ITS reconstruction: impact of noise and bad SSD strips

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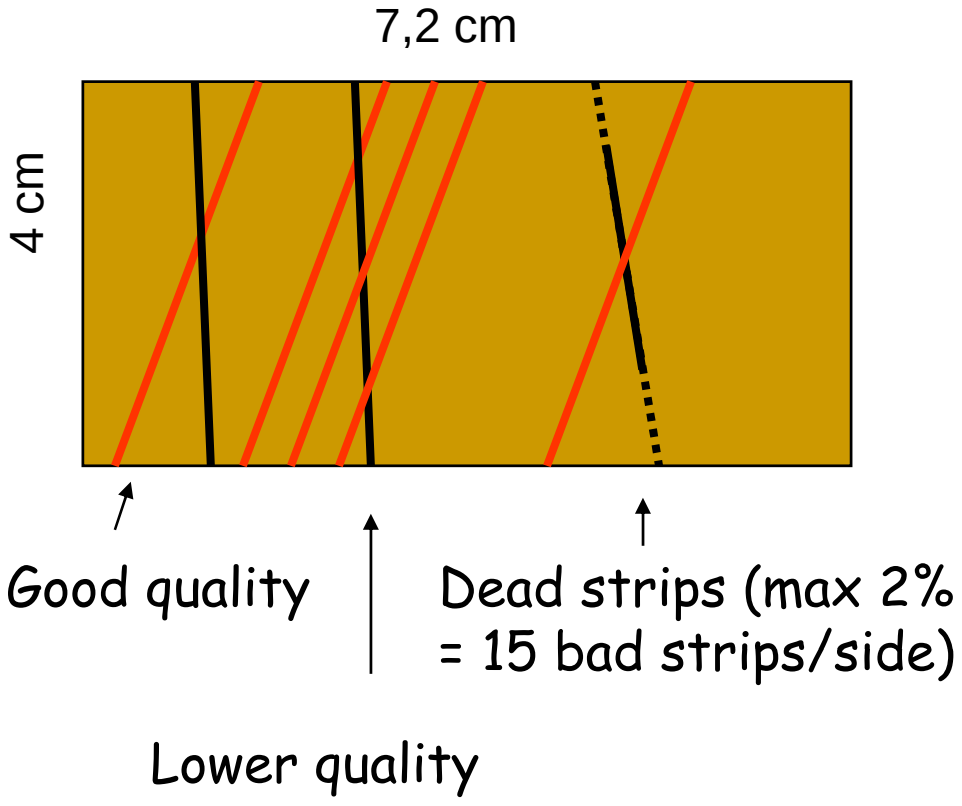
Offline week, 9-10-2007

