

# **Mono photon bench mark & LCFIPlus**

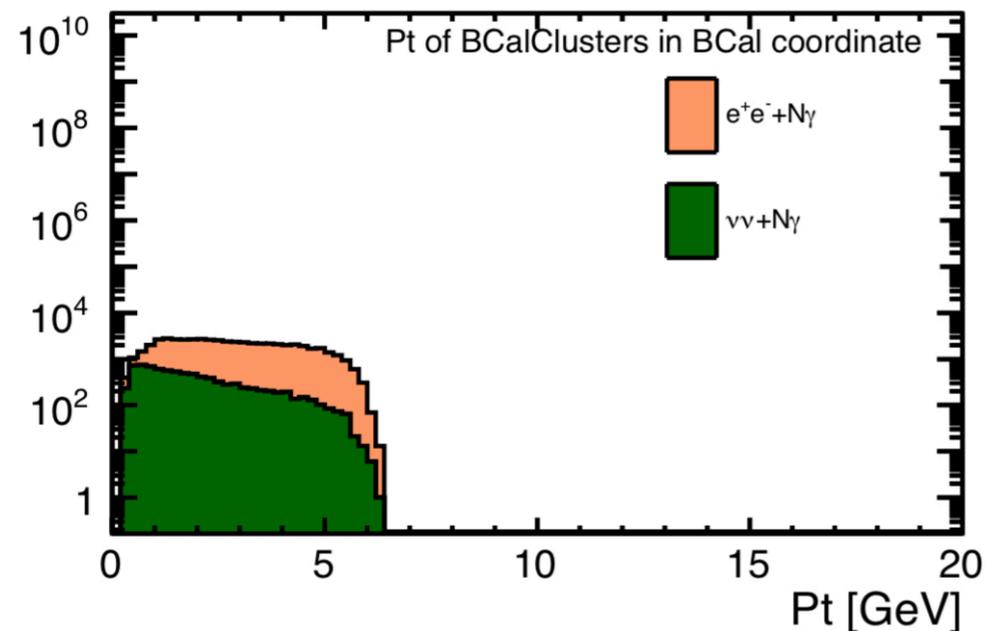
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# **Mono photon benchmark**

