




Update on DCH Background studies using FullSim

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SuperB Collaboration Meeting, LNF, Frascati

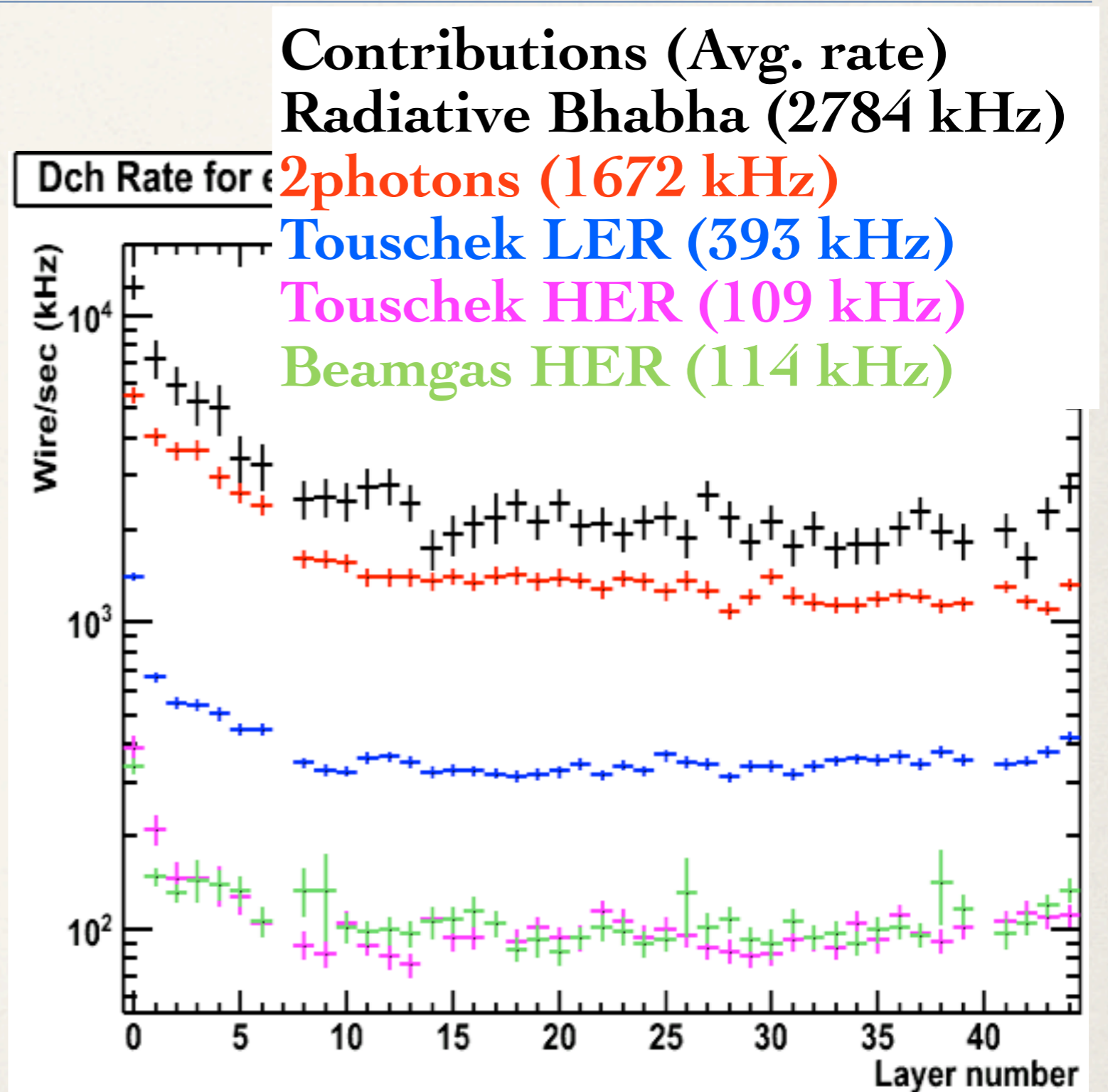
March 21th, 2012

New productions

- New official productions:
 - **2photons** ($\sim 100\text{k}$ evts, 372us): first official production, 1 evt = 1 bunch xing, normalization like RadBhabha
 - **RadBhabha** ($\sim 10\text{k}$ evts, 37us)
 - **Touschek**: ($\sim 84\text{k}$ evts HER, $\sim 188\text{k}$ LER, weighted evts)
 - **Beam-gas** ($\sim 275\text{k}$ evts HER, weighted evts)  **NEW**
- Same magnetic field configuration, solenoidal field around IP region but limited in z (± 20 cm from IP)

Dch Rate

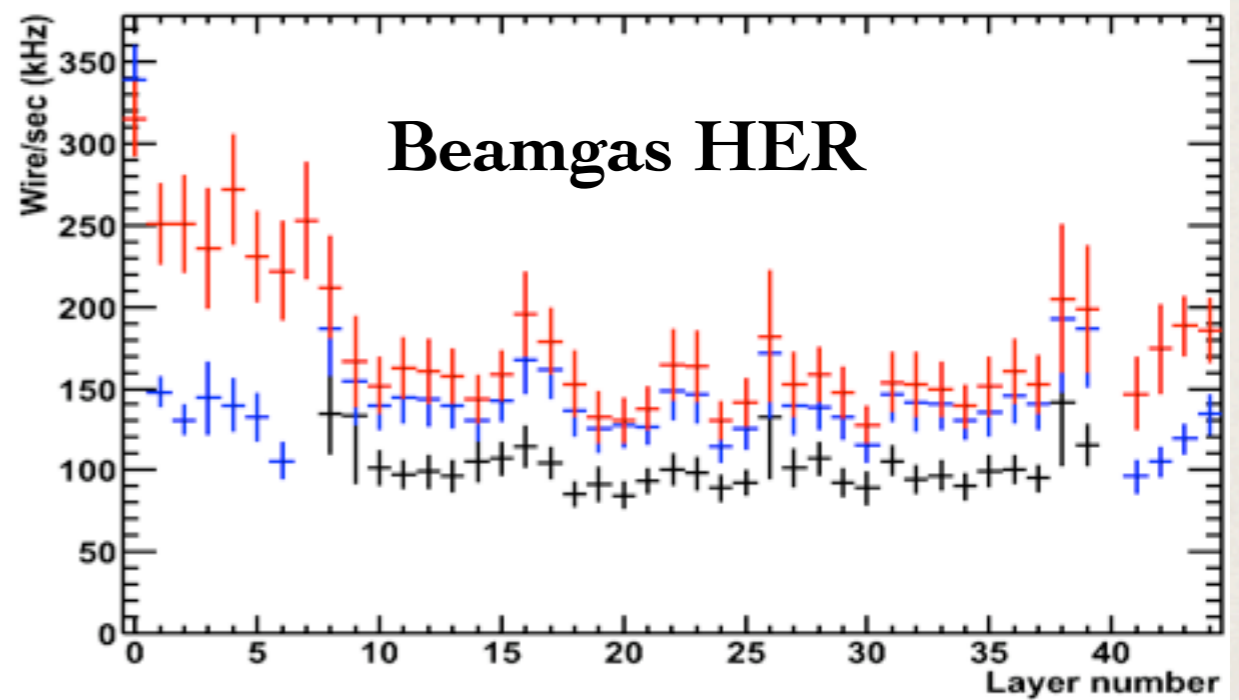
- Rate on each layer separately for each background contribution, fully axial configuration
- 2photon is now lower than Radiative Bhabha due to recent simulation with extended B field ($\pm 40\text{cm}$)
- 2photon and RadBhabha are 20% smaller than shown due to normalization error
- Beamgas HER similar to Touschek HER
- No occupancy value because needs to have separate bunch xing, not weighted events