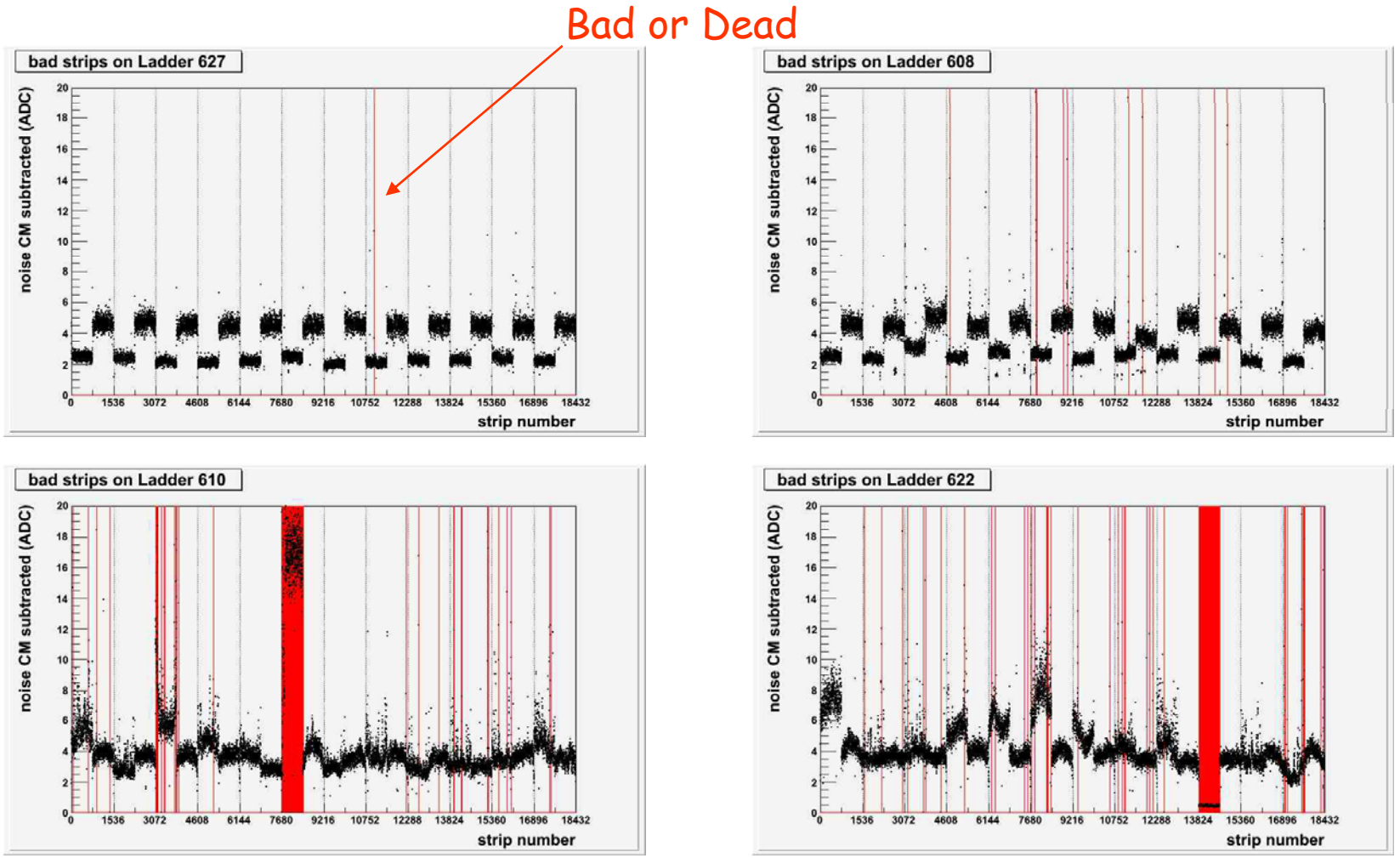
How SSD works



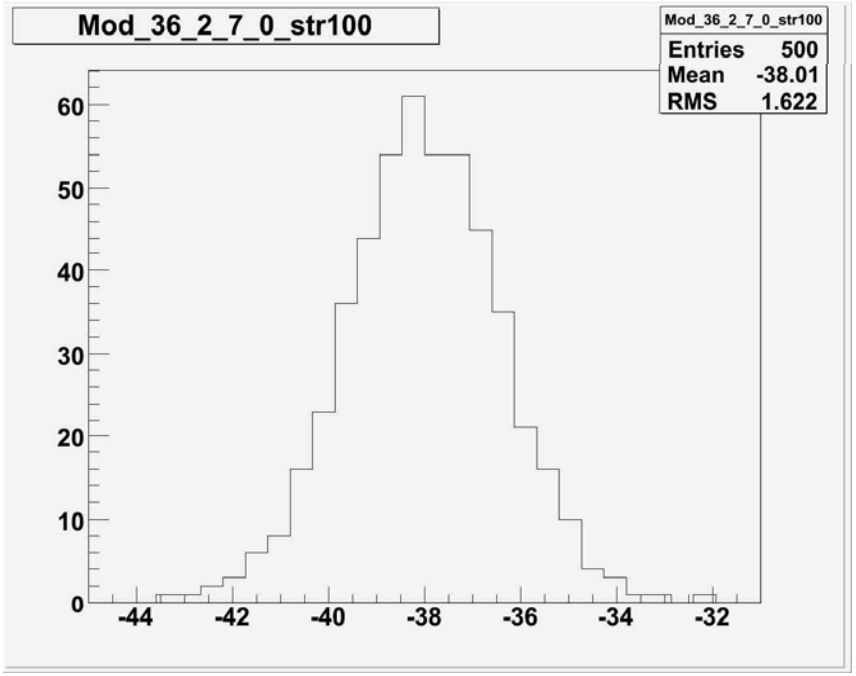
- 748 (lay5) +950 (lay6) =1698 double-sided SSD modules
- 768 strips per side
- 35 mrad stereo angle