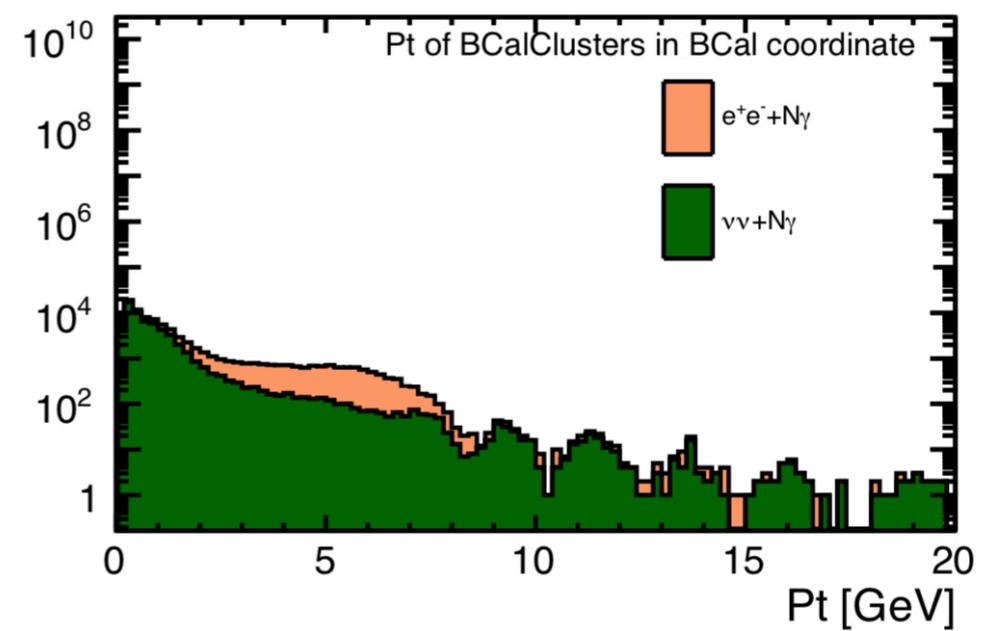
# Monophoton

**BeamCal reconstruction to be reprocessed.**

**Moritz's sample**



**I5 sample**



**Moritz found a problem with the BeamCal background map file (to be supplied at BCal reconstruction).**

**—> Need to reprocess BCal reco. with a new file that has been recently produced by Moritz.**

# **Mono photon**

## **Issue on reprocessing BeamCal**

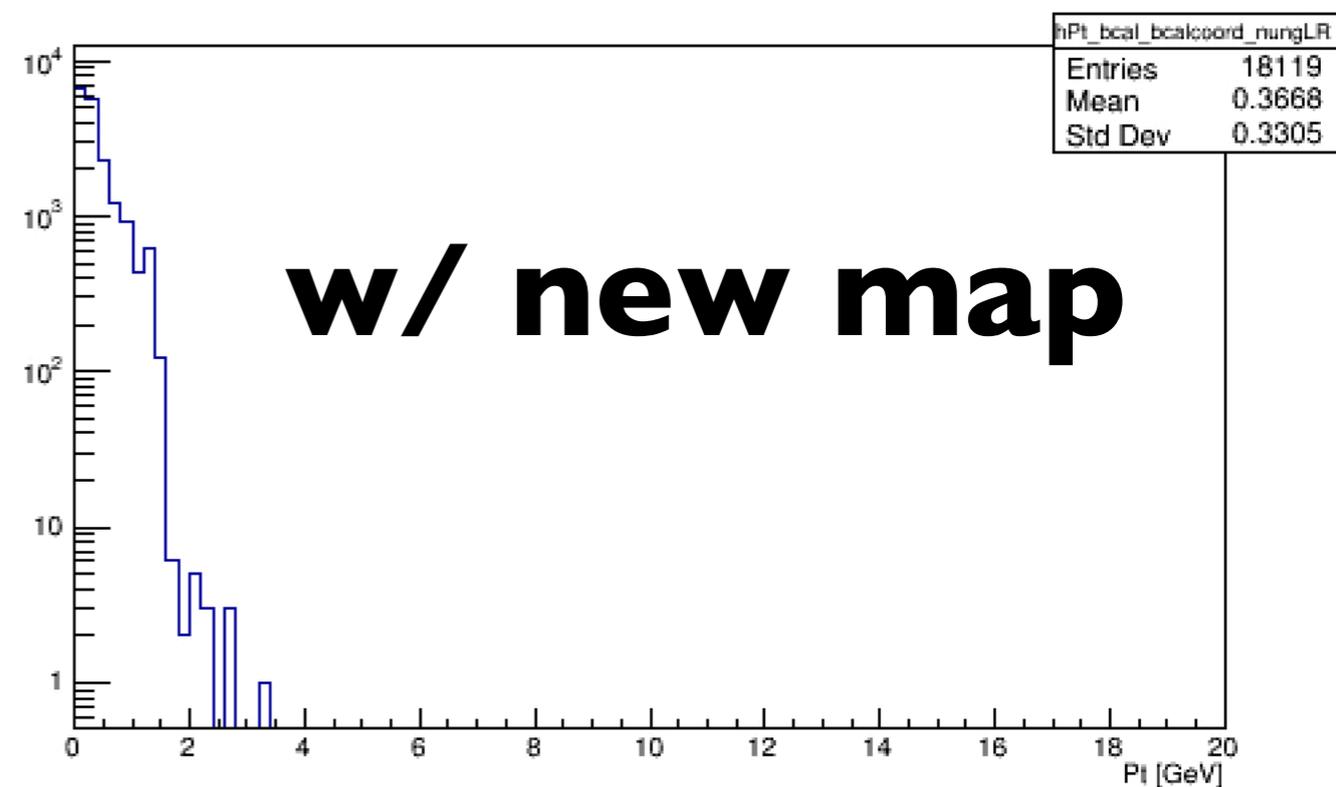