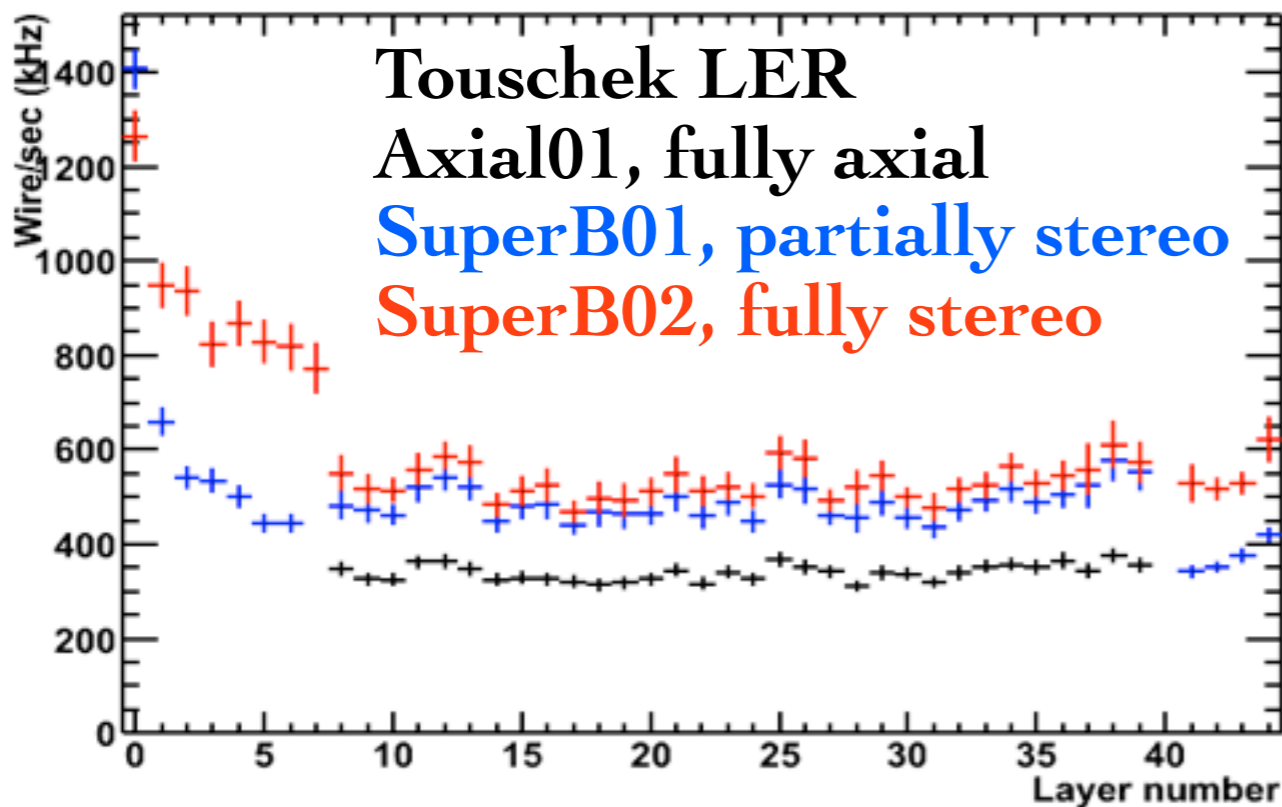
Dch Occupancy, stereo

- Significant increase in rate for stereo layers configuration, but same order or smaller than RadBhabha
- First layer has lower occupancy for SuperB02 due to larger radius compared to Axial01/SuperB01 (+0.6cm)

