



# Update on DCH Background rates using Bruno simulation

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SuperB Collaboration Meeting, Pisa, ITALY - Dch Parallel Session

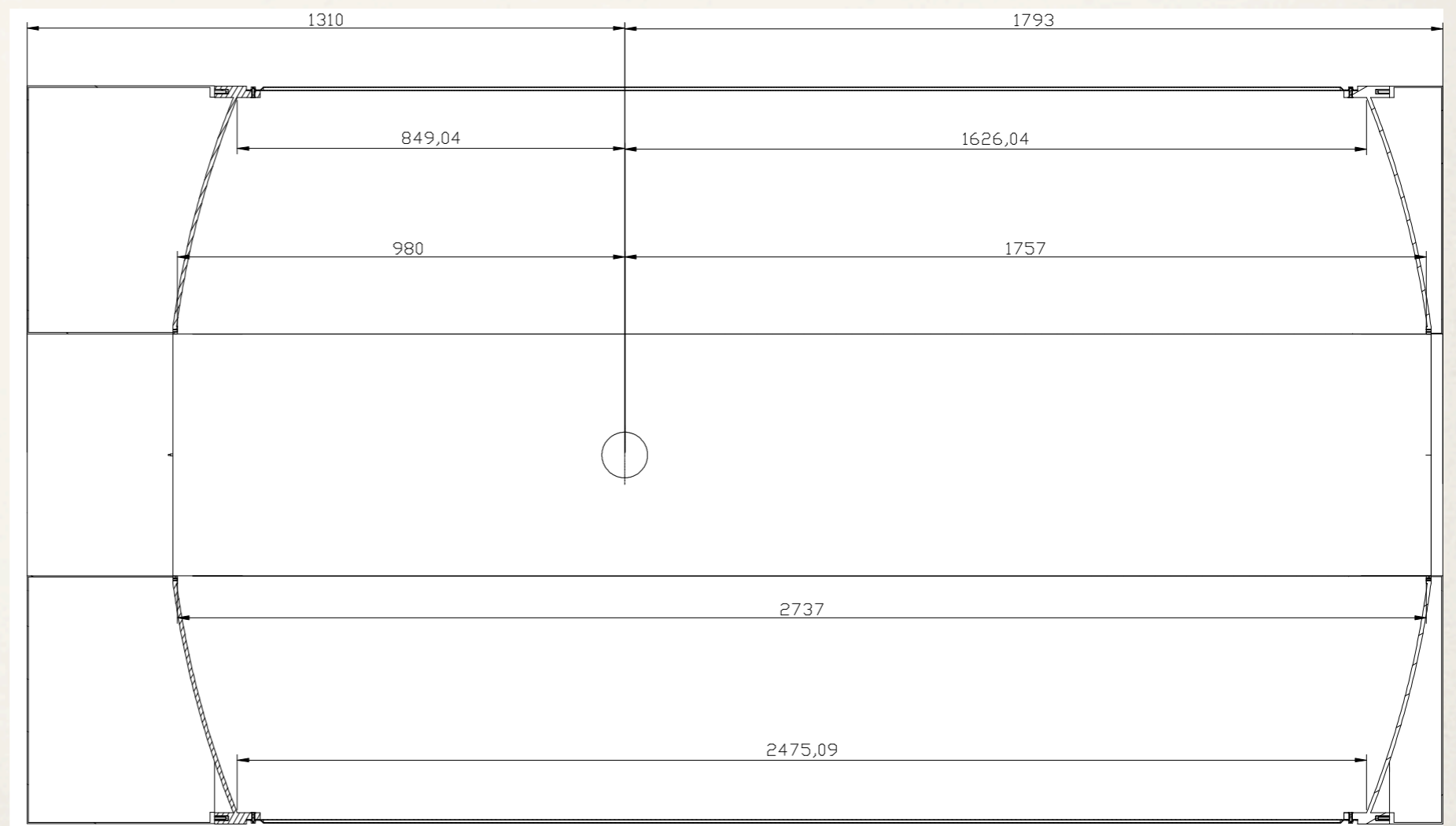
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*Sep 19<sup>th</sup>, 2012*

