

Muon Collider Full Simulation Studies

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Oct 22, 2021

Status update and next steps

- Ran 100events with 50% bib interactively: 4hrs run time; 28GB files
- Need to optimize to submit jobs on condor (2GB memory limit)
- Sending 8GB of bib files to remote server node for 100% bib

- Use only Output_REC file; not save Output_DST file since not used to create ntuples JetHistograms.root ??
- This saves 13GB storage

reco steering file

```
<!-- =====  
<!-- =====  
<!-- == Output configuration  
<!-- =====  
<!-- =====  
  
<processor name="Output_REC" type="LCIOOutputProcessor">  
  <!-- standard output: full reconstruction keep all collections -->  
  <parameter name="LCIOOutputFile" type="string"> Output_REC_Hbb_sig_and_BIB.slcio </parameter>  
  <parameter name="FullSubsetCollections" type="StringVec"> EfficientMCParticles InefficientMCParticles </pa  
  <parameter name="LCIOWriteMode" type="string" value="WRITE_NEW"/>  
  <!--parameter name="SplitFileSizekB" type="int">996147 </parameter-->  
  <parameter name="Verbosity" type="string">WARNING </parameter>  
  <parameter name="DropCollectionNames" type="StringVec"> </parameter>  
  <parameter name="DropCollectionTypes" type="StringVec"> </parameter>  
  <parameter name="KeepCollectionNames" type="StringVec"> </parameter>  
</processor>  
  
<processor name="Output_DST" type="LCIOOutputProcessor">  
  <!-- dst output: keep only collections for analysis -->  
  <parameter name="LCIOOutputFile" type="string"> Output_DST_Hbb_sig_and_BIB.slcio </parameter>  
  <parameter name="FullSubsetCollections" type="StringVec">  
</parameter>  
  <parameter name="DropCollectionTypes" type="StringVec">  
    LCRelation  
    TrackerHitPlane  
    SimCalorimeterHit  
    CalorimeterHit
```

Ltuple steering file

```
<!-- ===== Setup ===== -->
<processor name="MyAIDAProcessor"/>
<processor name="MyFastJetProcessor" />
<processor name="MyLCTuple" />

<!-- ===== Output ===== -->
<!--processor name="MyLCIOOutputProcessor" /-->

</execute>

<global>
<parameter name="LCIOInputFiles"> Output_REC_sig_and_BIB.slcio </parameter>
<parameter name="SkipEvents" value="0" />
<parameter name="SupressCheck" value="false" />
<parameter name="Verbosity" options="DEBUG0-4, MESSAGE0-4, WARNING0-4, ERROR0-4, SILENT"> MESSAGE </parameter>
</global>

<processor name="MyAIDAProcessor" type="AIDAProcessor">
  <!--Processor that handles AIDA files. Creates on directory per processor. Processors only need to create and fill the
  <!-- compression of output file 0: false >0: true (default) -->
  <parameter name="Compress" type="int" value="1"/>
  <!-- filename without extension-->
  <parameter name="FileName" type="string" value="JetHistograms_sig_and_BIB"/>
  <!-- type of output file xml (default) or root ( only OpenScientist)-->
  <parameter name="FileType" type="string" value="root" />
</processor>

<processor name="MyLCTuple" type="LCTuple">
  <!--LCTuple creates a ROOT TTree with a column wise ntuple from LCIO collections ....-->
  <parameter name="FullSubsetCollections" type="StringVec"> </parameter>
```

Effect of increasing BIB fraction on jet performance

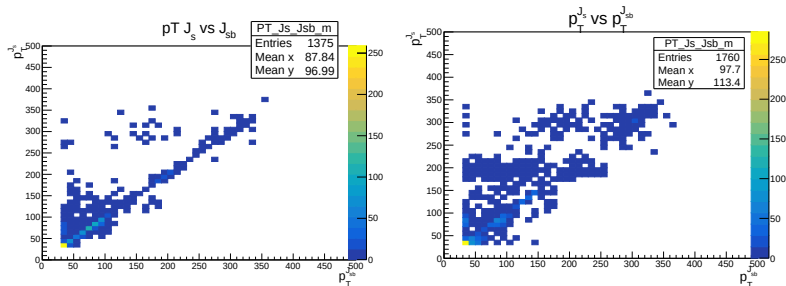


Figure: $E_{th} = 1(5)$ MeV. Left: 5% BIB and Right: 10% BIB

- ▶ Higher BIB fraction increases run time significantly.
- ▶ Jet reconstruction degrades.

Effect of Calorimeter hit Energy cuts

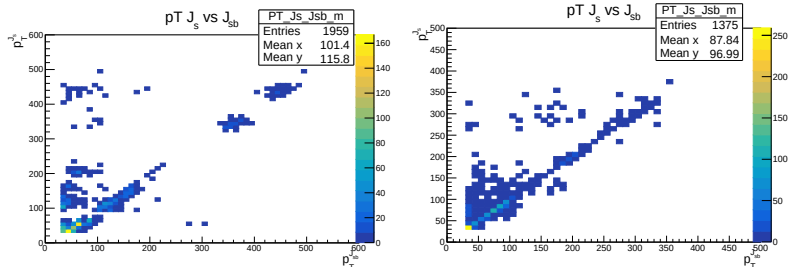


Figure: 5% BIB. Left: $E_{th} = 0.05(0.25)$ MeV and Right: $E_{th} = 1(5)$ MeV

- ▶ Harder energy cut reduces run time.
- ▶ Jet performance appears to be improved (need optimization).