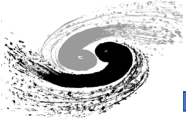


Status



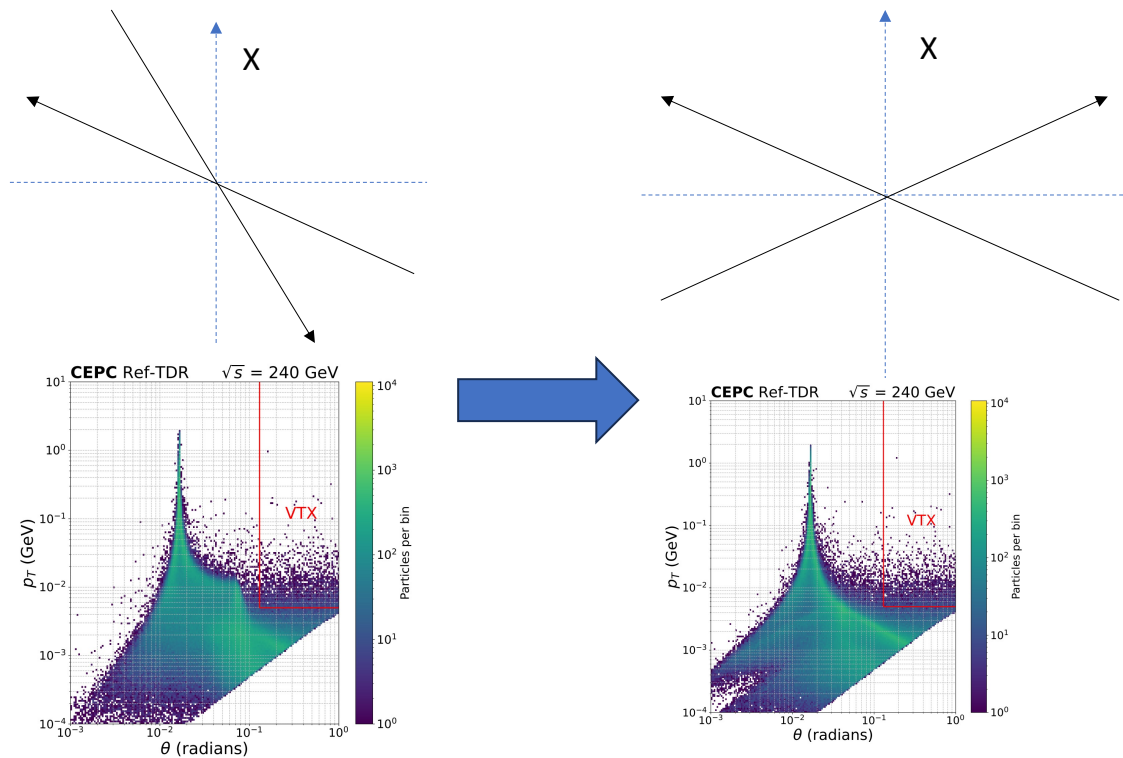
- The updates on BG simulation is on going.
 - SR: Finished the coding of the new generator with re-weighting. Testing in progress. We set ~50 steps in simulation. Can not be finished before Review.
 - Single Beam loss: New lattice with Solenoid(No Beam-beam) has been tested. Generation and accelerator tracking on going.
 - Accelerator Tracking finished last week for BTH/BGB/TSC, BGC is still simulating. Adjustment of the collimator is ongoing based on IR lossmap.
 - Detector simulation will be started after acc-tracking finished.
 - Pair Production: Physics group did a lot of check. We see less hits on VTX with B field(uniform). ($\sim 5.1 \rightarrow 1.2$ MHz / cm²).
 - Non-uniform B field in detector simulation: The B field can be loaded successfully(thanks to the Software and Magnet colleagues). Simulation on going, can be done before the review for some of the sources.

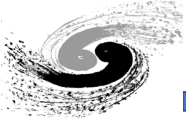


Pair Production - Generation



- [Chenguang and Xiaotian did a lot of check.](#) Thanks to them.

