



Update on DCH Background studies using FullSim

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SuperB Collaboration Meeting, LNF, Frascati

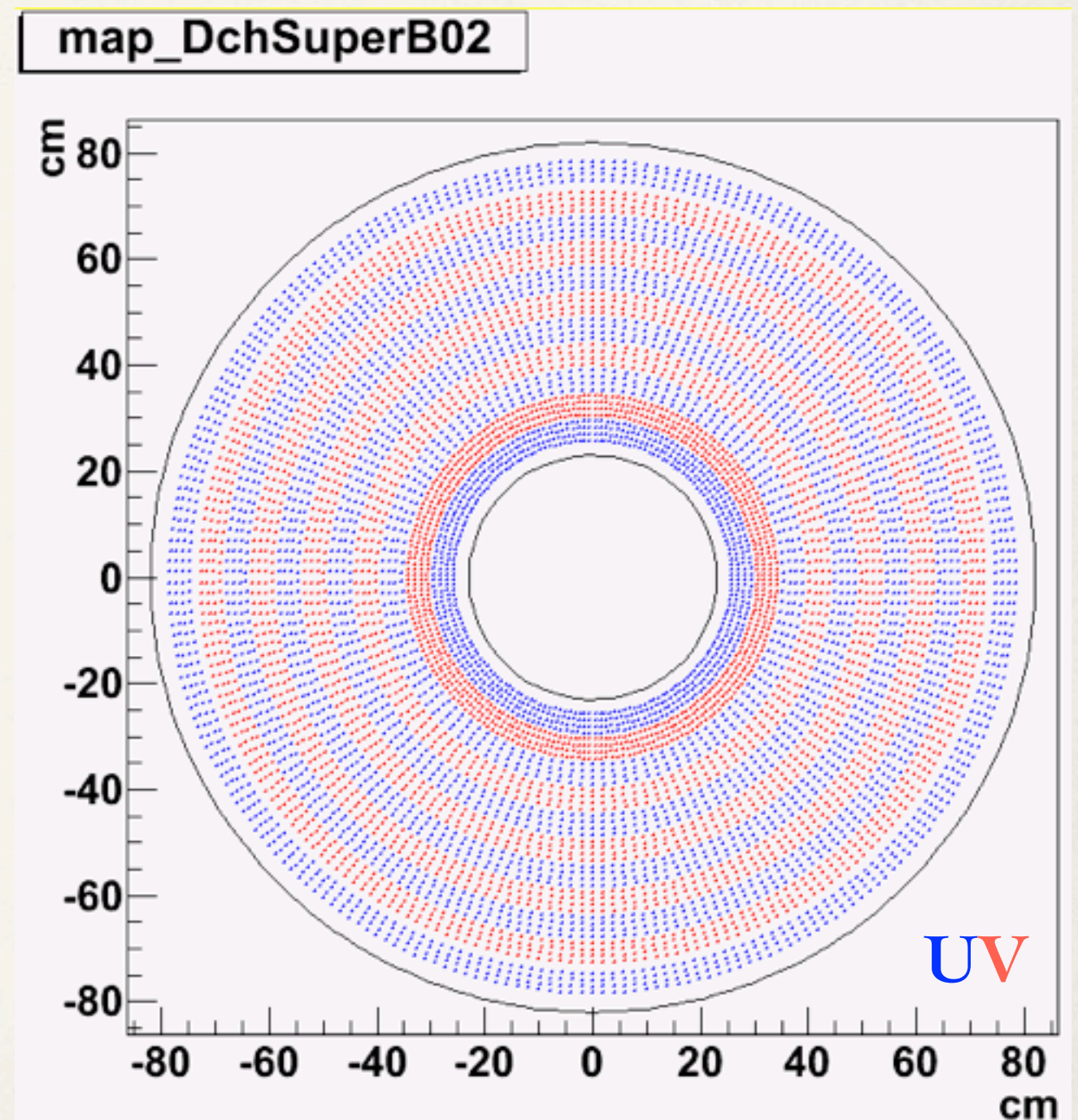
Dec 13th, 2011

New productions

- New official productions:
 - **2photons** ($\sim 100\text{k}$ evts, $372\mu\text{s}$): first official production, 1 evt = 1 bunch xing, normalization like RadBhabha
 - **RadBhabha** ($\sim 10\text{k}$ evts, $37\mu\text{s}$)
 - **Touschek/BeamGas**: ($\sim 84\text{k}$ evts HER, $\sim 188\text{k}$ LER, weight evts)
- Same magnetic field configuration, solenoidal field around IP region but limited in z (± 20 cm from IP)

