Update on DCH Background rates using Bruno simulation

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Productions

- 2012 official productions (**thicker tungsten shielding**):

  - **2photons** (~100k evts, 372us) solenoidal field limited in z, **±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:

  New entry

  - **RadBhabha** (~10k evts, 37us) old tungsten shielding

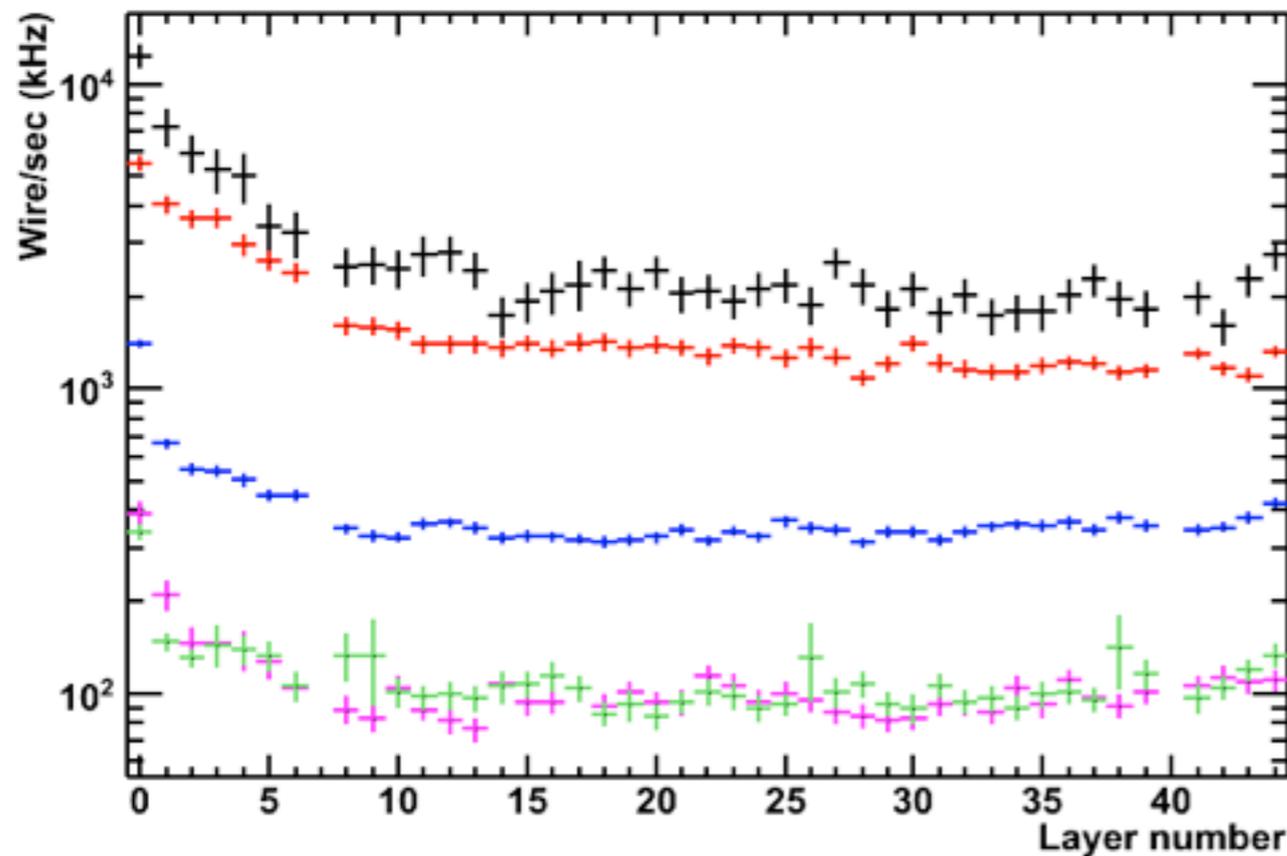 - **RadBhabha** (~10k evts, 37us) CSI, only for EMC studies

