

# Flavor Tagging Training and Application Example

Note: This page is actively under construction.

## ~homer/lcd/pythsid/Makefile

```
# gnumake file for isajet NLC generator          6/95 RXD
# adapted                                     8/3/98 GRB
#adapted                                     2/7/01

WWPYTH = ./
CERNLIB = /cern/pro/lib
STDHEP = /cern/99/lib/
FORT    = f77
DEST = ./

$(DEST)/zpyth: $(DEST)/sid-Zbb250.o
    $(FORT) $(OPTS) \
    -o $$ $(DEST)/sid-Zbb250.o \
    -lXm -lXt -lXl1 -lXmu -lXext \
    $(WWPYTH)pythia-6.4.27.o \
    -L$(CERNLIB) -lmathlib -lkernlib \
    -lpdflib -lFmcfio \
    $(STDHEP)libstdhep.a \
    -L$(CERNLIB) -lmathlib -lkernlib \
    -lpdflib -lFmcfio \
    /usr/lib/libnsl.a /usr/lib/libdl.so

$(WWPYTH)/pythia-6.4.27.o: pythia-6.4.27.f
    $(FORT) $(OPTS) -c pythia-6.4.27.f

$(DEST)/sid-Zbb250.o: sid-Zbb250.f
    $(FORT) $(OPTS) -c sid-Zbb250.f;
```

## shZ

```
echo 193787$1 >! ranseed
echo $2 >> ranseed
rm Z.stdhep
ln -s /u/ey/homer/scr/Z$2_$1.stdhep Z.stdhep
rm /u/ey/homer/scr/Z$2_$1.stdhep
zpyth < ranseed >! tmp/pythZ$2_$1gen.log
```

## ~homer/lcd/pythsid/doallZ

```
source shZ 1 5
source shZ 2 5
source shZ 3 5
source shZ 4 5
source shZ 5 5
source shZ 6 5
source shZ 7 5
source shZ 8 5
source shZ 9 5
source shZ 10 5
source shZ 1 4
...
source shZ 1 3
...
```

source /u/ey/homer/sidhome/sid/grid\_vvh/upload\_stdhep.sh.o1 files-to-upload /ilc/user/h/homer/E912\_Z\_stdhep

```
bash-4.1$ ls -ld Z912*stdhep > files-to-upload
```

```
Uploading /ilc/user/h/homer/E912_Z_stdhep/Z912_3_1.stdhep
```

```
putAndRegister: Checksum information not provided. Calculating Adler32.
```

```
putAndRegister: Checksum calculated to be 6b39568b.
```

```
__putFile: Executing transfer of file:/nfs/surrey16/bbrwork/h/homer/dirac_directory to srm://srm-ilc.gridpp.rl.ac.uk:8443/srm/managerv2?SFN=/castor/ads.rl.ac.uk/prod/ilc/user/h/homer/E912_Z_stdhep/dirac_directory.  
1368254803.22 using 1 streams
```

```
__putFile: Successfully put file to storage.
```

```
__putFile: Executing transfer of file:Z912_3_1.stdhep to srm://srm-ilc.gridpp.rl.ac.uk:8443/srm/managerv2?SFN=/castor/ads.rl.ac.uk/prod/ilc/user/h/homer/E912_Z_stdhep/Z912_3_1.stdhep using 4 streams
```

```
__putFile: Successfully put file to storage.
```

```
putAndRegister: Sending accounting took 1.3 seconds
```

```
Successfully uploaded file to RAL-SRM
```

```
Uploading /ilc/user/h/homer/E912_Z_stdhep/Z912_3_10.stdhep
```

```
putAndRegister: Checksum information not provided. Calculating Adler32.
```

```
putAndRegister: Checksum calculated to be 43dbcc3.
```

```
__putFile: Executing transfer of file:Z912_3_10.stdhep to srm://srm-ilc.gridpp.rl.ac.uk:8443/srm/managerv2?SFN=/castor/ads.rl.ac.uk/prod/ilc/user/h/homer/E912_Z_stdhep/Z912_3_10.stdhep using 4 streams
```

```
...
```

```
bash-4.1$ dirac-dms-user-lfns -b /ilc/user/h/homer/E912_Z_stdhep
```

```
Will search for files in /ilc/user/h/homer/E912_Z_stdhep
```

```
/ilc/user/h/homer/E912_Z_stdhep: 30 files, 0 sub-directories
```

```
30 matched files have been put in ilc-user-h-homer-E912_Z_stdhep.lfns
```

```
bash-4.1$ python recoChain.py --SE PNNL-SRM --detector sidloi3 --macFile defaultILCCrossingAngle.mac --  
productionSteps 1 2 3 35 4 --dontPromptMe ilc-user-h-homer-E912_Z_stdhep.lfns trainsampsZ912-noovrly
```

```
Attribute list :
```

```
outputSE : Not defined
```

```
energy : Not defined
```

```
outputRecFile : Not defined
```

```
seed : Not defined
```

```
outputDstPath : Not defined
```

```
outputPath : Not defined
```

```
forget_about_input : Not defined
```

```
outputDstFile : Not defined
```

```
accountInProduction : True
```

```
apname : slic
```

```
detectortype : SID
```

```
inputSB : ['defaultILCCrossingAngle.mac', 'LFN:/ilc/user/h/homer/E912_Z_stdhep/Z912_3_1.stdhep']
```

```
version : v3r0p3
```

```
prodparameters : {'Z912_3_1_sidloi3_0.slcio': {'datatype': 'SIM', 'detectortype': 'SID'}}
```

```
outputFile : Z912_3_1_sidloi3_0.slcio
```

```
willBeCut : Not defined
```

```
outputRecPath : Not defined
```

```
logfile : Not defined
```

```
detectorModel : sidloi3
```

```
addedtojob : Not defined
```

```
datatype : SIM
```

```
nbevt : 200
```

```
startFrom : Not defined
```

```
steeringfile : defaultILCCrossingAngle.mac
```

```
debug : Not defined
```

```
inputfile : LFN:/ilc/user/h/homer/E912_Z_stdhep/Z912_3_1.stdhep
```

```
None
```

```
2013-05-11 07:13:15 UTC recoChain/SLIC INFO: No startFrom defined for Slic : start from the beginning
```

```
2013-05-11 07:13:15 UTC recoChain/ILCJob WARN: Energy not set for this step
```

```
2013-05-11 07:13:27 UTC recoChain/LCSIM INFO: Energy set to 0 !
```

```
2013-05-11 07:13:27 UTC recoChain/ILCJob WARN: Energy not set for this step
```

```
2013-05-11 07:13:27 UTC recoChain/SLICPandora INFO: No startFrom defined for SlicPandora : start from the beginning
```

```
2013-05-11 07:13:27 UTC recoChain/ILCJob WARN: Energy not set for this step
```

```
2013-05-11 07:13:30 UTC recoChain/ILCJob WARN: Energy not set for this step
```

```
2013-05-11 07:13:30 UTC recoChain/LCSIM INFO: Energy set to 0 !
```

```

2013-05-11 07:13:30 UTC recoChain/ILCJob   WARN: Energy not set for this step
Site is: None <type 'NoneType'>
2013-05-11 07:13:30 UTC recoChain   INFO: <====v18r0p4====>
2013-05-11 07:13:32 UTC recoChain   INFO: Replica Lookup Time: 1.37 seconds
2013-05-11 07:13:32 UTC recoChain   INFO: All LFN files have replicas available
Attribute list :
  outputSE : Not defined
  energy : Not defined
  outputRecFile : Not defined
  seed : Not defined
  outputDstPath : Not defined
  outputPath : Not defined
  forget_about_Input : Not defined
  outputDstFile : Not defined
  accountInProduction : True
  appname : slic
  detectortype : SID
  inputSB : ['defaultILCCrossingAngle.mac', 'LFN:/ilc/user/h/homer/E912_Z_stdhep/Z912_3_1.stdhep']
  version : v3r0p3
  prodparameters : {'Z912_3_1_sidloi3_1.slcio': {'datatype': 'SIM', 'detectortype': 'SID'}}
  outputFile : Z912_3_1_sidloi3_1.slcio
  willBeCut : Not defined
  outputRecPath : Not defined
  logfile : Not defined
  detectorModel : sidloi3
  addedtojob : Not defined
  datatype : SIM
  nbevts : 200
  startFrom : 200
  steeringfile : defaultILCCrossingAngle.mac
  debug : Not defined
  inputfile : LFN:/ilc/user/h/homer/E912_Z_stdhep/Z912_3_1.stdhep
None
2013-05-11 07:13:40 UTC recoChain/ILCJob   WARN: Energy not set for this step
2013-05-11 07:13:40 UTC recoChain/LCSIM   INFO: Energy set to 0 !
2013-05-11 07:13:40 UTC recoChain/ILCJob   WARN: Energy not set for this step
2013-05-11 07:13:40 UTC recoChain/SLICPandora   INFO: No startFrom defined for SlicPandora : start from the
beginning
2013-05-11 07:13:40 UTC recoChain/ILCJob   WARN: Energy not set for this step
2013-05-11 07:13:40 UTC recoChain/ILCJob   WARN: Energy not set for this step
2013-05-11 07:13:40 UTC recoChain/LCSIM   INFO: Energy set to 0 !
2013-05-11 07:13:40 UTC recoChain/ILCJob   WARN: Energy not set for this step
Site is: None <type 'NoneType'>
2013-05-11 07:13:40 UTC recoChain   INFO: <====v18r0p4====>
2013-05-11 07:13:41 UTC recoChain   INFO: Replica Lookup Time: 1.28 seconds
2013-05-11 07:13:41 UTC recoChain   INFO: All LFN files have replicas available