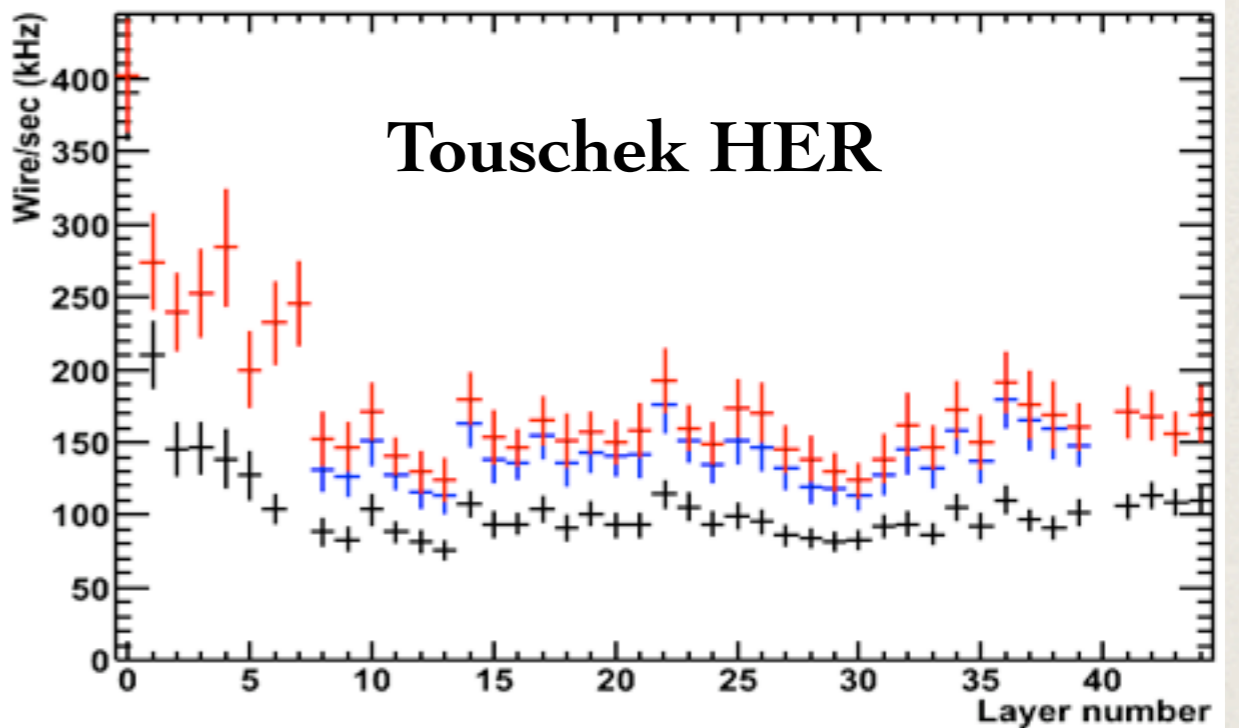
Dch Rate for each layer



Dch Rate for each layer



Dch Rate for each layer



Dch Rate, stereo

- Updated table, including normalization correction

Avg. Rate [kHz](Occ.)	Axial01	SuperB01	SuperB02
Pairs	1421	1680	1927
RadBhabha	2366	3250	3929
Touschek HER	109	144	176
Touschek LER	393	503	601
Beamgas HER	114	144	177
TOTAL	4403	5721	6810

Dch Electronics

- 3 silicon plates behind the backward endplate to simulate the electronics
- No significant variation for dose, beamgas HER contribution similar to Touschek HER

Dose [krad] (1y)	Plate 1	Plate 2	Plate 3
Pairs	0.16	0.16	0.16
RadBhabha	0.68	0.78	0.99
Touschek HER	0.005	0.003	0.003
Touschek LER	0.16	0.18	0.21
Beamgas HER	0.005	0.004	0.002
TOTAL	1.01	1.13	1.37

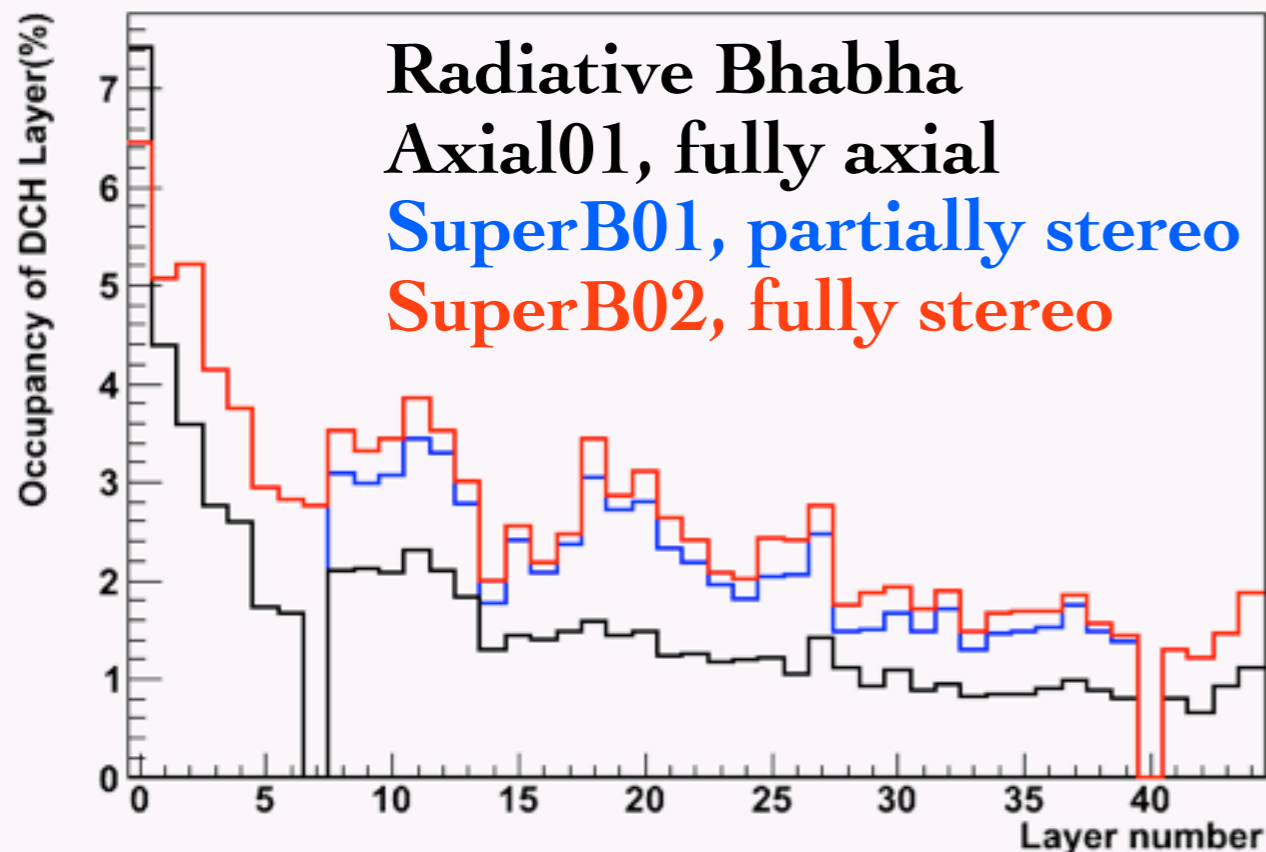
Conclusions

- Updated results from different background sources simulated with same configuration: Beamgas HER added plus normalization
- 2photons bkg estimation is affected by magnetic field around IP and generator cuts
- Rate from Beamgas HER is similar to Touschek HER. Waiting for Beamgas from LER
- Rate increase due to stereo layers is similar for different contributions, larger when contribution has tracks coming through the endplates
- Radiation dose on electronics is low, ~ 1 krad
- New production should be ready in a month or so