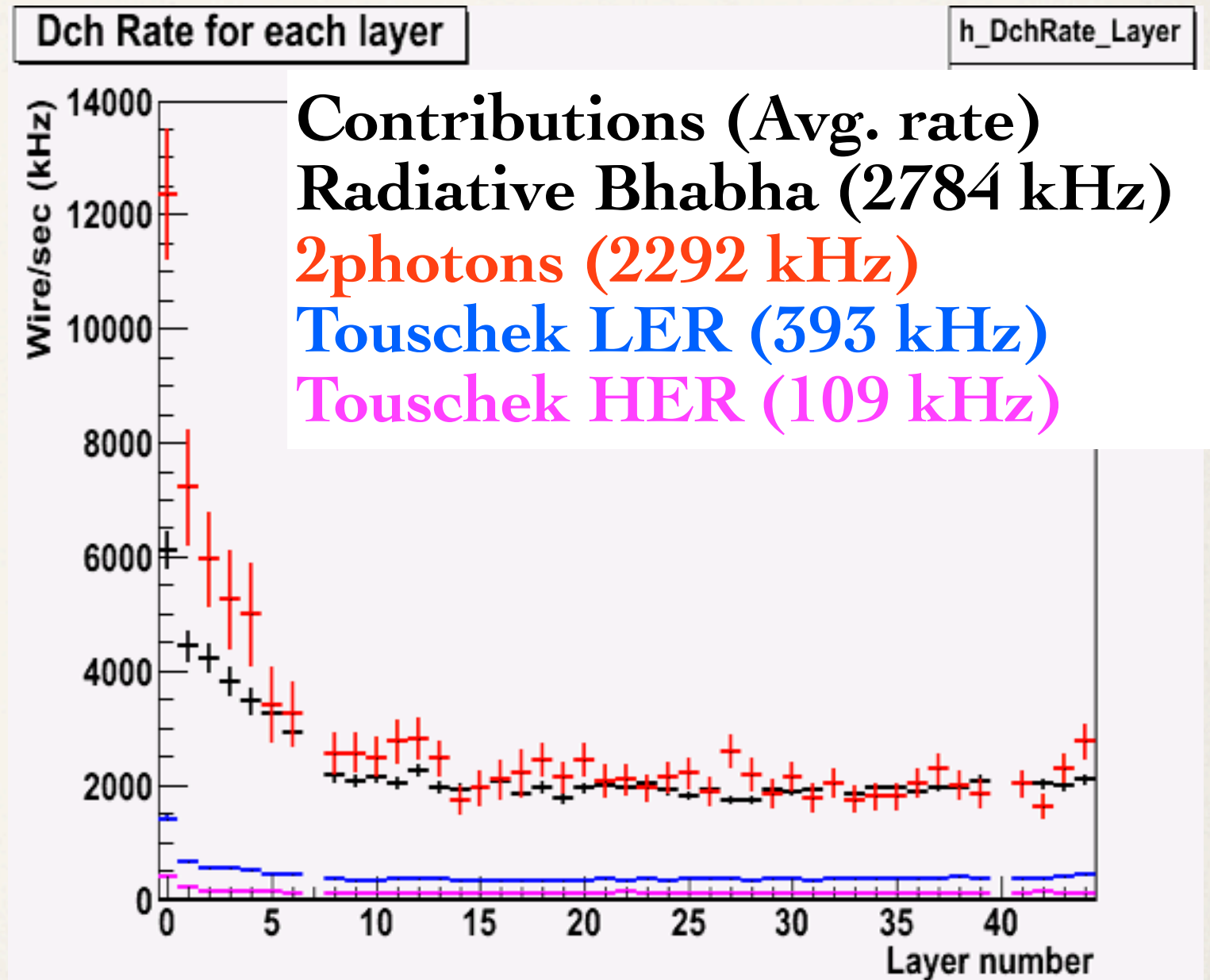
Dch configurations

- Old configurations:
 - **Axial01** version
 - AA-AAAAAAAAAA-AA
 - **SuperB01** version
 - AA-UVUVUVUV-A
- New configuration (by Giuseppe):
 - **SuperB02** version
 - UVUVUVUVUV-U, fully axial
 - 8 inner layers, cell size ~1cm, then 2cm
 - 1cm empty space before last 4 layers