- Typical charge is 50 (in ADC channels) after pedestal subtraction
- Typical noise is 2 (on Pside) and 4 (on Nside) (in ADC channels)
- Not bad provided noise is gaussian

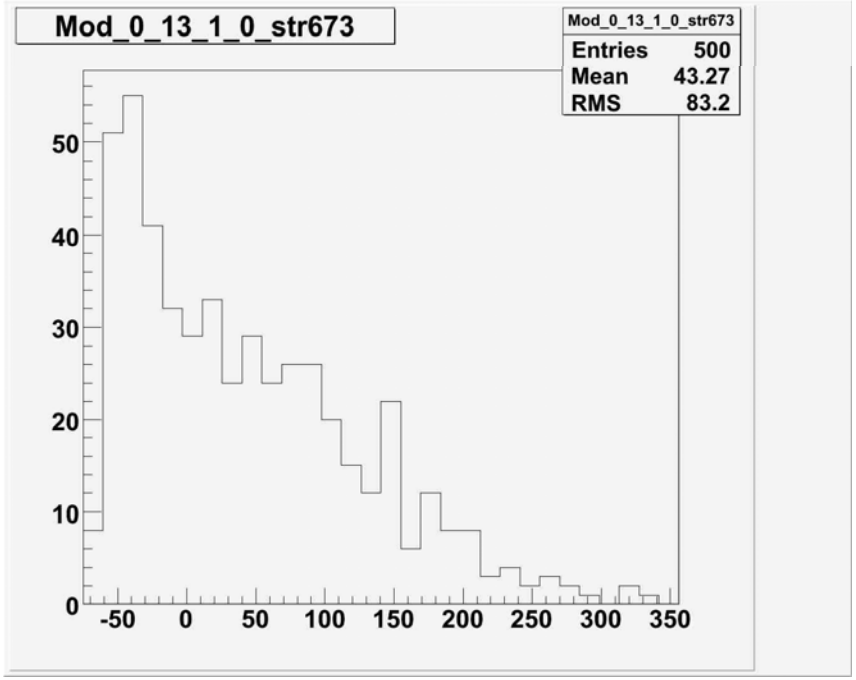
Noise and bad channels (from tests)



Gaussian and non-gaussian behaviours



Noise charge distribution (ADC)



Noise charge distribution (ADC)