```

# **~homer/lcd/pythsid/sid-Zbb250.f**

```

C...Zbb at a linear collider.

C-----

C...Preamble: declarations.

C...All real arithmetic in double precision.
      IMPLICIT DOUBLE PRECISION(A-H, O-Z)
C...Three Pythia functions return integers, so need declaring.
      INTEGER PYK,PYCHGE,PYCOMP
C...Parameter statement to help give large particle numbers
C...(left- and righthanded SUSY, excited fermions).
      PARAMETER (KSUSY1=1000000,KSUSY2=2000000,KEXCIT=4000000)

C...Commonblocks.
C...The event record.
      COMMON/PYJETS/N,NPAD,K(4000,5),P(4000,5),V(4000,5)
C...Parameters.

```

```

COMMON/PYDAT1/MSTU(200),PARU(200),MSTJ(200),PARJ(200)
C...Particle properties + some flavour parameters.
COMMON/PYDAT2/KCHG(500,4),PMAS(500,4),PARF(2000),VCKM(4,4)
C...Decay information.
c COMMON/PYDAT3/MDCY(500,3),MDME(4000,2),BRAT(4000),KFDP(4000,5)
COMMON/PYDAT3/MDCY(500,3),MDME(8000,2),BRAT(8000),KFDP(8000,5)

c COMMON/PYDAT4/CHAF(500,2)

C...Selection of hard scattering subprocesses.
COMMON/PYSUBS/MSEL,MSELPD,MSUB(500),KFIN(2,-40:40),CKIN(200)
C...Parameters.
COMMON/PYPARS/MSTP(200),PARP(200),MSTI(200),PARI(200)
C...Supersymmetry parameters.
COMMON/PYMSSM/IMSS(0:99),RMSS(0:99)
C...Random Number Seed Values
COMMON/PYDATR/MRPY(6),RRPY(100)

include 'stdlun.inc'
include 'stdcml.inc'

external stdxwinit,stdflpyxsec, stdxwrt
external lunhep, stdxend

integer nevt,ngood,istream,lok,ifl,i,k,iqq

C-----

c MRPY(1) = 189326783

write(6,('( ' ran seed - '))')
read(5,*) mrpy(1)
write(6,*) ' mrpy(1) = ',mrpy(1)
read(5,*) iqq
write(6,*) ' iqq = ',iqq

C...First section: initialization.

MSEL=0
PESUM=1000D0
PZSUM=0D0
PQSUM=0D0
*
* Choose the process to be generated
* Here: Process 25 = flf2 -> W+W-
*          22 = Z0 Z0
*          35 = Z0 e e
*          36 = W e nu
* Process 1 = flf1 -> gamma*/Z0
*

c MSUB(1)=1

c select bbbar production
MSUB(1) = 1

mdme(174,1)=0
c d dbar

mdme(175,1)=0
c u ubar

mdme(176,1)=0
c s sbar

mdme(177,1)=0
c c cbar

mdme(178,1)=0

```

```

c      b bbar

      if (iqq.eq.5) mdme(178,1)=1
      if (iqq.eq.4) mdme(177,1)=1
      if (iqq.eq.3) mdme(176,1)=1
      if (iqq.eq.3) mdme(175,1)=1
      if (iqq.eq.3) mdme(174,1)=1

```

```

      mdme(179,1)=0
c      t tbae

```

```

      mdme(182,1)=0
c      e- e+

```

```

      mdme(183,1)=0
c      nu_e nu_ebar

```

```

      mdme(184,1)=0
c      mu- mu+

```

```

      mdme(185,1)=0
c      nu_mu nu_mubar

```

```

      mdme(186,1)=0
c      tau- tau+

```

```

      mdme(187,1)=0
c      nu_tau nu_taubar

```

```

      PMAS(25,1)=125.