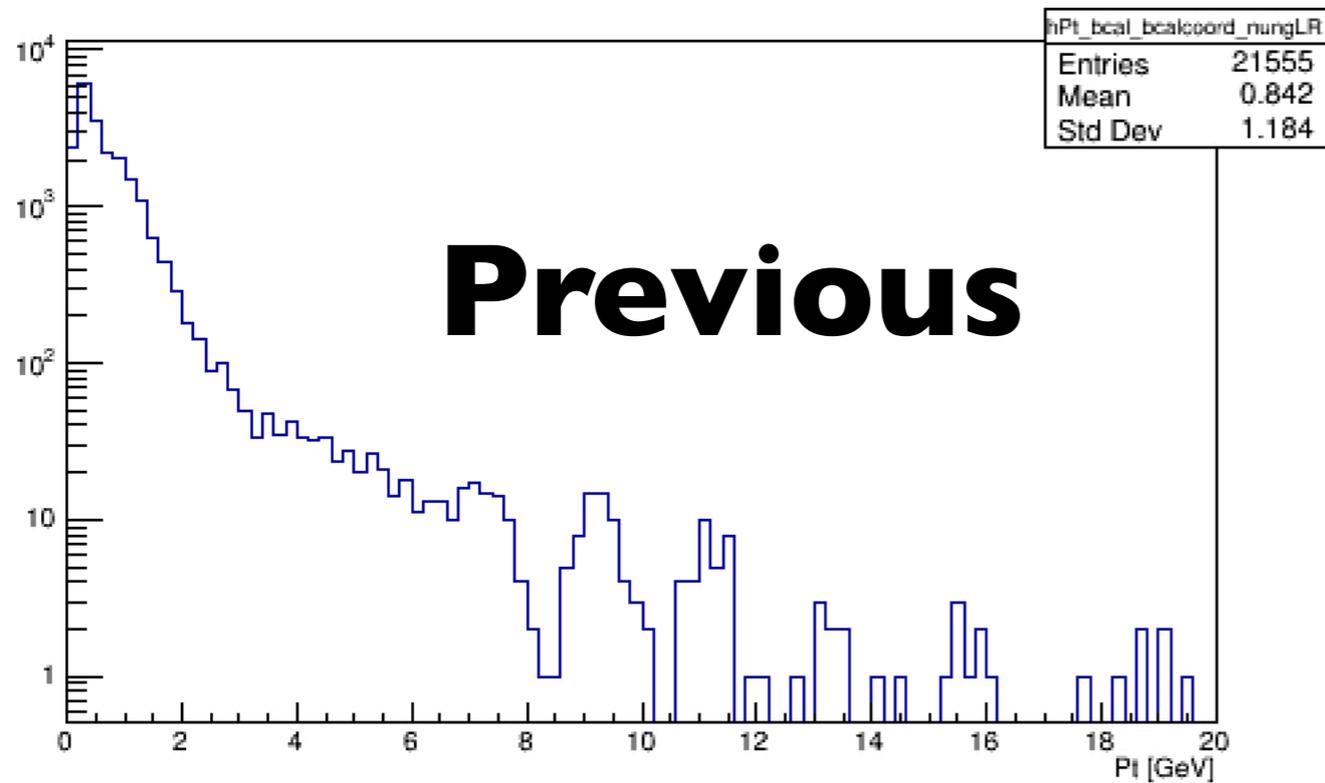
**REC Input files (~80k files) are necessary, but there is no replicas on KEKCC.**  
**—> Grid is the best option.**

**Luckily I have got an Grid account recently (motivated by sharing files of re-vertexing files for ttbar samples .)**

**Thanks to many helps from Akiya, Yuichi and Andre, I have been trained for making use of Grid!**  
**(This is the main achievement for these days.)**