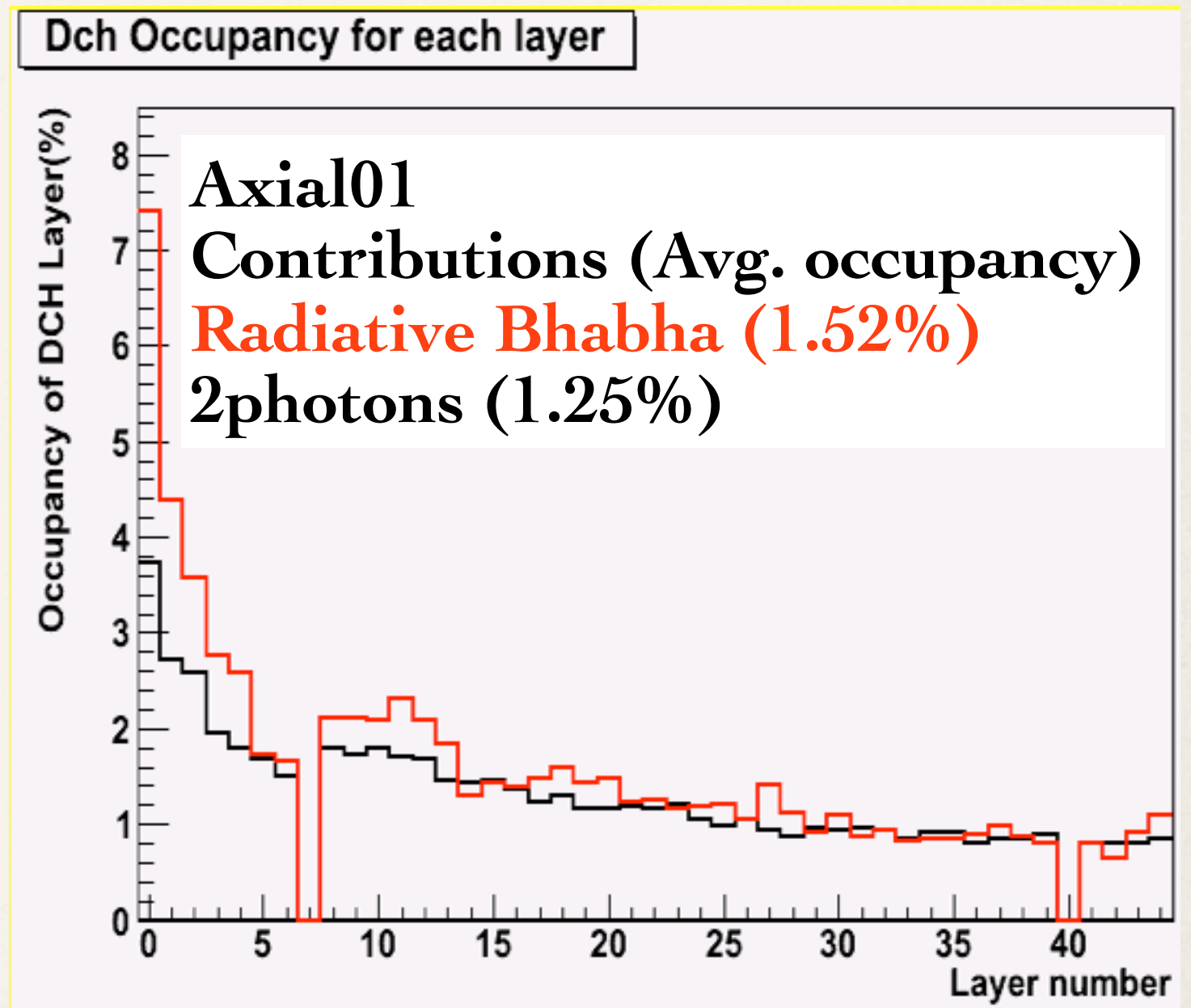
Dch Rate

- Rate on each layer separately for each background contribution, fully axial configuration
- In the end, 2photons comparable with Radiative Bhabha, Touschek is much smaller
- Normalization problem with Touschek fixed
- No occupancy value because needs to have separate bunch xing, not weighted events



