
ILC Asian Physics & Software Meeting : 1 June (Mon.) 3:00pm JST

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- Try tagging by 11 category (b, c, u, d, s /bar/g) $H \rightarrow bb / Z \rightarrow \mu \mu$

→ can get results

→ How should we evaluate the results of the flavor tags? **Still in progress**

e.g.)

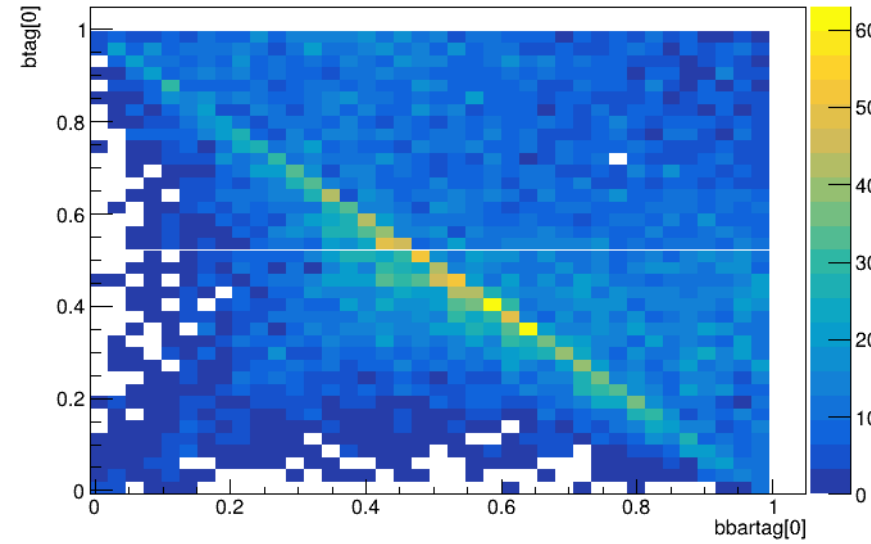
- ✓ Verify which of the two jets is identified as the bjet – bbarjet

- ✓ Compare the discrimination performance with that of bjet–cjet, etc.

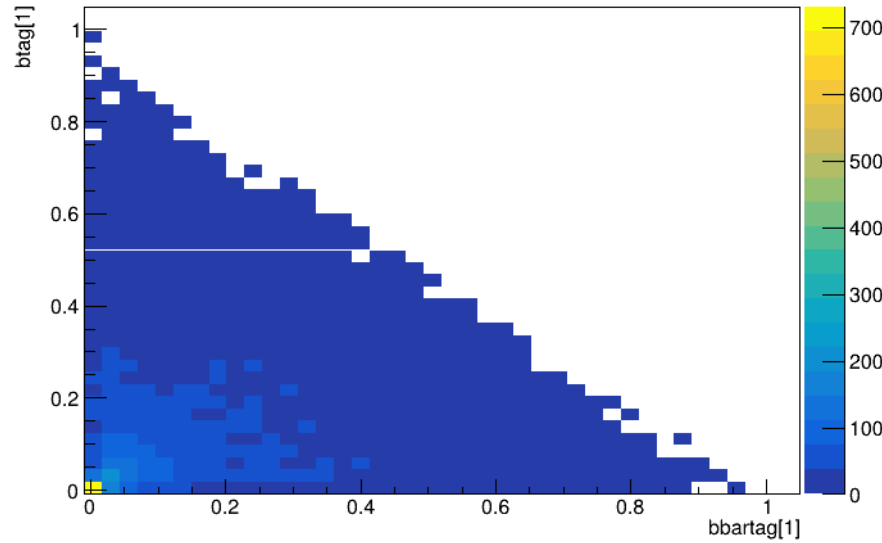
- Generate $H \rightarrow bs$ event

Results b v.s. bbar

btag[0]:bbartag[0]