```

```

c  ISR on
      MSTP(11)=1

```

```

c  FSR on
      MSTP(71)=1

```

```

c  turn off frag, decay & qcd
      MSTP(111)=1

```

```

c  protection against poor init
      MSTP(121)=1

```

```

c  scale factor for weights
      PARP(121)=2.5

```

```

c  best Coulomb correction
      MSTP(40)=1

```

```

c  lamda-LLa -> timelike showers
      MSTP(3)=1

```

```

      PARJ(21)=0.40000
      PARJ(41)=0.11000
      PARJ(42)=0.52000
      PARJ(81)=0.25000
      PARJ(82)=1.90000
      MSTJ(11)=3
      PARJ(54)=-0.03100
      PARJ(55)=-0.00200
      PARJ(1)=0.08500
      PARJ(3)=0.45000
      PARJ(4)=0.02500
      PARJ(2)=0.31000
      PARJ(11)=0.60000
      PARJ(12)=0.40000
      PARJ(13)=0.72000
      PARJ(14)=0.43000
      PARJ(15)=0.08000
      PARJ(16)=0.08000
      PARJ(17)=0.17000

```

```

c      MSTP(3)=1

```

C...If interested only in cross sections and resonance decays:  
 C...switch off initial and final state radiation,  
 C...multiple interactions and hadronization.

```

C      MSTP(61)=0
C      MSTP(71)=0
C      MSTP(81)=0
C      MSTP(111)=0

C...Initialization
      CALL PYINIT('CMS','e+','e-',250D0)

C...List resonance data: decay channels, widths etc.
      CALL PYSTAT(2)

C...Histograms for mass distributions.
      CALL PYBOOK(1,'top mass',100,0D0,1000D0)

C-----

c      nevt = 500000
      nevt = 10000

      WRITE(6,*) "Now open stdHEP output file"
      Call STDXWINIT('Z.stdhep','PYTHIA stdHEP output file',nevt,
listream,lok)
      WRITE(6,*) "Just opened stdHEP output file",istream,lok
      Call STDFLPYXSEC(nevt)
      Call STDXWRT(100,istream,lok)

C...Second section: event loop.

C...Loop over the number of events.
      DO 200 IEV=1,nevt
        IF(MOD(IEV,1000).EQ.0) WRITE(6,*)
          & 'Now at event number',IEV

C...Event generation.
          CALL PYEVNT

C...List first few events.
          IF(IEV.LE.30) CALL PYLIST(1)

c          CALL PYFILL(IH,P(I,5),1D0)

          Call PYHEPC(1)
          Call STDXWRT(1,istream,lok)

C...End of documentation and event loops.
      150 CONTINUE
      200 CONTINUE

C-----

C...Third section: produce output and end.

C...Cross section table.
      CALL PYSTAT(1)

C...Histograms.
      CALL PYHIST

C
C      Close stdHEP output
C
      Call STDFLPYXSEC(ngood)
      Call STDXWRT(200,istream,lok)
      Call STDXEND(istream)

      END

```

## ilc-user-j-jstrube-from\_homer.lfns

```
/ilc/user/j/jstrube/from_homer/Z3_1.stdhep
/ilc/user/j/jstrube/from_homer/Z3_10.stdhep
/ilc/user/j/jstrube/from_homer/Z3_2.stdhep
/ilc/user/j/jstrube/from_homer/Z3_3.stdhep
/ilc/user/j/jstrube/from_homer/Z3_4.stdhep
/ilc/user/j/jstrube/from_homer/Z3_5.stdhep
/ilc/user/j/jstrube/from_homer/Z3_6.stdhep
/ilc/user/j/jstrube/from_homer/Z3_7.stdhep
/ilc/user/j/jstrube/from_homer/Z3_8.stdhep
/ilc/user/j/jstrube/from_homer/Z3_9.stdhep
/ilc/user/j/jstrube/from_homer/Z4_1.stdhep
/ilc/user/j/jstrube/from_homer/Z4_10.stdhep
/ilc/user/j/jstrube/from_homer/Z4_2.stdhep
/ilc/user/j/jstrube/from_homer/Z4_3.stdhep
/ilc/user/j/jstrube/from_homer/Z4_4.stdhep
/ilc/user/j/jstrube/from_homer/Z4_5.stdhep
/ilc/user/j/jstrube/from_homer/Z4_6.stdhep
/ilc/user/j/jstrube/from_homer/Z4_7.stdhep
/ilc/user/j/jstrube/from_homer/Z4_8.stdhep
/ilc/user/j/jstrube/from_homer/Z4_9.stdhep
/ilc/user/j/jstrube/from_homer/Z5_1.stdhep
/ilc/user/j/jstrube/from_homer/Z5_10.stdhep
/ilc/user/j/jstrube/from_homer/Z5_2.stdhep
/ilc/user/j/jstrube/from_homer/Z5_3.stdhep
/ilc/user/j/jstrube/from_homer/Z5_4.stdhep
/ilc/user/j/jstrube/from_homer/Z5_5.stdhep
/ilc/user/j/jstrube/from_homer/Z5_6.stdhep
/ilc/user/j/jstrube/from_homer/Z5_7.stdhep
/ilc/user/j/jstrube/from_homer/Z5_8.stdhep
/ilc/user/j/jstrube/from_homer/Z5_9.stdhep
```