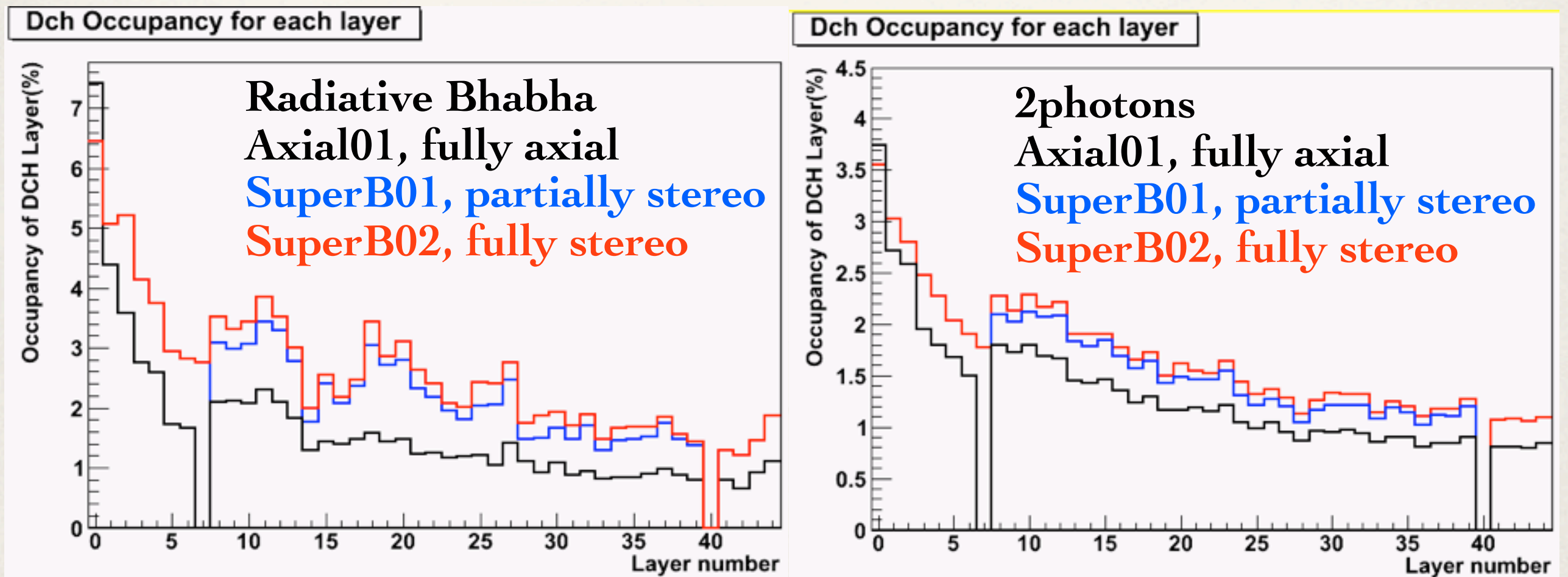
Dch Occupancy

- Only for Radiative Bhabha and 2photons
- Total occupancy: ~3%, including contributions from Touschek (approximated)
- Occupancy around >10% on first layer then rapidly decreasing after few layers



Dch Occupancy, stereo

- Occupancy from RadBhabha is more sensitive to stereo layers due to more tracks coming through the endplate (low p_T , going along z). 2photons tracks are more likely to come directly from the IP
