

# ILD background study on 250-setA simulated data

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# Motivation

**Get familiar with LCIO soft**

Reproduce analysis done by Daniel and Akiya

# 250 Set-A

Simulated data:

Beamstrahlung electron-positron pairs that produced in case of the pinch effect

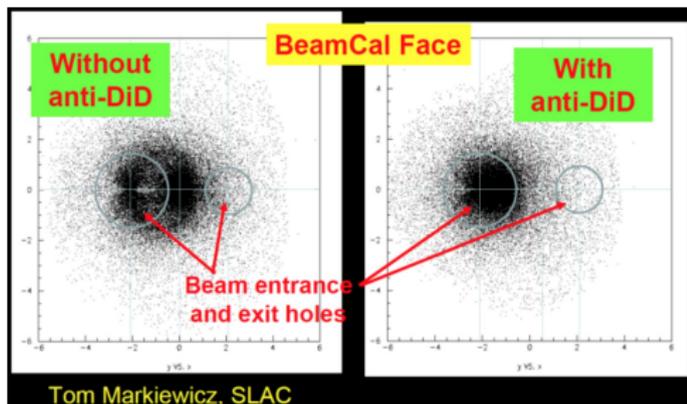
Simulated model variants:

Model	size	anti-DID
ILD_l5_v03	large	no
ILD_l5_v05	large	yes
ILD_s5_v03	small	no
ILD_s5_v05	small	yes

# The goal of Anti-DID

Add small dipole field to main solenoid for guiding beamstrahlung pairs and backscattered particles to the beam pipe.

## Detector Integrated Dipole (DID)



## Statistics

Number of events	ILD_I5_v03	ILD_I5_v05	ILD_s5_v03	ILD_s5_v05
	18123	40156	19333	18280

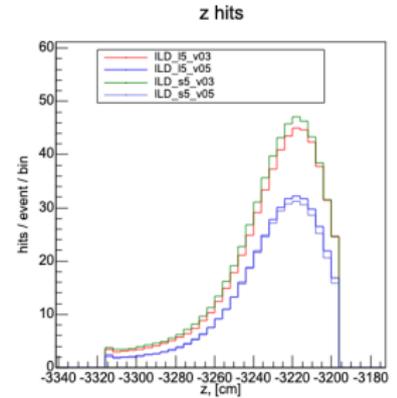
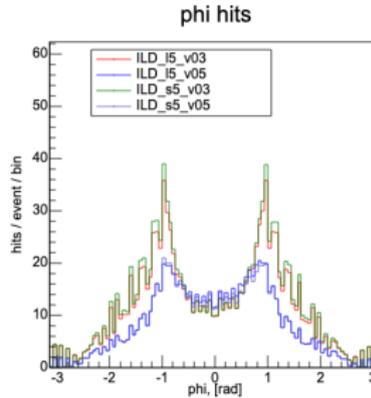
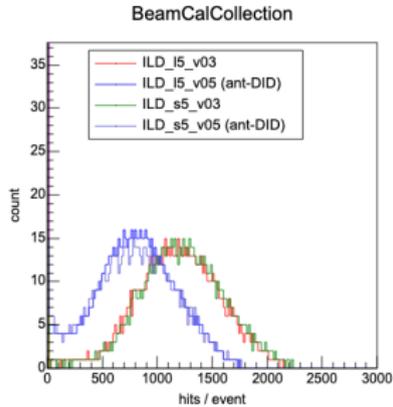
MCParticles in one event	ILD_I5_v03	ILD_I5_v05	ILD_s5_v03	ILD_s5_v05
	$200.79 \pm 4.88$	$200.55 \pm 4.87$	$200.76 \pm 4.54$	$200.47 \pm 4.48$

number of hits Detector Collection	ILD_I5_v03	ILD_I5_v05	ILD_s5_v03	ILD_s5_v05
BeamCalCollection	$1145.63 \pm 471.46$	$825.38 \pm 388.08$	$1200.01 \pm 447.16$	$789.14 \pm 421.81$
HCalEndcapRPCHits	$3.04 \pm 2.51$	$2.05 \pm 2.02$	$3.37 \pm 2.61$	$2.33 \pm 2.20$
HcalEndcapsCollection	$90.36 \pm 54.93$	$60.22 \pm 42.91$	$100.15 \pm 56.46$	$65.66 \pm 46.25$
LHCalCollection	$14.83 \pm 6.82$	$7.79 \pm 4.74$	$15.90 \pm 6.80$	$8.03 \pm 5.09$
VXDCollection	$2.95 \pm 9.42$	$2.08 \pm 9.52$	$3.17 \pm 10.57$	$2.16 \pm 9.55$
YokeBarrelCollection	$8.69 \pm 6.69$	$9.35 \pm 6.65$	$9.37 \pm 6.95$	$9.66 \pm 7.16$
YokeEndcapsCollection	$243.59 \pm 135.89$	$234.11 \pm 121.32$	$259.37 \pm 136.03$	$229.81 \pm 129.94$

\* detector collection selected only with more than 1 hit per event.