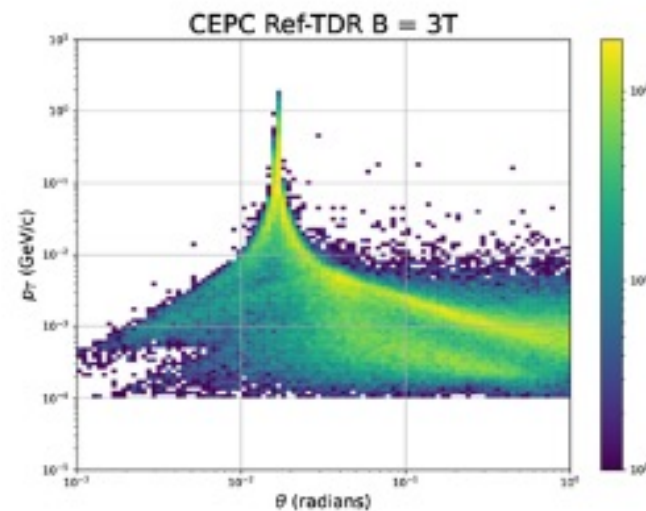
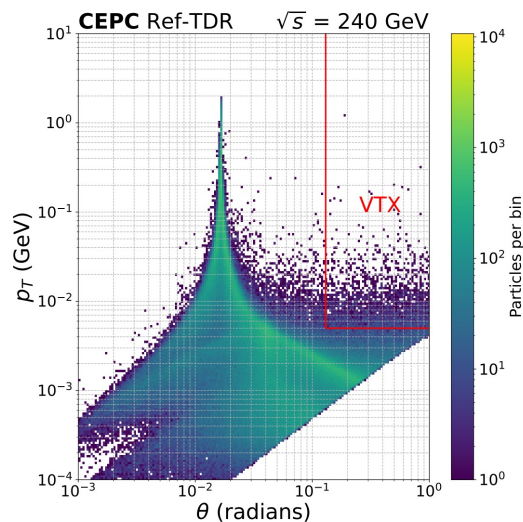


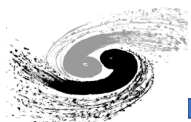


Pair Production - Generation



- [Chenguang and Xiaotian did a lot of check](#). Thanks to them.
- Currently, we have two versions:
 - Simply change the phi in boost code to minus. Plus angle, 5 MeV cut(v1).
 - Keep the phi in boost code at plus. Minus angle, 0.511 MeV cut(v2).





Pair Production - Detector Simulation - 1



- We performed a detector simulation using CEPCSW 25.5 with generator v1. Compared with old results in May.
 - Slightly decreased hit rate.

```
Number of files: 2000
Number of hits in VXD L1: 1839637
Number of hits in VXD L2: 1138610
Number of hits in VXD L3: 514045
Number of hits in VXD L4: 367173
Number of hits in VXD L1: 0.5457424320527683 hits in cm^2/MHz
Number of hits in VXD L2: 0.15051329461659807 hits in cm^2/MHz
Number of hits in VXD L3: 0.03827264160041939 hits in cm^2/MHz
Number of hits in VXD L4: 0.01750964885149231 hits in cm^2/MHz
```

May Results

```
Number of files: 2000
Number of hits in VXD L1: 1709905
Number of hits in VXD L2: 1045509
Number of hits in VXD L3: 446435
Number of hits in VXD L4: 284167
Number of hits in VXD L1: 0.507256438786124 hits in cm^2/MHz
Number of hits in VXD L2: 0.13820623755395162 hits in cm^2/MHz
Number of hits in VXD L3: 0.03323881518715916 hits in cm^2/MHz
Number of hits in VXD L4: 0.013551280691069374 hits in cm^2/MHz
```

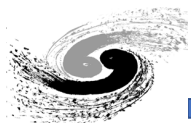
Results
based on v1



Main Changes in MDI from CEPCSW 25.5-25.8



- B Field: Uniform → Non-uniform
- Beam pipe Geometry:
 - Fix the error on mask setting (asymmetry on 1.9m SR mask)
 - Be window in extending pipe has been added
 - Extend the beam pipe to 20m. Add the -7.2 m SR mask, and -19 m Collimator.



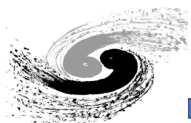
Pair Production - Detector Simulation - 2



- We performed a detector simulation using CEPCSW 25.8 with generator v2.
 - Main reason of the increase might be the increase of pairs.