# New DCH Geometry

- Updated geometry
- Discussion about backward shift due to upgraded FTOF

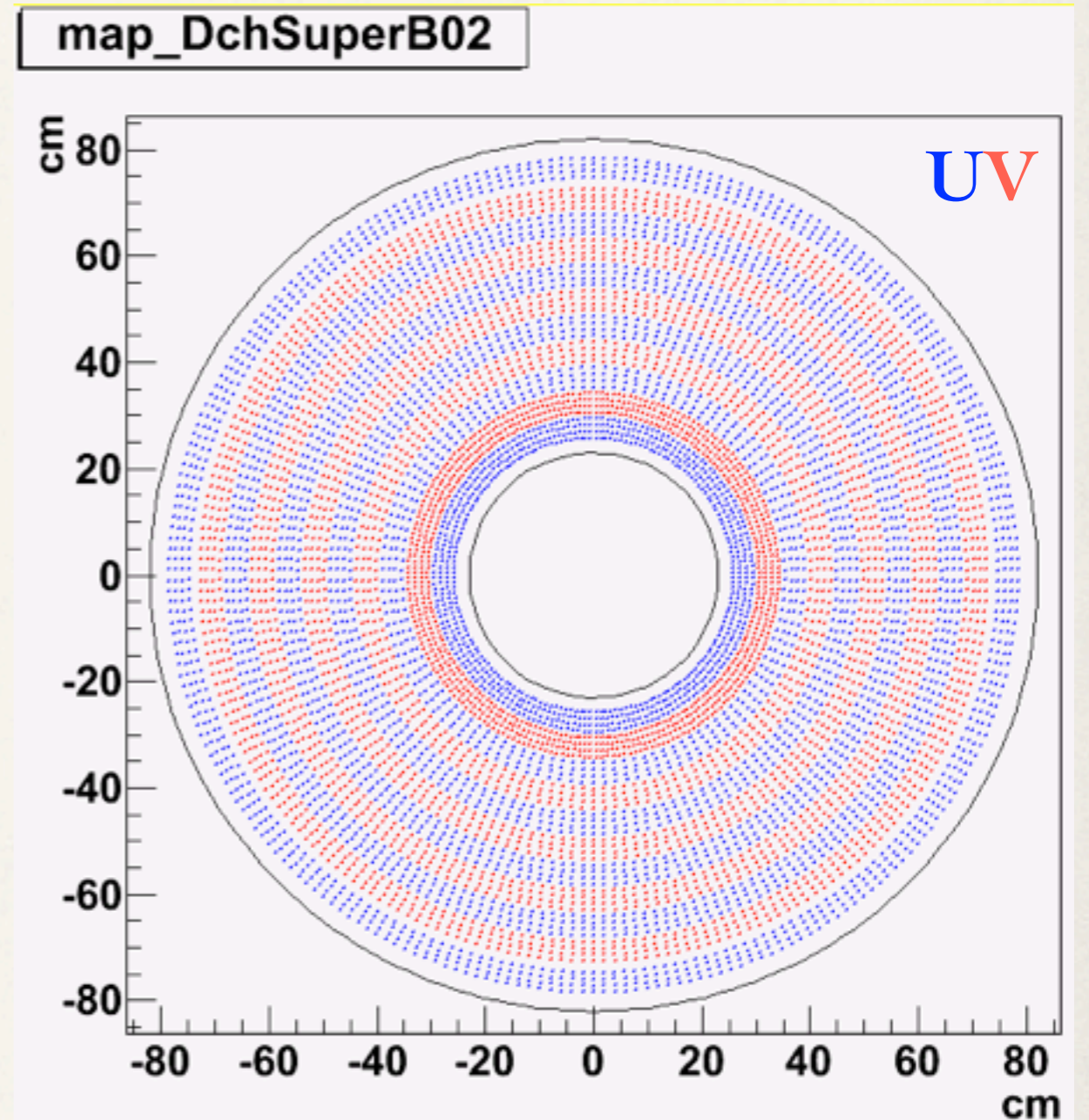
- Convex endplates
- Inner radius: 236  
->265 mm
- Thinner inner  
plate: 1 -> 0.5mm
- Correct thickness  
for all the walls  
plus coating





