Some Slides from B2GM

CDC Background

14th campaign

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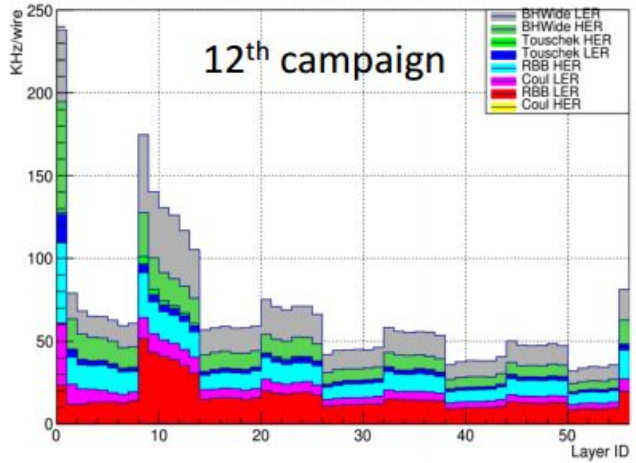
Full Presentation in the background session on Tuesday of the last B2GM:
https://kds.kek.jp/indico/event/22581/session/27/contribution/292/material/slides/0.pdf

Major update

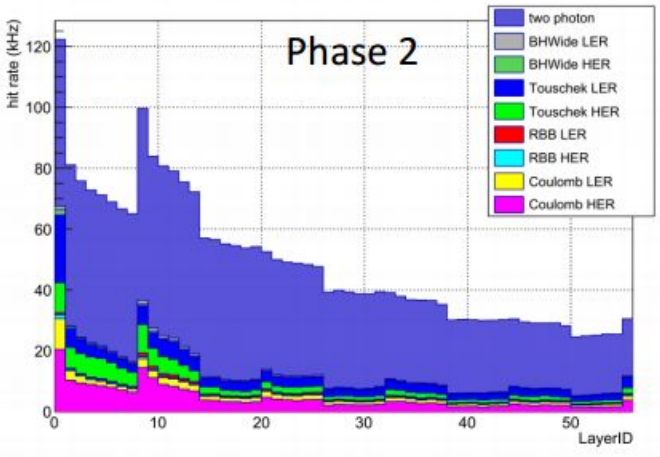
1. **Phase3:**

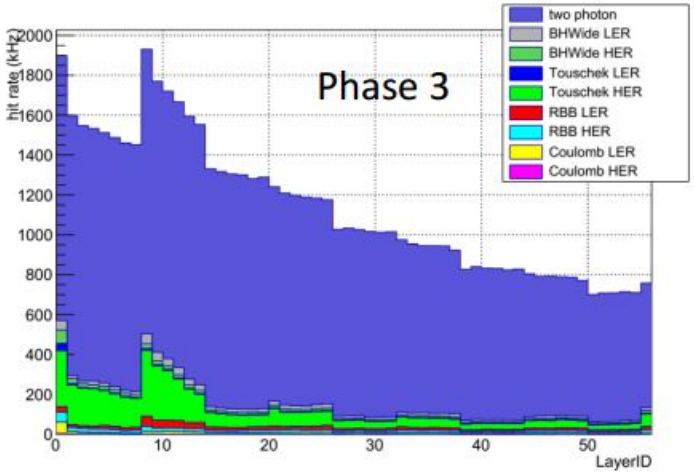
- Touschek/ Coulomb are updated with new SAD simulation results.
- RBB/ BHWide are the same as 12th campaign.
- Data 100us:~nakayama/basf2/release_201610_14th/Work_MCgen/output
- Two photon sample is generated by Geant4-only approach, no SAD tracking was used.
- Data 100us: ~nakayama/basf2/release_201610_14th_aafh/Work_aafh/output/aafh_100us.root