Dch Rate

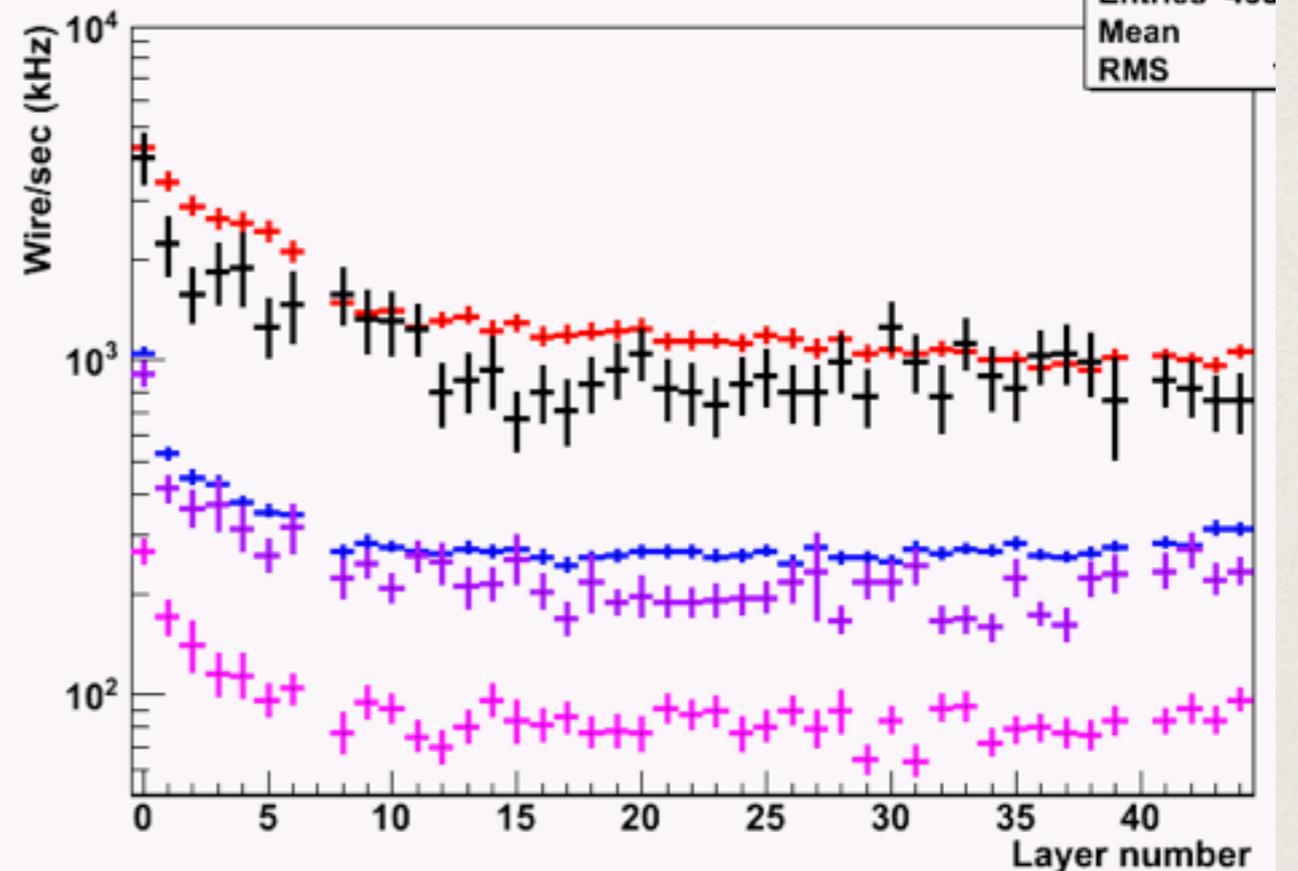**Contributions (Avg. rate)**
Radiative Bhabha (2784 kHz)
2photons (1672 kHz)
Touschek LER (393 kHz)
Touschek HER (109 kHz)
Beamgas HER (114 kHz) OLD

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

Dch Rate, stereo

- Updated table, including normalization correction

Avg. Rate [kHz](Occ.)	Axial01	SuperB01	SuperB02
Pairs	1431	1613	1792
RadBhabha	1111	1410	1645
Touschek HER	92	117	140
Touschek LER	306	374	440
Beamgas HER (old)	114	144	177
Beamgas LER	244	291	342
TOTAL	3298	3949	4536