# Dch configurations

- Inner wall of carbon fiber wall 236-237mm (discussion about thinning down the wall to 0.5mm)
- Old configurations:
  - **Axial01** version (1st layer 246mm)
    - AA-AAAAAAAAAA-AA
  - **SuperB01** version (1st layer 246mm)
    - AA-UVUVUVUV-A
  - **SuperB02** version (1st layer 252mm)
    - UVUVUVUVUV-U, fully axial
    - 8 inner layers, cell size ~1cm, then 2cm
    - 1cm empty space before last 4 layers
- New configurations (by Giuseppe):
  - **SuperB03-06**, very similar
    - Inner wall @264mm (.5mm thick), 1st layer @ 286mm, for a reliable occupancy estimate we need a production with the wall in the right position
    - AA-UVVUUVVUUVVU-AA (2 layers for each letter)
    - Cell size 1.0-1.2 cm





# Production September 2012

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- Rad-Bhabha ( $\Delta E/E > 30\%$ ): main radiative Bhabha component. Two geometries:
  - Geometry\_CABIBBO-V03: 15k bunch-crossings
  - Geometry\_CABIBBO-V03\_LYSO: 12k bunch-crossings (not analyzed)
- Rad-Bhabha ( $0.5 < \Delta E/E < 30\%$ ): verify that low k radiative-bhabha is negligible. Check for contribution to neutron cloud.
  - Geometry\_CABIBBO-V03: 20k bunch-crossings
- Pairs:
  - Geometry\_CABIBBO-V03: 100k bunch-crossings
- Touschek HER/LER:
  - Geometry\_CABIBBO-V03: 90k (198k) for HER (LER) primaries
- Beam-Gas:
  - Geometry\_CABIBBO-V03: 285k (283k) for HER (LER) primaries
- Synchrotron Radiation: first time this samples is produced. Main contribution on innermost layers of SVT
  - Geometry\_CABIBBO-V03: 9.8k (9.6k) for HER (LER) primaries

