

stau NLSP sample production

- need to generated signal MC files for stau NLSP analysis, LSP = $O(eV)$ gravitino
 - $e^+e^- \rightarrow \text{stau}^+ \text{stau}^- \rightarrow \tau^+ \tau^- \text{LSP LSP}$
- stau & tau have nonzero lifetime
 - analysis target: $c\tau = 1 \text{ um} \sim 1000 \text{ um}$
 - needs to be simulated carefully in Mokka/G4
- problem with stau flight found after running Mokka

STDHEP file

Generated using latest lcsoft JSF/physssim/StdHep on jlclgin2
STUSTUStudy package

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Terminal — bash — 154x21
bash
( 1) IDHEP= 1000015 JMOHEP= 0, 0 JDAHEP= 3, 4 PHEP=( 1.51e+02, -1.62e+01, 1.58e+02, 2.50e+02) VHEP=( 0.00e+00, 0.00e+00, 0.00e+00)
( 2) IDHEP=-1000015 JMOHEP= 0, 0 JDAHEP= 5, 6 PHEP=(-1.51e+02, 1.62e+01, -1.57e+02, 2.49e+02) VHEP=( 0.00e+00, 0.00e+00, 0.00e+00)
( 3) IDHEP= 1000022 JMOHEP= 1, 0 JDAHEP= 0,-1 PHEP=(-1.14e+01, -4.33e-01, -1.03e+01, 1.55e+01) VHEP=( 0.00e+00, 0.00e+00, 0.00e+00)
( 4) IDHEP=      15 JMOHEP= 1, 0 JDAHEP= 0,-1 PHEP=( 1.62e+02, -1.57e+01, 1.68e+02, 2.34e+02) VHEP=( 0.00e+00, 0.00e+00, 0.00e+00)
( 5) IDHEP= 1000022 JMOHEP= 2, 0 JDAHEP= 0,-1 PHEP=(-1.51e+02, -1.47e+00, -8.24e+01, 1.72e+02) VHEP=( 0.00e+00, 0.00e+00, 0.00e+00)
( 6) IDHEP=     -15 JMOHEP= 2, 0 JDAHEP= 0,-1 PHEP=( 4.71e-01, 1.76e+01, -7.50e+01, 7.71e+01) VHEP=( 0.00e+00, 0.00e+00, 0.00e+00)
( 7) IDHEP= 1000015 JMOHEP= 5, 0 JDAHEP= 0, 0 PHEP=( 1.52e+02, -1.62e+01, 1.58e+02, 2.50e+02) VHEP=( 0.00e+00, 0.00e+00, 0.00e+00)
( 8) IDHEP=-1000015 JMOHEP= 4, 0 JDAHEP= 0, 0 PHEP=(-1.50e+02, 1.62e+01, -1.57e+02, 2.49e+02) VHEP=( 0.00e+00, 0.00e+00, 0.00e+00)
( 9) IDHEP= 1000022 JMOHEP= 7, 0 JDAHEP= 0, 0 PHEP=(-1.14e+01, -4.33e-01, -1.03e+01, 1.54e+01) VHEP=( 3.00e-04, -3.20e-05, 3.13e-04)
(10) IDHEP=      15 JMOHEP= 7, 0 JDAHEP=11,12 PHEP=( 1.63e+02, -1.57e+01, 1.68e+02, 2.35e+02) VHEP=( 3.00e-04, -3.20e-05, 3.13e-04)
(11) IDHEP=      16 JMOHEP=10, 0 JDAHEP= 0, 0 PHEP=( 6.46e+01, -6.90e+00, 6.72e+01, 9.35e+01) VHEP=( 5.51e-02, -5.32e-03, 5.69e-02)
(12) IDHEP=     -213 JMOHEP=10, 0 JDAHEP=13,14 PHEP=( 9.85e+01, -8.84e+00, 1.01e+02, 1.42e+02) VHEP=( 5.51e-02, -5.32e-03, 5.69e-02)
(13) IDHEP=     -211 JMOHEP=12, 0 JDAHEP= 0, 0 PHEP=( 2.17e+01, -1.78e+00, 2.26e+01, 3.14e+01) VHEP=( 5.51e-02, -5.32e-03, 5.69e-02)
(14) IDHEP=     111 JMOHEP=12, 0 JDAHEP=15,16 PHEP=( 7.68e+01, -7.06e+00, 7.86e+01, 1.10e+02) VHEP=( 5.51e-02, -5.32e-03, 5.69e-02)
(15) IDHEP=      22 JMOHEP=14, 0 JDAHEP= 0, 0 PHEP=( 2.47e+00, -2.12e-01, 2.50e+00, 3.52e+00) VHEP=( 5.60e-02, -5.40e-03, 5.78e-02)
(16) IDHEP=      22 JMOHEP=14, 0 JDAHEP= 0, 0 PHEP=( 7.43e+01, -6.85e+00, 7.61e+01, 1.07e+02) VHEP=( 5.60e-02, -5.40e-03, 5.78e-02)
(17) IDHEP= 1000022 JMOHEP= 8, 0 JDAHEP= 0, 0 PHEP=(-1.51e+02, -1.47e+00, -8.24e+01, 1.72e+02) VHEP=(-2.03e-03, 2.19e-04, -2.13e-03)
(18) IDHEP=     -15 JMOHEP= 8, 0 JDAHEP=19,21 PHEP=( 7.41e-01, 1.76e+01, -7.50e+01, 7.71e+01) VHEP=(-2.03e-03, 2.19e-04, -2.13e-03)
(19) IDHEP=     -16 JMOHEP=18, 0 JDAHEP= 0, 0 PHEP=( 4.00e-01, 1.60e+00, -6.32e+00, 6.54e+00) VHEP=(-6.17e-04, 3.39e-02, -1.45e-01)
(20) IDHEP=     -13 JMOHEP=18, 0 JDAHEP= 0, 0 PHEP=( 2.51e-01, 3.09e+00, -1.52e+01, 1.55e+01) VHEP=(-6.17e-04, 3.39e-02, -1.45e-01)
(21) IDHEP=      14 JMOHEP=18, 0 JDAHEP= 0, 0 PHEP=( 8.94e-02, 1.30e+01, -5.35e+01, 5.50e+01) VHEP=(-6.17e-04, 3.39e-02, -1.45e-01)
```

Stau has nonzero lifetime

-> Tau and LSP particles are (correctly) generated at a displaced vertex

Mokka/Marlin output

Using ilcsoft v01-11 @ kekcc to run Mokka and Marlin
dumpevent command shows:

```
tomohiko@cw103:~/nfs/work/110728-stau-reco -- ssh -- 195x17
tomohiko@c...-reco -- ssh
[ id ]index| PDG | px, py, pz | energy |gen|[simstat]| vertex x, y, z | endpoint x, y, z | mass | charge | [parents] - [daughters] |
[0000003e] 0| 100015| 1.51e+02,-1.62e+01, 1.58e+02| 2.50e+02| 102 | [ 0 ]| 0.00e+00, 0.00e+00, 0.00e+00| 0.00e+00, 0.00e+00, 0.00e+00| 1.20e+02|-1.00e+00| [ ] - [2,3]
[0000003f] 1| -100015|-1.51e+02, 1.62e+01,-1.57e+02| 2.49e+02| 102 | [ 0 ]| 0.00e+00, 0.00e+00, 0.00e+00| 0.00e+00, 0.00e+00, 0.00e+00| 1.20e+02| 1.00e+00| [ ] - [4,5]
[00000040] 2| 100022|-1.75e-01,-6.65e-03,-1.58e-01| 2.36e-01| 2 | [ 1 ]| 0.00e+00, 0.00e+00, 0.00e+00|-7.50e+03,-2.85e+02,-6.76e+03| 3.75e-09| 0.00e+00| [0] - [ ]
[00000041] 3| 15| 1.62e+02,-1.57e+01, 1.68e+02| 2.34e+02| 102 | [ 0 ]| 0.00e+00, 0.00e+00, 0.00e+00| 0.00e+00, 0.00e+00, 0.00e+00| 1.78e+00|-1.00e+00| [0] - [ ]
[00000042] 4| 100022|-2.53e+01,-2.47e-01,-1.38e+01| 2.88e+01| 2 | [ 1 ]| 0.00e+00, 0.00e+00, 0.00e+00|-7.50e+03,-7.31e+01,-4.08e+03| 3.75e-09| 0.00e+00| [1] - [ ]
[00000043] 5| -15| 4.71e-01, 1.76e+01,-7.50e+01| 7.71e+01| 102 | [ 0 ]| 0.00e+00, 0.00e+00, 0.00e+00| 0.00e+00, 0.00e+00, 0.00e+00| 1.78e+00| 1.00e+00| [1] - [ ]
[00000044] 6| 100015| 1.52e+02,-1.62e+01, 1.58e+02| 2.50e+02| 13 | [ 0 ]| 0.00e+00, 0.00e+00, 0.00e+00| 0.00e+00, 0.00e+00, 0.00e+00| 1.20e+02|-1.00e+00| [ ] - [ ]
[00000045] 7| -100015|-1.50e+02, 1.62e+01,-1.57e+02| 2.49e+02| 13 | [ 0 ]| 0.00e+00, 0.00e+00, 0.00e+00| 0.00e+00, 0.00e+00, 0.00e+00| 1.20e+02| 1.00e+00| [ ] - [ ]
[00000046] 8| 100022|-1.74e-01,-6.63e-03,-1.57e-01| 2.35e-01| 1 | [ 1 ]| 0.00e+00, 0.00e+00, 0.00e+00| 7.50e+03,-2.86e+02,-6.79e+03| 3.75e-09| 0.00e+00| [ ] - [ ]
[00000047] 9| 15| 1.63e+02,-1.57e+01, 1.68e+02| 2.35e+02| 2 | [ t ]| 0.00e+00, 0.00e+00, 0.00e+00| 6.15e+00,-5.93e-01, 6.35e+00| 1.78e+00|-1.00e+00| [ ] - [10,11]
[00000048] 10| 16| 6.46e+01,-6.90e+00, 6.72e+01| 9.35e+01| 1 | [ v l ]| 6.15e+00,-5.93e-01, 6.35e+00| 7.50e+03,-8.01e+02, 7.81e+03| 1.00e-02| 0.00e+00| [9] - [ ]
[00000049] 11| -213| 9.85e+01,-8.83e+00, 1.01e+02| 1.41e+02| 2 | [ vt ]| 6.15e+00,-5.93e-01, 6.35e+00| 6.15e+00,-5.93e-01, 6.35e+00| 7.36e-01|-1.00e+00| [9] - [12,13]
[0000004a] 12| -211| 2.17e+01,-1.78e+00, 2.26e+01| 3.14e+01| 1 | [ v c s ]| 6.15e+00,-5.93e-01, 6.35e+00| 2.17e+03,-6.84e+01, 2.25e+03| 1.40e-01|-1.00e+00| [11] - [ ]
[0000004b] 13| 111| 7.68e+01,-7.06e+00, 7.86e+01| 1.10e+02| 2 | [ vt ]| 6.15e+00,-5.93e-01, 6.35e+00| 6.16e+00,-5.94e-01, 6.37e+00| 1.35e-01| 0.00e+00| [11] - [14,15]
```

Tau, LSP produced at (0,0,0)
-> Stau does not fly !!

tau decay length does not
match specified value

verification of b-baryons