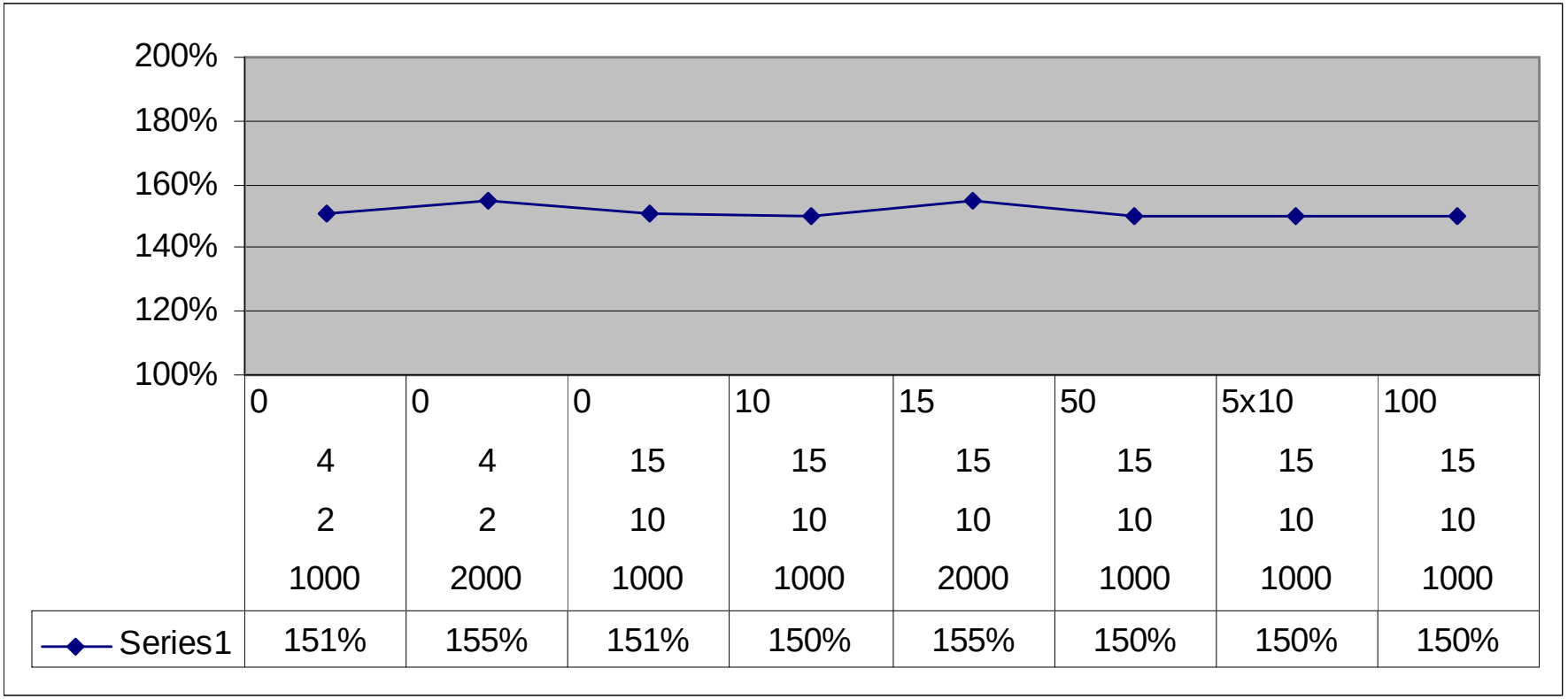
Simulated effect of noise and dead channels in the reconstruction

- Simulation of high-momentum pi+ (3-10 GeV/c) in -0.9<eta<0.9, 0<phi<45 (corresponds to 1/8 of each SSD layer, ~100 modules per SSD layer)
- Simulation with 1000 and 2000 pi's (corresponds to 8000 and 16000 in ITS, 40000 and 80000 in ALICE, respectively. Leads to a density of 10 and 20 tracks per SSD module)
- Simulations repeated changing noise values and number of dead strips. Looked at the tracking efficiencies

Pions	1000	1000	1000	1000	1000	1000	2000	2000
Pnoise	2	10	10	10	10	10	2	10
Nnoise	4	15	15	15	15	15	4	15
#dead/side	0	0	10	50	5x10	100	0	15