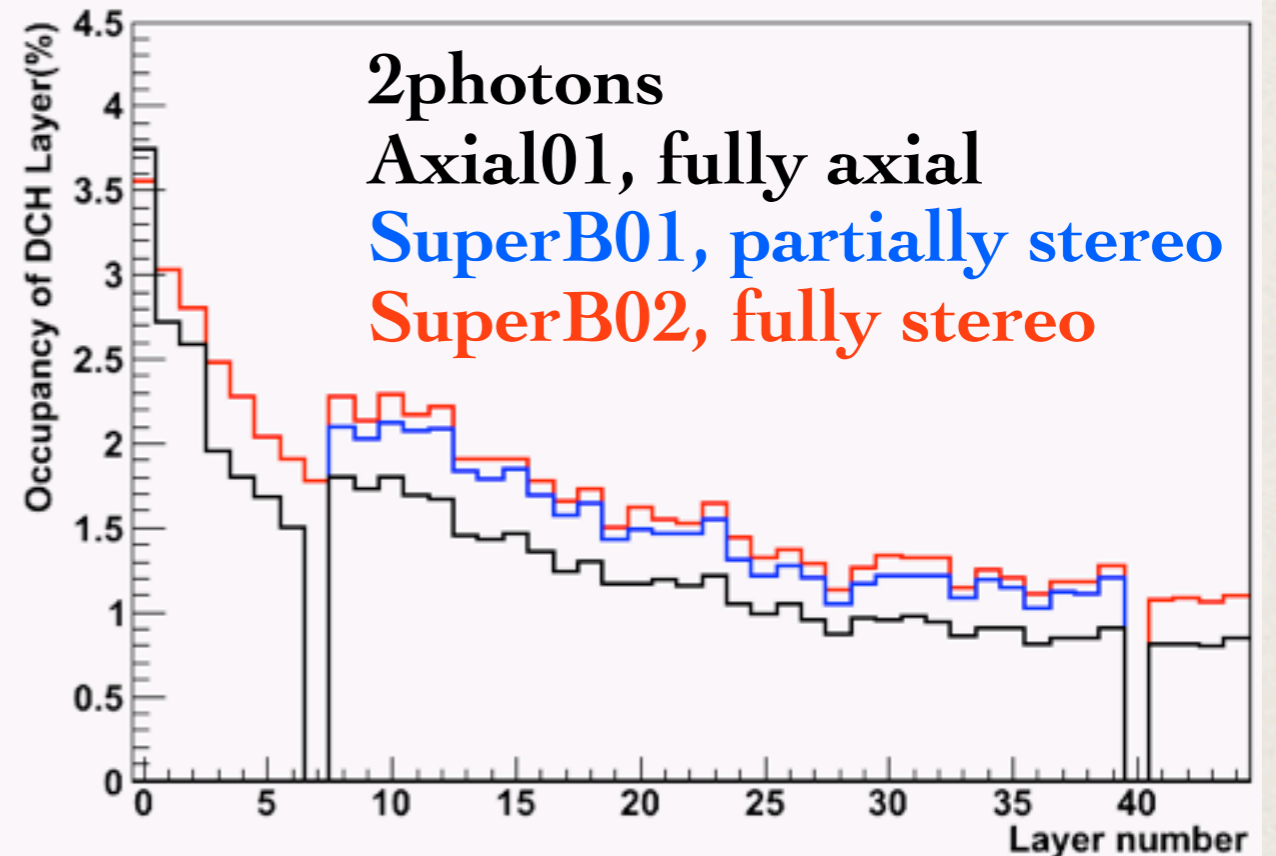
Dch Occupancy, stereo

- 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 Occupancy for each layer

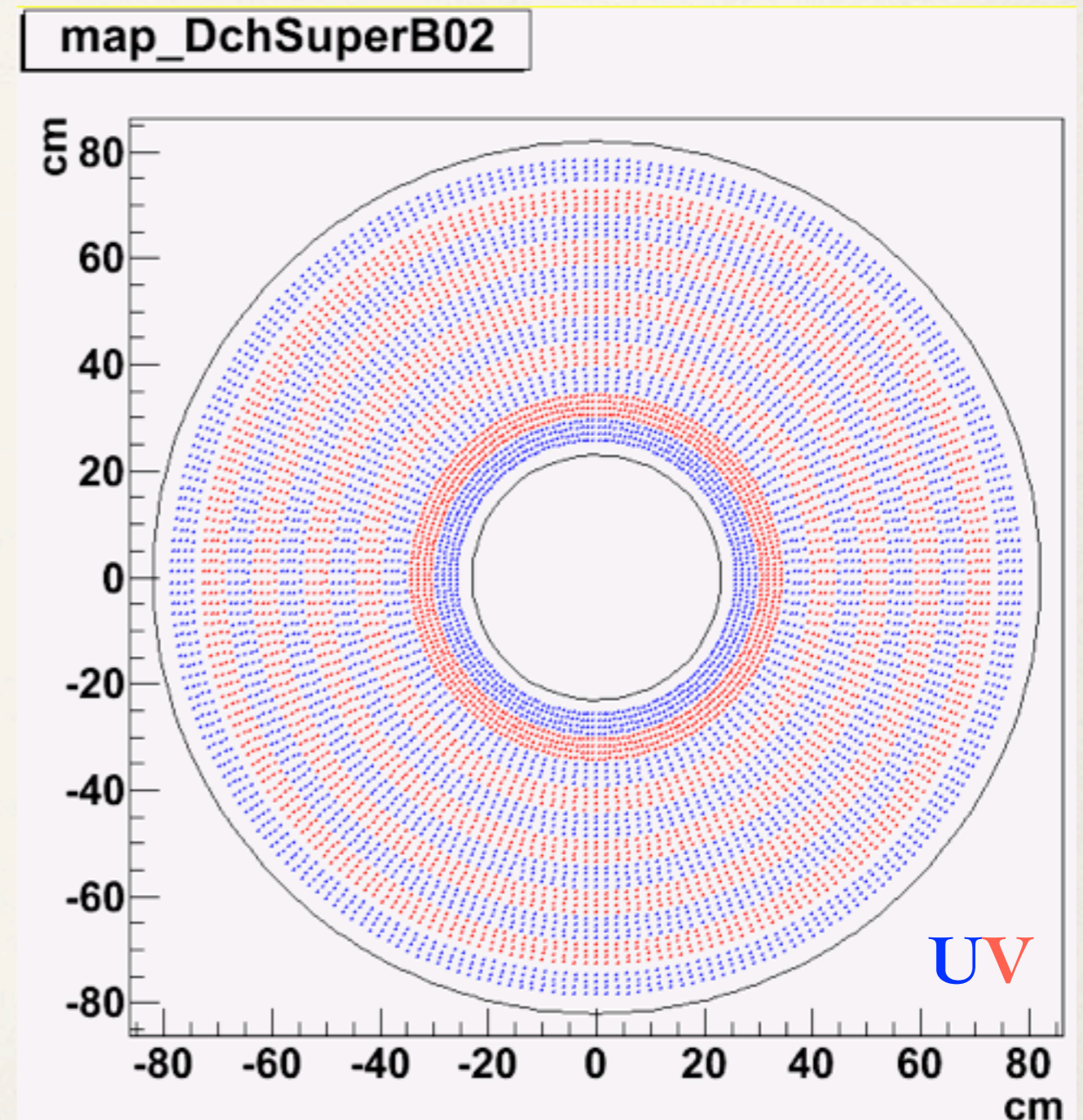


