Background Calculations for the NEW KLOE IR

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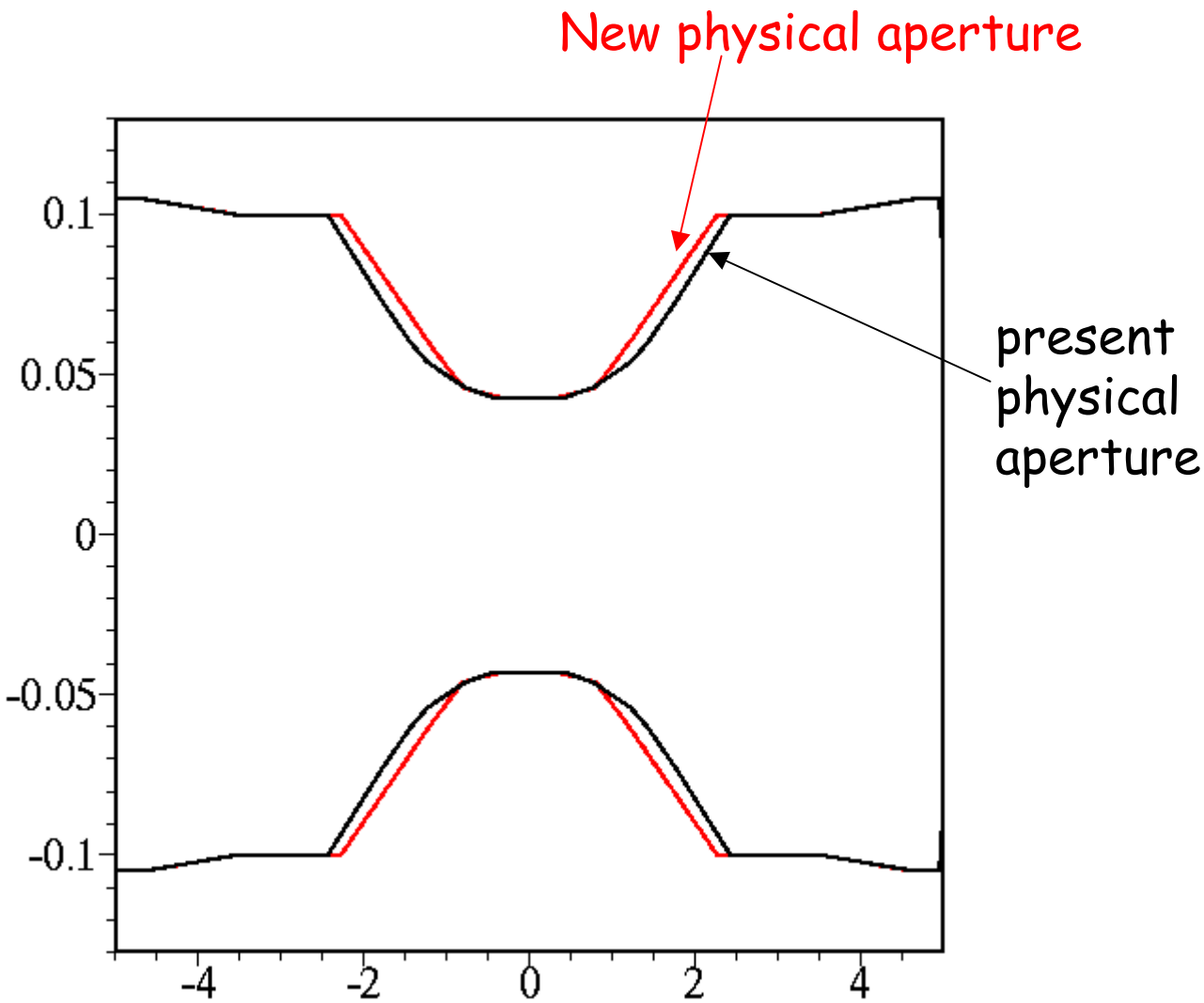
Steps

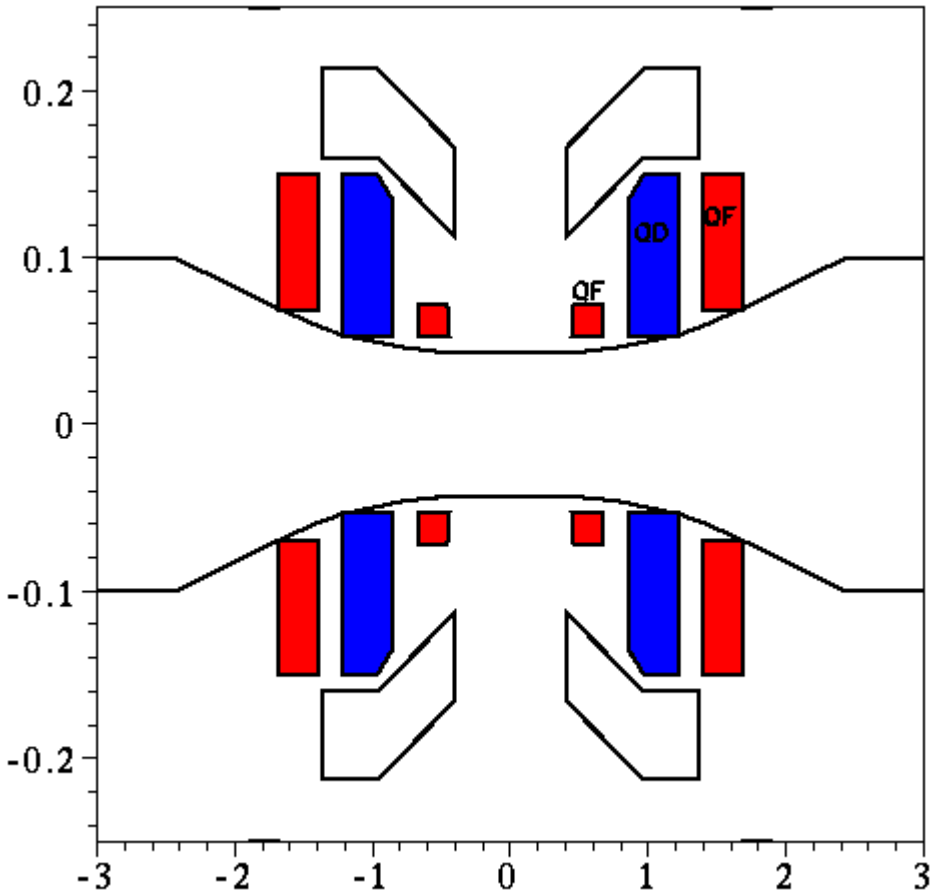
- Optics with new KLOE IR: idea is to change only the IR to have different dN/dt only due to a change of IR;
- NEW KLOE IR physical aperture in the simulation;
- Loss rates at KLOE IR and along ring evaluated;
- Compared to simulations with present KLOE IR;
- Output used as GEANT input ➡ masks to be added (Mario's talk).