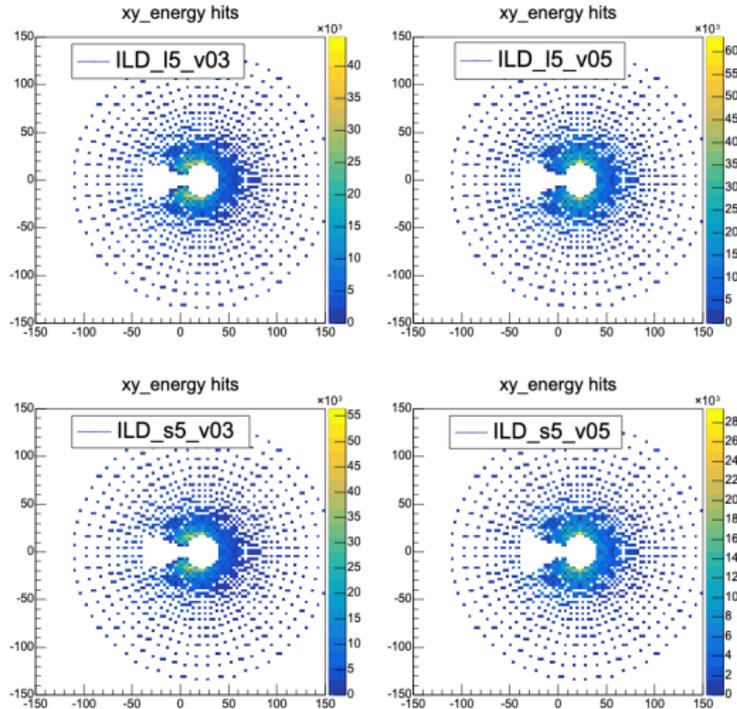
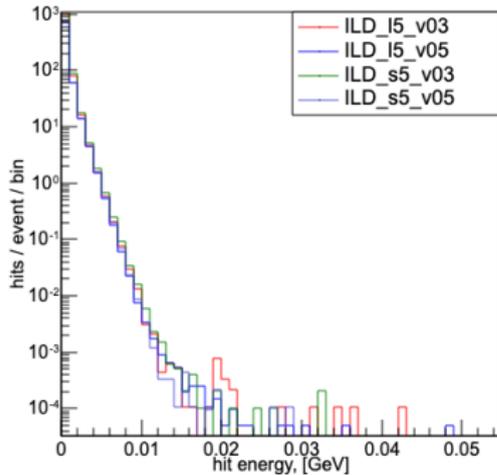
# BeamCal