CDC hit rate

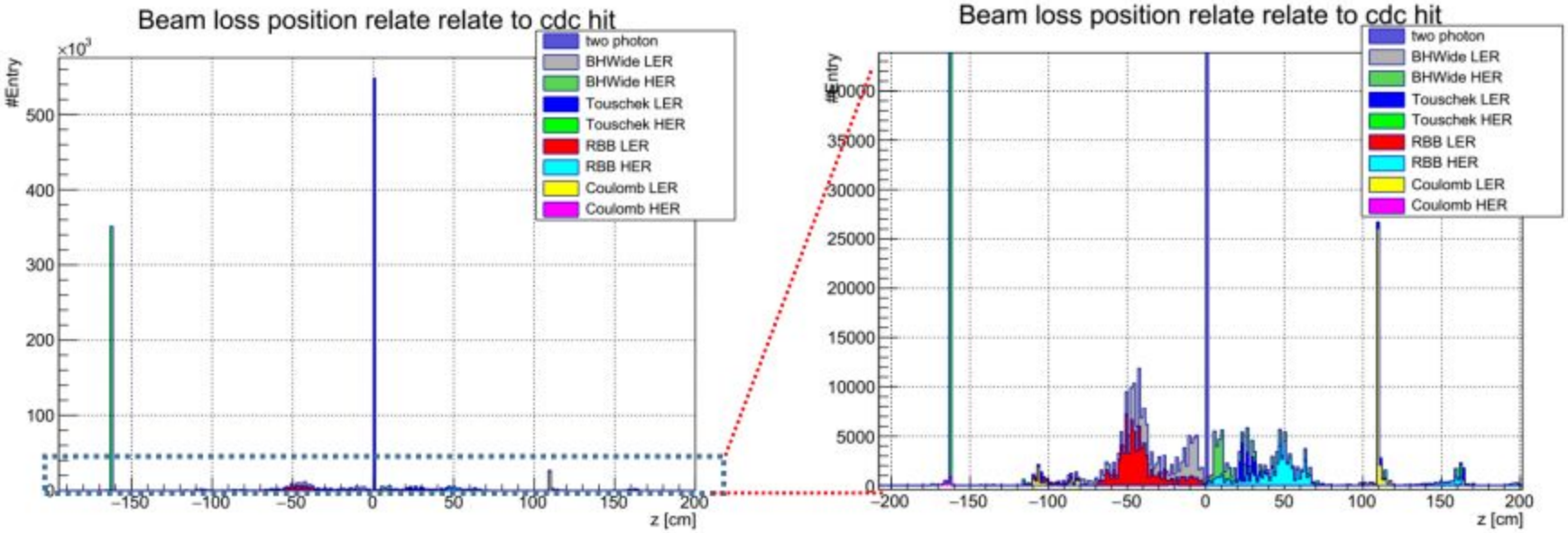


CDC Hit rate is too high at phase 3 (10 times higher than requirement).
Main contribution is two photons and Touschek HER.



