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Kloster Seeon



SynRad simulation for BEAST

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DESY

Update of Phase2 Status

Status of Phase2

HEPEvt files for both HER and LER for detuned optics are recreated with correct thickness of plated gold ($6.6\mu\text{m}$). Files with gold thickness $10\mu\text{m}$ are also available.

The threshold for the SynRad photons was changed to 4.3KeV in conformity with photon attenuation coefficient for $6.6\mu\text{m}$ of gold.

KEKCC: </home/belle/soloviev/SynRadBeast/Phase2>

subdirs : [dt_4-8_6um](#) ($6\mu\text{m}$), [dt_4-8](#) ($10\mu\text{m}$), [nominal](#) ($10\mu\text{m}$).

HEPEvt files for nominal optics are created assuming gold thickness $10\mu\text{m}$.

Steering file example is modified for new HEPEvt files, see also READMEBeastPh2.

All detuned and nominal cases are normalized for beam currents of Phase2: 0.8A for HER and 1.0A for LER (design currents : 2.6A for HER and 3.6A for LER).

Simulation using created HEPEvt files for HER and LER with hypothetical assumption that full PXD will be installed in Phase2 was done for detuned options for 100ROF (2msec).

Atomic Deexcitation processes (FLUO and PIXE) included in Physics list (as always).

Contribution to SynRad from LER makes up $\sim 3\%$ of SynRad from HER (both for detuned and nominal cases).

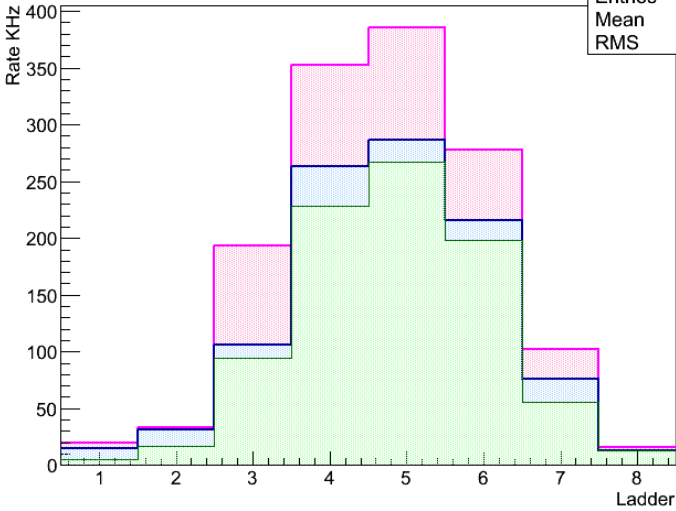
Hit Rates

Color Code:

Detuned gold 6.6 μm , Detuned gold 10 μm , Nominal gold 10 μm

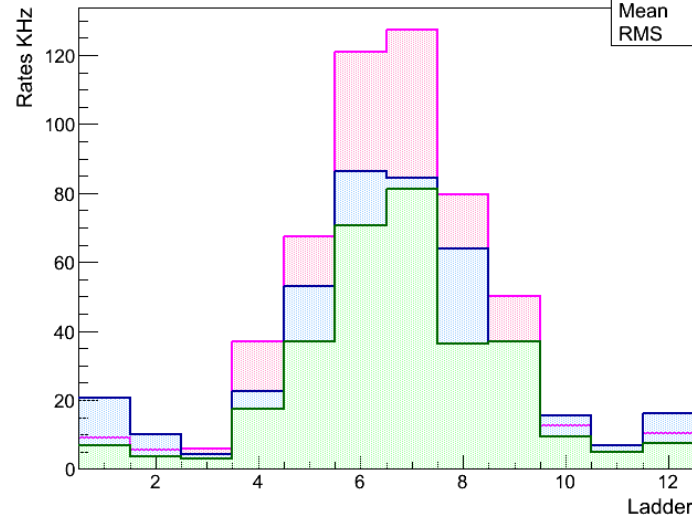
Layer 1 Sensor 1

hlad11	
Entries	2762
Mean	4.72
RMS	1.336



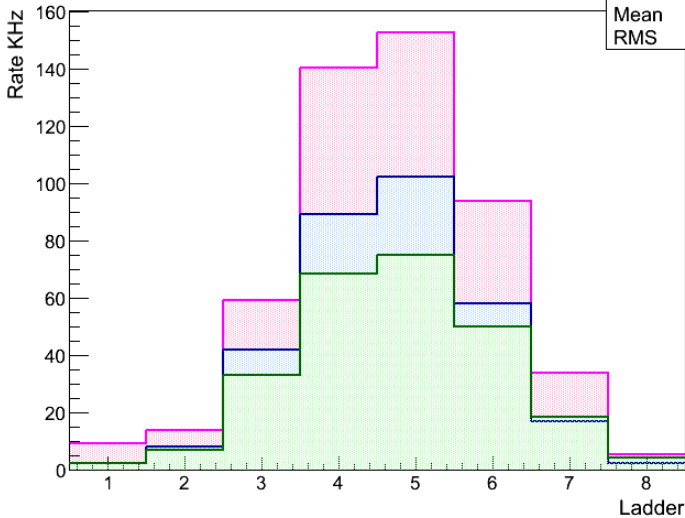
Layer 2 Sensor 1

hlad21	
Entries	1062
Mean	6.655
RMS	1.918



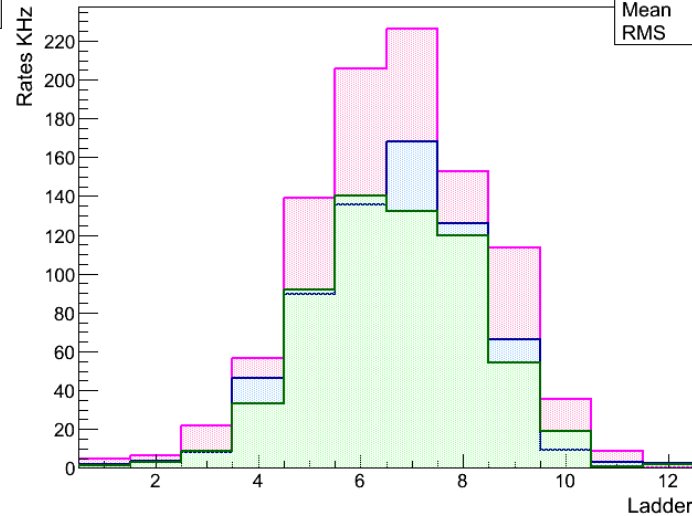
Layer 1 Sensor 2

hlad12	
Entries	1020
Mean	4.684
RMS	1.317



Layer 2 Sensor 2

hlad22	
Entries	1944
Mean	6.708
RMS	1.741



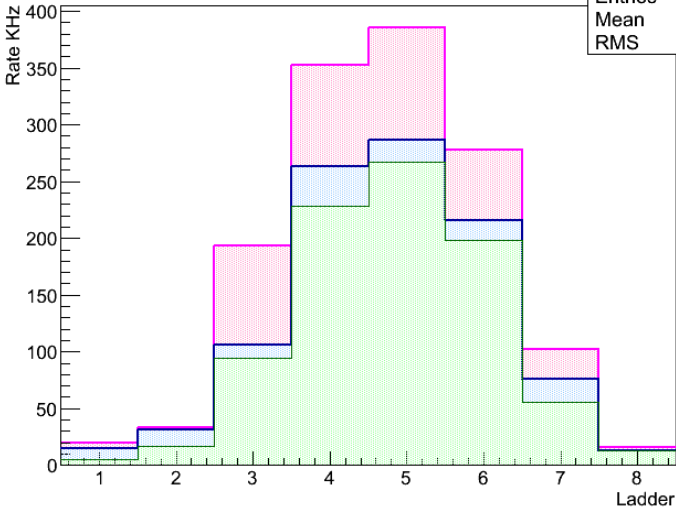
Hit Rates

Color Code:

Detuned gold 6.6 μm , Detuned gold 10 μm , Nominal gold 10 μm

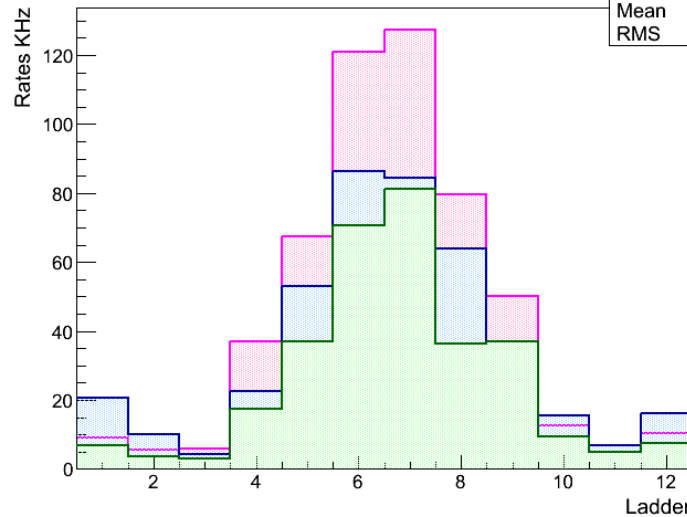
Layer 1 Sensor 1

hlad11	
Entries	2762
Mean	4.72
RMS	1.336



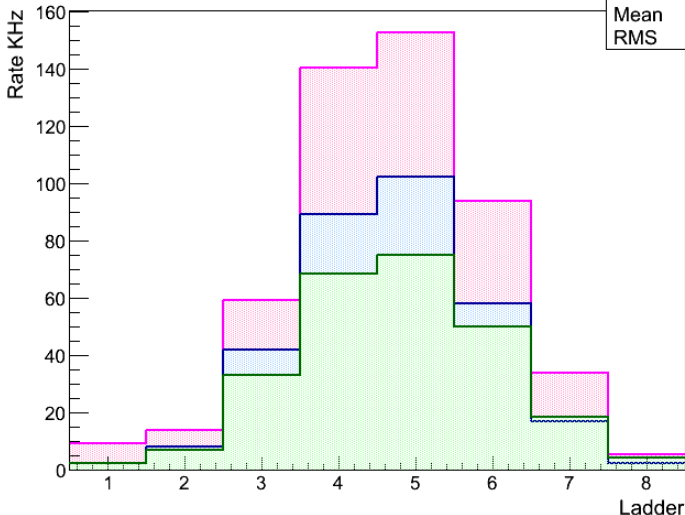
Layer 2 Sensor 1

hlad21	
Entries	1062
Mean	6.655
RMS	1.918



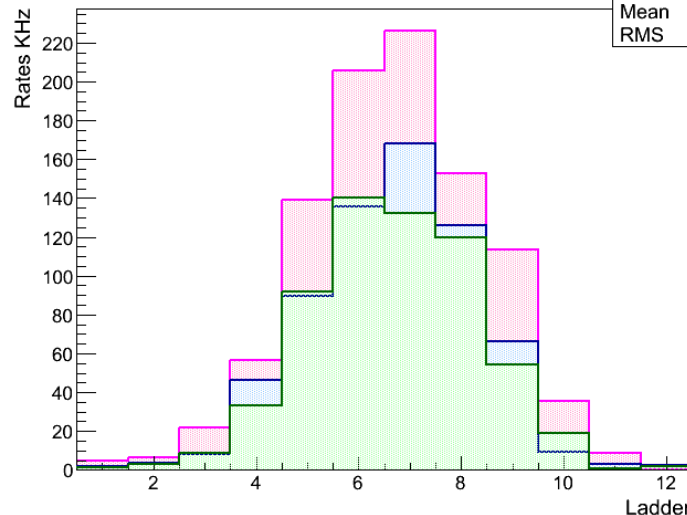
Layer 1 Sensor 2

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Layer 2 Sensor 2

hlad22	
Entries	1944
Mean	6.708
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Using scaling factor 10 μm /6.6 μ for detuned case (~ 1.7) and assuming the worst case of flat beam tails with fraction $1\text{e-}5$ of the core \rightarrow maximal occupancy for 6.6 μm of gold in phase3 is expected as

$\sim 0.1\%$

(0.05% for 10 μm)