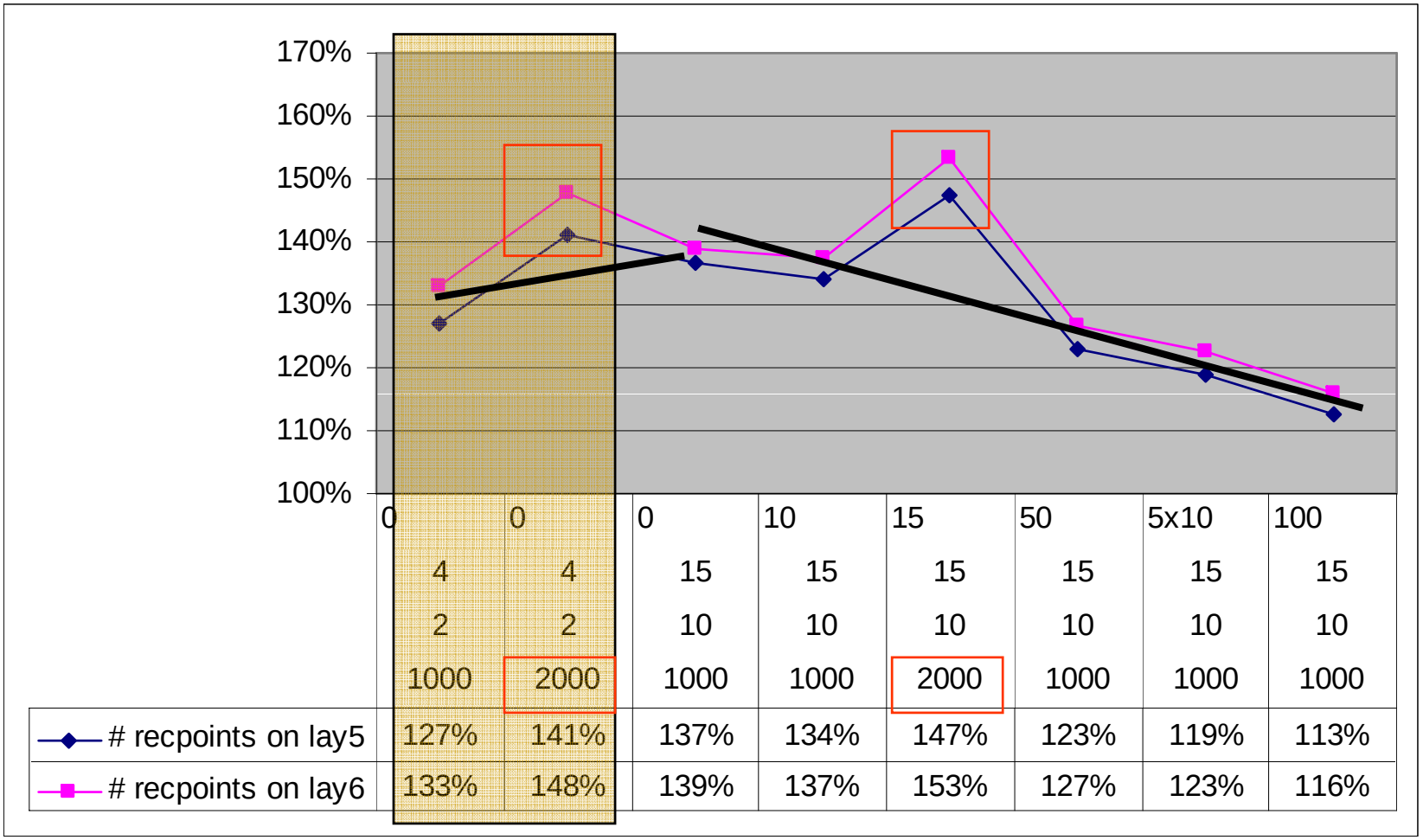
Pions, Pnoise, Nnoise, #dead/side	1000,2,4,0
ESD tracks	1509
Recpoints on Lay5	1270
Recpoints on Lay6	1328
ITSrefit tracks	995 (99.5%)
BadQual/ SSD6used	92/955