```
tomohiko@cw103:~/nfs/work/110728-stau-reco — ssh — 192x44
tomohiko@c...okka — ssh  tomohiko@c...reco — ssh  tomohiko@j...a/run — ssh  tomohiko@c.../src — bash  tomohiko@...vtag — bash  tomohiko@j...tudy — bash
collection name : MCParticlesSkimmed
parameters:

----- print out of MCParticle collection -----

flag: 0x0
simulator status bits: [sbvtcls] s: created in simulation b: backscatter v: vertex is not endpoint of parent t: decayed in tracker c: decayed in calorimeter l: has left detector s: stopped

[ id ] index | PDG | px, py, pz | energy | genl[simstat] | vertex x, y, z | endpoint x, y, z | mass | charge | [parents] - [daughters] |
[00000067] 01 | 5122 | 3.17e+01, 9.47e+01, -1.58e+00 | 1.00e+02 | 2 | [ t ] | 0.00e+00, 0.00e+00, 0.00e+00 | 7.34e+01, 2.19e+02, -3.67e+00 | 5.64e+00 | 0.00e+00 | [] - [1,2,3]
[00000068] 11 | 4122 | 1.17e+01, 4.15e+01, -5.62e-01 | 4.32e+01 | 2 | [ vt ] | 7.34e+01, 2.19e+02, -3.67e+00 | 7.38e+01, 2.21e+02, -3.69e+00 | 2.28e+00 | 1.00e+00 | [0] - [4,5,6,7]
[00000069] 21 | -211 | 2.64e+00, 7.12e+00, -2.43e-01 | 7.60e+00 | 1 | [ v c s ] | 7.34e+01, 2.19e+02, -3.67e+00 | 4.81e+02, 1.95e+03, -6.10e+01 | 1.40e-01 | -1.00e+00 | [0] - []
[0000006a] 31 | 223 | 1.74e+01, 4.60e+01, -7.79e-01 | 4.92e+01 | 2 | [ vt ] | 7.34e+01, 2.19e+02, -3.67e+00 | 7.34e+01, 2.19e+02, -3.67e+00 | 7.80e-01 | 0.00e+00 | [0] - [8,9,10]
[0000006b] 41 | -11 | 3.61e-01, 1.24e+00, -1.11e-01 | 1.30e+00 | 1 | [ v c s ] | 7.38e+01, 2.21e+02, -3.69e+00 | 1.55e+03, 1.07e+03, -1.67e+02 | 5.10e-04 | 1.00e+00 | [1] - []
[0000006c] 51 | 121 | 1.19e+00, 4.46e+00, -5.20e-02 | 4.62e+00 | 1 | [ v l ] | 7.38e+01, 2.21e+02, -3.69e+00 | 2.02e+03, 7.50e+03, -8.86e+01 | 0.00e+00 | 0.00e+00 | [1] - []
[0000006d] 61 | 2112 | 5.44e+00, 1.79e+01, 4.86e-01 | 1.87e+01 | 1 | [ v c s ] | 7.38e+01, 2.21e+02, -3.69e+00 | 5.80e+02, 1.88e+03, 4.15e+01 | 9.40e-01 | 0.00e+00 | [1] - []
[0000006e] 71 | 111 | 4.71e+00, 1.79e+01, -8.86e-01 | 1.86e+01 | 2 | [ vt ] | 7.38e+01, 2.21e+02, -3.69e+00 | 7.38e+01, 2.21e+02, -3.69e+00 | 1.35e-01 | 0.00e+00 | [1] - [11,12]