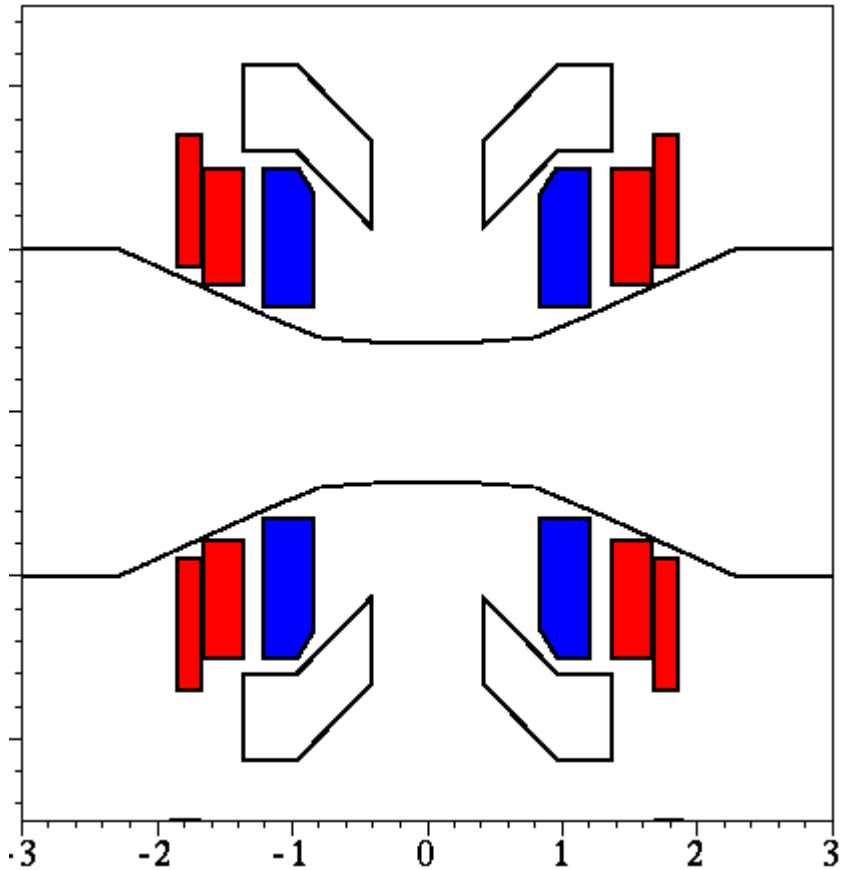
Physical Aperture in the KLOE IR



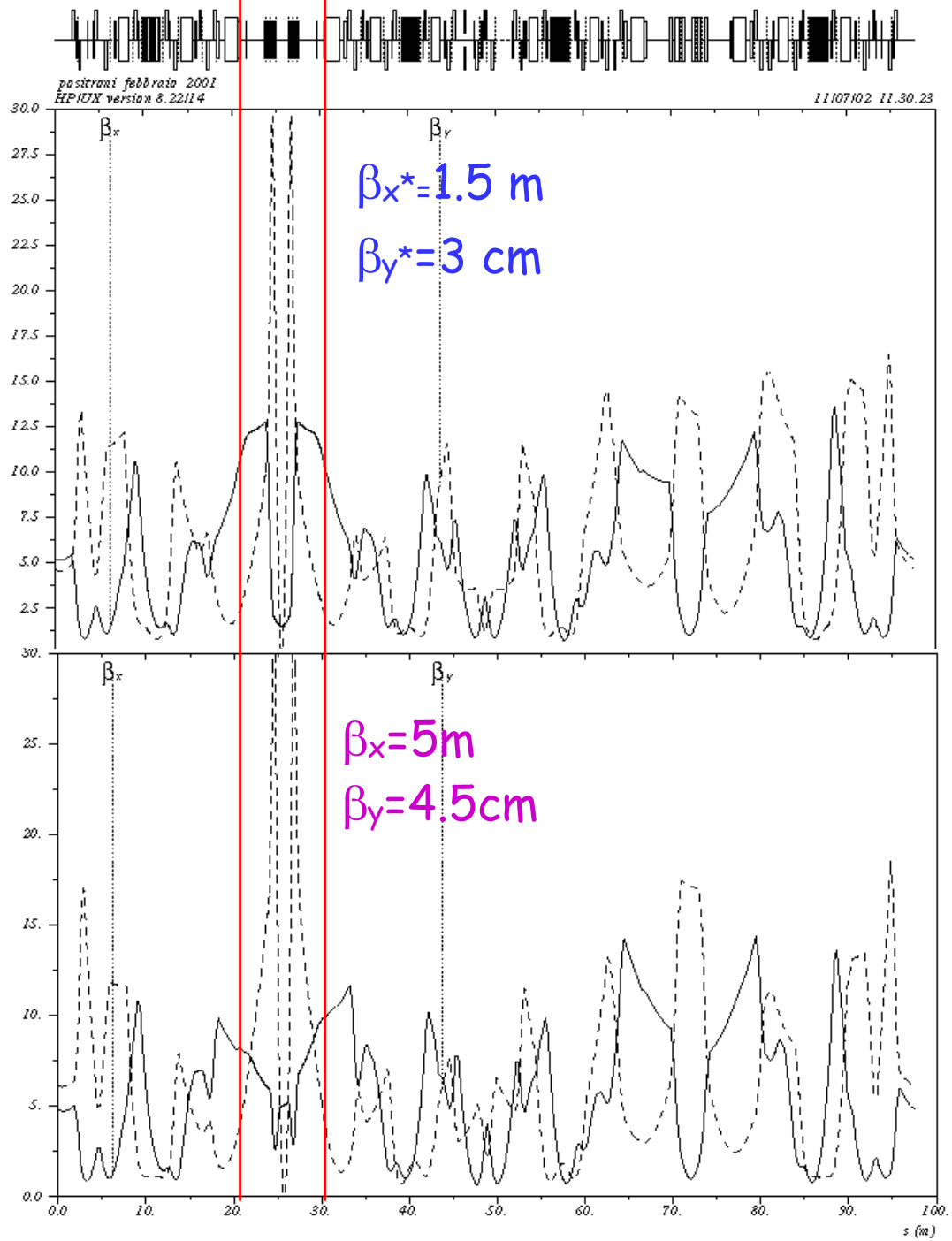
PRESENT
KLOE IR

NEW
KLOE IR





Optics used for comparison



lattice with new KLOE IR

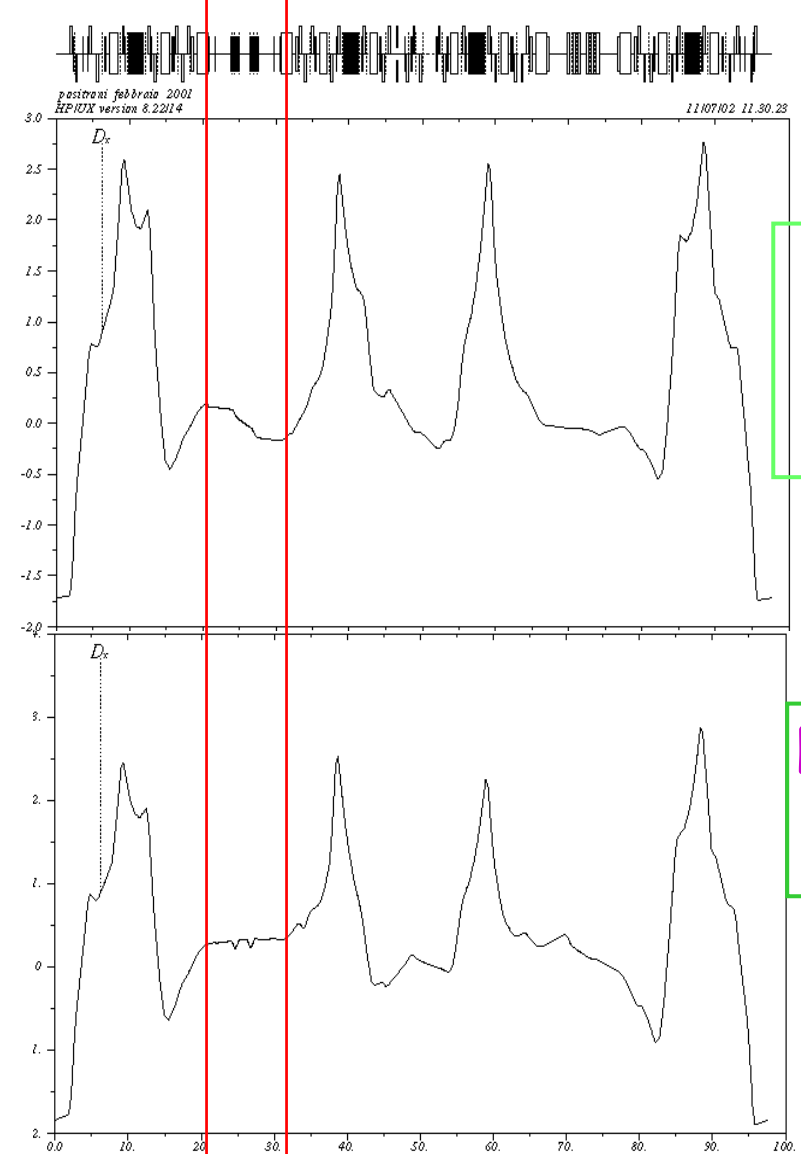
ε_x=0.99mm mrad

θ_x=15.5 mrad

(first) detuned lattice

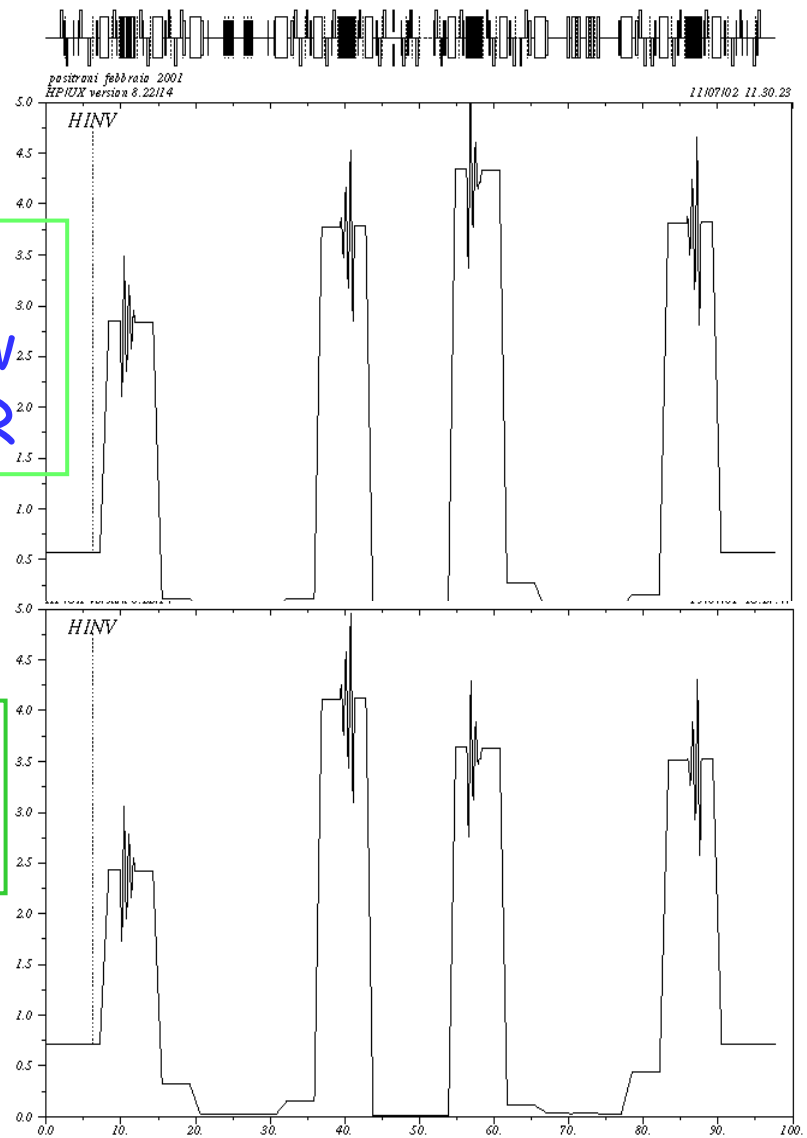