Dch Occupancy for each layer



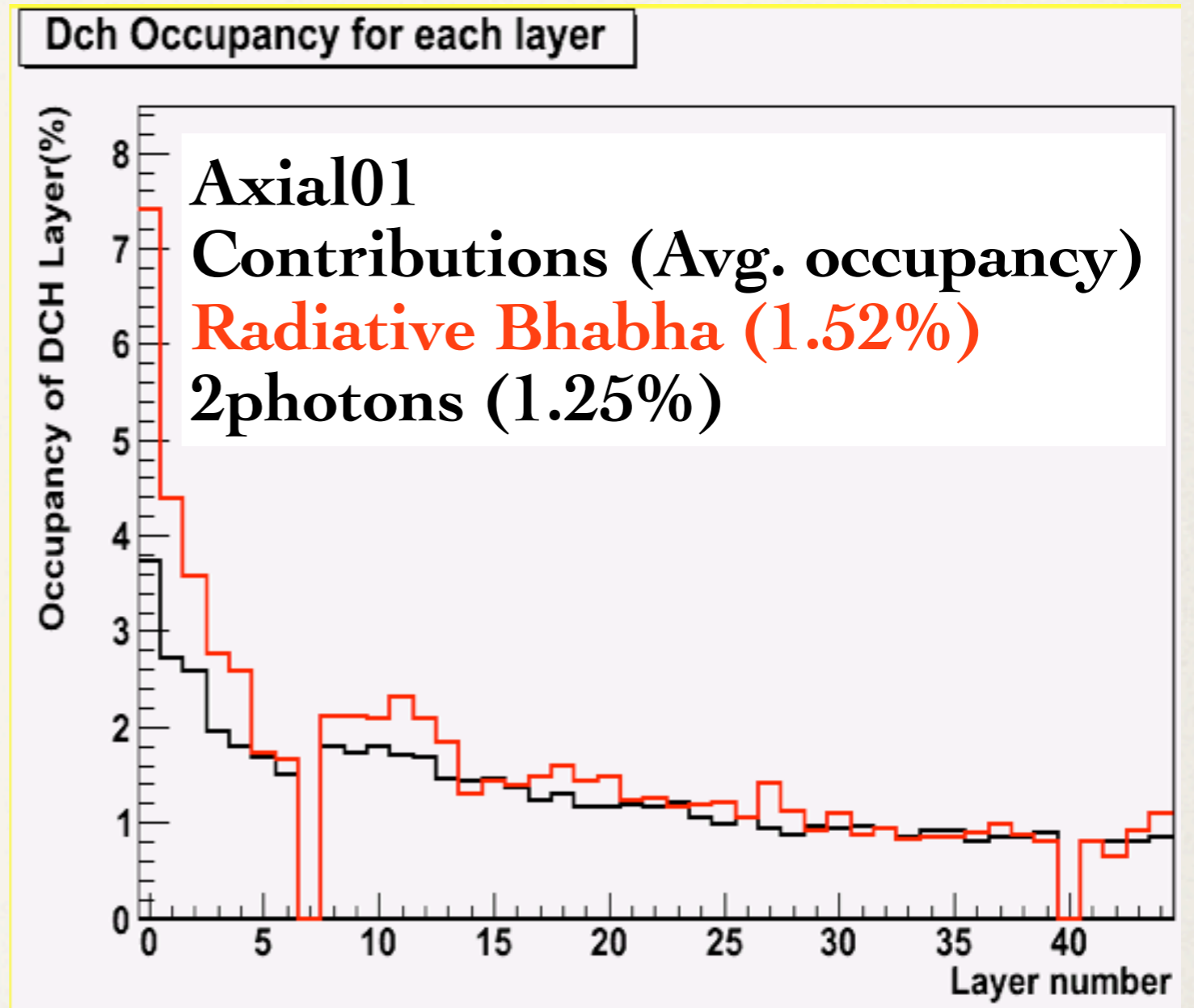
Dch configurations

- Old configurations:
 - **Axial01** version
 - AA-AAAAAAAAAAA-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 Occupancy