	Axial01	SuperB01	SuperB02
TOTAL (old)	4403	5721	6810

No BeamgasLER

Dch Electronics

- 3 silicon plates behind the backward endplate to simulate the electronics
- Increased tungsten shielding cut half of the dose, mostly from reducing contribution from Radiative Bhabha

Dose [krad] (1y)	Plate 1	Plate 2	Plate 3
Pairs	0.11	0.098	0.097
RadBhabha	0.16	0.18	0.22
Touschek HER	0.0035	0.0027	0.0024
Touschek LER	0.12	0.128	0.148
Beamgas HER (old)	0.005	0.004	0.002
Beamgas LER	0.09	0.10	0.11
TOTAL	0.49	0.51	0.58
TOTAL (old)	1.01	1.13	1.37

Conclusions

- Updated results from different background sources simulated with same configuration, additional 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 (detailed radiation levels will be available through ETD people)

Dch Rate, stereo

- Updated table, including normalization correction
  OLD

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

- No significant variation for dose on electronics

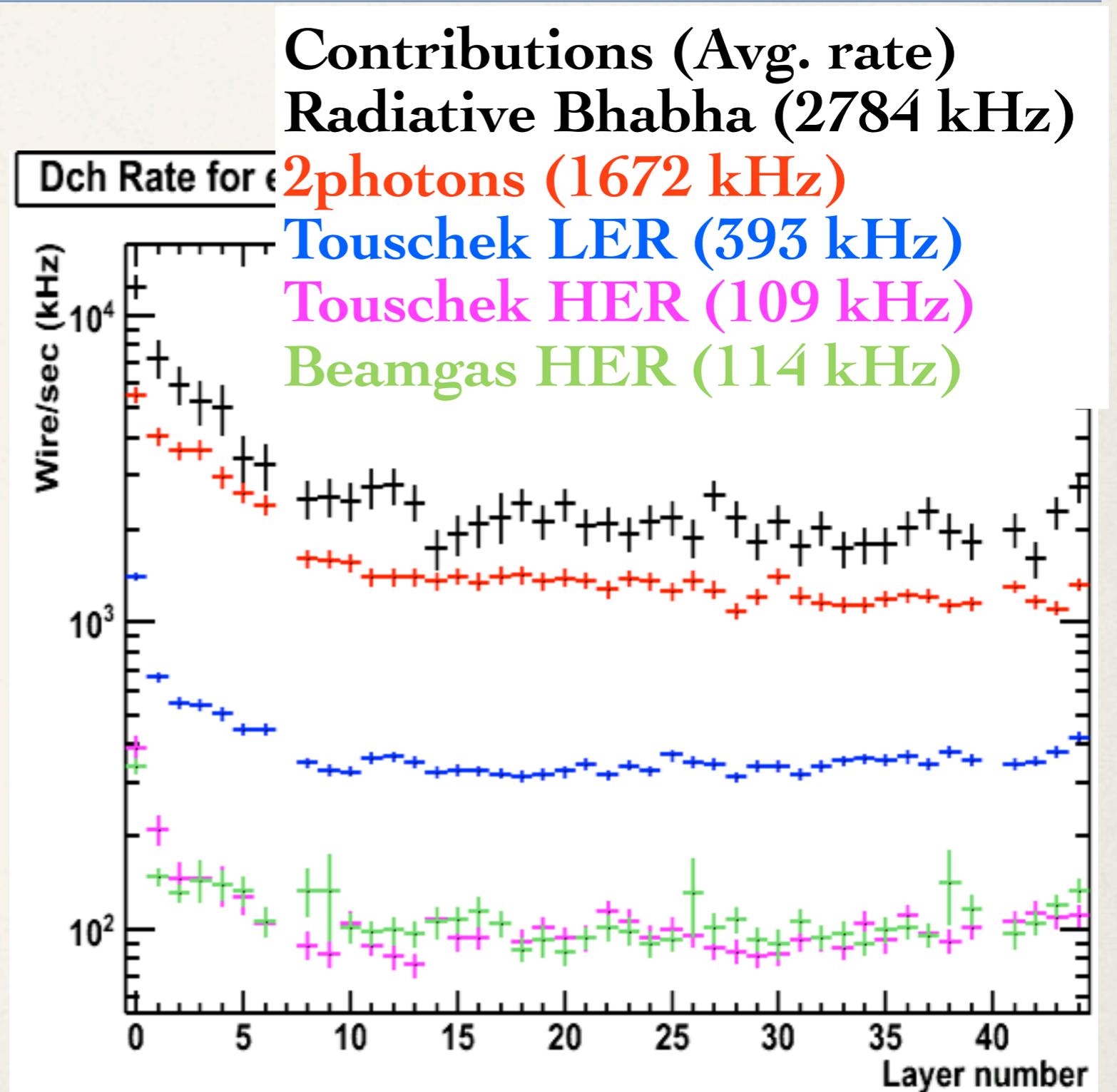- Beamgas HER contribution similar to Touschek HER