Ave Hit Rate on VTX [MHz/cm²]

	250514	250823(v2)
1	1.23	2.67
2	0.34	0.36
3	0.09	0.07
4	0.04	0.02
5	0.01	<0.01
6	0.01	<0.01



SR - 1



- Currently, no new versions available.
- For Non-uniform B field with previous generator(CEPCSW), we face some trouble that the lots of the particles have been killed during tracking.
 - SynRad turned off at CEPCSW by default.

```
Step# s X(mm) Y(mm) Z(mm) N_x N_y N_z Delta[N] StepLen StartSafety PhysStep
Step taken was -1.13687e-13 out of PhysicalStep= -1
Final safety is: 2.01366e-11
Chord length = 3.85551e-07

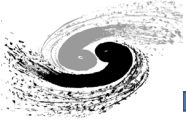
Error: in advancing propagation.
The final curve point is NOT further along than the original!
Going "backwards" from len(A) = 740.099 to len(B) = 740.099
Curve distance is -1.13687e-13 mm
Point A (start) is ( X= 18.537919 -0.0552242767 1110 P= -1965.19821 19.1848389 -119983.906 Pmag= 120000 Ekin= 119999.489 l= 740.099258834 m0= 0.510999 (Pdir-1)= 0 t_
lab= 0 t_proper= 0 PolV= (0,0,0) )
Point B (end) is ( X= 18.537919 -0.0552246623 1110 P= -1965.19822 19.1846206 -119983.906 Pmag= 120000 Ekin= 119999.489 l= 740.099258834 m0= 0.510999 (Pdir-1)= 0 t_
lab= 0 t_proper= 0 PolV= (0,0,0) )
fEpsStep= 1e-10

In full precision, the position, momentum, E_kin, length, rest mass ... are:
Point A (Curve start) is ( X= 30.6585747 -0.0779799857 1850 P= -1965.25831 -4.83939253 -119983.906 Pmag= 120000 Ekin= 119999.489 l= 0 m0= 0.510999 (Pdir-1)= 0 t_lab=
14.5892 t_proper= 0 PolV= (0,0,0) )
Point S (Sub start) is ( X= 30.6585747 -0.0779799857 1850 P= -1965.25831 -4.83939253 -119983.906 Pmag= 120000 Ekin= 119999.489 l= 0 m0= 0.510999 (Pdir-1)= 0 t_lab=
14.5892 t_proper= 0 PolV= (0,0,0) ) Point A' (Current start) is ( X= 18.537919 -0.0552242767 1110 P= -1965.19821 19.1848389 -119983.906 Pmag= 120000 Ekin= 119999.489 l=
740.099258834 m0= 0.510999 (Pdir-1)= 0 t_lab= 0 t_proper= 0 PolV= (0,0,0) )
Point E (Trial Point) is (18.537919022702915584, -0.05522466088437027409, 1110.00000000000002274)
Point F (Intersection) is ( X= 18.537919 -0.0552242767 1110 P= -1965.19821 19.1848389 -119983.906 Pmag= 120000 Ekin= 119999.489 l= 740.099258834 m0= 0.510999 (Pdir-1)=
0 t_lab= 0 t_proper= 0 PolV= (0,0,0) )
Point B' (Current end) is ( X= 18.537919 -0.0552246623 1110 P= -1965.19822 19.1846206 -119983.906 Pmag= 120000 Ekin= 119999.489 l= 740.099258834 m0= 0.510999 (Pdir-1)=
0 t_lab= 0 t_proper= 0 PolV= (0,0,0) )
Point B (Curve end) is ( X= 16.8090979 0.11942111 -1047.9851 P= -1965.35446 -7.79756825 -119983.905 Pmag= 120000 Ekin= 119999.489 l= 2898.37383661 m0= 0.510999 (Pd
ir-1)= 0 t_lab= 0 t_proper= 0 PolV= (0,0,0) )

LocateIntersection parameters are :
Substep no (total) = 2
Substep no = 2 at depth: 0
* Locations: eMultiLevelLocator::EstimateIntersectionPoint() - After EndIf(Intersects_AF)
* Bool flags: Recalculated = 0 Intersects_AF = 0 Intersects_FB = 1
* Number of calls to MLL::EIP= 238791

*** Fatal Exception *** core dump ***
G4Track(0x22ce7040) - track ID = 1, parent ID = 0
Particle type : e+ - creator process : not available
Kinetic energy : 119.999 GeV - Momentum direction : (-0.0163772, -4.03283e-05, -0.999866)
Step length : 2.00027 cm - total energy deposit : 0 eV
Pre-step point : (30.6586, -0.07798, 1850) - Physical volume : AV_11BeamPipe_assembly_0#01BeamPipe_BeforeMask_34#34 (beam)
- defined by : Transportation - step status : 1
Post-step point : (30.6586, -0.07798, 1850) - Physical volume : AV_11BeamPipe_assembly_0#01BeamPipe_BeforeMask_34#34 (beam)
- defined by : SynRad - step status : 7
*** Note: Step information might not be properly updated.

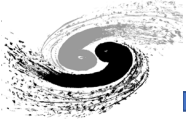
----- EEEE ----- G4Exception-END ----- EEEE -----
```