# Mono photon

**A small test before large production**



**Clear improvement already seen.**

# Mono photon

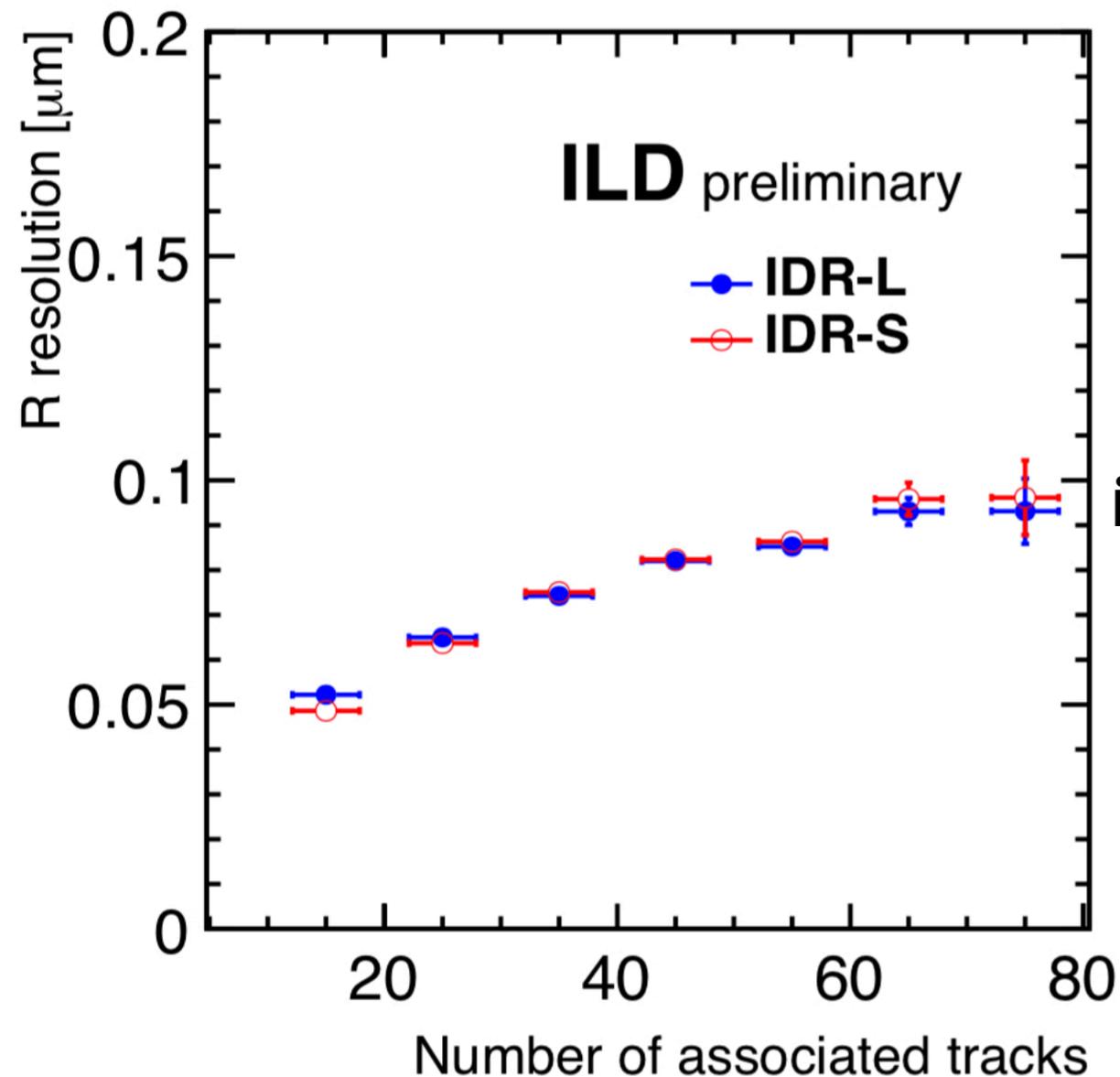
## Ongoing tasks:

- **Increasing statistics.**
- **Testing resubmission scripts for failed jobs  
(According to my limited experience, at first submission, the success rate would be ~50%, and at second submission become almost 100%. )**
- **Preparation for our supporting document for the IDR. Most important plots are already in.**

**LCFIPlus**

# Primary vertex x resolution

Shown at a ILD sw/ana meeting



**Why the resolution is much smaller than the beam spot constraint?**

Input beam size

<code>&lt;parameter</code>	<code>name="BeamSizeX"</code>	<code>type="float"</code>	<code>value="474.e-6" /&gt;</code>
<code>&lt;parameter</code>	<code>name="BeamSizeY"</code>	<code>type="float"</code>	<code>value="5.9e-6" /&gt;</code>
<code>&lt;parameter</code>	<code>name="BeamSizeZ"</code>	<code>type="float"</code>	<code>value="196.e-3" /&gt;</code>

**(mm)**

**The question was caused by confusion of the position distribution and the position error on the constraint.**

**The error works as a weight for  $(0,0,0)$  that is the position of the constraint.**

### **Extreame case:**

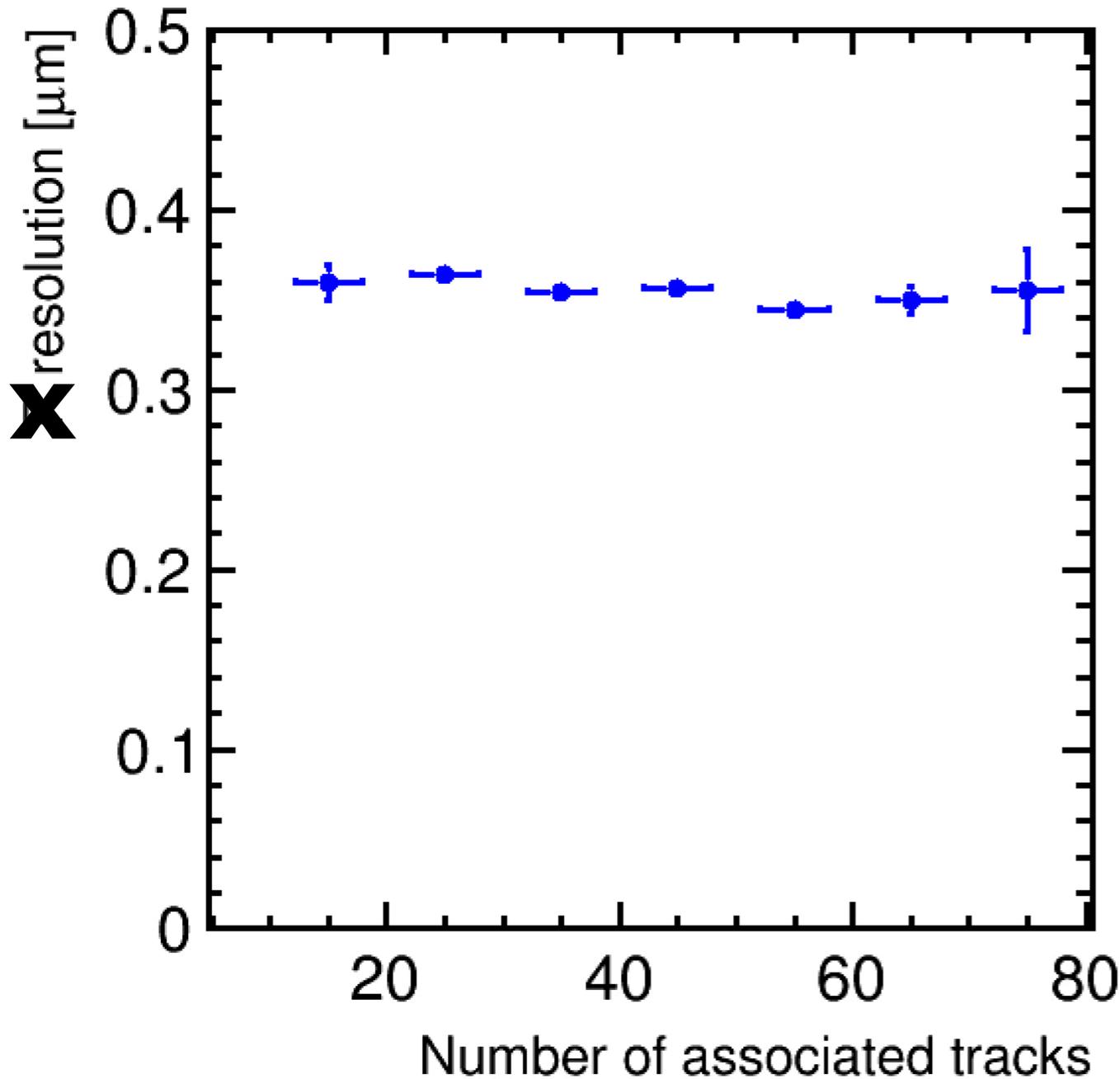
Consider a point as a beam spot constraint, which corresponds to a case where the beam constraint is extremely strong and we can neglect contribution from tracks.

