B-Tagging through G.N.N

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Sprace

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  - Track Analysis in the CMSSW
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    - General Idea
    - Results

Previous Chapters

- Track Analysis
  - Overall Structure
  - Available Features: quality criteria, number of valid hits, number of lost hits, point of closest approach(CMS center),PT, Charge,$Tranverse\ IP$,$Longitudinal\ IP$,$Curvature$
  - Hit in each detector region: working on it
- B-Tagging
  - Not a quite good idea
  - Alternative: MC Truth
- M.L
  - First we work with the data

Today - Track Analysis - Results

- Hits by detector region: done
  - Pixel: barrel, endcap
  - Strip:TIB,TID,TOB,TEC
  - Lost: not by region

```
################################ HIT PATTERN ##########################################
PIXEL:
Number of valid pixel barrel hits: 2
Number of valid pixel endcap hits: 2
-------------------------------------------------------------------------------------------
STRIP:
Number of valid strip TIB hits: 0
Number of valid strip TID hits: 3
Number of valid strip TOB hits: 0
Number of valid strip TEC hits: 13
-------------------------------------------------------------------------------------------
Number of lost hits: 0
################################ PARAMETERS ###########################################
Perigee: (0.00662605,0.0456904,-1.49585)
PT: 0.699768 +/- 0.0102767 - Charge: 1
T_IP: -0.0268931 +/- 0.0109016 - L_IP: -1.58746 +/- 0.0283327
Curvature (q/p): 0.541727 +/- 0.00772058
#######################################################################################
```

Today - Flavour Identification - General Idea

- The jet flavor is determined by re-clustering the jet constituents with selected hadrons and partons.
- The hadron and parton four-momenta are rescaled by a very small number (the default rescale factor is 10^{-18}) which turns them into the so-called "ghosts"
- The result is that each jet is associated with five gen-level partons:
  - the heaviest parton in the jet cone
  - the nearest status=2 parton
  - the nearest status=3 parton (originating from primary physics process about the jet cone)
  - the "physics definition" parton
  - the "algorithmic definition" parton
- Jet is considered a b jet if there is at least one b "ghost" parton clustered inside it
- Jet is considered a light-flavor jet if there are light-flavour and no b or c "ghost" partons clustered inside it

Today - Flavour Identification - Results

```
-------------------- Jet Flavour by Ref From Partons--------------
[printJetFlavour] (pt,eta,phi) jet =   21.82 -4.018 -2.436
[printJetFlavour] (pt,eta,phi) jet =   21.70  3.953 -1.380
[printJetFlavour] (pt,eta,phi) jet =   21.73  1.381  2.240
[printJetFlavour] (pt,eta,phi) jet =   20.69 -3.029 -1.275
[printJetFlavour] (pt,eta,phi) jet =   20.62 -2.884 -0.522
                    theNearest Stat2 flav (pt,eta,phi)=21 (1.3337,-2.99603,-0.467948) Dr=0.124067
                  theAlgoDefinition flav (pt,eta,phi)=21 (1.3337,-2.99603,-0.467948) Dr=0.124067
```

```
-------------------- Jet Flavour by Value ------------------------
[printJetFlavour] (pt,eta,phi) jet =   21.82 -4.018 -2.436 | parton =    0.00  0.000  0.000 |    0
[printJetFlavour] (pt,eta,phi) jet =   21.70  3.953 -1.380 | parton =    0.00  0.000  0.000 |    0
[printJetFlavour] (pt,eta,phi) jet =   21.73  1.381  2.240 | parton =    0.00  0.000  0.000 |    0
[printJetFlavour] (pt,eta,phi) jet =   20.69 -3.029 -1.275 | parton =    0.00  0.000  0.000 |    0
[printJetFlavour] (pt,eta,phi) jet =   20.62 -2.884 -0.522 | parton =    1.33 -2.996 -0.468 |   21
[printJetFlavour] (pt,eta,phi) jet =   20.61  3.745 -3.066 | parton =    0.00  0.000  0.000 |    0
[printJetFlavour] (pt,eta,phi) jet =   20.28 -3.395  2.958 | parton =    1.21 -3.587  2.831 |   -1
[printJetFlavour] (pt,eta,phi) jet =   17.42  4.219  2.694 | parton =    0.00  0.000  0.000 |    0
[printJetFlavour] (pt,eta,phi) jet =   17.70 -1.041 -2.352 | parton =    2.59 -1.343 -2.194 |   -3
[printJetFlavour] (pt,eta,phi) jet =   17.47  1.144 -2.066 | parton =    0.78  1.055 -1.961 |   21
[printJetFlavour] (pt,eta,phi) jet =   17.22  4.254  0.852 | parton =    4.40  4.006  0.980 |   21
[printJetFlavour] (pt,eta,phi) jet =   16.85  1.226 -0.653 | parton =    0.00  0.000  0.000 |    0
[printJetFlavour] (pt,eta,phi) jet =   16.96 -0.898 -3.029 | parton =    2.40 -0.902  2.893 |   21
[printJetFlavour] (pt,eta,phi) jet =   16.20 -3.548  1.632 | parton =    0.00  0.000  0.000 |    0
[printJetFlavour] (pt,eta,phi) jet =   16.17  3.599  1.319 | parton =    1.06  3.616  1.035 |   -1
```