ε_x=0.87mm mrad

θ_x=12.5 mrad



Lattice with new KLOE IR

Detuned lattice



Sextupoles Set

Lattice with new KLOE IR

β_x^*=1.5 m

β_y^*=3 cm

Sextp. OFF

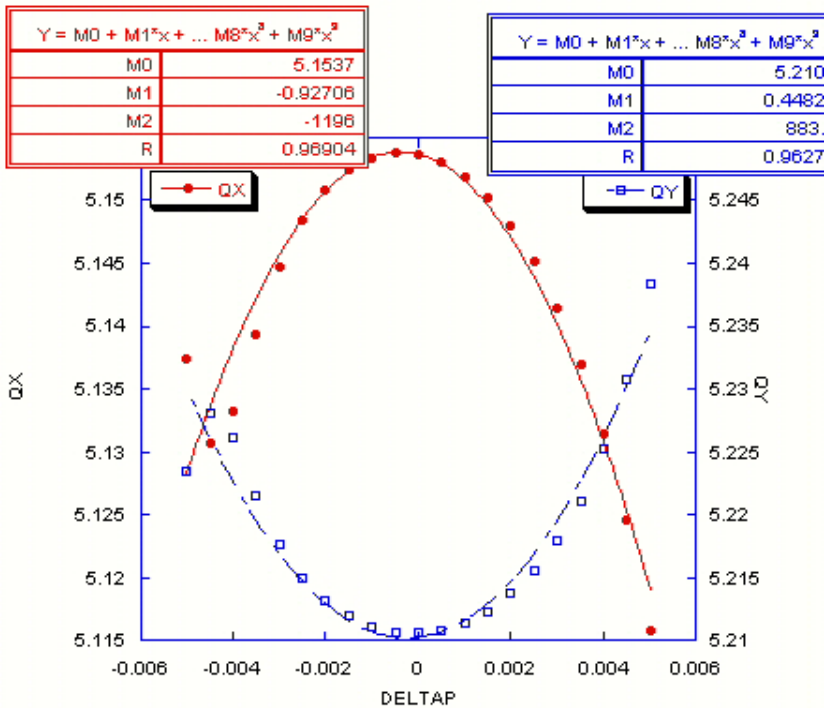
Cx= -9.1

Cy= -14

Sextp. ON

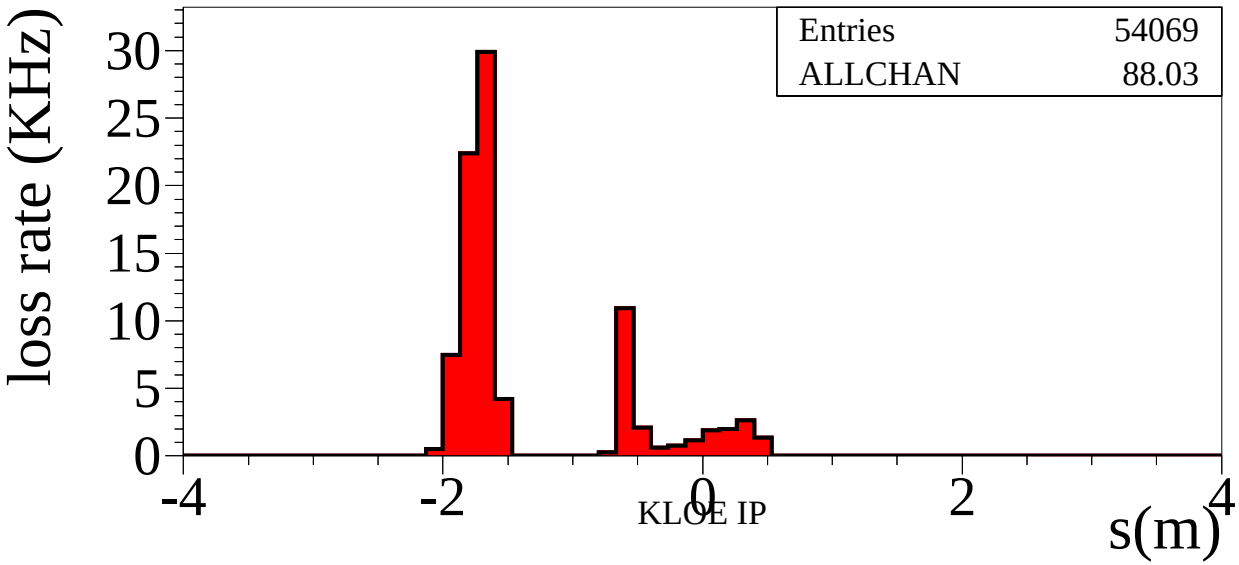
Cx= -0.9

Cy= 0.45

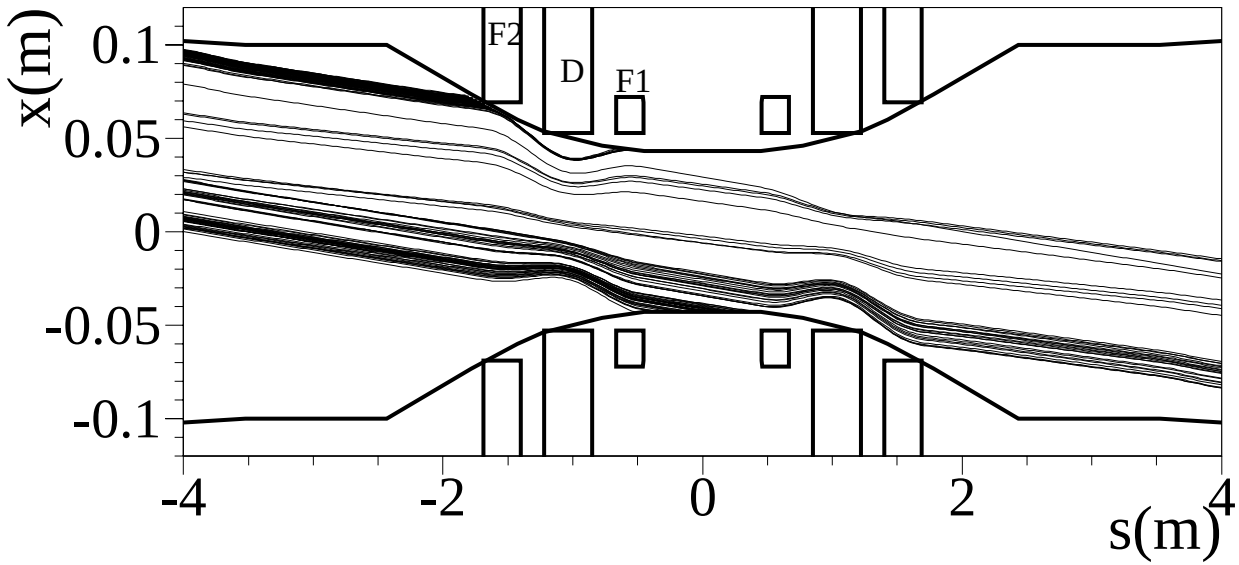


	Lattice new KLOE IR	Percentage value with respect to June '02 set value
CSPL101	-13.5	90%
CSPL102	28	0
CSPL103	-137.6	86%
CSPL104	0.0	0
CSPS101	0.0	0
CSPS102	-72	90%
CSPS103	28	0
CSPS104	0.0	0
CSPS201	0.0	0
CSPS202	29	0
CSPS203	-9.9	90%
CSPS204	0.0	0
CSPL201	0.0	0
CSPL202	-22.5	90%
CSPL203	24	0
CSPL204	-27	90%