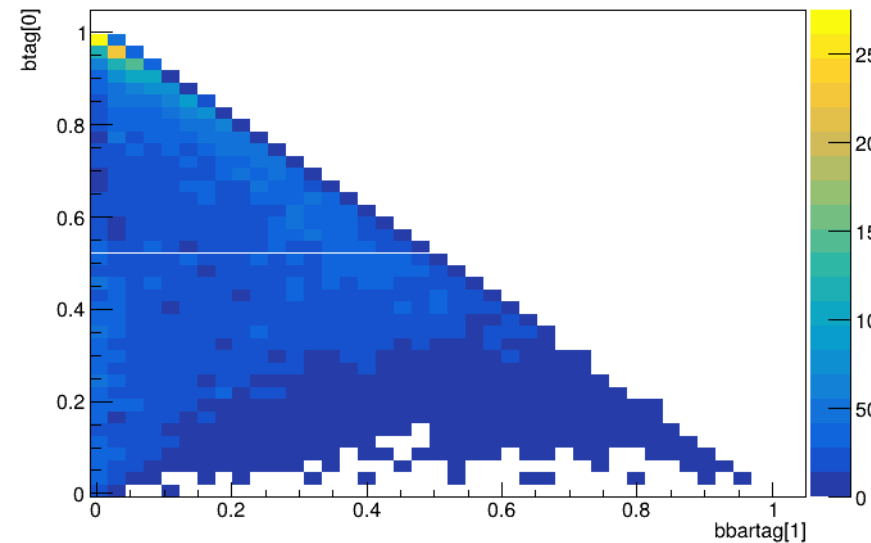


btag[1]:bbartag[1]

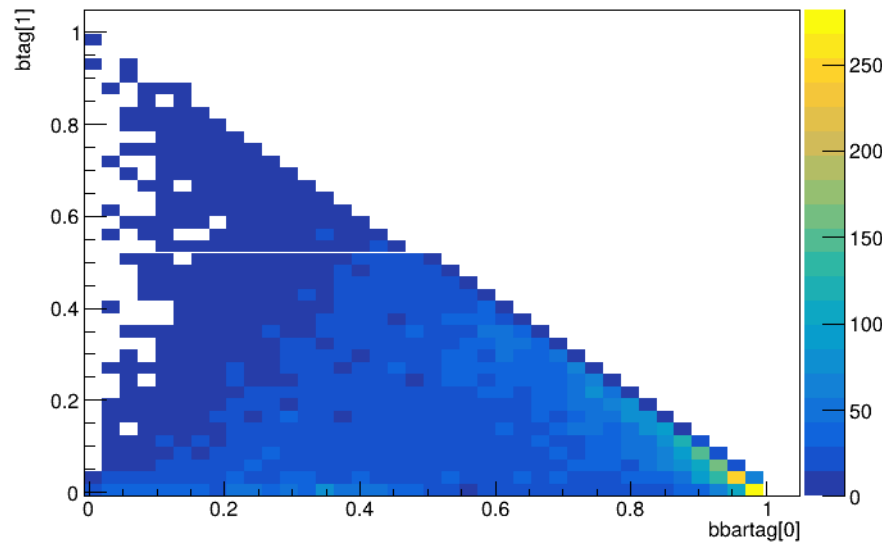


Jet[0] → bbar 60%, b 40%
Jet[1] → both is 0%

btag[0]:bbartag[1]



btag[1]:bbartag[0]

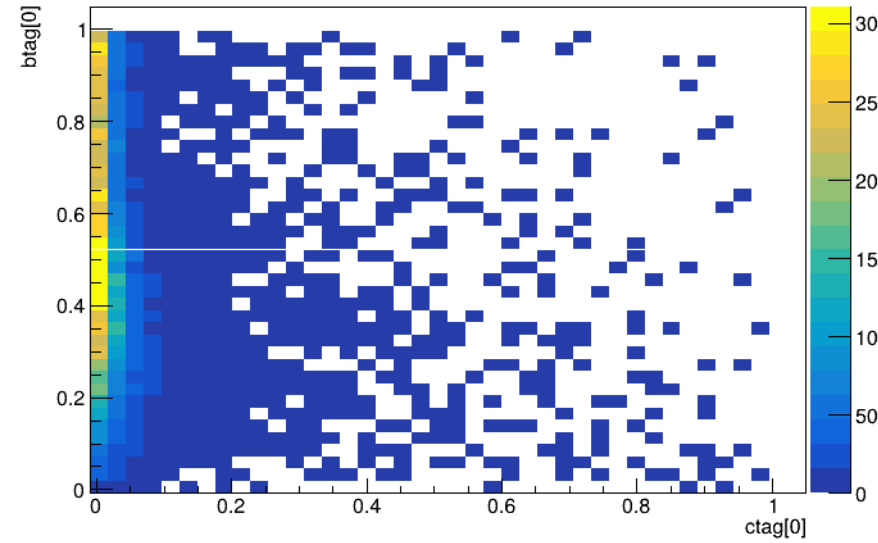


The note [0] looks like both a “b” and a “bbar”