**New entry,  
Significative effect**

**New entry, no contribution**

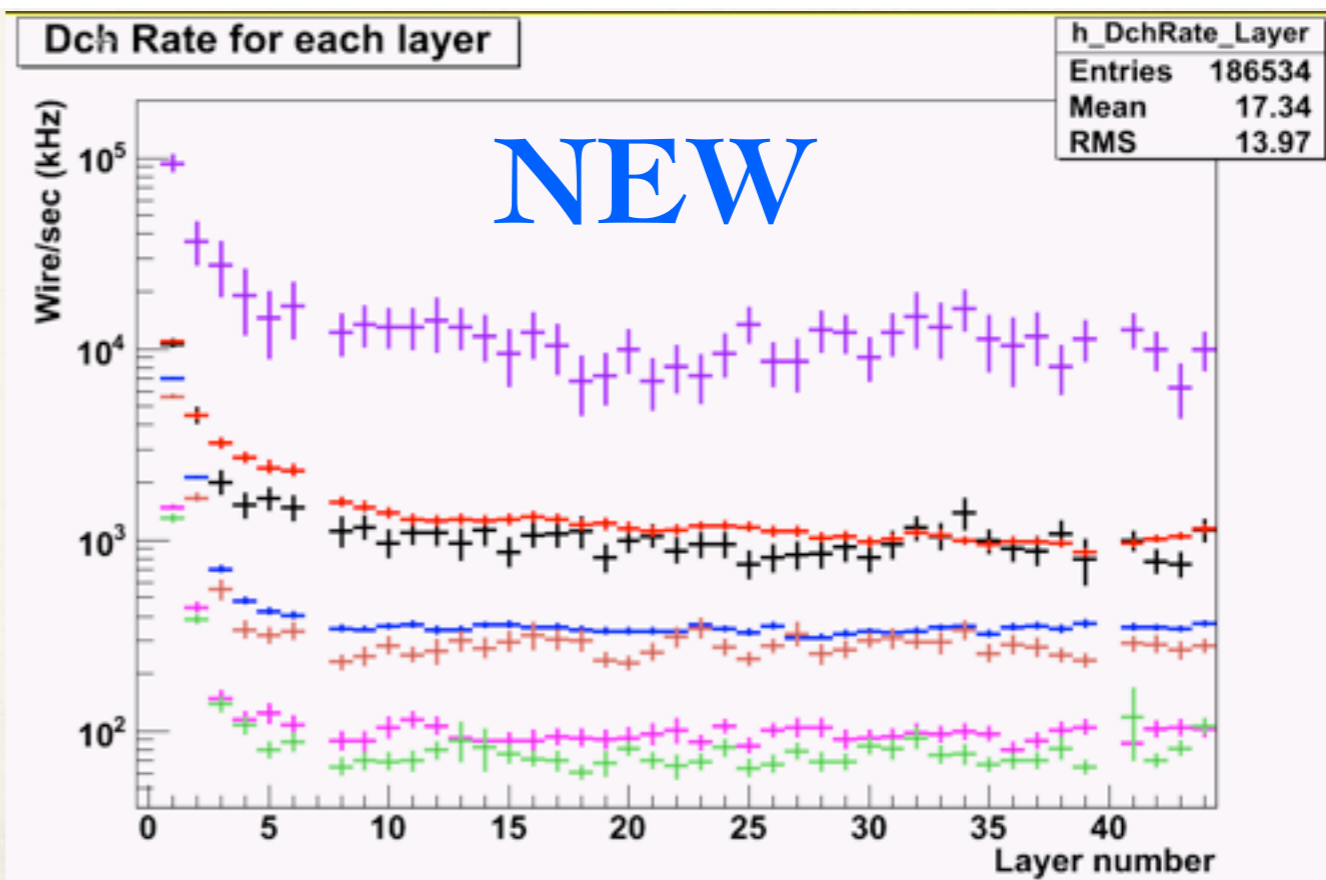
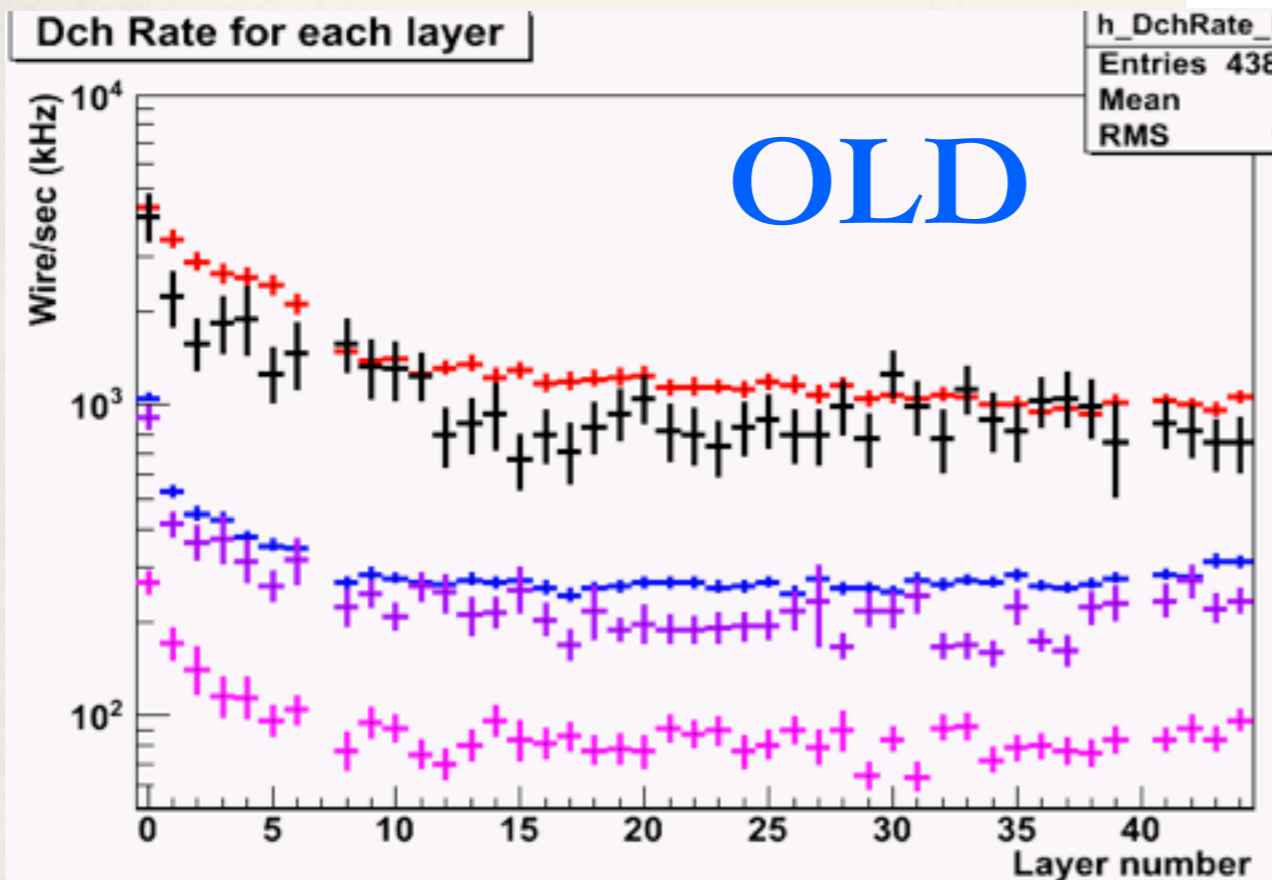