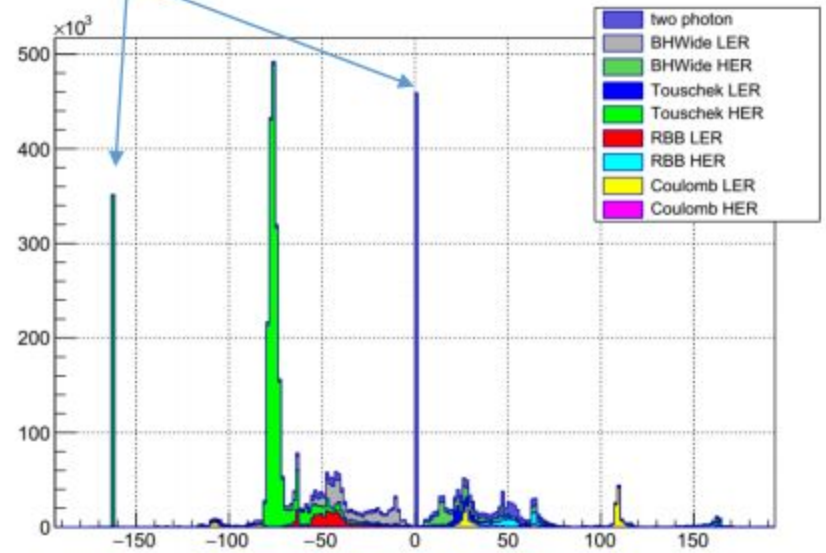


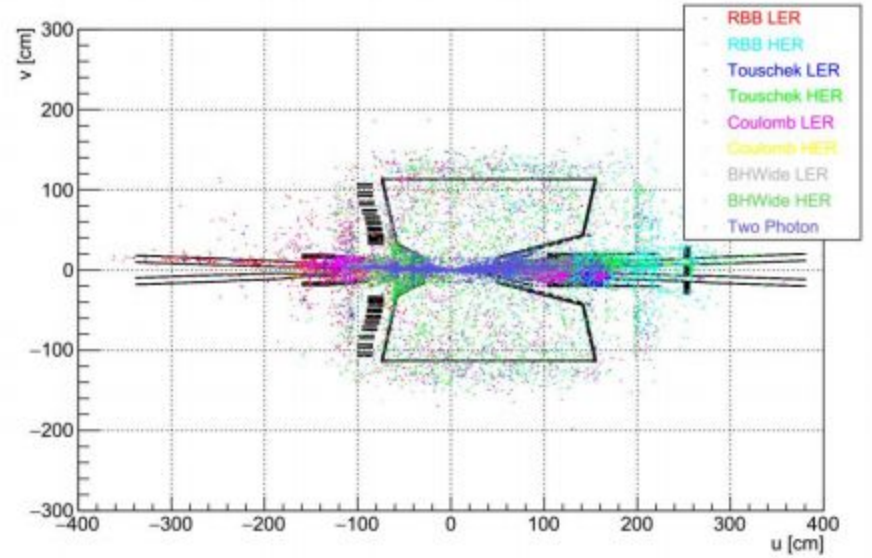
Beam loss position relate to cdc hit (Phase 3)



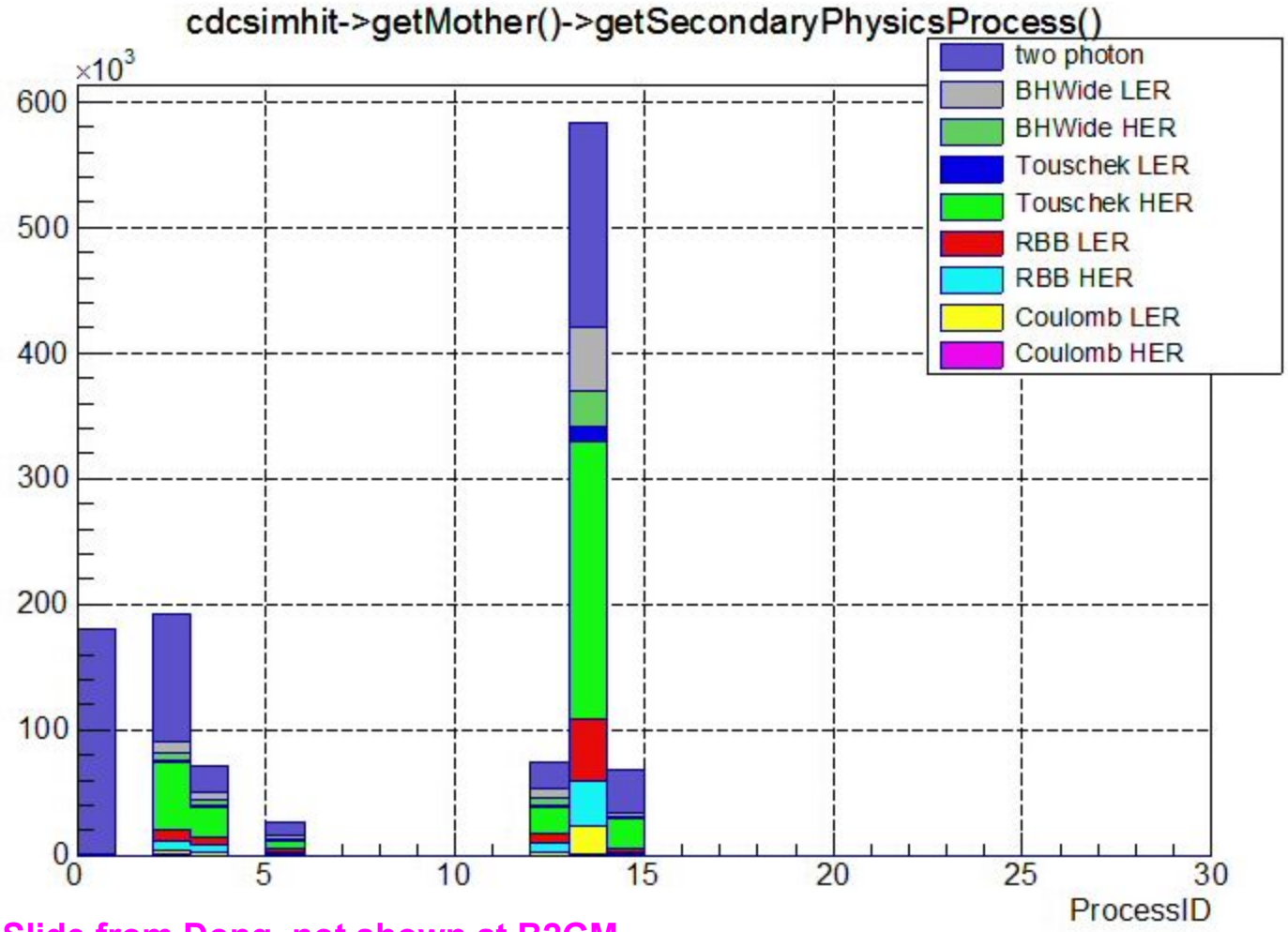
Production vertex of particles relate to cdc hit E>5MeV