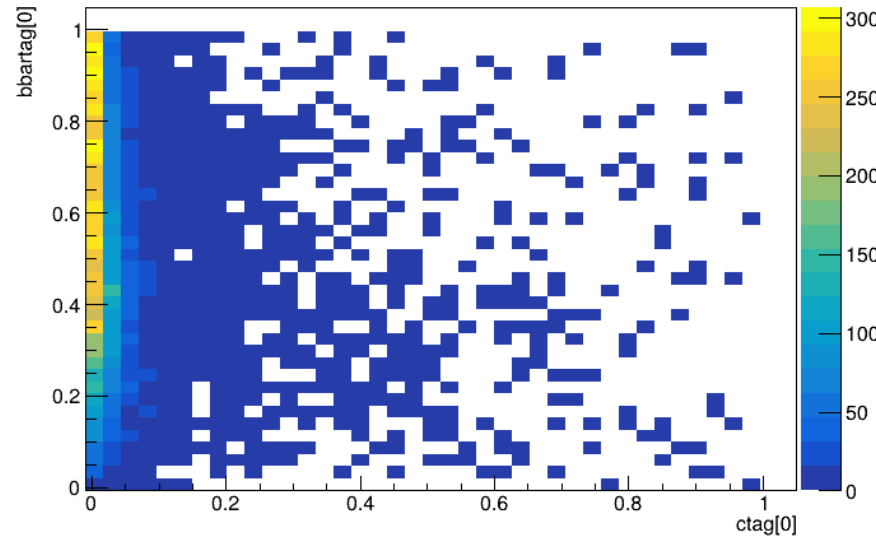
Maybe the way that retrieving or packing the values before putting into the root file is incorrect?

Results b v.s. c

btag[0]:ctag[0]

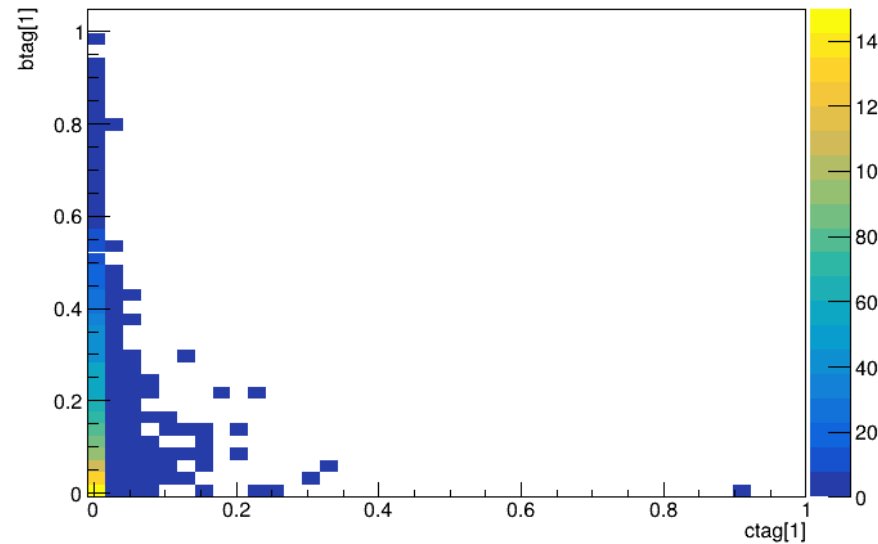


bbartag[0]:ctag[0]