## ~/sidhome/sid/grid\_vvh/reco-newflavsampshn-p2

```
python recoChain.py --SE PNNL-SRM --detector sidloi3 --macFile defaultILCCrossingAngle.mac --productionSteps
1 11 12 2 3 35 4 --dontPromptMe ilc-user-j-jstrube-from_homer-p2.lfns trainsampsZ250p
```

```
~/sidhome/lcfi/steering/subflavtupjob.sh
export mydir=`echo $1 | awk -F '/' '{print substr($0,1,length($0)-length($NF))}'`
export myfil=`echo $1 | awk -F '/' '{print $NF}'`
echo "mydir = "$mydir
echo "myfil = "$myfil
mkdir /u/ey/homer/sidhome/lcfi/steering/tupparts/$myfil-dir
cd /u/ey/homer/sidhome/lcfi/steering/tupparts/$myfil-dir
rm /u/ey/homer/sidhome/lcfi/steering/tupparts/$myfil-dir/*.{slcio,log}

ln -s $1 input-dst.slcio
Marlin /u/ey/homer/sidhome/lcfi/steering/makentuple-all-batch.xml > /u/ey/homer/sidhome/lcfi/steering/tupparts
/$myfil-dir/tup.log
ln -s output-ntpl.root $myfil-ntpl.root
```

## /u/ey/homer/sidhome/lcfi/steering/makentuple-all-batch.xml

```
<marlin>

<execute>
  <processor name="JetClustering"/>
  <processor name="MakeNtuple"/>
```

```

</execute>

<global>
  <parameter name="LCIOInputFiles">
    input-dst.slcio
  </parameter>
  <parameter name="GearXMLFile">/u/ey/homer/sidhome/lcfi/steering/clic_sid.gear</parameter>
  <parameter name="MaxRecordNumber" value="-1" />
  <parameter name="SkipNEvents" value="0" />
  <parameter name="SupressCheck" value="false" />
  <parameter name="Verbosity" options="DEBUG0-4,MESSAGE0-4,WARNING0-4,ERROR0-4,SILENT">WARNING<
/parameter>
</global>

<processor name="JetClustering" type="LcfiplusProcessor">

  <!-- run primary and secondary vertex finders -->
  <parameter name="Algorithms" type="stringVec"> JetClustering JetVertexRefiner</parameter>

  <!-- general parameters -->
  <parameter name="PFOCollection" type="string" value="PandoraPFOCollection" /> <!-- input PFO collection
->

  <parameter name="UseMCP" type="int" value="0" /> <!-- MC info not used -->
  <parameter name="MCPCollection" type="string" value="" /> <!-- not used -->
  <parameter name="MCPFORelation" type="string" value="" /> <!-- not used -->
  <parameter name="ReadSubdetectorEnergies" type="int" value="0"/> <!-- true for ILD -->
  <parameter name="UpdateVertexRPDDaughters" type="int" value="0"/> <!-- false for non-updative
PandoraPFOs -->
  <parameter name="MagneticField" type="float" value="5"/>

  <!-- jet clustering parameters -->
  <parameter name="JetClustering.InputVertexCollectionName" type="string" value="BuildUpVertex" /> <!--
vertex collections to be used in JC -->
  <parameter name="JetClustering.OutputJetCollectionName" type="stringVec" value="VertexJets" /> <!--
output collection name, may be multiple -->
  <parameter name="JetClustering.NJetsRequested" type="intVec" value="2" /> <!-- Multiple NJets can be
specified -->

  <parameter name="JetClustering.YCut" type="doubleVec" value="0." /> <!-- specify 0 if not used -->
  <parameter name="JetClustering.UseMuonID" type="int" value="1" /> <!-- jet-muon ID for jet clustering -->
  <parameter name="JetClustering.VertexSelectionMinimumDistance" type="double" value="0.3" /> <!-- in mm -
>
  <parameter name="JetClustering.VertexSelectionMaximumDistance" type="double" value="30." /> <!-- in mm -
>

  <parameter name="JetClustering.VertexSelectionK0MassWidth" type="double" value="0.02" /> <!-- in GeV -->
  <parameter name="JetClustering.YAddedForJetVertexVertex" type="double" value="100"/> <!-- add penalty
for combining vertices -->
  <parameter name="JetClustering.YAddedForJetLeptonVertex" type="double" value="100"/> <!-- add penalty
for combining lepton and vertex -->
  <parameter name="JetClustering.YAddedForJetLeptonLepton" type="double" value="100"/> <!-- add penalty
for combining leptons -->

  <!-- vertex refiner parameters -->
  <parameter name="JetVertexRefiner.InputJetCollectionName" type="string" value="VertexJets" />
  <parameter name="JetVertexRefiner.OutputJetCollectionName" type="string" value="RefinedJets" />
  <parameter name="JetVertexRefiner.PrimaryVertexCollectionName" type="string" value="PrimaryVertex" />
  <parameter name="JetVertexRefiner.InputVertexCollectionName" type="string" value="BuildUpVertex" />
  <parameter name="JetVertexRefiner.V0VertexCollectionName" type="string" value="BuildUpVertex_V0" />
  <parameter name="JetVertexRefiner.OutputVertexCollectionName" type="string" value="RefinedVertex" />

  <parameter name="JetVertexRefiner.MinPosSingle" type="double" value="0.3" />
  <parameter name="JetVertexRefiner.MaxPosSingle" type="double" value="30." />
  <parameter name="JetVertexRefiner.MinEnergySingle" type="double" value="1." />
  <parameter name="JetVertexRefiner.MaxAngleSingle" type="double" value="0.5" />
  <parameter name="JetVertexRefiner.MaxSeparationPerPosSingle" type="double" value="0.1" />
  <parameter name="JetVertexRefiner.mind0sigSingle" type="double" value="5." />
  <parameter name="JetVertexRefiner.minz0sigSingle" type="double" value="5." />
  <parameter name="JetVertexRefiner.OneVertexProbThreshold" type="double" value="0.001" />
  <parameter name="JetVertexRefiner.MaxCharmFlightLengthPerJetEnergy" type="double" value="0.1" />
</processor>