- First layer has lower occupancy for SuperB02 due to larger starting radius (+0.6cm)



Dch Rate, stereo

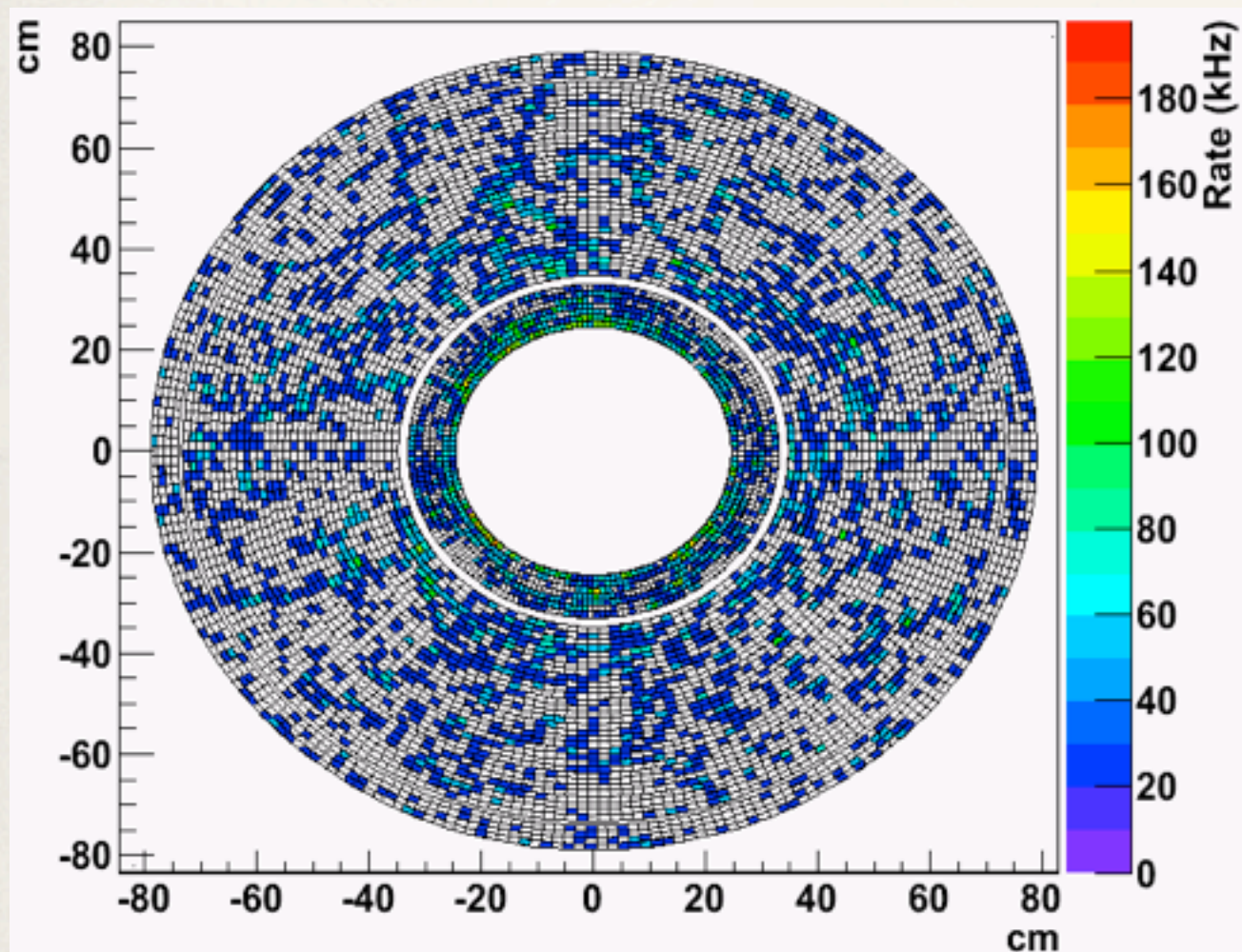
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Avg. Rate [kHz](Occ.)	Axial01	SuperB01	SuperB02
Pairs	2292 (1.35%)	2661(1.45%)	2981(1.6%)
RadBhabha	2784 (1.51%)	3830 (2.09%)	4623 (2.50%)
Touschek HER	109	144	176
Touschek LER	393	503	601
TOTAL	5578 (~3%)	7138 (~4%)	8381 (~4.5)