Beam loss position





- Touschek: beam loss at z=-160cm, then make shower at z ~ 60-70cm



Bonus Slide from Dong, not shown at B2GM

SVD beam background: results of 14th campaign

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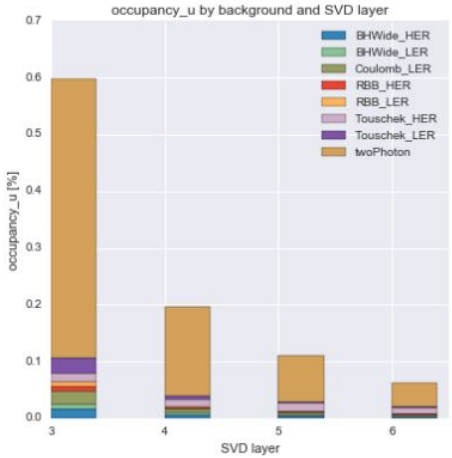
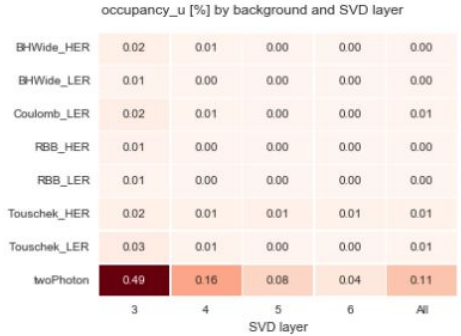
25th B2GM
KEK, 17-21 October 2016

Same session as Dong's talk
https://kds.kek.jp/indico/event/22581/session/27/contribution/291/material/slides/0.pdf

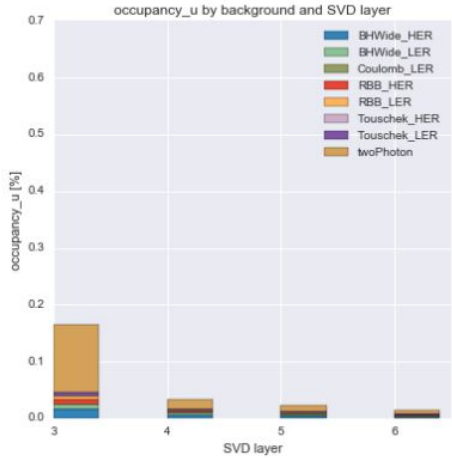
U-strips' occupancy

(a) Campaign 14





(b) Campaign 12



V-strips' occupancy

(a) Campaign 14 **(b)** Campaign 12

Less BKG in Layer 3, but about the same in the other layers;