ESD tracks / # primaries pions



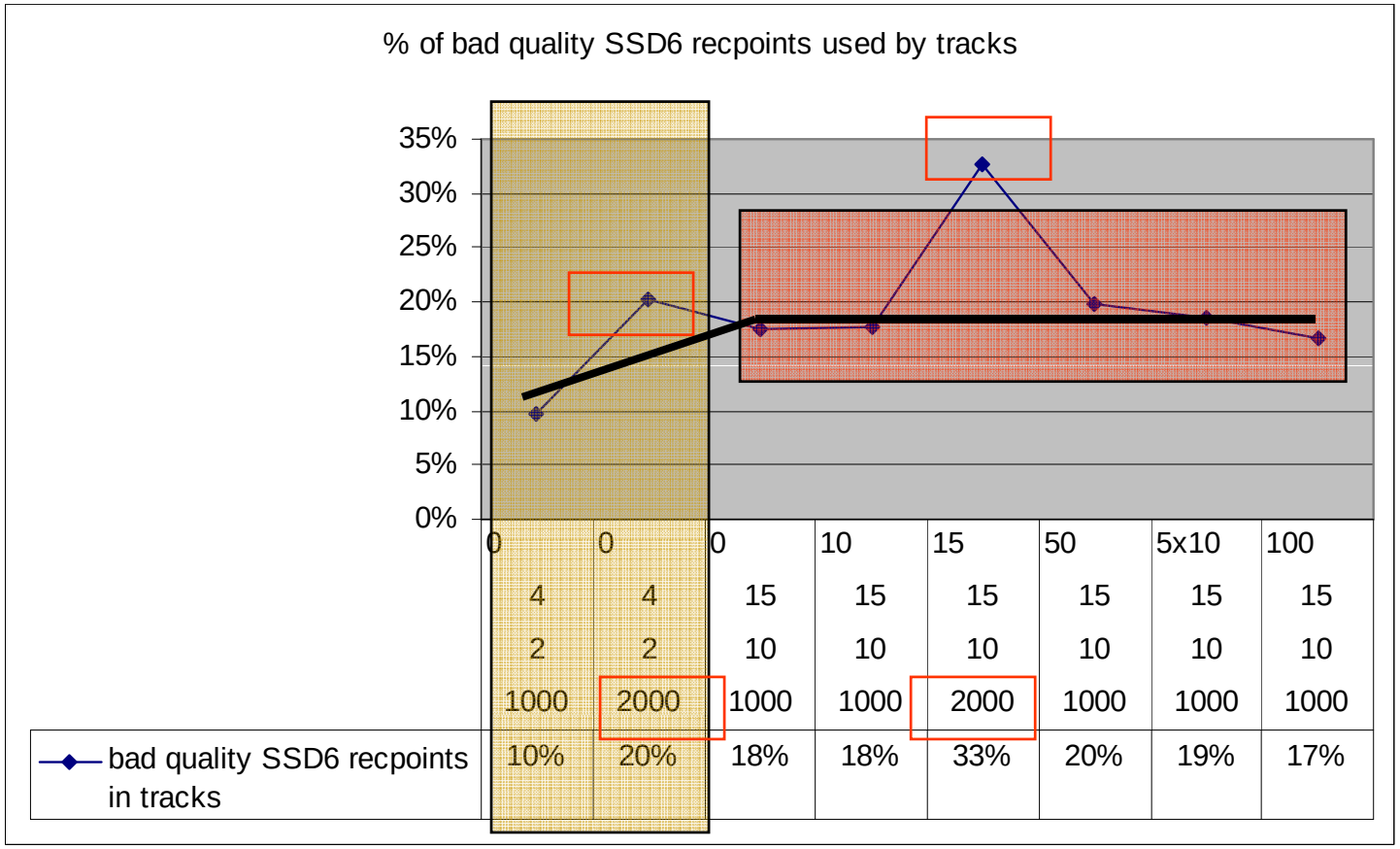
	0	0	0	10	15	50	5x10	100
	4	4	15	15	15	15	15	15
	2	2	10	10	10	10	10	10
	1000	2000	1000	1000	2000	1000	1000	1000
Series1	151%	155%	151%	150%	155%	150%	150%	150%