# Dch Rate

DCH

Contributions (Avg. rate)  
 Radiative Bhabha (1111 kHz)  
 2photons (1431 kHz)  
 Touschek LER (306 kHz)  
 Touschek HER (92 kHz)  
 Beamgas HER (xxx kHz)  
 Beamgas LER (244 kHz)

Contributions (Avg. rate)  
 Radiative Bhabha (662 kHz)  
 2photons (781 kHz)  
 Touschek HER (68 kHz)  
 Touschek LER (273 kHz)  
 Beamgas HER (56 kHz)  
 Beamgas LER (219 kHz)  
 Radiative Bhabha Low $\Delta E$ (6974 kHz)



# Dch Rate, stereo

DCH

- Updated table, including normalization correction

Avg. Rate [kHz]	Ax01	SpB1	SpB2	SpB3	SpB4	SpB5	SpB6
Pairs	781	885	981	745	747	753	777
RadBhabha	662	798	874	649	638	653	672
Touschek HER	68	83	97	65	65	65	69
Touschek LER	273	324	362	228	228	230	239
Beamgas HER	56	70	84	54	54	55	59
Beamgas LER	219	260	386	184	186	185	193
RadBhabha Low $\Delta E$	6974	8267	9271	7086	6995	7129	7158
<b>TOTAL</b>	<b>9033</b>	<b>10687</b>	<b>12055</b>	<b>9011</b>	<b>8913</b>	<b>9070</b>	<b>9167</b>

<b>TOTAL (old)</b>	<b>3298</b>	<b>3949</b>	<b>4536</b>
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# Dch Electronics

- 3 silicon plates behind the backward endplate to simulate the electronics
- New RadBhabha contribution does affect the dose (10 Gy = 1 krad)

**OLD**

Syst.	Location	rMin(cm)	rMax(cm)	zMin(cm)	zMax(cm)	TID(Gy)	NIEL(cm-2)	SEE(cm-2)
DCH	FEEZone0	23.6	40	-111.9	-111.9	7.66696	3.01257e+11	7.59315e+10
DCH	FEEZone1	40	60	-111.9	-111.9	5.49084	1.69857e+11	4.48331e+10
DCH	FEEZone2	60	81	-111.9	-111.9	3.73313	1.05596e+11	3.2304e+10

**NEW**

DCH	FEEZone0	23.6	40	-112.8	-112.8	16.1803	7.65089e+11	1.715e+11
DCH	FEEZone1	40	60	-112.8	-112.8	14.4786	5.92476e+11	1.6403e+11
DCH	FEEZone2	60	81	-112.8	-112.8	10.0808	4.15611e+11	1.15576e+11



# Conclusions

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- Updated geometry according the last design available
- Rate increase due to new Rad Bhabha source (low  $\Delta E/E$ ), need to double-check the normalization
- Radiation dose on electronics is still low,  $\sim 1.5$  krad







# Productions

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- 2012 official productions (**thicker tungsten shielding**):
  - **2photons** (~100k evts, 372us) solenoidal field limited in z,  $\pm 40$  cm
  - **RadBhabha** (~10k evts, 37us)
  - **Touschek**: (~87k evts HER, ~198k LER, weighted evts)
  - **Beamgas** (~284k evts HER, ~282k evts LER, weighted evts)
- 2012, additional productions:
  - **RadBhabha** (~10k evts, 37us) old tungsten shielding
  - **RadBhabha** (~10k evts, 37us) CSI, only for EMC studies