## BeamCal hit distribution



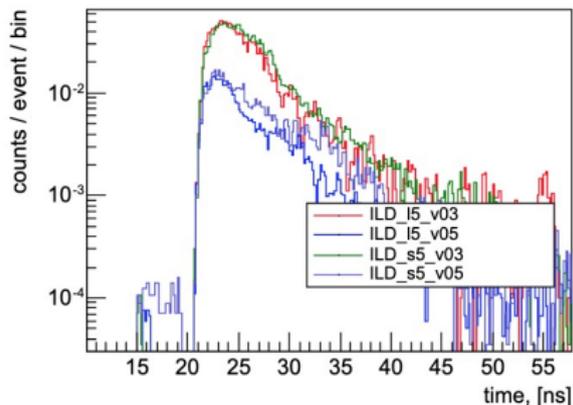
# BeamCal energy dist

energy hits

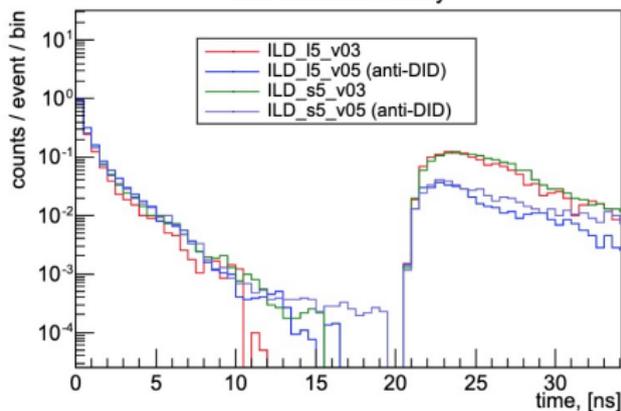


## VXD hit time

time boundary at 15 ns



hits time late + early

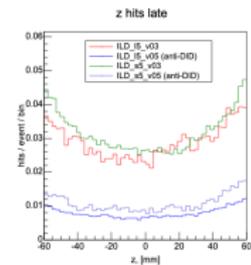
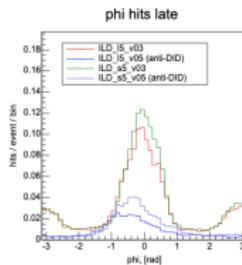
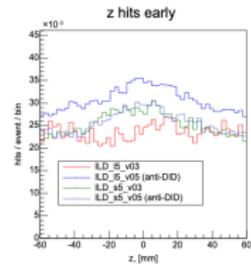
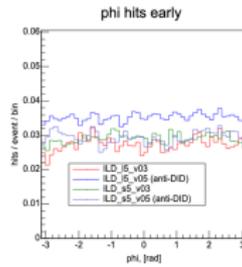
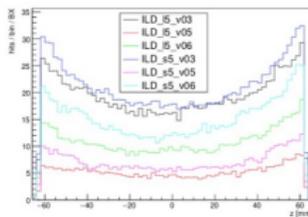
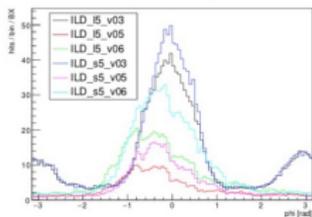
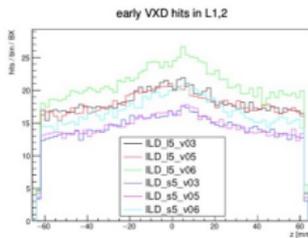
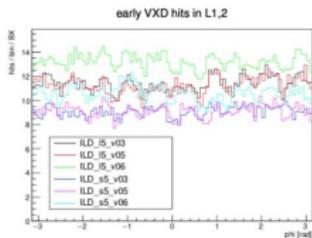


300 files were analyzed for each detector model

# VXD $\phi$ and $z$

Daniel and Akiya

Stepan 300 files



# Is Backscatter

```
MCParticle::isBackscatter()
```

True if the particle was created by the simulator as a result of an interaction or decay in non-tracking region, e.g.

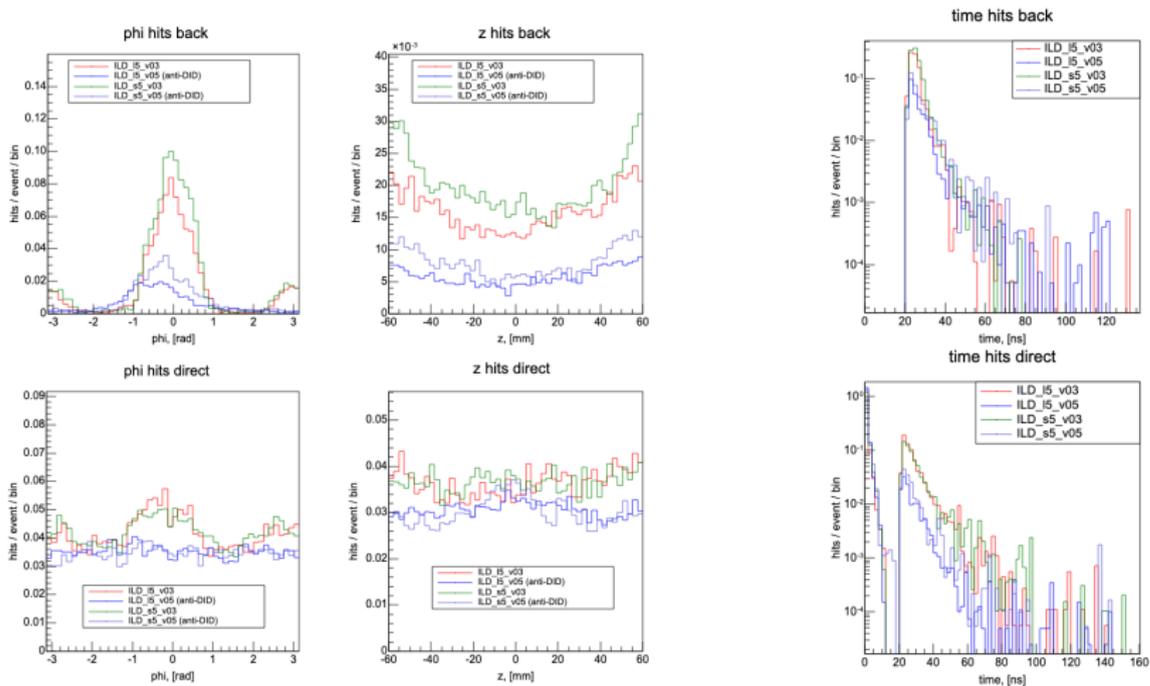
Analyzed 100 files for each detector models:

15 ns and 20 ns boundary

all early hits has `isBackscatter() = false` for all MCParticles

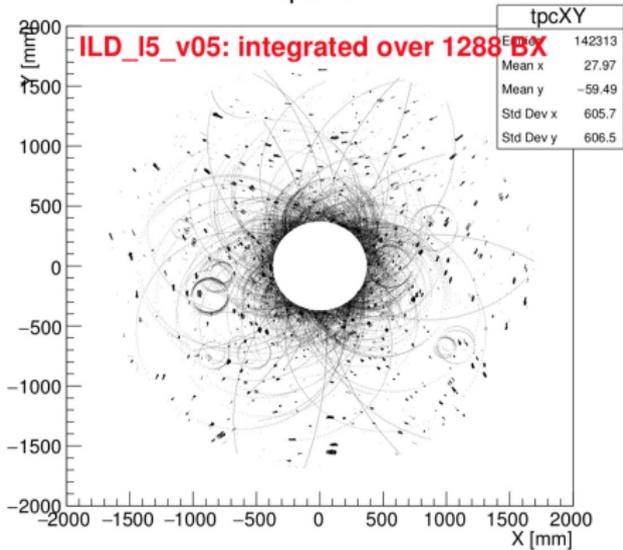
# VXD $\phi$ and z direct and backscattered

direct - from tracking region

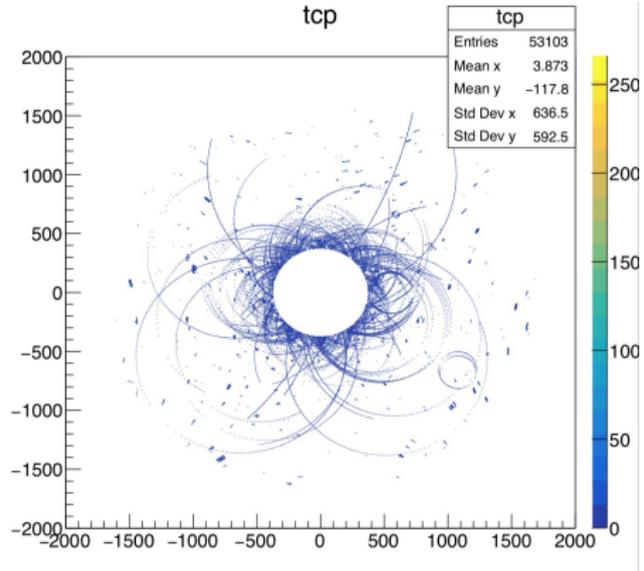


# TPC

Daniel and Akiya  
 tpcXY



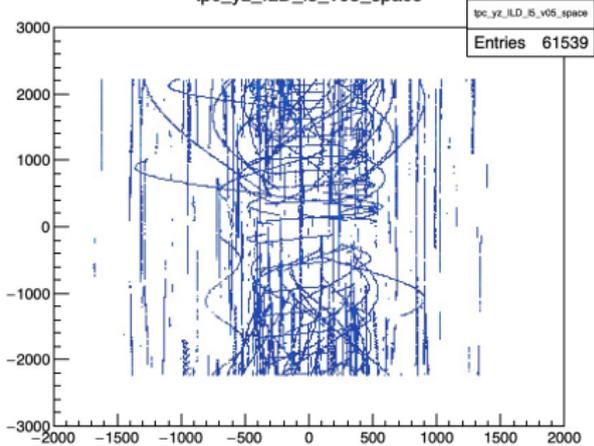
Stepan  
 tcp



# TPC

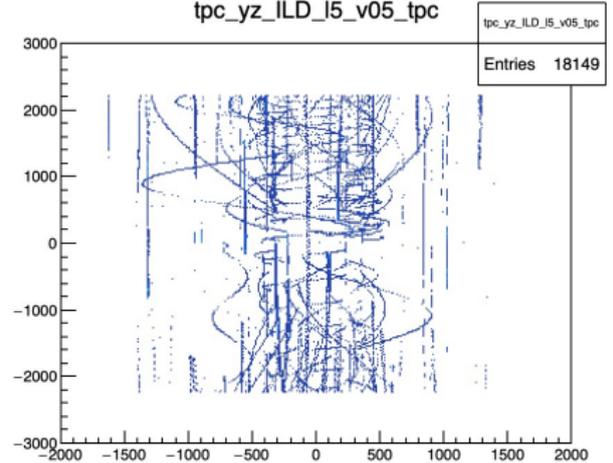
## TPCSpacePointCollection

tpc\_yz\_ILD\_I5\_v05\_space



## TPCCollection

tpc\_yz\_ILD\_I5\_v05\_tpc



# Summary

## Conclusions:

- Set of ILD Detector models was analyzed
- Results were compared with Daniel and Akiya's