```



```

<processor name="MakeNtuple" type="LcfiplusProcessor">
  <parameter name="Algorithms" type="stringVec">FlavorTag MakeNtuple</parameter>

  <!-- general parameters -->
  <parameter name="PFOCollection" type="string" value="PandoraPFOCollection" /> <!-- input PFO collection
->

  <parameter name="UseMCP" type="int" value="0" /> <!-- MC info not used -->
  <parameter name="MCPCollection" type="string" value="" /> <!-- not used -->
  <parameter name="MCPFORelation" type="string" value="" /> <!-- not used -->
  <parameter name="ReadSubdetectorEnergies" type="int" value="0"/> <!-- true for ILD -->
  <parameter name="UpdateVertexRPDaughters" type="int" value="0"/> <!-- false for non-updative
PandoraPFOs -->

  <parameter name="PrimaryVertexCollectionName" type="string" value="PrimaryVertex" />
  <parameter name="FlavorTag.JetCollectionName" type="string" value="RefinedJets" />
  <parameter name="MakeNtuple.AuxiliaryInfo" type="int" value="-1" />
  <parameter name="FlavorTag.D0ProbFileName" type="string" value="/u/ey/homer/sidhome/lcfi/steering
/d0prob_zpole.root"/>
  <parameter name="FlavorTag.Z0ProbFileName" type="string" value="/u/ey/homer/sidhome/lcfi/steering
/z0prob_zpole.root"/>

  <parameter name="MakeNtuple.OutputRootFileName" type="string" value="output-ntpl.root" />
</processor>

</marlin>

```

```

~/sidhome/lcfi/steering/training-ffh-n1.xml
<marlin>

<execute>
  <processor name="MyLcfiplusProcessor"/>
</execute>

<global>
  <parameter name="LCIOInputFiles"> </parameter>
  <parameter name="MaxRecordNumber" value="-1" />
  <parameter name="SkipNEvents" value="0" />
  <parameter name="SupressCheck" value="false" />

  <parameter name="GearXMLFile">clic_sid.gear</parameter>

  <parameter name="Verbosity" options="DEBUG0-4,MESSAGE0-4,WARNING0-4,ERROR0-4,SILENT">WARNING</parameter>
</global>

<processor name="MyLcfiplusProcessor" type="LcfiplusProcessor">
  <parameter name="Algorithms" type="stringVec">TrainMVA</parameter>
  <parameter name="ReadSubdetectorEnergies" type="int" value="0"/> <!-- true for ILD -->
  <parameter name="PFOCollection" type="string" value="PandoraPFOCollection" />
  <parameter name="MagneticField" type="float" value="5"/>

  <parameter name="FlavorTag.WeightsDirectory" type="string" value="/u/ey/homer/sidhome/lcfi/steering
/weights-n1/" />
  <parameter name="FlavorTag.WeightsPrefix" type="string" value="flavwgts" />
  <parameter name="FlavorTag.BookName" type="string" value="bdt" />

  <parameter name="FlavorTag.CategoryDefinition1" type="string">nvtx==0</parameter>
  <parameter name="FlavorTag.CategoryPreselection1" type="string">trkl0sig!=0</parameter>
  <parameter name="FlavorTag.CategoryVariables1" type="stringVec">
    trkl0sig trk2d0sig trklz0sig trk2z0sig trklpt_jete trk2pt_jete jprobr jprobz
  </parameter>
  <parameter name="FlavorTag.CategorySpectators1" type="stringVec">
    aux nvtx
  </parameter>

  <parameter name="FlavorTag.CategoryDefinition2" type="string">nvtx==1&&nvtxall==1</parameter>
  <parameter name="FlavorTag.CategoryPreselection2" type="string">trkl0sig!=0</parameter>
  <parameter name="FlavorTag.CategoryVariables2" type="stringVec">
    trkl0sig trk2d0sig trklz0sig trk2z0sig trklpt_jete trk2pt_jete jprobr jprobz

```

```

        vtxlen1_jete vtxsig1_jete vtxdirang1_jete vtxmom1_jete vtxmass1 vtxmult1 vtxmasspc vtxprob
        d0bprob d0cprob d0qprob z0bprob z0cprob z0qprob
        trkmass
    </parameter>
    <parameter name="FlavorTag.CategorySpectators2" type="stringVec">
        aux nvtx
    </parameter>

    <parameter name="FlavorTag.CategoryDefinition3" type="string">nvtx=1&&nvtxall=2</parameter>
    <parameter name="FlavorTag.CategoryPreselection3" type="string">trkl0sig!=0</parameter>
    <parameter name="FlavorTag.CategoryVariables3" type="stringVec">
        trkl0sig trk2d0sig trklz0sig trk2z0sig trklpt_jete trk2pt_jete jprobr jprobz
        vtxlen1_jete vtxsig1_jete vtxdirang1_jete vtxmom1_jete vtxmass1 vtxmult1 vtxmasspc vtxprob
        lvtxprob vtxlen12all_jete vtxmassall
    </parameter>
    <parameter name="FlavorTag.CategorySpectators3" type="stringVec">
        aux nvtx
    </parameter>

    <parameter name="FlavorTag.CategoryDefinition4" type="string">nvtx=2</parameter>
    <parameter name="FlavorTag.CategoryPreselection4" type="string">trkl0sig!=0</parameter>
    <parameter name="FlavorTag.CategoryVariables4" type="stringVec">
        trkl0sig trk2d0sig trklz0sig trk2z0sig trklpt_jete trk2pt_jete jprobr jprobz
        vtxlen1_jete vtxsig1_jete vtxdirang1_jete vtxmom1_jete vtxmass1 vtxmult1 vtxmasspc vtxprob
        vtxlen2_jete vtxsig2_jete vtxdirang2_jete vtxmom2_jete vtxmass2 vtxmult2
        vtxlen12_jete vtxsig12_jete vtxdirang12_jete vtxmom_jete vtxmass vtxmult
        lvtxprob
    </parameter>
    <parameter name="FlavorTag.CategorySpectators4" type="stringVec">
        aux nvtx
    </parameter>

    <parameter name="TrainMVA.Verbose" type="bool" value="true" />
    <parameter name="TrainMVA.BookType" type="string" value="BDT" />
    <parameter name="TrainMVA.BookOptions" type="string">
        !H: !V: NTrees=1000: BoostType=Grad: Shrinkage=0.10: UseBaggedGrad: GradBaggingFraction=0.50: nCuts=20:
        NNodesMax=8
    </parameter>

    <parameter name="TrainMVA.InputRootFileB" type="string" value="bb-new-fastjets-nl.root" />
    <parameter name="TrainMVA.InputRootFileC" type="string" value="cc-new-fastjets-nl.root" />
    <parameter name="TrainMVA.InputRootFileO" type="string" value="qq-new-fastjets-nl.root" />
    <parameter name="TrainMVA.TreeNameB" type="string" value="ntp" />
    <parameter name="TrainMVA.TreeNameC" type="string" value="ntp" />
    <parameter name="TrainMVA.TreeNameO" type="string" value="ntp" />

</processor>

</marlin>