 **New entry**



# Dch Rate

DCH

Contributions (Avg. rate)  
Radiative Bhabha (2784 kHz)

2photons (1672 kHz)

Touschek LER (393 kHz)

Touschek HER (109 kHz)

Beamgas HER (114 kHz) **OLD**

Contributions (Avg. rate)  
Radiative Bhabha (1111 kHz)

2photons (1431 kHz)

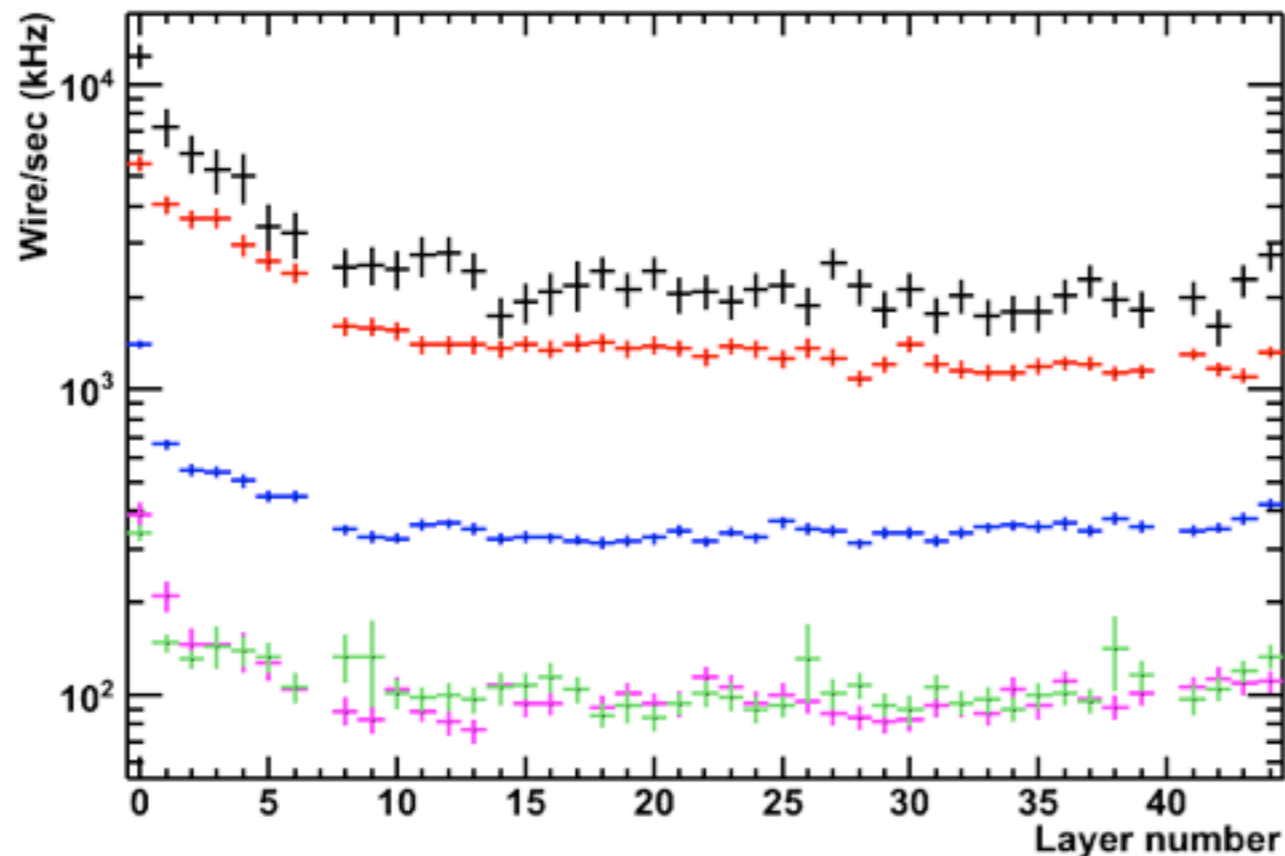
Touschek LER (306 kHz)

Touschek HER (92 kHz)

Beamgas HER (xxx kHz)

Beamgas LER (244 kHz) **NEW**

Dch Rate for each layer



Dch Rate for each layer