This case the fitted position must be extremely close to  $(0,0)$ .

This is not because the position distributes according to the extremely small error of the point (this was my confusion), but because the point error contributes as a (extremely large) weight for  $(0,0)$ .

# Primary vertex resolution revisited

## with Geometric mean method



**x resolution :=**  

$$\sqrt{(\sigma_{in} * \sigma_{out})}$$

$\sigma_{in}$  : vertex fit **with** the beam constraint point.

$\sigma_{out}$  : vertex fit **without** the beam constraint point.

The resolution becomes much closer to the input beam size as expected.

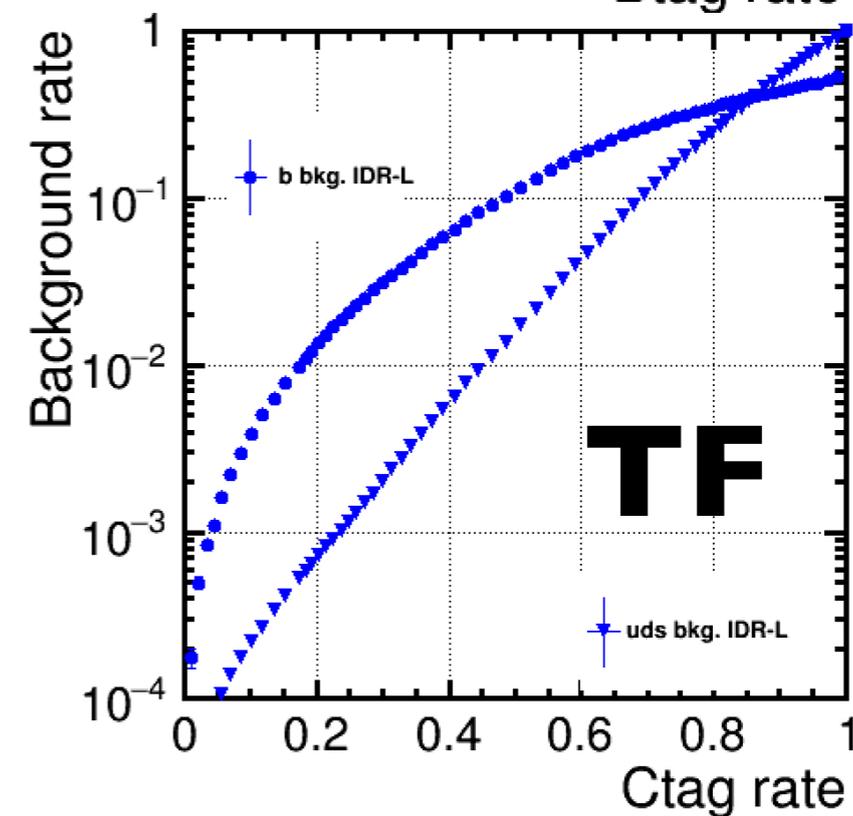
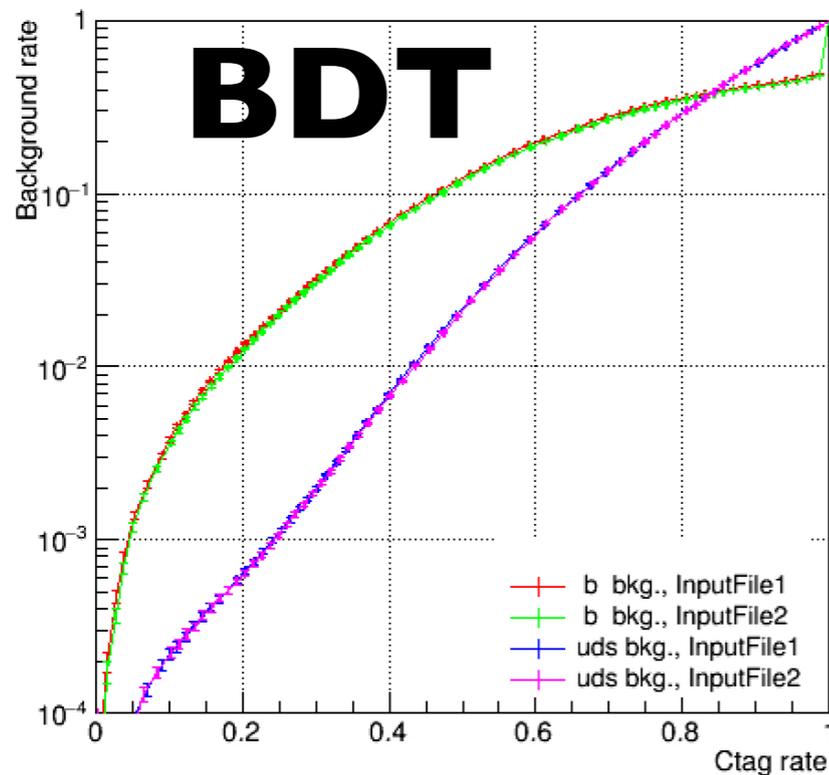
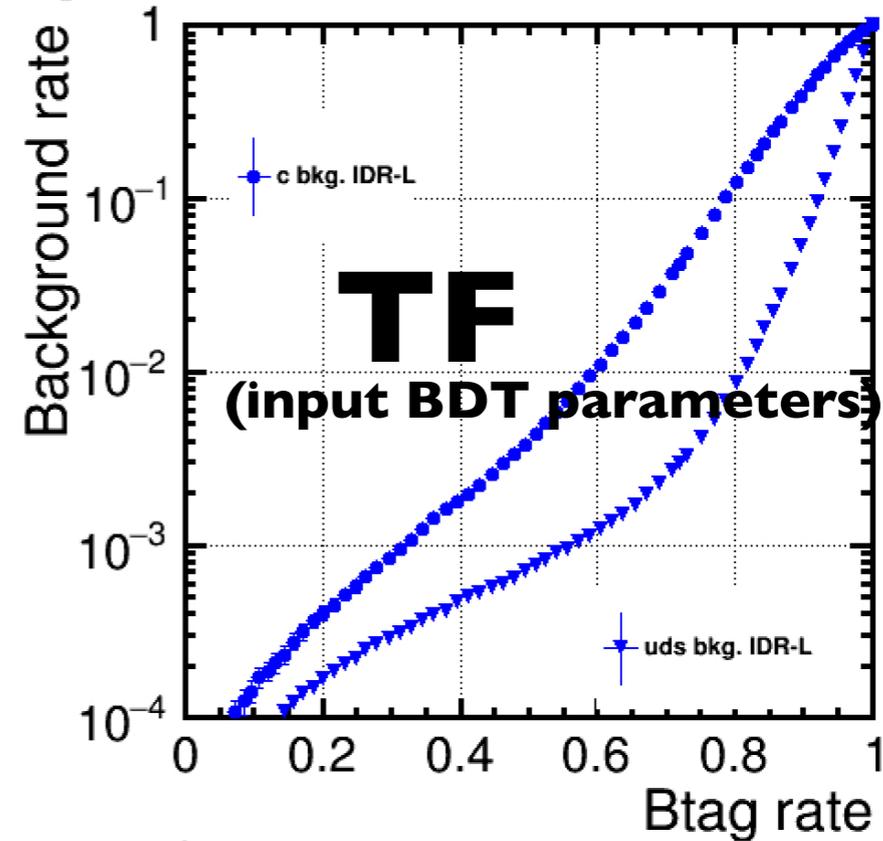
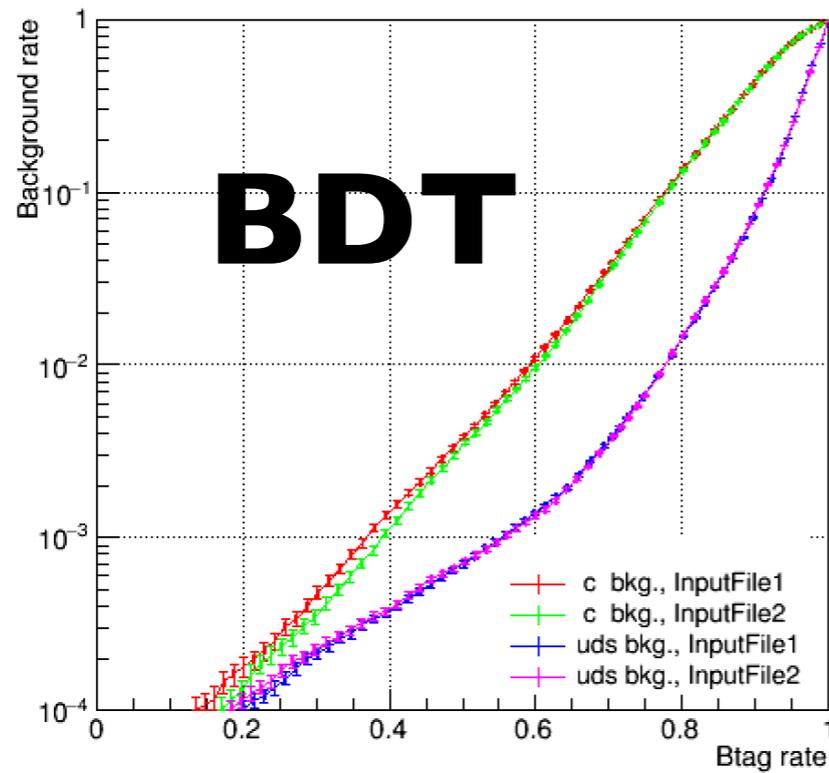
Input beam size

<parameter	name="BeamSizeX"	type="float"	value="474.e-6" />
<parameter	name="BeamSizeY"	type="float"	value="5.9e-6" />
<parameter	name="BeamSizeZ"	type="float"	value="196.e-3" />

**(mm)**

# Extra (Flavour tagging)

## First trial using Keras (Tensorflow) interface in TMVA



Need more work on LCFIPlus to fully benefit from TF.

# Summary

## ❖ **Monophton**

- ▶ Reprocessing BCalReco on Grid
- ▶ Supporting document

## ❖ **LCFIPlus**

- ▶ Primary vertex position resolution has been understood.
- ▶ LCFIPlus with Tensorflow (Keras interface in TMVA)