- Total dose around 1krad

OLD

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**

Old productions

- New official productions:

  - **2photons** (~100k evts, 372us): first official production, 1 evt = 1 bunch xing, normalization like RadBhabha

  - **RadBhabha** (~10k evts, 37us)

  - **Touschek**: (~84k evts HER, ~188k LER, weighted evts)

  - **Beam-gas** (~275k evts HER, weighted evts) ⟵ NEW

- Same magnetic field configuration, solenoidal field around IP region but limited in z (±20 cm from IP)
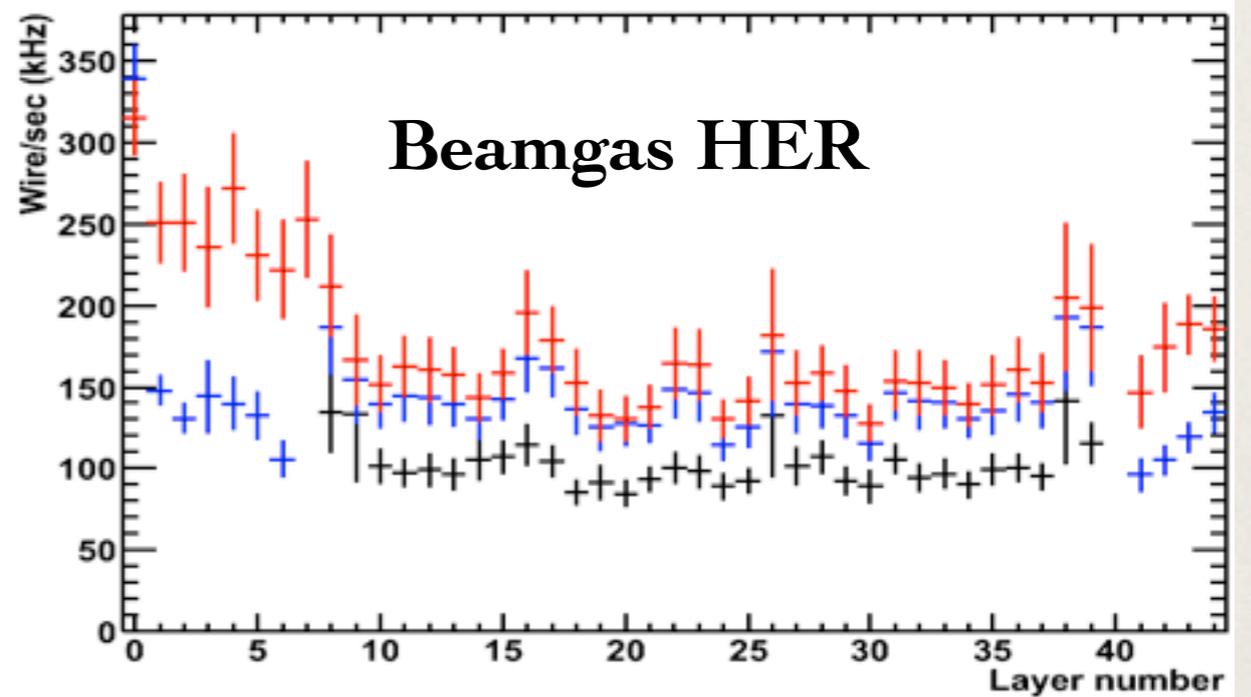
Dch Rate