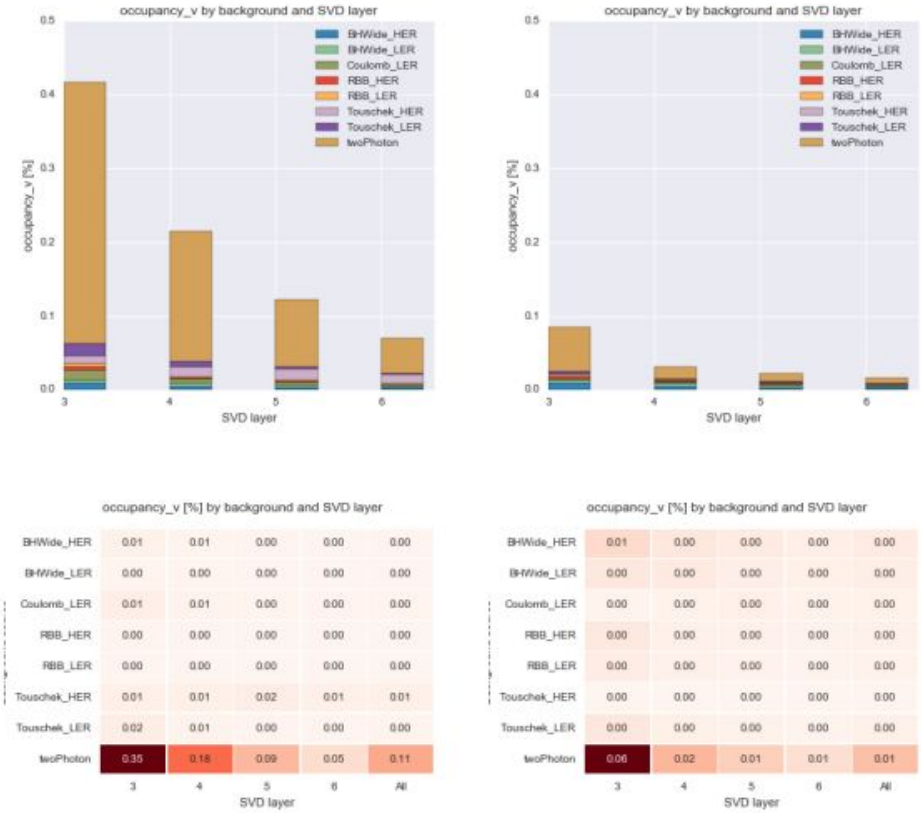
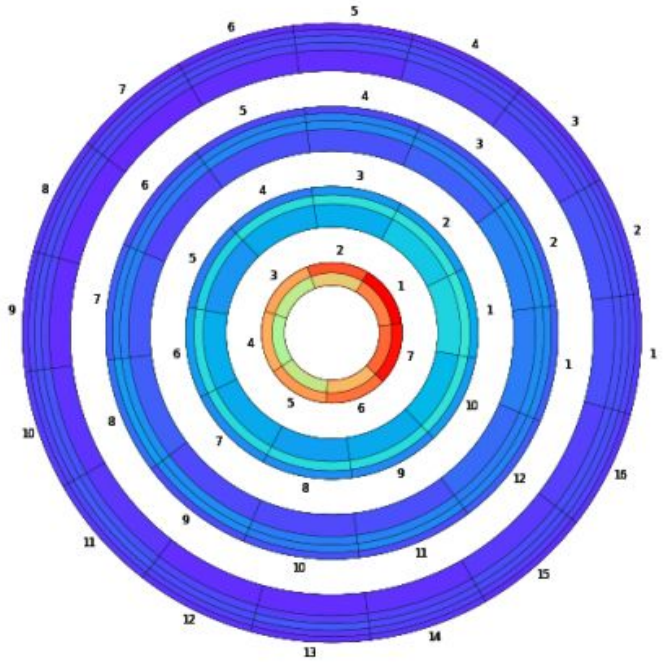


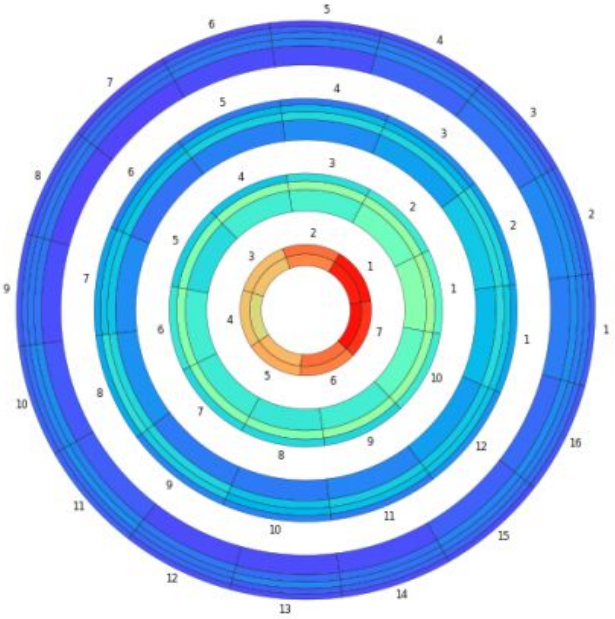
Figure: V-strips' occupancy by SVD layer.

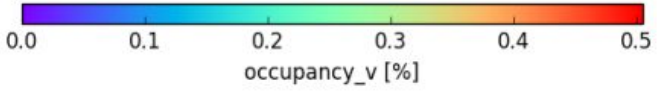
U-strips' occupancy: total, 14th campaign

V-strips' occupancy: total, 14th campaign

Note scaling for v-strips is a bit lower than for the u-strips







BPAC Report Discussion

2.4.2 Concerns

- The performance goals for the tracking efficiency are not clear. The CDC tracking efficiency for the CDC of 95% for tracks with a p_T of $0.3 - 0.6 GeV$ seems rather low.
- The VXD track finding has not yet reached the performance of the BaBar tracking and even though the new development of the VXD-TF2 shows some promising performance, it is not guaranteed that it will be fully available for the Physics run start.
- The rather high CPU requirements for the track fitting might eventually cause severe problems once the luminosity starts to approach design values.
- The expected loss of experienced developers over the year might turn out to be difficult to replace and result in further delays in finalising the track reconstruction in time, both for the GenFit fitter and the pattern recognition.