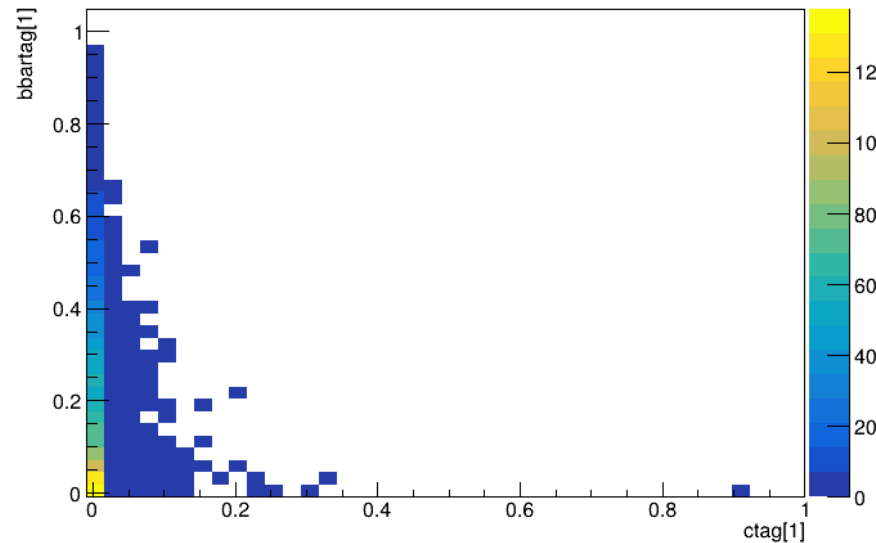


[0] looks like a B, but can't distinguish B with bbar?

btag[1]:ctag[1]



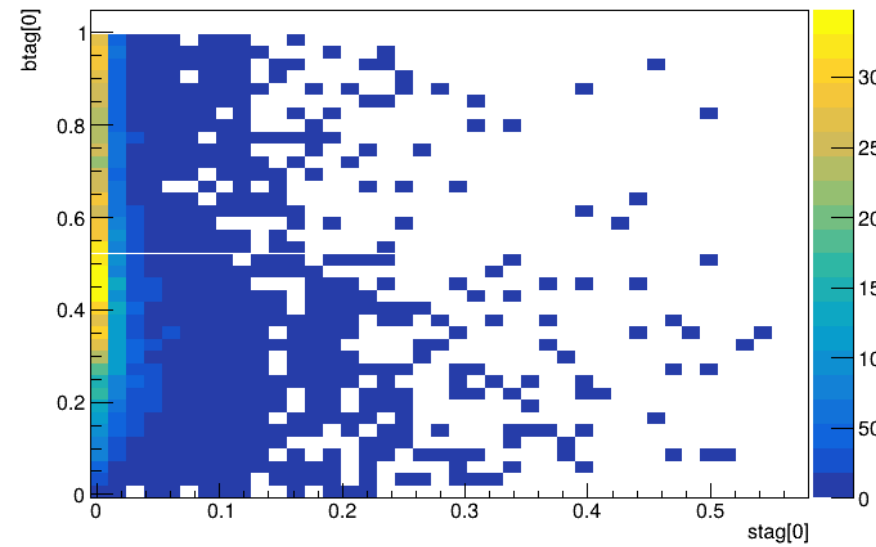
bbartag[1]:ctag[1]



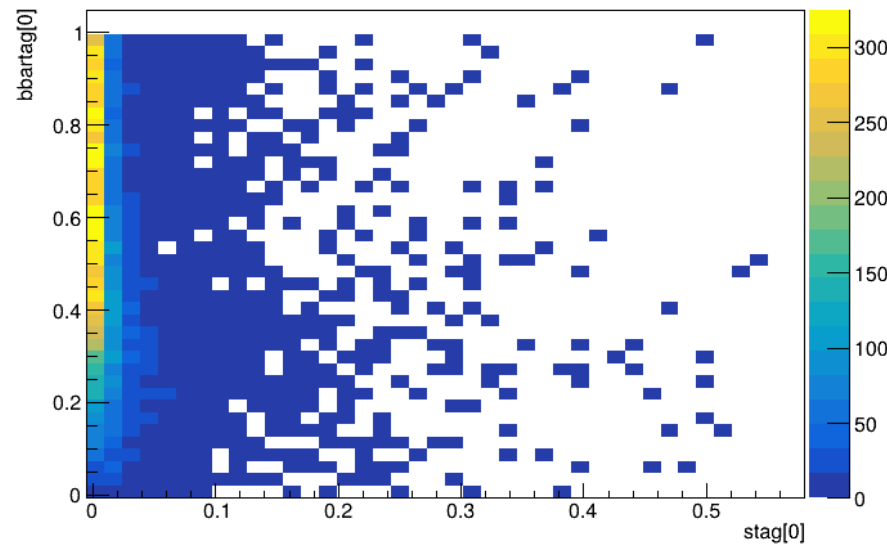
[1] is not b, not c?

