'HV
- Utilizzo di eventi off-time per studio di rumore su run di segnale

Grazie per l'attenzione