Touschek particles trajectories at KLOE IR



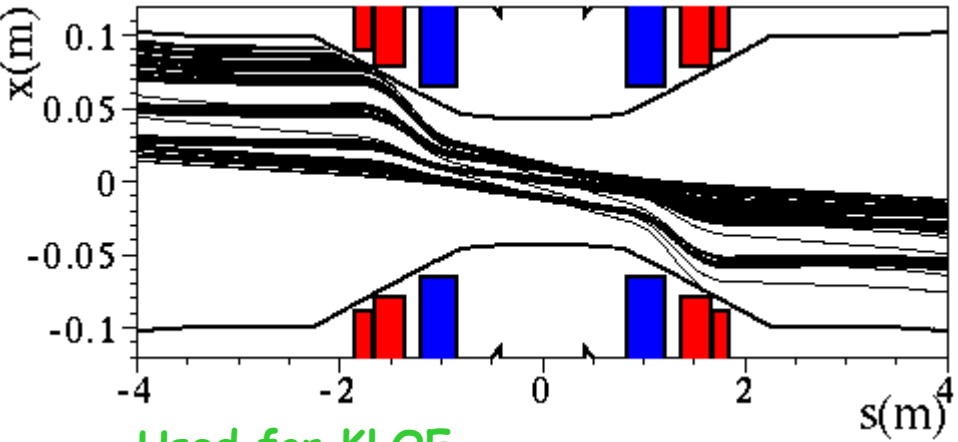
detuned optics and present KLOE IR

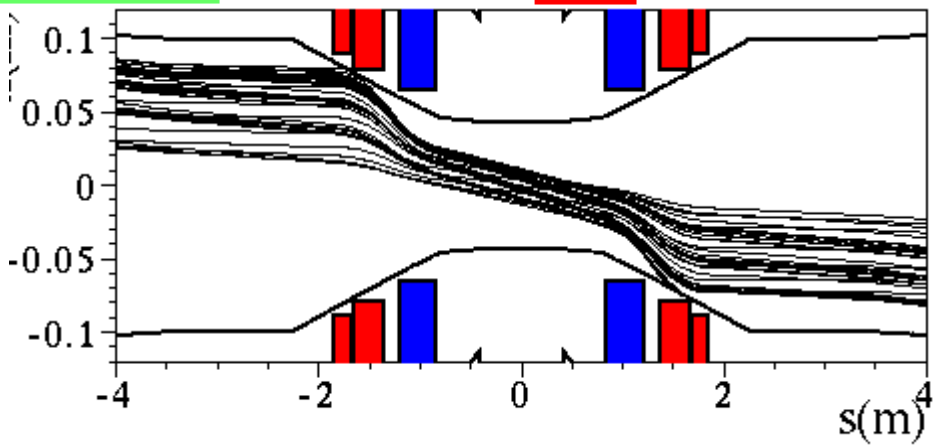


PL1

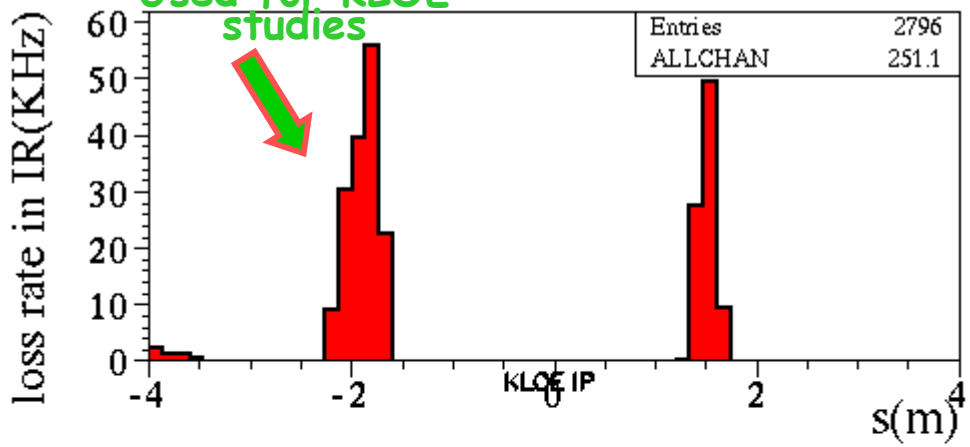
NEW KLOE IR

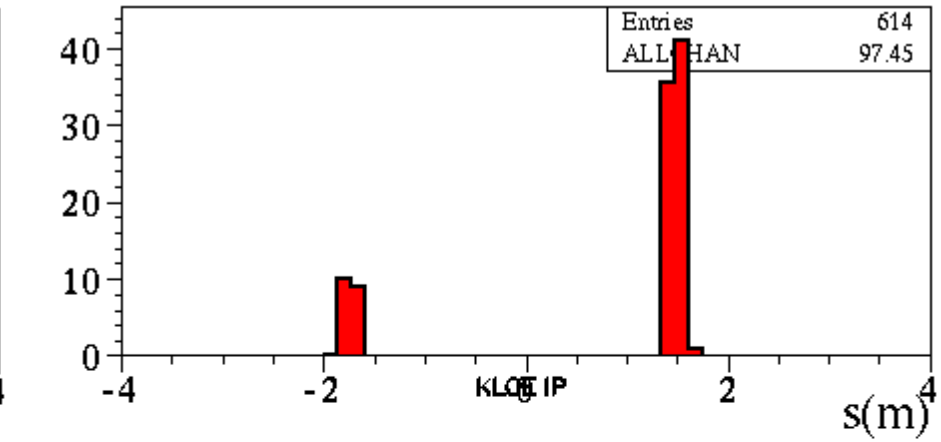
PS1

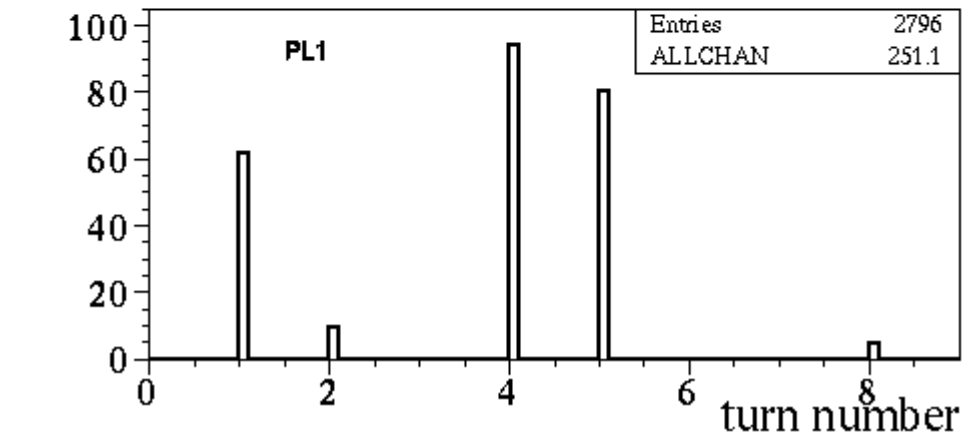