SR - 2



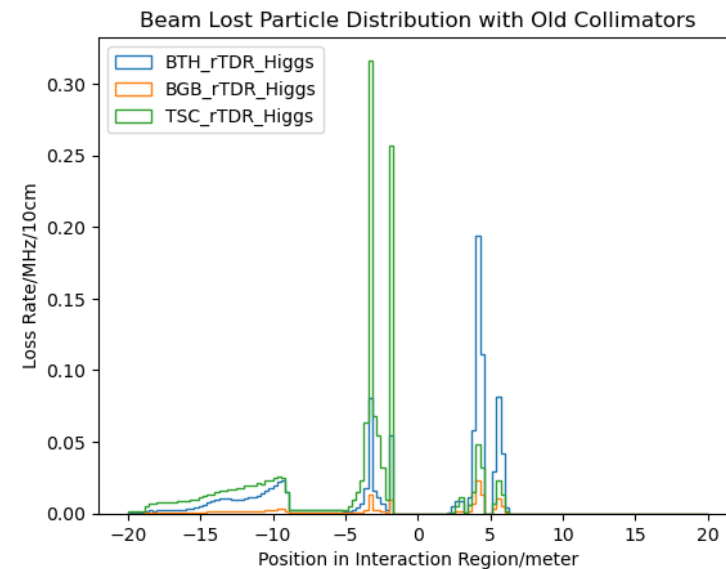
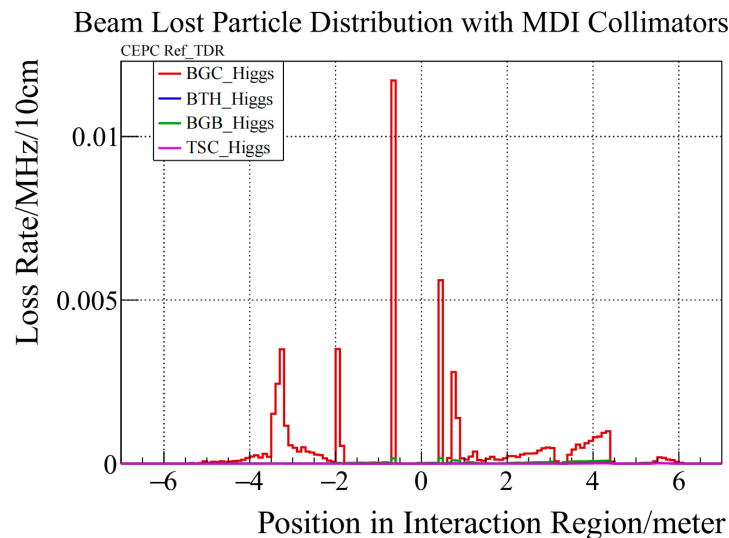
- Currently, no new versions available.
- For Non-uniform B field with previous generator(CEPCSW), we face some trouble that the lots of the particles have been killed during tracking.
 - SynRad turned off at CEPCSW by default.
- For new generator, we faced the trouble that the electron do not behave properly(off-track). We are discussing with accelerator colleagues.
 - We also plan to take a look at BDSIM again

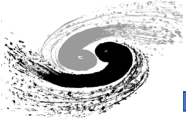


Single beam loss - 1



- We got a new version with solenoid and antisolenoid. No beam-beam.
- We incidentally ran a version including BGB/BTH/TSC without collimators and masks. The IR loss is higher than current version in TDR.





Single beam loss - 2



- We added previous settings of the collimators and performing the simulation. They are still running.
- Preliminary results of TSC and BGC suggested that the optimization of the collimators is needed, which is ongoing.