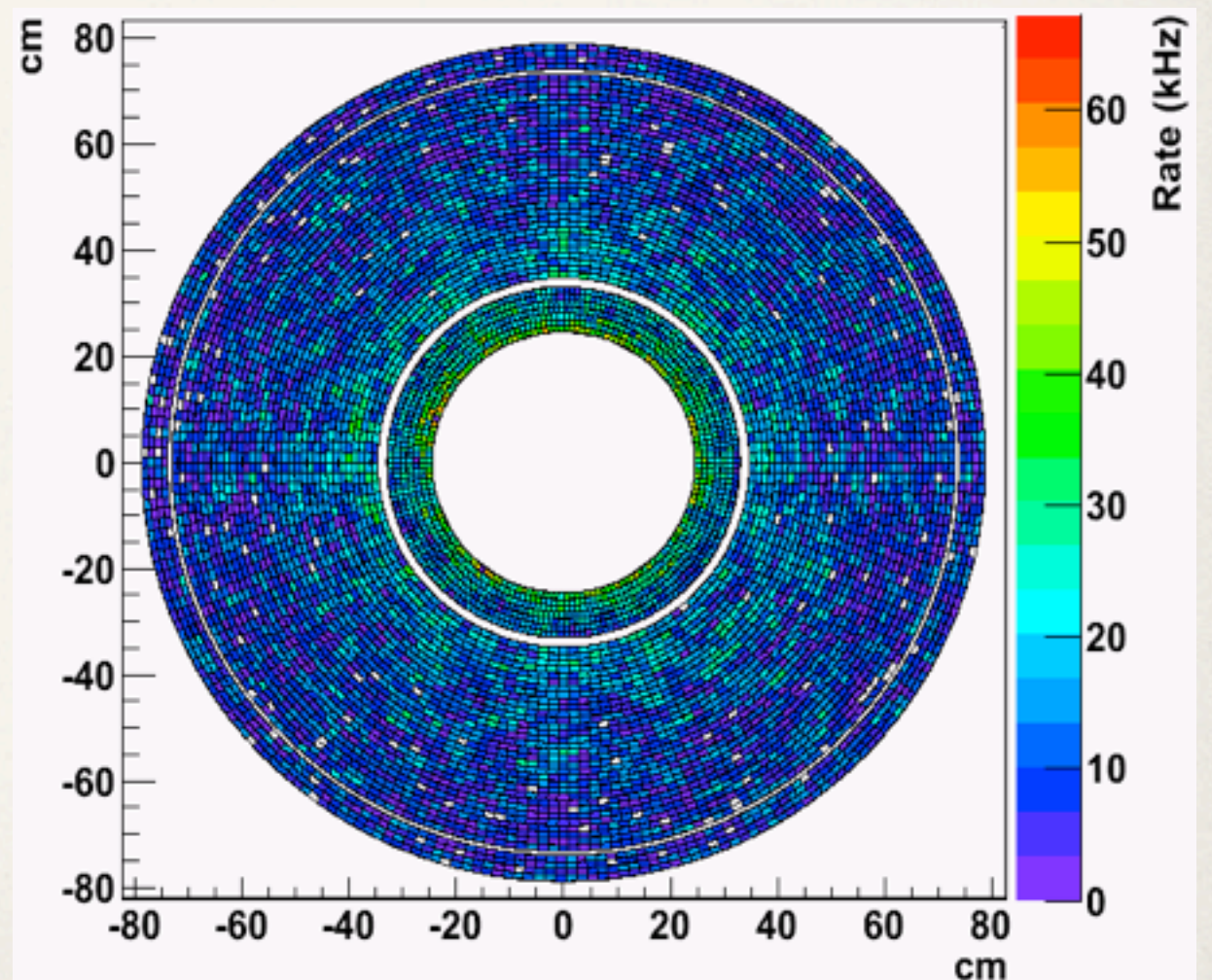
Rate map

- Rate map, uniform, no preferred areas
- Low stat for RadBhabha

Radiative Bhabha, Axial01



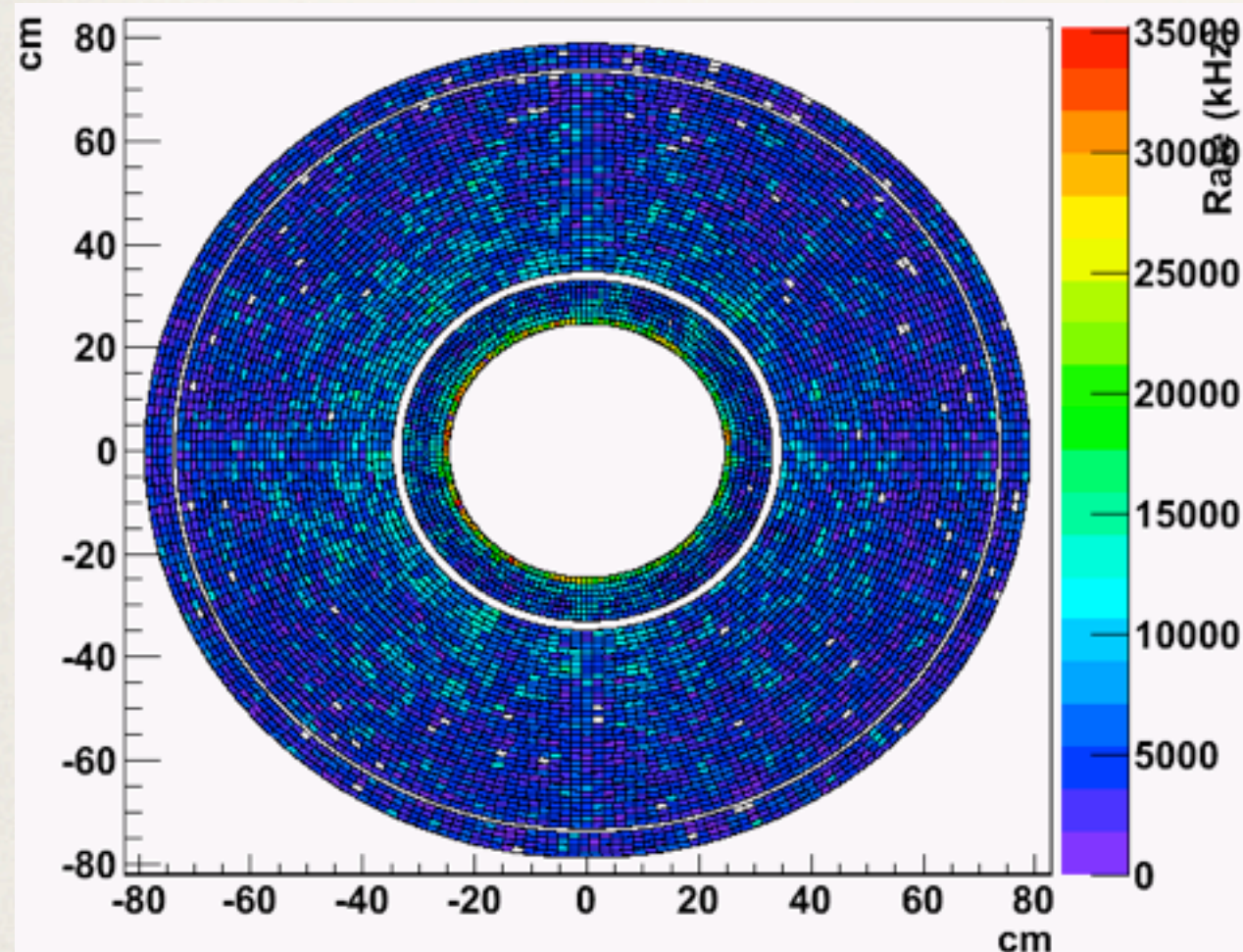
2photons, Axial01



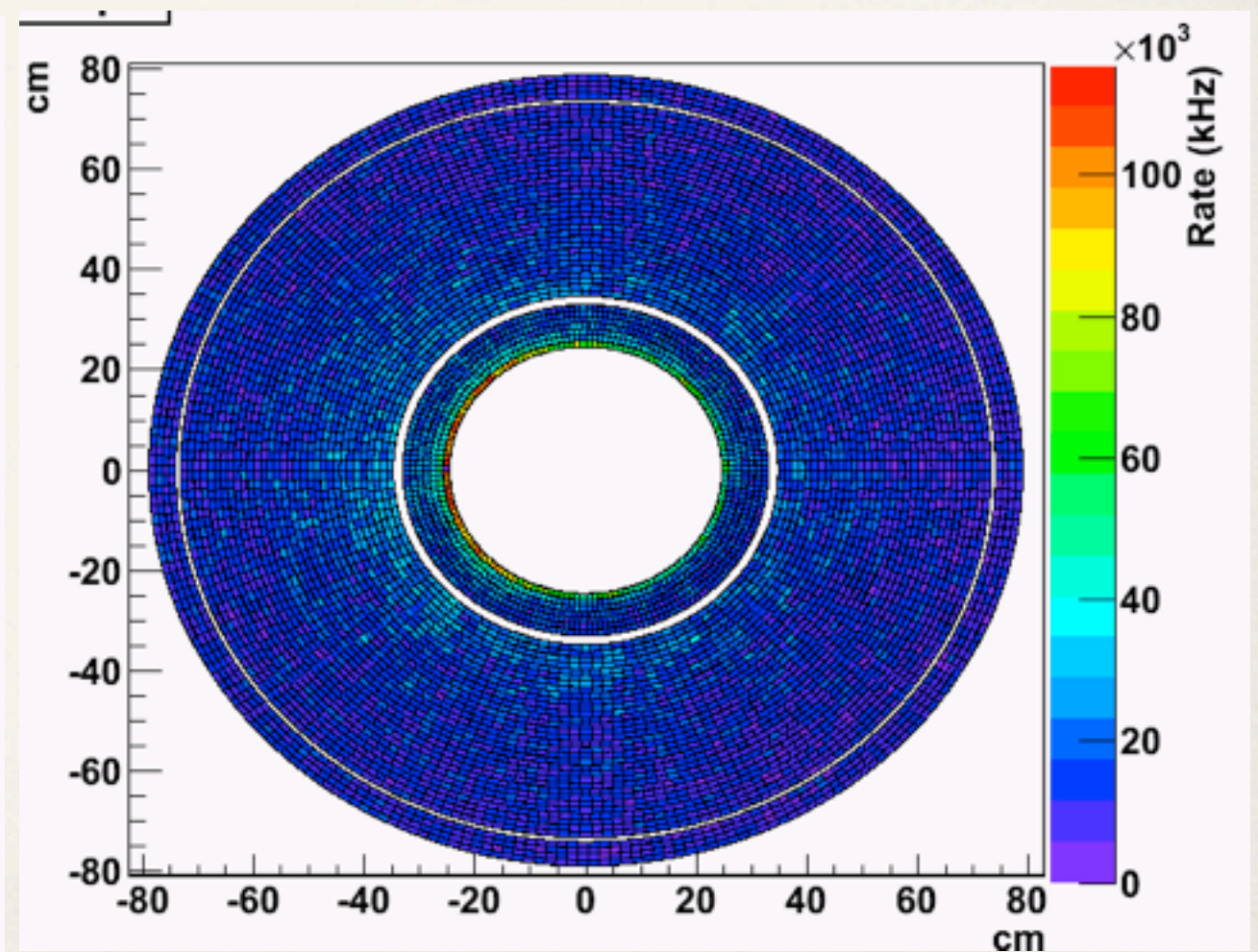
Rate map

- Rate map, wrong normalization for Touschek, need to be fixed
- Rate looks higher on the horizontal plane, negative x, as expected (particle lost along beam direction)

Touschek HER, Axial01



Touschek LER, Axial01



Dch Electronics

- No significant variation for dose on electronics
- Touschek background contribution is similar to RadBhabha one
- Total dose around 1krad

Dose [krad] (1y)	Plate 1	Plate 2	Plate 3
Pairs	0.16	0.16	0.15
RadBhabha	0.74	0.88	1.06
Touschek HER	0.005	0.004	0.003
Touschek LER	0.15	0.17	0.18
TOTAL	1.05	1.2	1.4