```

```

/u/ey/homer/sidhome/lcfi/subprepdatab-job-data8.sh:
export mydir=`echo $1 | awk -F '/' '{print substr($0,1,length($0)-length($NF))}`
export myfil=`echo $1 | awk -F '/' '{print $NF}`
echo "mydir = "$mydir
echo "myfil = "$myfil
mkdir /u/ey/homer/tagged_files/$myfil-dir
cd /u/ey/homer/tagged_files/$myfil-dir
rm /u/ey/homer/tagged_files/$myfil-dir/*.{slcio,log}
ln -s $1 input_prejet.slcio
Marlin /u/ey/homer/sidhome/lcfi/mfast-all-batch-6jet-step1.xml > /u/ey/homer/tagged_files/$myfil-dir/jet-6jet-
step1.log
Marlin /u/ey/homer/sidhome/lcfi/mfast-all-batch-2jet-step2.xml > /u/ey/homer/tagged_files/$myfil-dir/jet-2jet-
step2.log
Marlin /u/ey/homer/sidhome/lcfi/steering/revertex-all-batch.xml >& /u/ey/homer/tagged_files/$myfil-dir/vtx.log
Marlin /u/ey/homer/sidhome/lcfi/steering/flavortag-all-batch.xml > /u/ey/homer/tagged_files/$myfil-dir/flav.log
rm -v output_postjet.slcio
rm -v output_postjet-6jet.slcio
rm -v output_postjet_vtx.slcio
ln -s output_postjet_flavtag.slcio $myfil-flav.slcio
cd /u/ey/homer/sidhome/sid/lcsim-homer/batch2/
source runitallbatch2 /u/ey/homer/tagged_files/$myfil-dir/$myfil-flav.slcio

```

```

/u/ey/homer/sidhome/lcfi/subproclst-data8-delay:
cat $1 | xargs -n 1 bsub -q long -o /dev/null -R rhel50 "echo sleep 0.1;source subprepdatab-job-data8.sh"

```

```

$ source subproclst-data8-delay proclst-ffh-ilc250-m80p30

```

```

$ more proclst-ffh-ilc250-m80p30
/nfs/slac/g/lcd/ilc_data4/snowmass/ILC250/higgs/sidloi3/slcio/reco/higgs_ffh_-80e-+30e+_000_SLIC-v3r0p3_geant4-
v9r5p1_QGSP_BERT_sidloi3_lcsimTracking_test_pando
ra.slcio
/nfs/slac/g/lcd/ilc_data4/snowmass/ILC250/higgs/sidloi3/slcio/reco/higgs_ffh_-80e-+30e+_001_SLIC-v3r0p3_geant4-
v9r5p1_QGSP_BERT_sidloi3_lcsimTracking_test_pando
ra.slcio
/nfs/slac/g/lcd/ilc_data4/snowmass/ILC250/higgs/sidloi3/slcio/reco/higgs_ffh_-80e-+30e+_002_SLIC-v3r0p3_geant4-
v9r5p1_QGSP_BERT_sidloi3_lcsimTracking_test_pando
ra.slcio
/nfs/slac/g/lcd/ilc_data4/snowmass/ILC250/higgs/sidloi3/slcio/reco/higgs_ffh_-80e-+30e+_003_SLIC-v3r0p3_geant4-
v9r5p1_QGSP_BERT_sidloi3_lcsimTracking_test_pando
ra.slcio
/nfs/slac/g/lcd/ilc_data4/snowmass/ILC250/higgs/sidloi3/slcio/reco/higgs_ffh_-80e-+30e+_004_SLIC-v3r0p3_geant4-
v9r5p1_QGSP_BERT_sidloi3_lcsimTracking_test_pando
ra.slcio
/nfs/slac/g/lcd/ilc_data4/snowmass/ILC250/higgs/sidloi3/slcio/reco/higgs_ffh_-80e-+30e+_005_SLIC-v3r0p3_geant4-
v9r5p1_QGSP_BERT_sidloi3_lcsimTracking_test_pando
ra.slcio
/nfs/slac/g/lcd/ilc_data4/snowmass/ILC250/higgs/sidloi3/slcio/reco/higgs_ffh_-80e-+30e+_006_SLIC-v3r0p3_geant4-
v9r5p1_QGSP_BERT_sidloi3_lcsimTracking_test_pando
ra.slcio
/nfs/slac/g/lcd/ilc_data4/snowmass/ILC250/higgs/sidloi3/slcio/reco/higgs_ffh_-80e-+30e+_007_SLIC-v3r0p3_geant4-
v9r5p1_QGSP_BERT_sidloi3_lcsimTracking_test_pando
ra.slcio
/nfs/slac/g/lcd/ilc_data4/snowmass/ILC250/higgs/sidloi3/slcio/reco/higgs_ffh_-80e-+30e+_008_SLIC-v3r0p3_geant4-
v9r5p1_QGSP_BERT_sidloi3_lcsimTracking_test_pando
ra.slcio
/nfs/slac/g/lcd/ilc_data4/snowmass/ILC250/higgs/sidloi3/slcio/reco/higgs_ffh_-80e-+30e+_009_SLIC-v3r0p3_geant4-
v9r5p1_QGSP_BERT_sidloi3_lcsimTracking_test_pando
ra.slcio
...