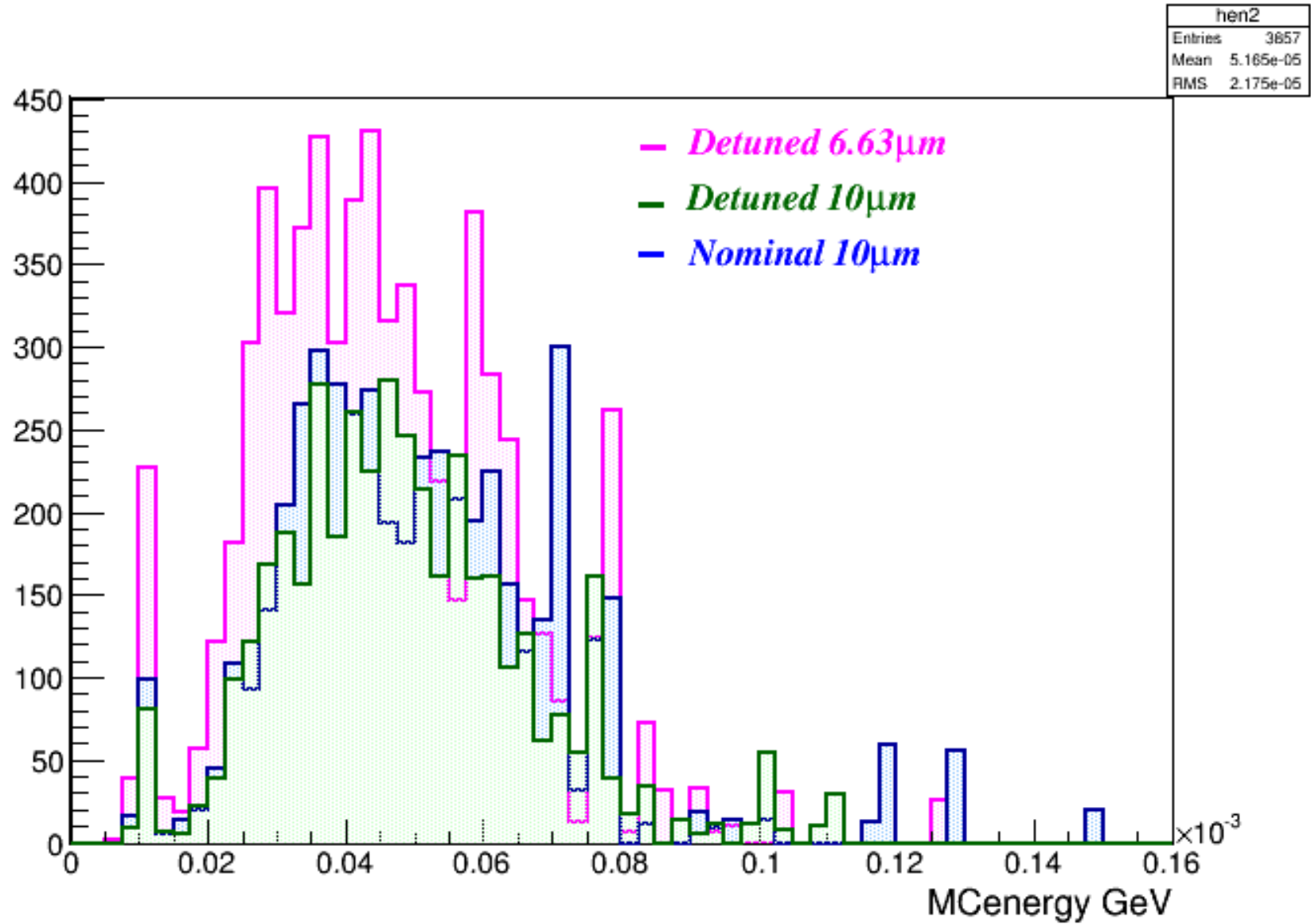
and for the tail's fraction $1\text{e-}7$ (from beam beam simulation)

$\sim 0.02\%$

(0.01% for 10 μm)

Still tolerable !