Results b v.s. s

btag[0]:stag[0]

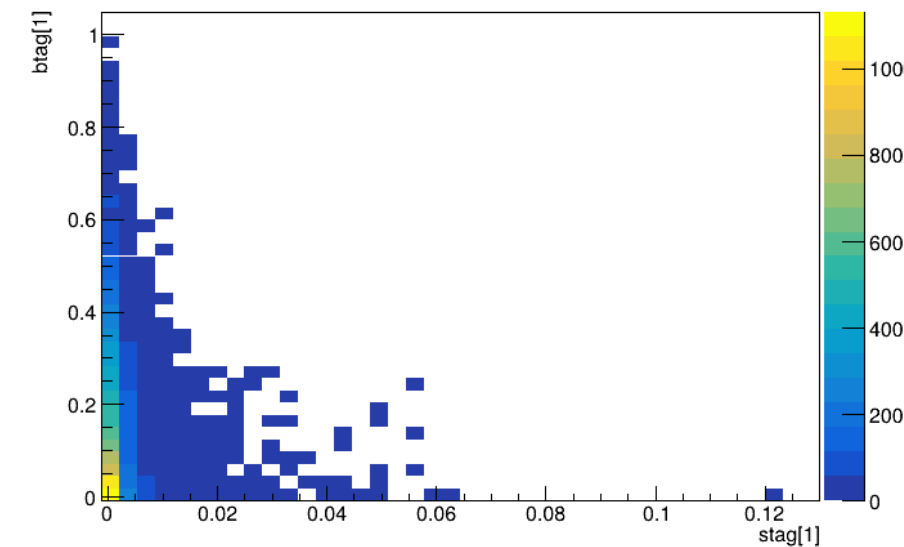


bbartag[0]:stag[0]

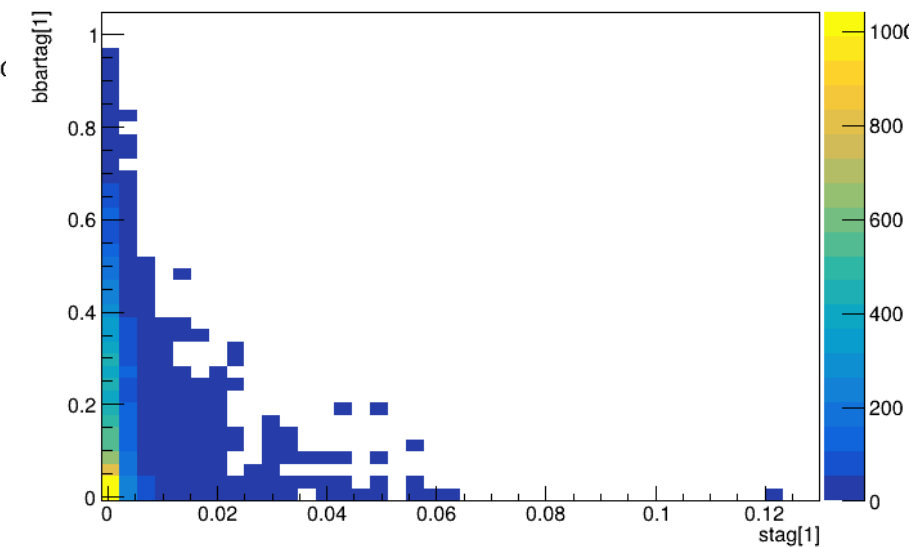


[0] looks like a B, but
can't distinguish B with
bbar?

btag[1]:stag[1]



bbartag[1]:stag[1]



[1] is not b, not s

Calculate the amplitude of the Feynman diagram that contributes to the physical phenomenon of interest

→ Calculate Cross section (σ)

→ generate MC event

After that, simulate hadronization and parton showers in PYTHIA.