  The fact that tracking is not an institutional responsibility might cause maintenance problems during the data taking period, if the tracking code needs to be adjusted to meet new, more challenging requirements in terms of efficiency and CPU performance or if it will have to be adjusted to detector deficiencies.
- The relation of the online (HLT) and offline reconstruction was not clear at the review. It is not clear that the current CPU performance of the reconstruction code meets the requirements of the HLT and if there are different requirements (working points) with respect to a trade-off between efficiency and purity.

2.4.3 Recommendations

- Complete studies of the track finding efficiency in the CDC in order to understand, if the tracks that are not found are lost due to deficiencies of the algorithms or due to geometrical and detector resolution effects.
- In order to address the expected further drain in experienced man power working on track reconstruction one needs to actively seek for new institutes or groups to join Belle II tracking and try to make the tracking reconstruction a formal responsibility of one or more institutes. In particular, it is vital to ensure the development support for the GenFit package.
- The rather high CPU demands for the track reconstruction seem to a large extend be due to the detailed simulation model being used and the choices of track fitting techniques. The committee therefore recommends to start investigating the use of faster and more modern Runge-Kutta integration codes and of a simplified reconstruction geometry as soon as time allows. It should be investigated if the use of DAF is strictly necessary and if fast track fitting techniques could be sufficient in most cases.
- In order to better understand the performance requirements and potentially needed improvements of the tracking code for the HLT, The committee proposes to organise HLT dress rehearsals with realistic assumptions on the timing and data rates for the first data taking period as soon as the status of the track reconstruction software allows.

- The performance goals for the tracking efficiency are not clear. The CDC tracking efficiency for the CDC of 95% for tracks with a p_T of $0.3 - 0.6GeV$ seems rather low.
  - It is about the same in that region for the adapted Trasan and our new development, despite different approaches were taken; → remaining tracks are probably very difficult to find;
  - That is CDC stand-alone tracking, we have the chance to find those tracks in the VXD as well, the combination should have a higher efficiency, additional CDC hits can be taken then up by extending the VXD track
    → Extension has medium to high priority; Ian Watson is (in theory) working on it Sasha Glazov has indicated some interest to take this over, if Ian doesn't continue;
  - Further improvements in the CDC stand-alone track finding are probably possible, e.g. by returning hits to the finding pool after a trackfit was done, but the improvements will be small;
    → Further improving this has low priority, with Viktor's thesis completed and Oliver's thesis on the way, we temporarily pause the development;

- The VXD track finding has not yet reached the performance of the BaBar tracking and even though the new development of the VXD-TF2 shows some promising performance, it is not guaranteed that it will be fully available for the Physics run start.

  - Making sure, the redesigned version of the VXD trackfinder is available for the Physics run start is crucial and is the tracking group’s number 1 priority;
    - We believe with the current amount of available human resources this goal is achievable;

- The rather high CPU requirements for the track fitting might eventually cause severe problems once the luminosity starts to approach design values.

  - This can be improved a lot with a moderate amount of development work; a very low key effort is under way;
    → As it says “once the luminosity...”, it has low priority, we can’t do this in the near future with the available people;

- The expected loss of experienced developers over the year might turn out to be difficult to replace and result in further delays in finalising the track reconstruction in time, both for the GenFit fitter and the pattern recognition.

  The fact that tracking is not an institutional responsibility might cause maintenance problems during the data taking period, if the tracking code needs to be adjusted to meet new, more challenging requirements in terms of efficiency and CPU performance or if it will have to be adjusted to detector deficiencies.

- Yes, this is a problem, but not my business to address;

- The relation of the online (HLT) and offline reconstruction was not clear at the review. It is not clear that the current CPU performance of the reconstruction code meets the requirements of the HLT and if there are different requirements (working points) with respect to a trade-off between efficiency and purity.

  - Nils and Thomas did a good job in the meantime to address this issue;

Overall Impression

- Software was not very much discussed in this B2GM;
- The Background issue isn’t taken as serious as my feeling is, it should be taken;
- Detector construction is mostly on a good path, but the TOP detector just loves making trouble...