Energy Spectrum



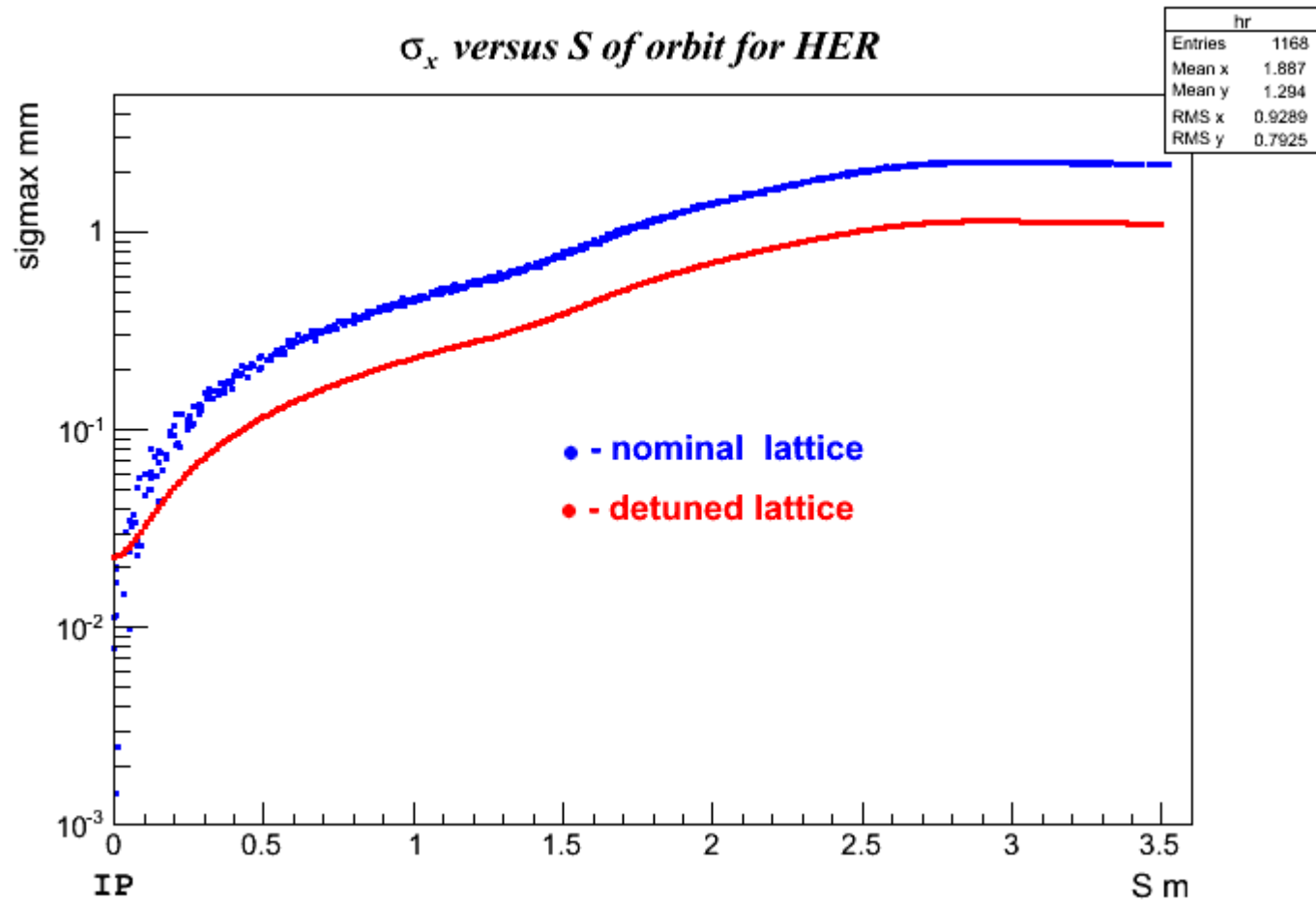
Conclusions

1. HEPEvt files for simulation of synchrotron radiation background for Phase2 (both for thickness of gold plated on central beam pipe of $10\mu\text{m}$ and $6.6\mu\text{m}$) are created and available for use.
2. Detuned optics doesn't worsen the SynRad background at IP, i.e. hit rates and occupancy in PXD.
3. Hit Rate (occupancy) in PXD for Phase3 is estimated for the most worse case of beam tails (fraction $1\text{e-}05$ of core beyond $10\sigma_x$ and $30\sigma_y$) as **0.1%** and for ideal beam tails (fraction $1\text{e-}07$ of core) as **0.02%** and is tolerable with limit (1%) for gold thickness of $6.6\mu\text{m}$

Thank you for your attention

Additional material

Beam size in X plane versus S orbit



Energy Spectrum