- In my situation, I want to create an event predicted by BSM, so I'm going to hack the SM event

($H \rightarrow bb$ @SM \rightarrow $H \rightarrow bs$ @BSM)

Results

PDG number: 25 (Higgs)

→ PDG: 5(b), -3(sbar),

so $H \rightarrow b\bar{s}$ were generated.

- Original: Higgs particle decay mode in PHYSIA: 214 ($h \rightarrow b\bar{b}$)
- Current: Hack decay mode 214 ($h \rightarrow b\bar{s}$)

↓ Add parameter

```
# $ps_PYTHIA_PYGIVE = sprintf "PMAS(25,1)=125.0;PMAS(25,2)=0.0041;MSTJ(41)
03100; PARJ(55)=-0.00200;PARJ(1)=0.08500; PARJ(3)=0.45000; PARJ(4)=0.02500; PA
0.17000; MSTP(3)=1; MSTP(125)=2; MWID(25)=2;BRAT(210)=0.000052;BRAT(211)=0.000
T(224)=0.00153;BRAT(225)=0.0262;BRAT(226)=0.214;MDME(210,1)=%d;MDME(211,1)=%d;
)=%d;MDME(224,1)=%d;MDME(225,1)=%d;MDME(226,1)=%d" (ih_dd ih_uu ih_ss,ih_cc,ih
$ps_PYTHIA_PYGIVE = sprintf "KFDP(214,1)=-5;KFDP(214,2)=3; PMAS(25,1)=125.
00; MSTJ(11)=3; PARJ(54)=-0.03100; PARJ(55)=-0.00200;PARJ(1)=0.08500; PARJ(3)=
PARJ(16)=0.08000; PARJ(17)=0.17000; MSTP(3)=1; MSTP(125)=2; MWID(25)=2;BRAT(2
0.0819;BRAT(223)=0.00227;BRAT(224)=0.00153;BRAT(225)=0.0262;BRAT(226)=0.214;MD
&d;MDME(223,1)=%d;MDME(223,1)=%d;MDME(224,1)=%d;MDME(225,1)=%d;MDME(226,1)=%d
```

25 (Higgs) → PDG: 5(b), -3(sbar)

25 (Higgs) → PDG: -5(bbar), 3(s)

```
0, -1.00e+00 | (0, 0) | [4,5] - [14]
[00000015] 10 | 25 | -4.45e+01, 4.30e+01, 6.68e+00
0, 0.00e+00 | (0, 0) | [4,5] - [11,12]
[00000016] 11 | 5 | -4.30e+00, 3.47e+01, -5.51e+01
0, 0.00e+00 | (500, 0) | [10] - [15]
[00000017] 12 | -3 | -4.02e+01, 8.24e+00, 6.18e+01
0, 0.00e+00 | (501, 500) | [10] - [16]
[00000018] 13 | -14 | 2.05e+01, 7.40e+00, -7.58e+00
```

```
e+00, 0.00e+00, -1.00e+00 | (0, 0) | [4,5] - [14]
[00000015] 10 | 25 | -3.41e+01, 3.75e+01, -1.30e+01 | 0.0
e+00, 0.00e+00, 0.00e+00 | (0, 0) | [4,5] - [11,12]
[00000016] 11 | -5 | 1.06e+01, -8.86e+00, 4.60e+01 | 0.0
e+00, 0.00e+00, 0.00e+00 | (0, 500) | [10] - [15]
[00000017] 12 | 3 | -4.47e+01, 4.64e+01, -5.89e+01 | 0.0
e+00, 0.00e+00, 0.00e+00 | (500, 501) | [10] - [16]
[00000018] 13 | -14 | 2.20e+01, 6.72e+01, 1.20e+01 | 0.0
```

- Tagging by 11 category (b, c, u, d, s /bar/g)
 - Check why the same “jet” has both ‘b’ and “bbar” characteristics at the same time, and fix it.
- Generate $H \rightarrow bs$ event
 - How to do detector simulation ?

① `cp /tianjp/analysis/tutorial/QFV`

② `source whizard3-3.1.5.setup`

③ `whizard simulate_n23n23h_bb.eL.pR.sin`

outputされた.slcioファイルを確認する

④ `dumpevent E250-SetA.Pn23n23h_bb.Gwhizard-3_1_5.eL.pR.I411201.0.slcio 40` (数字は何でもいい)

<https://whizard.hepforge.org/>を参考にする