- 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 (±40cm)

- 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

Contributions (Avg. rate)
Radiative Bhabha (2784 kHz)
2photons (1672 kHz)
Touschek LER (393 kHz)
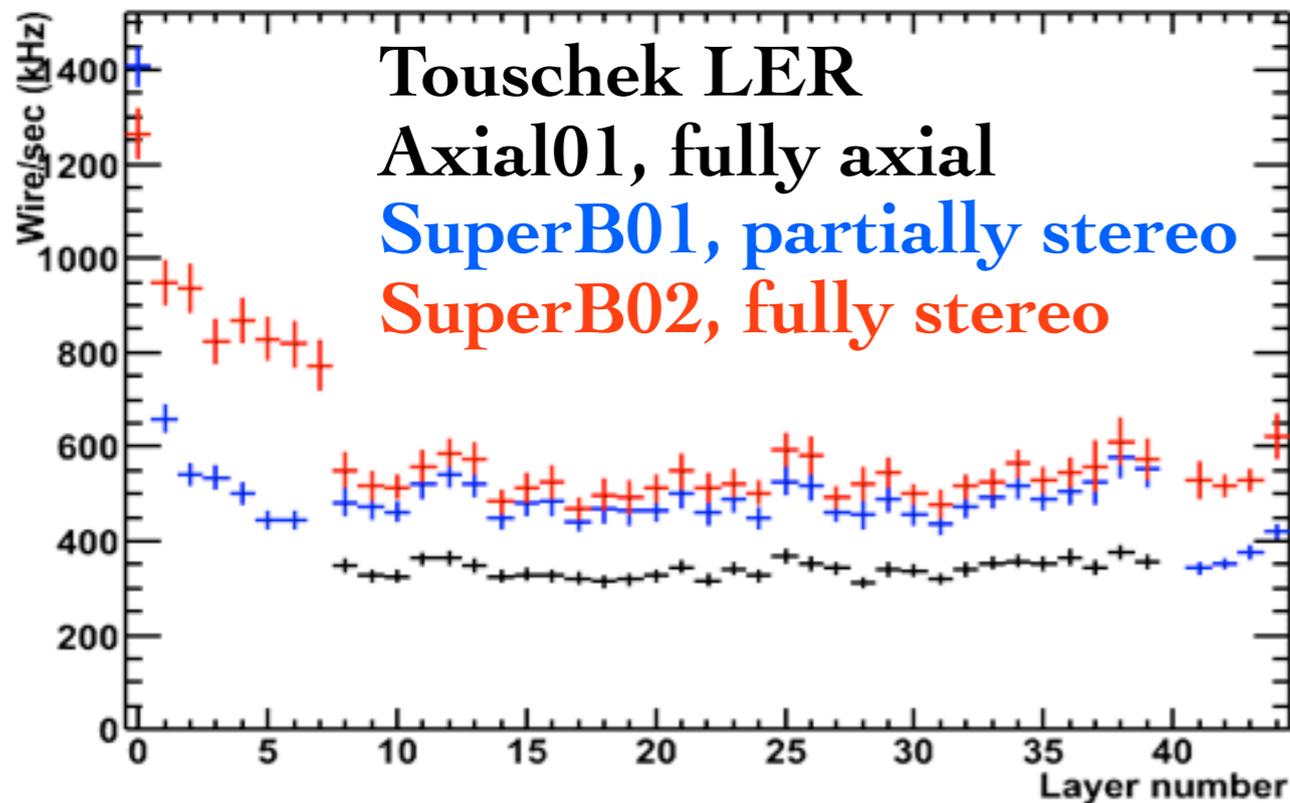**Touschek HER (109 kHz)**
Beamgas HER (114 kHz)

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)

Beamgas HER

Touschek LER
Axial01, fully axial
SuperB01, partially stereo
SuperB02, fully stereo

Touschek HER