```

```

~/sidhome/lcfi/steering/revertex-all-batch.xml
<marlin>

<execute>
  <processor name="VertexFinder"/>
  <processor name="MyLCIOOutputProcessor"/>
</execute>

<global>
  <parameter name="LCIOInputFiles">
output_postjet.slcio
  </parameter>
  <parameter name="GearXMLFile">/u/ey/homer/sidhome/lcfi/steering/clc_sid.gear</parameter>
  <parameter name="MaxRecordNumber" value="-1" />
  <parameter name="SkipNEvents" value="0" />
  <parameter name="SupressCheck" value="false" />
  <parameter name="Verbosity" options="DEBUG0-4,MESSAGE0-4,WARNING0-4,ERROR0-4,SILENT">WARNING<
/parameter>
</global>

<processor name="VertexFinder" type="LcfiplusProcessor">

  <!-- run primary and secondary vertex finders -->
  <parameter name="Algorithms" type="stringVec"> PrimaryVertexFinder BuildUpVertex </parameter>
  <parameter name="ReadSubdetectorEnergies" type="int" value="0"/> <!-- true for ILD -->
  <parameter name="UpdateVertexRPDaughters" type="int" value="0"/> <!-- false for non-updative
PandoraPFOs -->
  <parameter name="PrintEventNumber" type="int" value="10"/> <!-- 0 for not printing event number, n for
printing every n events -->

  <!-- specify input collection names -->
  <parameter name="PFOCollection" type="string" value="JetParts2Jet" />
  <parameter name="PrimaryVertexCollectionName" type="string" value="HNPrimaryVertex" />
  <parameter name="BuildUpVertexCollectionName" type="string" value="HNBUILDUPVertex" />
  <parameter name="BuildUpVertex.V0VertexCollectionName" type="string" value="HNBUILDUPVertex_V0" />
  <parameter name="MagneticField" type="float" value="5"/>
  <parameter name="BeamSizeX" type="float" value="335E-6"/>
  <parameter name="BeamSizeY" type="float" value="2.7E-6"/>
  <parameter name="BeamSizeZ" type="float" value="0.225"/>

  <!-- parameters for primary vertex finder -->
  <parameter name="PrimaryVertexFinder.TrackMaxD0" type="double" value="20." />
  <parameter name="PrimaryVertexFinder.TrackMaxZ0" type="double" value="20." />
  <parameter name="PrimaryVertexFinder.TrackMaxInnermostHitRadius" type="double" value="20." />
  <parameter name="PrimaryVertexFinder.TrackMinVtxFtdHits" type="int" value="3" />
  <parameter name="PrimaryVertexFinder.Chi2Threshold" type="double" value="25." />
  <parameter name="PrimaryVertexFinder.UseBeamConstraint" type="int" value="1" />

  <!-- parameters for secondary vertex finder -->
  <parameter name="BuildUpVertex.TrackMaxD0" type="double" value="10." />
  <parameter name="BuildUpVertex.TrackMaxZ0" type="double" value="20." />
  <parameter name="BuildUpVertex.TrackMinPt" type="double" value="0.1" />
  <parameter name="BuildUpVertex.TrackMaxD0Err" type="double" value="0.1" />
  <parameter name="BuildUpVertex.TrackMaxZ0Err" type="double" value="0.1" />
  <parameter name="BuildUpVertex.TrackMinTpcHits" type="int" value="4" />
  <parameter name="BuildUpVertex.TrackMinFtdHits" type="int" value="3" />
  <parameter name="BuildUpVertex.TrackMinVxdHits" type="int" value="3" />
  <parameter name="BuildUpVertex.TrackMinVxdFtdHits" type="int" value="0" />
  <parameter name="BuildUpVertex.PrimaryChi2Threshold" type="double" value="25." />
  <parameter name="BuildUpVertex.SecondaryChi2Threshold" type="double" value="9." />
  <parameter name="BuildUpVertex.MassThreshold" type="double" value="10." />
  <parameter name="BuildUpVertex.MinDistFromIP" type="double" value="0.3" />
  <parameter name="BuildUpVertex.MaxChi2ForDistOrder" type="double" value="1.0" />
  <parameter name="BuildUpVertex.AssocIPTracks" type="int" value="1" />
  <parameter name="BuildUpVertex.AssocIPTracksMinDist" type="double" value="0." />
  <parameter name="BuildUpVertex.AssocIPTracksChi2RatioSecToPri" type="double" value="2.0" />
  <parameter name="BuildUpVertex.UseV0Selection" type="int" value="1" />

</processor>

```

```

<processor name="MyLCIOOutputProcessor" type="LCIOOutputProcessor">
  <parameter name="LCIOOutputFile" type="string">
output_postjet_vtx.slcio
  </parameter>
  <parameter name="LCIOWriteMode" type="string" value="WRITE_NEW"/>
</processor>

</marlin>

~/sidhome/lcfi/steering/flavortag-all-batch.xml
<marlin>

<execute>
  <processor name="JetClusteringAndFlavorTag"/>
  <processor name="MyLCIOOutputProcessor"/>
</execute>

<global>
  <parameter name="LCIOInputFiles">
output_postjet_vtx.slcio
  </parameter>
  <parameter name="MaxRecordNumber" value="0" />
  <parameter name="SkipNEvents" value="0" />
  <parameter name="SupressCheck" value="false" />
  <parameter name="GearXMLFile"> /u/ey/homer/sidhome/lcfi/steering/clic_sid.gear </parameter>
  <parameter name="Verbosity" options="DEBUG0-4,MESSAGE0-4,WARNING0-4,ERROR0-4,SILENT">WARNING<
/parameter>
</global>

<processor name="JetClusteringAndFlavorTag" type="LcfiplusProcessor">

  <!-- run primary and secondary vertex finders -->
  <parameter name="Algorithms" type="stringVec"> JetClustering JetVertexRefiner FlavorTag ReadMVA<
/parameter>

  <!-- general parameters -->
  <parameter name="PFOCollection" type="string" value="JetParts2Jet" /> <!-- input PFO collection -->
  <parameter name="UseMCP" type="int" value="0" /> <!-- MC info not used -->
  <parameter name="MCPCollection" type="string" value="" /> <!-- not used -->
  <parameter name="MCPFORelation" type="string" value="" /> <!-- not used -->
  <parameter name="ReadSubdetectorEnergies" type="int" value="0"/> <!-- true for ILD -->
  <parameter name="UpdateVertexRPDDaughters" type="int" value="0"/> <!-- false for non-updative
PandoraPFOs -->
  <parameter name="MagneticField" type="float" value="5"/>

  <!-- jet clustering parameters -->
  <parameter name="JetClustering.InputVertexCollectionName" type="string" value="HNBuildUpVertex" /> <!--
vertex collections to be used in JC -->
  <parameter name="JetClustering.OutputJetCollectionName" type="stringVec" value="VertexJets" /> <!--
output collection name, may be multiple -->
  <parameter name="JetClustering.NJetsRequested" type="intVec" value="2" /> <!-- Multiple NJets can be
specified -->

  <parameter name="JetClustering.YCut" type="doubleVec" value="0." /> <!-- specify 0 if not used -->
  <parameter name="JetClustering.UseMuonID" type="int" value="1" /> <!-- jet-muon ID for jet clustering -->
  <parameter name="JetClustering.VertexSelectionMinimumDistance" type="double" value="0.3" /> <!-- in mm -
>
  <parameter name="JetClustering.VertexSelectionMaximumDistance" type="double" value="30." /> <!-- in mm -
>

  <parameter name="JetClustering.VertexSelectionK0MassWidth" type="double" value="0.02" /> <!-- in GeV -->
  <parameter name="JetClustering.YAddedForJetVertexVertex" type="double" value="100"/> <!-- add penalty
for combining vertices -->
  <parameter name="JetClustering.YAddedForJetLeptonVertex" type="double" value="100"/> <!-- add penalty
for combining lepton and vertex -->
  <parameter name="JetClustering.YAddedForJetLeptonLepton" type="double" value="100"/> <!-- add penalty
for combining leptons -->

  <parameter name="FlavorTag.D0ProbFileName" type="string" value="/u/ey/homer/sidhome/lcfi/steering
/vtxprob/d0prob_zpole.root"/>
  <parameter name="FlavorTag.Z0ProbFileName" type="string" value="/u/ey/homer/sidhome/lcfi/steering