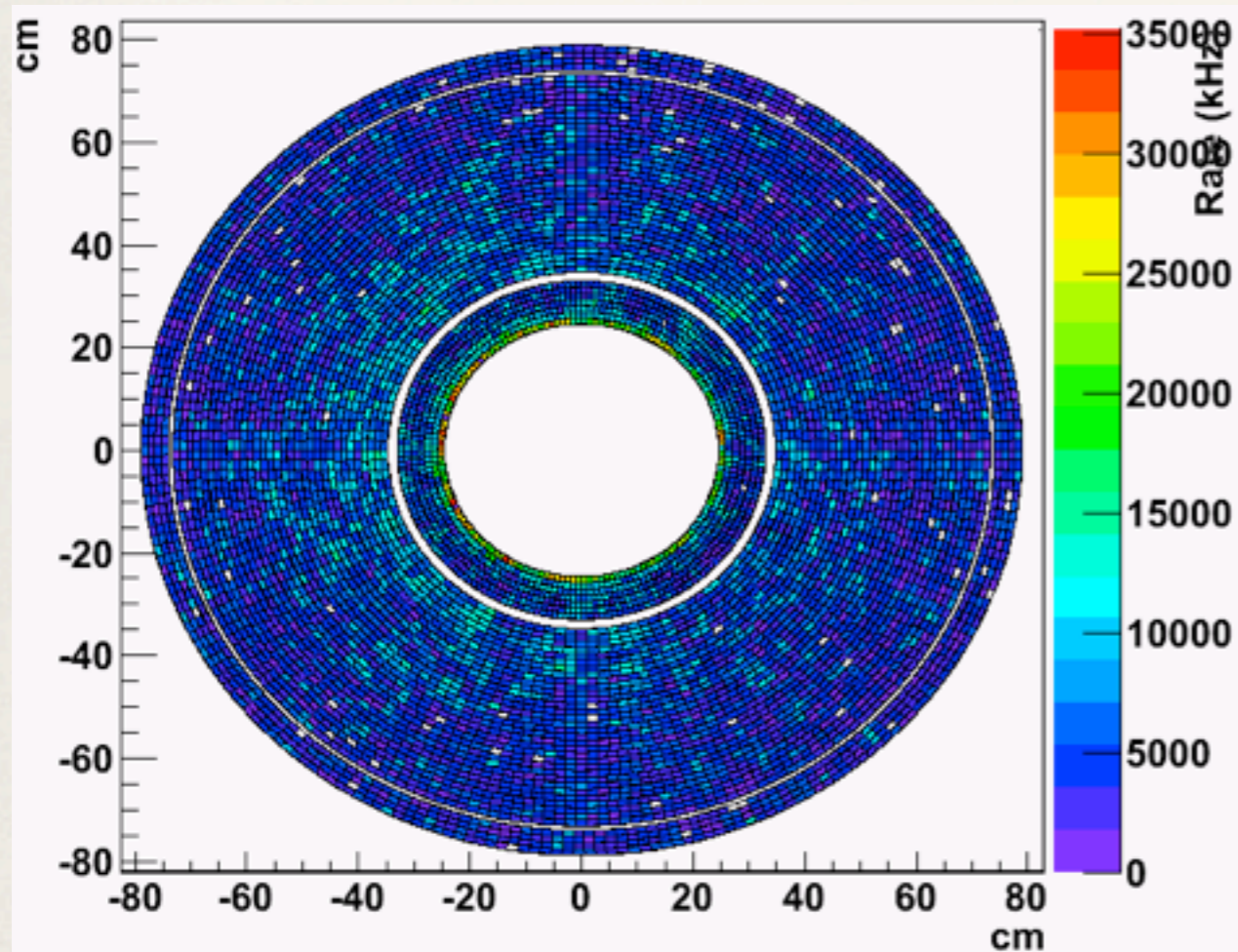
- Only for Radiative Bhabha and 2photons
- Total occupancy: ~3%, including contributions from Touschek (approximated)
- Occupancy around >10% on first layer then rapidly decreasing after few layers