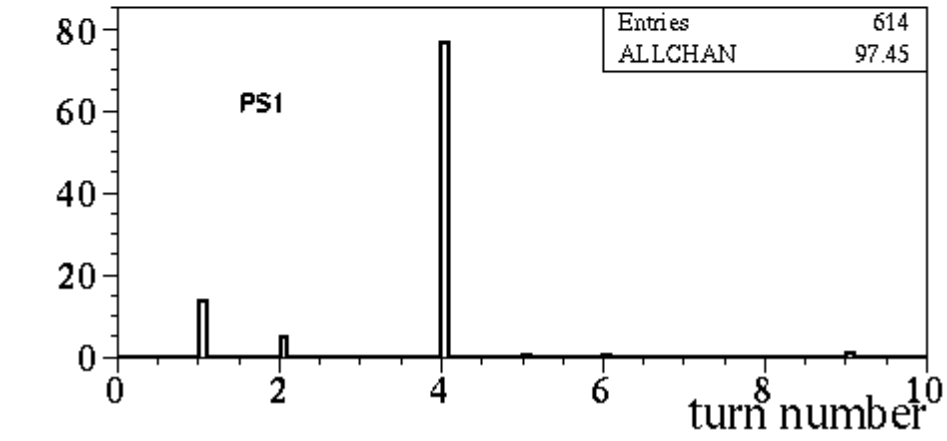


Used for KLOE studies









dN/dt(KHz)

I_b=10mA n_b=1 (nt=10 sextp.+ octp.)

	arc	KLOE IR -4m<s<4m	ALL RING
Lattice with new KLOE IR	PL1	251.1* (54.5 nt=1)	362
	PS1	97.5* (6.7 nt=1)	336
Detuned lattice	PL1	50.7 (20 nt=1)	249.1
	PS1	37.4	339.7