```

```
/vtxprob/z0prob_zpole.root"/>
```

```
<!-- vertex refiner parameters -->
<parameter name="JetVertexRefiner.InputJetCollectionName" type="string" value="VertexJets" />
<parameter name="JetVertexRefiner.OutputJetCollectionName" type="string" value="RefinedJets" />
<parameter name="JetVertexRefiner.PrimaryVertexCollectionName" type="string" value="HNPrimaryVertex" />
<parameter name="JetVertexRefiner.InputVertexCollectionName" type="string" value="HNBuildUpVertex" />
<parameter name="JetVertexRefiner.V0VertexCollectionName" type="string" value="HNBuildUpVertex_V0" />
<parameter name="JetVertexRefiner.OutputVertexCollectionName" type="string" value="RefinedVertex" />

<parameter name="JetVertexRefiner.MinPosSingle" type="double" value="0.3" />
<parameter name="JetVertexRefiner.MaxPosSingle" type="double" value="30." />
<parameter name="JetVertexRefiner.MinEnergySingle" type="double" value="1." />
<parameter name="JetVertexRefiner.MaxAngleSingle" type="double" value="0.5" />
<parameter name="JetVertexRefiner.MaxSeparationPerPosSingle" type="double" value="0.1" />
<parameter name="JetVertexRefiner.mind0sigSingle" type="double" value="5." />
<parameter name="JetVertexRefiner.minz0sigSingle" type="double" value="5." />
<parameter name="JetVertexRefiner.OneVertexProbThreshold" type="double" value="0.001" />
<parameter name="JetVertexRefiner.MaxCharmFlightLengthPerJetEnergy" type="double" value="0.1" />

<!-- FlavorTag parameters -->
<parameter name="PrimaryVertexCollectionName" type="string" value="HNPrimaryVertex" />
<parameter name="FlavorTag.JetCollectionName" type="string" value="RefinedJets" />
<parameter name="MakeNtuple.AuxiliaryInfo" type="int" value="-1" />

<parameter name="FlavorTag.WeightsDirectory" type="string" value="/u/ey/homer/sidhome/lcfi/steering
/weights-nl/" />
<parameter name="FlavorTag.WeightsPrefix" type="string" value="flavwgt" />
<parameter name="FlavorTag.BookName" type="string" value="bdt" />
<parameter name="FlavorTag.PIDAlgo" type="string" value="lcfiplus" />

<parameter name="FlavorTag.CategoryDefinition1" type="string">nvtx=0</parameter>
<parameter name="FlavorTag.CategoryPreselection1" type="string">trkl0sig!=0</parameter>
<parameter name="FlavorTag.CategoryVariables1" type="stringVec">
    trkl0sig trk20sig trklz0sig trk2z0sig trklpt_jete trk2pt_jete jprobr jprobz
</parameter>
<parameter name="FlavorTag.CategorySpectators1" type="stringVec">
    aux nvtx
</parameter>

<parameter name="FlavorTag.CategoryDefinition2" type="string">nvtx=1&&nvtxall=1</parameter>
<parameter name="FlavorTag.CategoryPreselection2" type="string">trkl0sig!=0</parameter>
<parameter name="FlavorTag.CategoryVariables2" type="stringVec">
    trkl0sig trk20sig trklz0sig trk2z0sig trklpt_jete trk2pt_jete jprobr jprobz
    vtxlen1_jete vtxsig1_jete vtxdirang1_jete vtxmom1_jete vtxmass1 vtxmult1 vtxmasspc vtxprob
    d0bprob d0cprob d0qprob z0bprob z0cprob z0qprob
    trkmass
</parameter>
<!-- nelectron nmuon -->
<parameter name="FlavorTag.CategorySpectators2" type="stringVec">
    aux nvtx
</parameter>

<parameter name="FlavorTag.CategoryDefinition3" type="string">nvtx=1&&nvtxall=2</parameter>
<parameter name="FlavorTag.CategoryPreselection3" type="string">trkl0sig!=0</parameter>
<parameter name="FlavorTag.CategoryVariables3" type="stringVec">
    trkl0sig trk20sig trklz0sig trk2z0sig trklpt_jete trk2pt_jete jprobr jprobz
    vtxlen1_jete vtxsig1_jete vtxdirang1_jete vtxmom1_jete vtxmass1 vtxmult1 vtxmasspc vtxprob
    lvtxprob vtxlen12all_jete vtxmassall
</parameter>
<parameter name="FlavorTag.CategorySpectators3" type="stringVec">
    aux nvtx
</parameter>

<parameter name="FlavorTag.CategoryDefinition4" type="string">nvtx=2</parameter>
<parameter name="FlavorTag.CategoryPreselection4" type="string">trkl0sig!=0</parameter>
<parameter name="FlavorTag.CategoryVariables4" type="stringVec">
    trkl0sig trk20sig trklz0sig trk2z0sig trklpt_jete trk2pt_jete jprobr jprobz
    vtxlen1_jete vtxsig1_jete vtxdirang1_jete vtxmom1_jete vtxmass1 vtxmult1 vtxmasspc vtxprob
    vtxlen2_jete vtxsig2_jete vtxdirang2_jete vtxmom2_jete vtxmass2 vtxmult2
    vtxlen12_jete vtxsig12_jete vtxdirang12_jete vtxmom_jete vtxmass vtxmult
</parameter>
```