[0000006f] 81 | 211 | 4.79e+00, 1.30e+01, -1.07e-01 | 1.39e+01 | 1 | [ v c s ] | 7.34e+01, 2.19e+02, -3.67e+00 | 9.51e+02, 2.12e+03, -1.89e+01 | 1.40e-01 | 1.00e+00 | [3] - []
[00000070] 91 | -211 | 8.70e+00, 2.32e+01, -3.30e-01 | 2.48e+01 | 1 | [ v c s ] | 7.34e+01, 2.19e+02, -3.67e+00 | 6.92e+02, 2.10e+03, -3.00e+01 | 1.40e-01 | -1.00e+00 | [3] - []
[00000071] 101 | 111 | 3.89e+00, 9.79e+00, -3.41e-01 | 1.05e+01 | 2 | [ vt ] | 7.34e+01, 2.19e+02, -3.67e+00 | 7.34e+01, 2.19e+02, -3.67e+00 | 1.35e-01 | 0.00e+00 | [3] - [13,14]
[00000072] 111 | 221 | 2.32e+00, 8.86e+00, -5.05e-01 | 9.17e+00 | 1 | [ v c s ] | 7.38e+01, 2.21e+02, -3.69e+00 | 5.01e+02, 1.85e+03, -9.65e+01 | 0.00e+00 | 0.00e+00 | [7] - []
[00000073] 121 | 221 | 2.39e+00, 9.08e+00, -3.81e-01 | 9.40e+00 | 1 | [ v c s ] | 7.38e+01, 2.21e+02, -3.69e+00 | 5.03e+02, 1.85e+03, -7.22e+01 | 0.00e+00 | 0.00e+00 | [7] - []
[00000074] 131 | 221 | 3.55e-01, 8.35e-01, -6.10e-02 | 9.10e-01 | 1 | [ v c s ] | 7.34e+01, 2.19e+02, -3.67e+00 | 7.66e+02, 1.85e+03, -1.23e+02 | 0.00e+00 | 0.00e+00 | [10] - []
[00000075] 141 | 221 | 3.54e+00, 8.95e+00, -2.80e-01 | 9.63e+00 | 1 | [ v c s ] | 7.34e+01, 2.19e+02, -3.67e+00 | 7.26e+02, 1.87e+03, -5.53e+01 | 0.00e+00 | 0.00e+00 | [10] - []

-----

collection name : PandoraClusters
parameters:

----- print out of Cluster collection -----

flag: 0x0
parameter ClusterSubdetectorNames [string]: ecal, hcal, yoke, lcal, lhcal, bcal,
LCIO::CLBIT_HITS : 0

[ id ] | type | energy | position (x,y,z) | itheta | iphi
-----|-----|-----|-----|-----|-----
[00000076] | 0x 0 | 1.706e+01 | (5.179e+02,1.908e+03,-8.726e+01) | 1.71e+00 | 1.19e+00
errors (6 pos)/(3 dir): (0.00e+00, 0.00e+00, 0.00e+00, 0.00e+00, 0.00e+00, 0.00e+00, )/(0.00e+00, 0.00e+00, 0.00e+00, )
clusters(e):
:
```

b-baryons fly properly with the same version of code.
maybe the status code is the problem?? still investigating this issue...