recpoints / # primaries

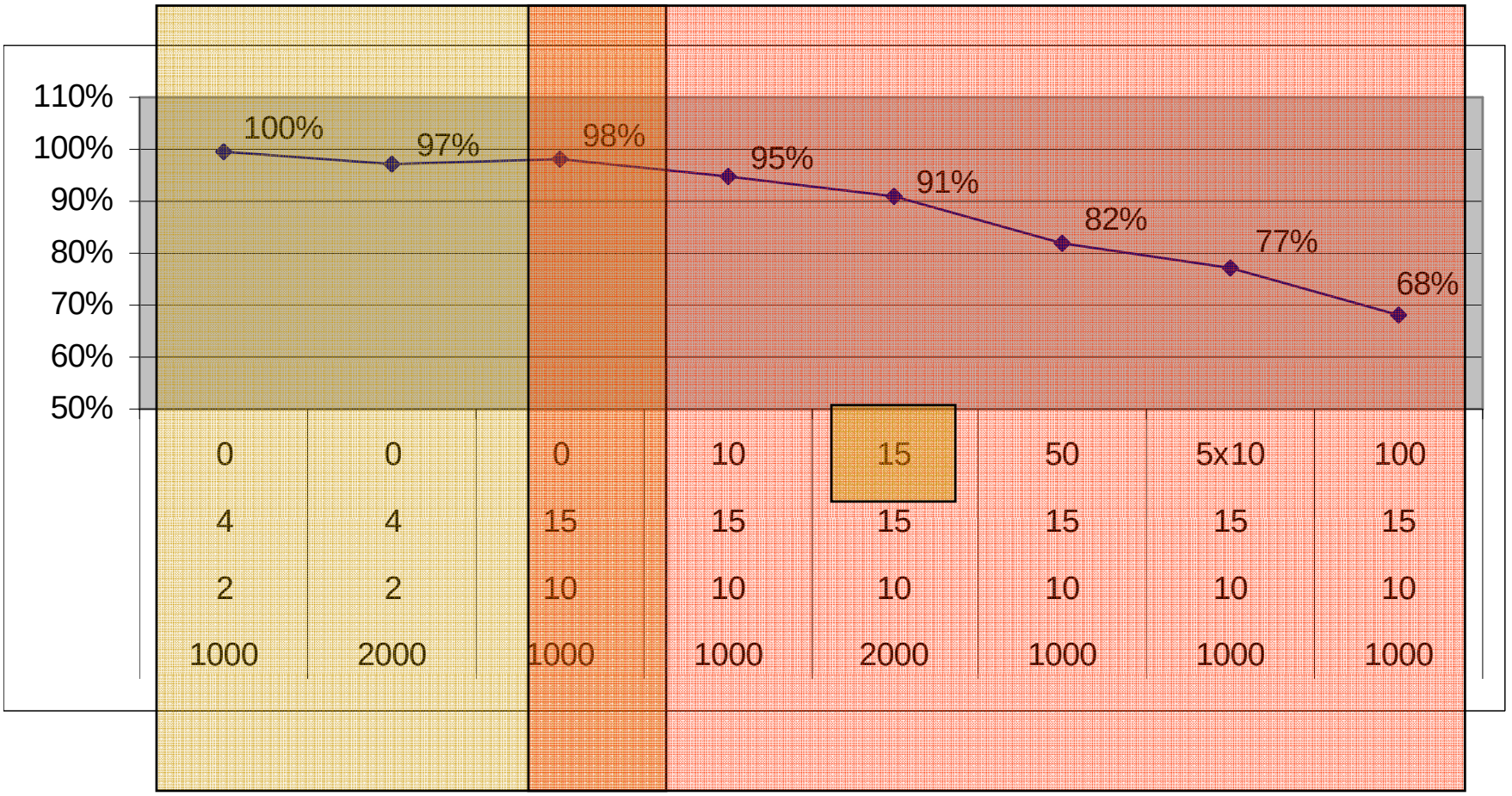


	0	0	0	10	15	50	5x10	100
	4	4	15	15	15	15	15	15
	2	2	10	10	10	10	10	10
	1000	2000	1000	1000	2000	1000	1000	1000
# recpoints on lay5	127%	141%	137%	134%	147%	123%	119%	113%
# recpoints on lay6	133%	148%	139%	137%	153%	127%	123%	116%

Bad quality recpoints



ITS-refit tracks / # primaries pions



Conclusions

- Noise mainly affects the quality of recpoints, provided it is gaussian and correctly calculated by the DA (work in progress)
- Noise threshold in the CF will be implemented soon
- Bad (dead+noisy) channels affect reconstruction removing recpoints from the SSD layers (mandatory for ITSrefit!?)
- In the worse case (2%) up to 10% ITSrefit tracks missing
- Calls for algorithms recovering clusters if strips from bad channels map are involved