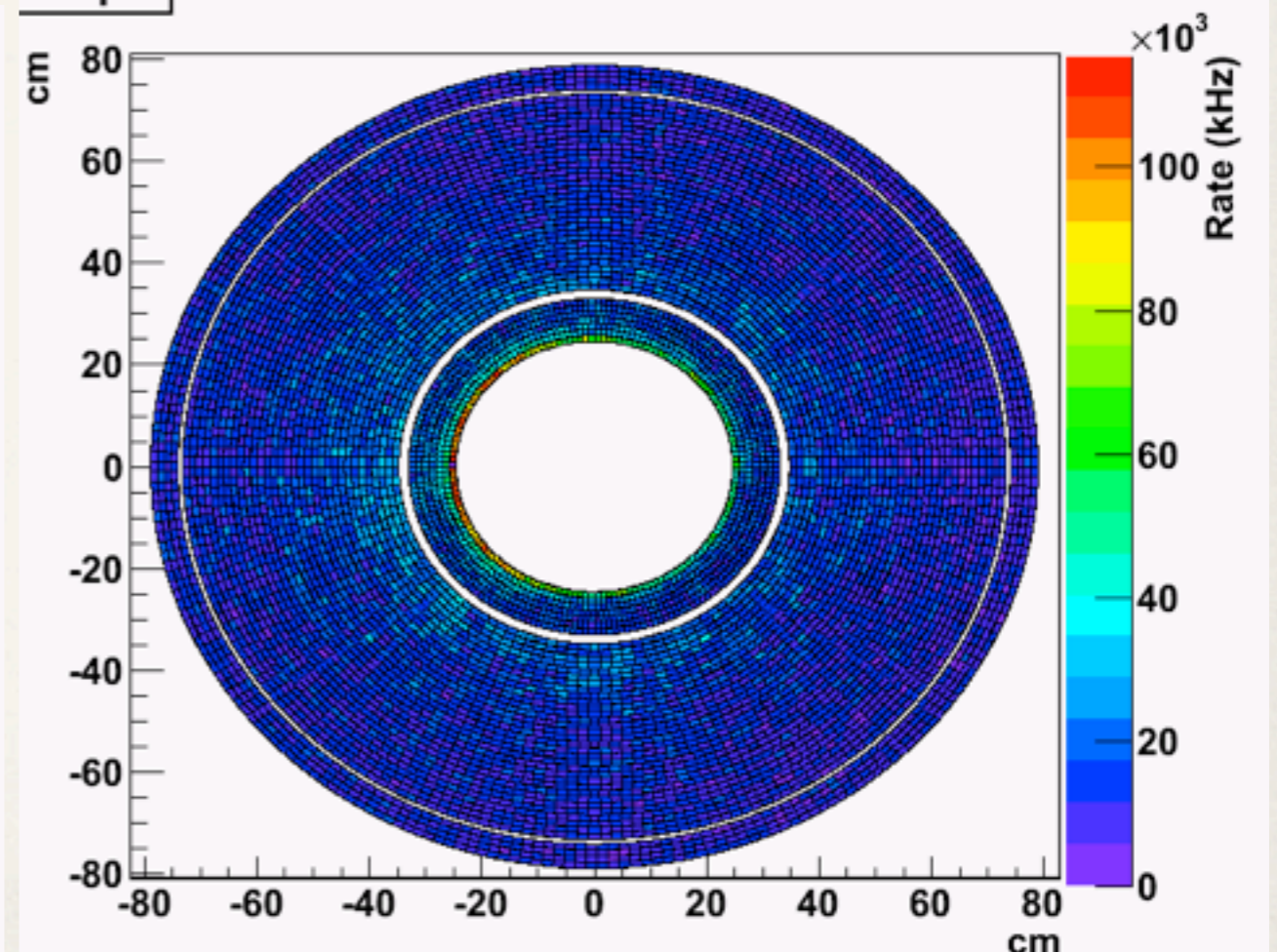
Rate map

- 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



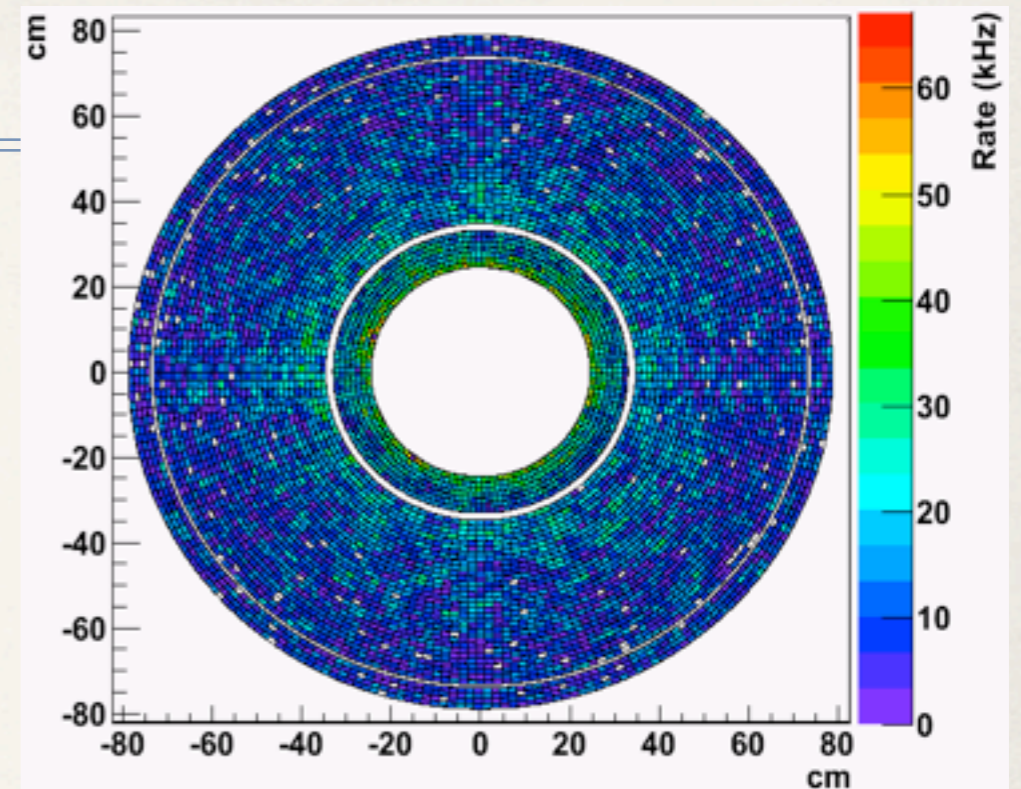
Touschek LER, Axial01



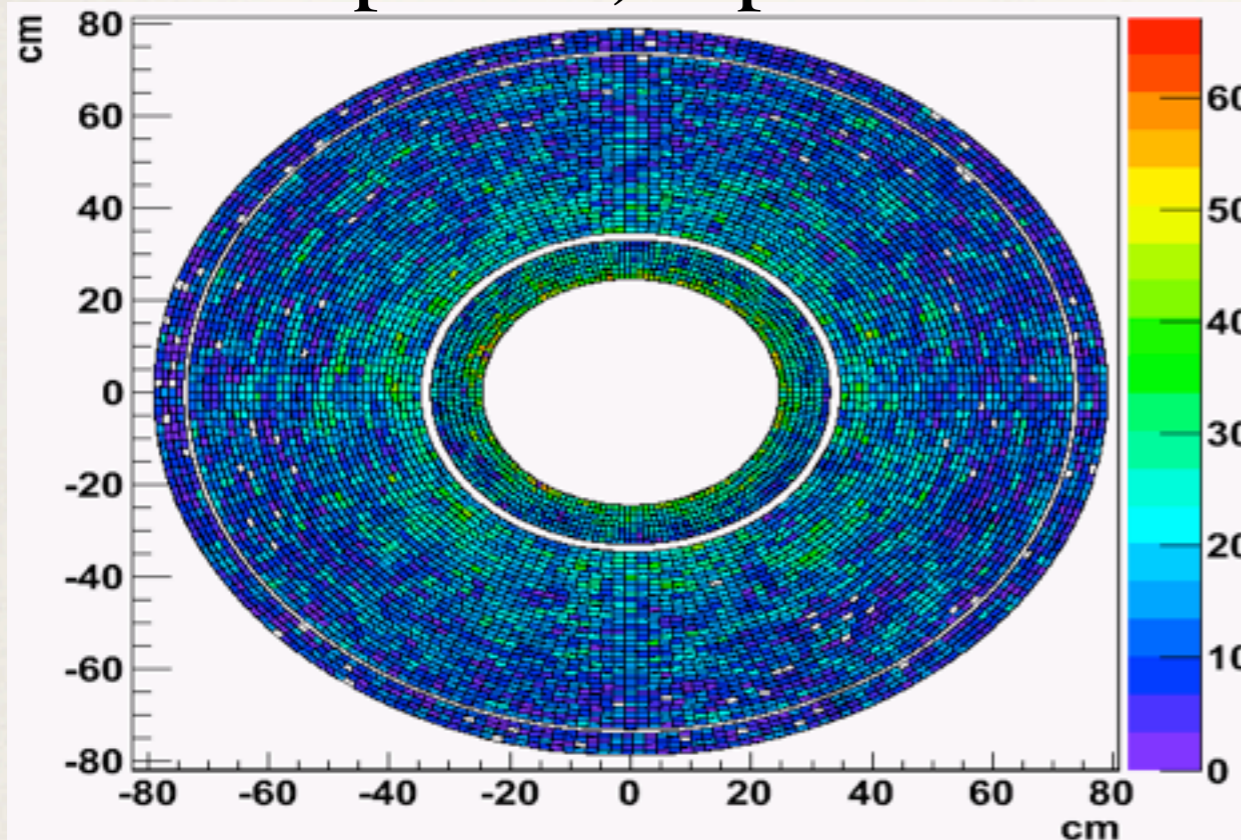
Rate map

- Rate map for different layers configuration