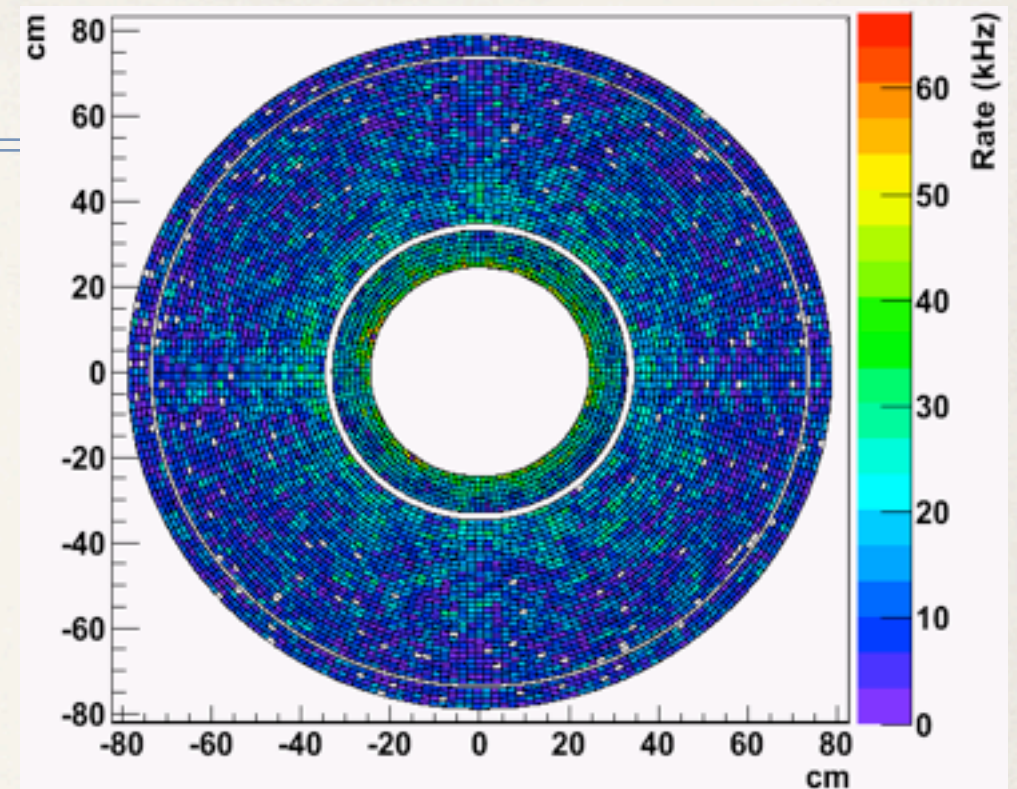
Conclusions

- Results from different background sources simulated with same configuration
- RadBhabha and 2photons bkg have different origin but produce almost the same occupancy
- Rate from Touschek is small compared to the other ones
- Increase of occupancy due to stereo layers is larger for RadBhabha contribution, due to track coming through the endplate
- Preferred areas for tracks from Touschek, not for RadBhabha and 2 photons
- Radiation dose on electronics is low, $\sim 1\text{krad}$

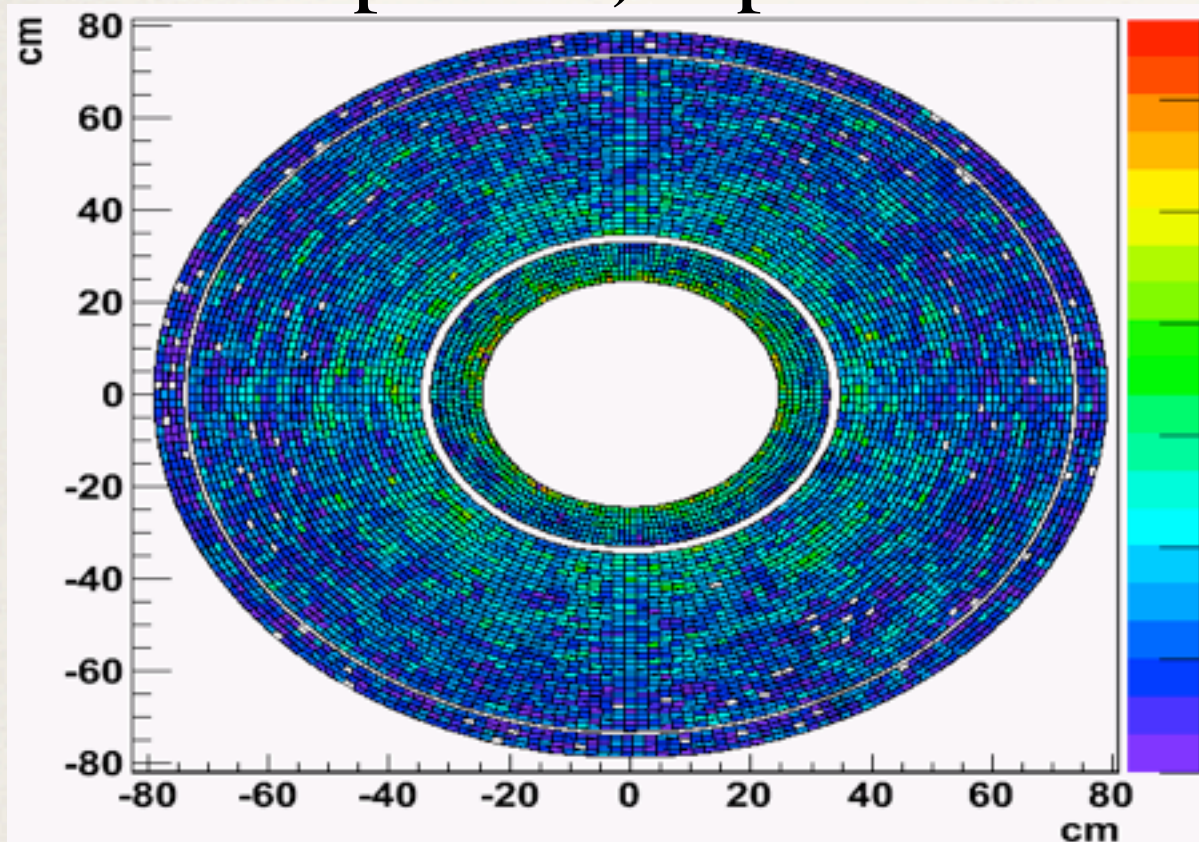
Rate map

- Rate map for different layers configuration

2photons, Axial01



2photons, SuperB01



2photons, SuperB02