* half in forward direction (after IP)

Scrapers sets that cut KLOE bkg particles

Particles generated close to KLOE and lost right away (dN/dt~54 KHz)

PL1 Lost at nt=1

SCHPL101_ext/int +15/-15 → dN/dt(@KLOE) reduction factor ~ 2

(15mm is about the limit position for edge effect- depending on orbit)

Particles generated close to KLOE and lost in the first turns (dN/dt~250 KHz)

PL1 nt< 10

SCHPL101_ext	20
SCHPS201_ext	22
SCHPS101_ext	20
SCHPL201_ext	30
SCHPL110_int	24

→ dN/dt(@KLOE) reduction factor ~20

Particles generated farther from KLOE (dN/dt~97 KHz)

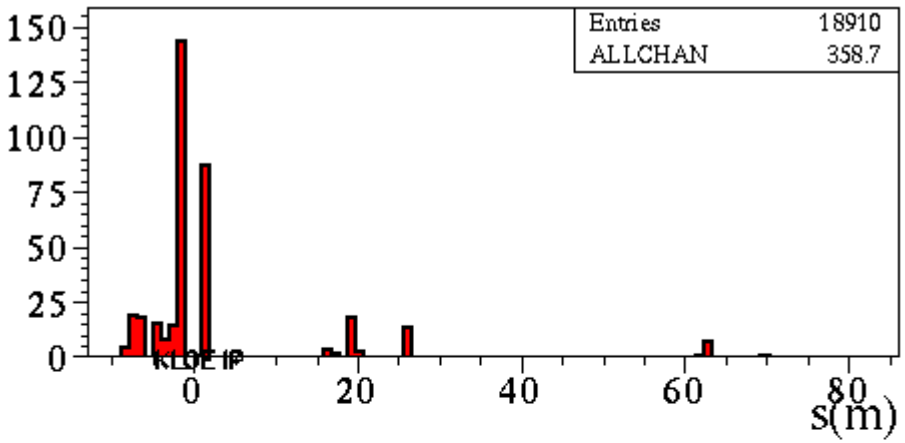
PS1 nt< 10

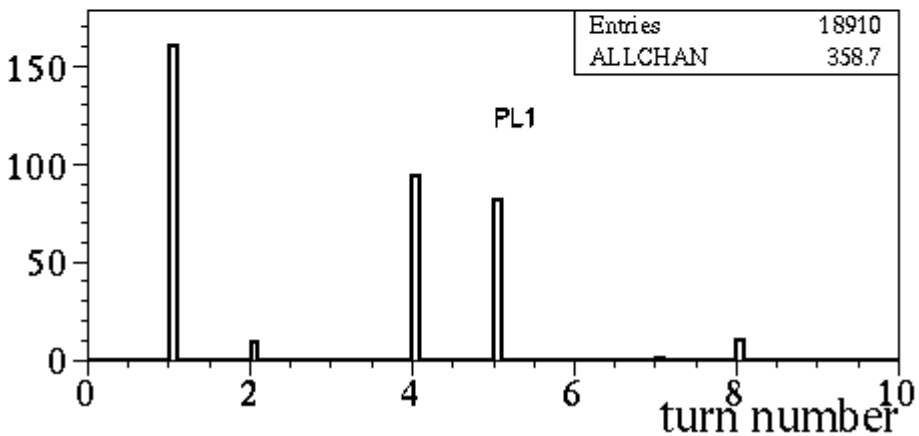
SCHPL101_ext	20
SCHPS201_ext	14
SCHPL110_int	-10

→ dN/dt(@KLOE) = 0

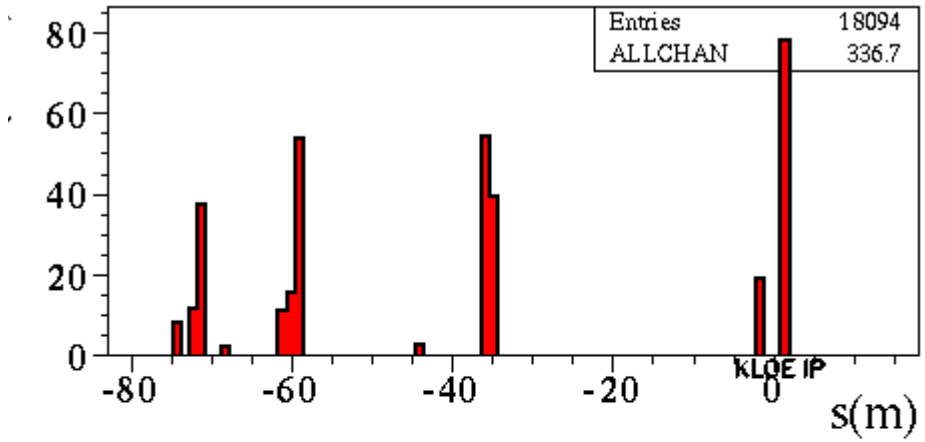
Touschek particles lost along the ring and generated at:

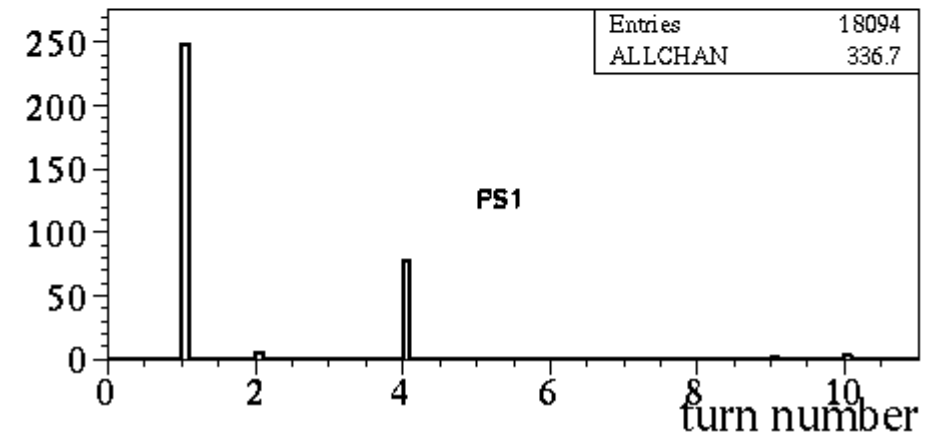
PL1





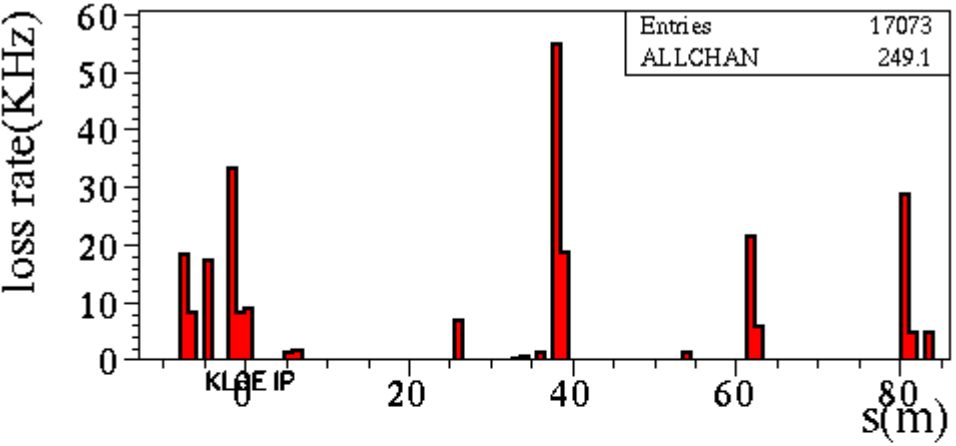
PS1

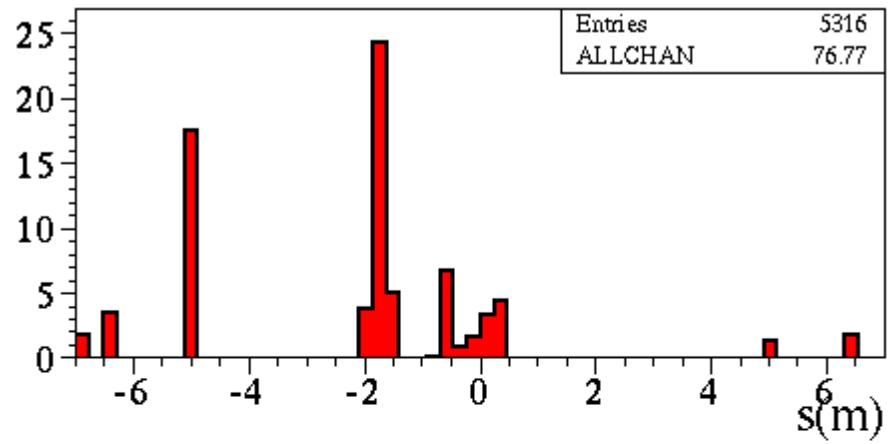


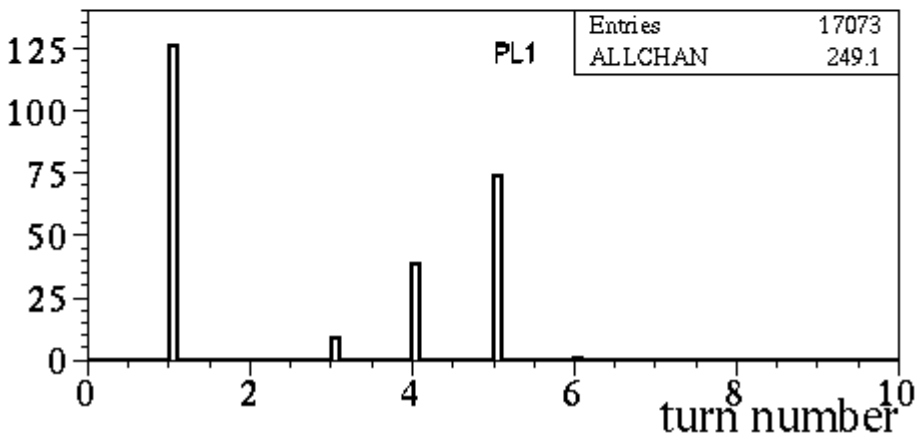


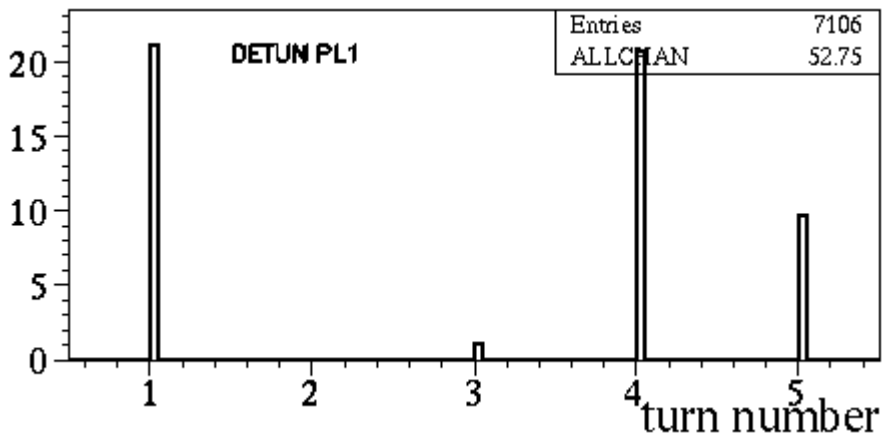
Detuned lattice

PL1









Conclusion

Expected background rates increased…..BUT:

- More losses at nt>1
- Half of total losses are in forward direction

  (should be less dangerous)
- No background in the central region

  (background in drift chamber)