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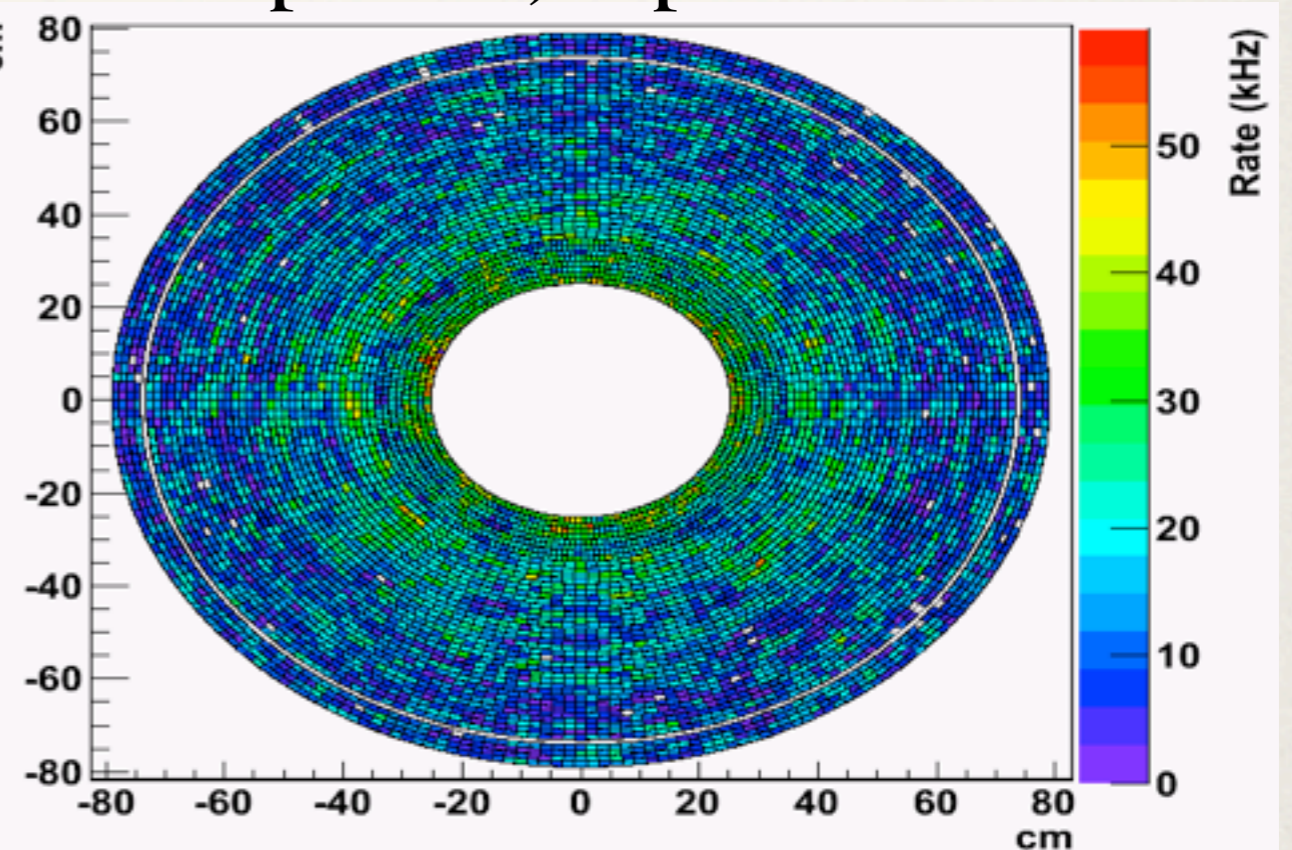
2photons, Axial01



2photons, SuperB01



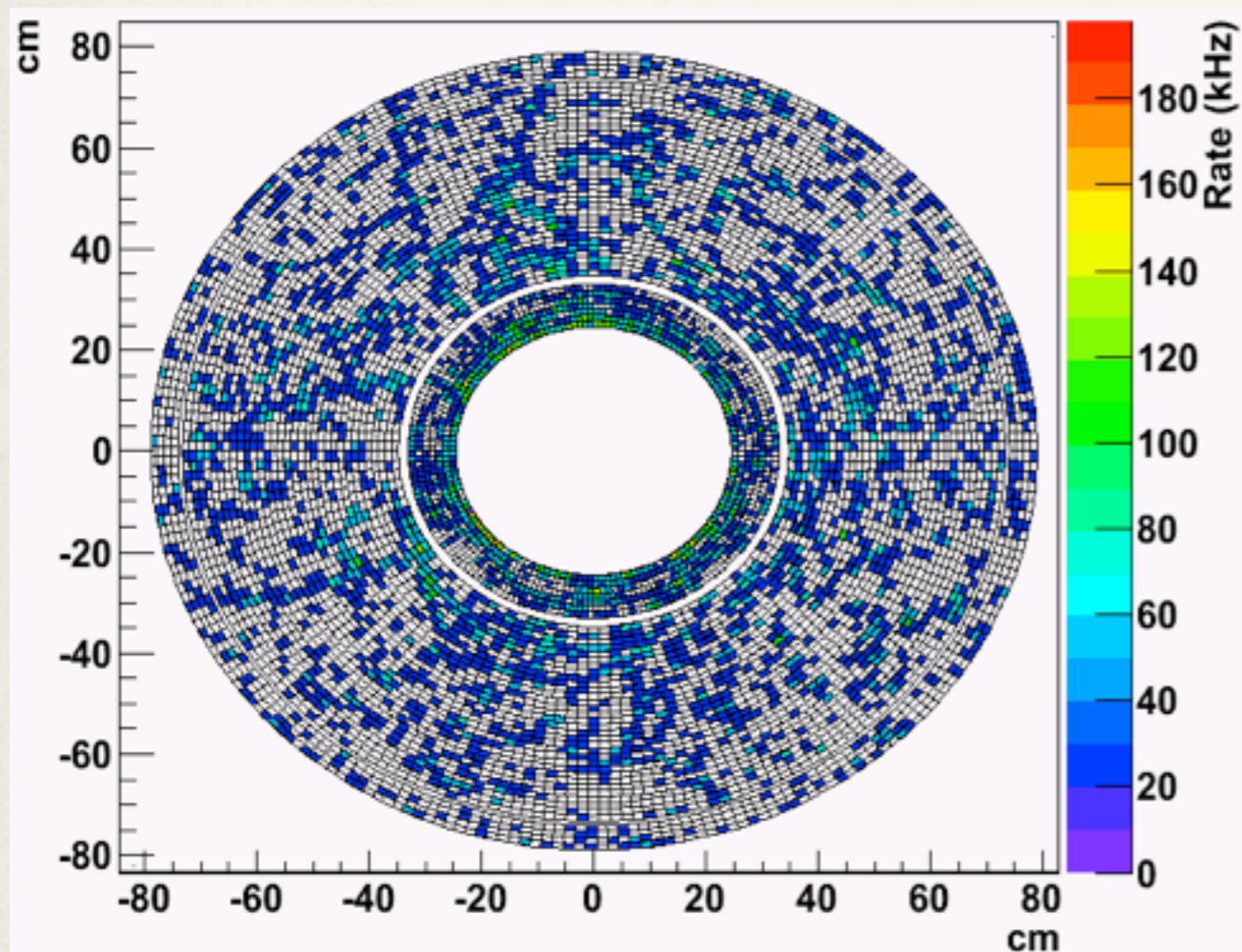
2photons, SuperB02



Rate map

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

Radiative Bhabha, Axial01



2photons, Axial01

