KKMC status

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What is KKMC?

⇛ KKMC is the MC event generator for the process:

$$e^- e^+ \to f\bar{f} \; + \; n\gamma,$$

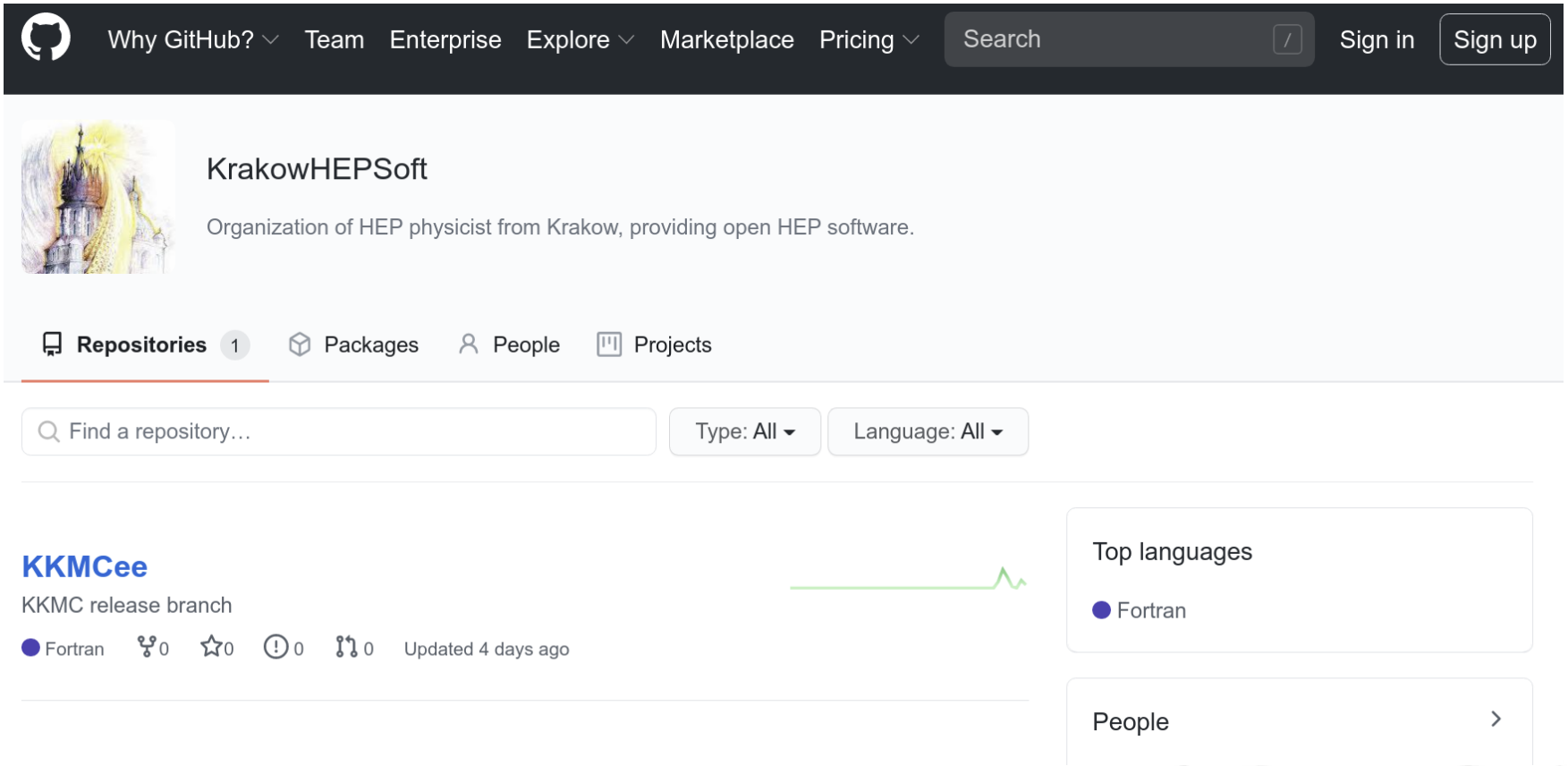
where $f = \mu, \tau, \nu, u, d, s, c, b$.

⇛ Interfaced with Tauola & Photos & Dizet.

⇛ Main LEP generator. Since the LEP times:

- v4.16, Oct. 2001, Improved $\nu\nu$ matrix elm.
- v4.19, Sept. 2002, With C++ wrappers.
- v4.22, June 2013, Added $\mu^+\mu^-$ and $q\bar{q}$ beams.
- v4.30, Aug. 2020, LHE files interface, updated Tauola & Dizet versions, moved to github, etc. (todays presentation :)).

KKMC @ github



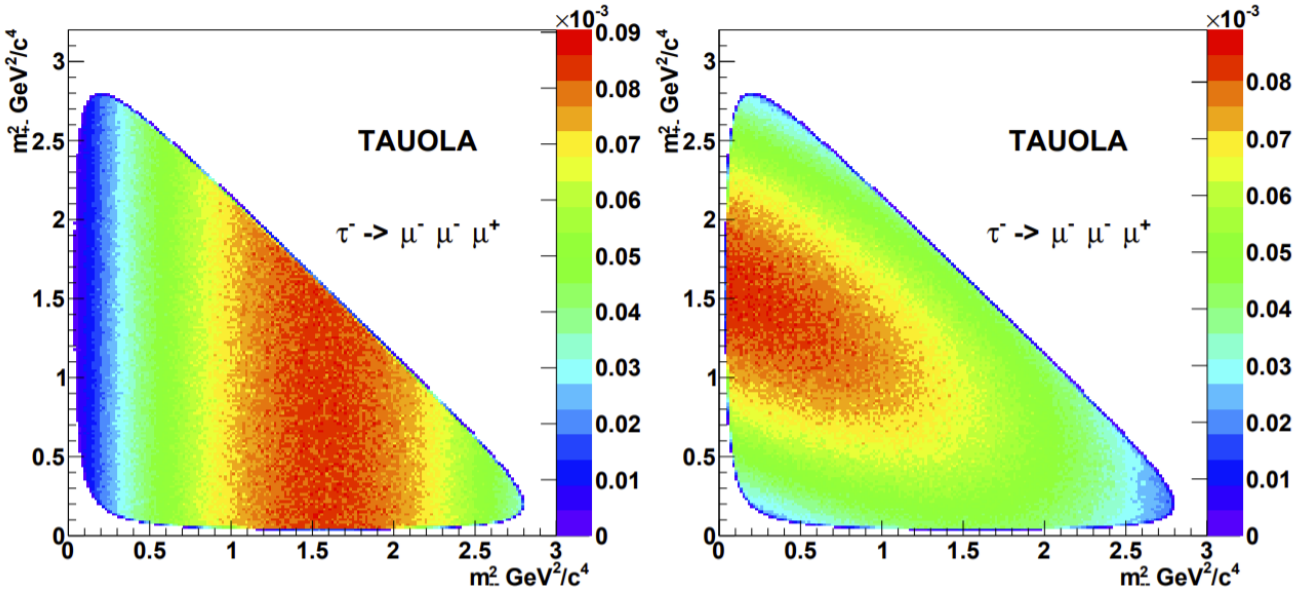
⇛ Visit us @ https://github.com/KrakowHEPSoft

⇛ More projects from Krakow group is being migrated there (for now they remain invisible).

⇛ GitHub allows for bug reports and discussion with authors; forking to the experimental environments.

Tauola @ KKMC

- ⇛ In the KKMC v4.30, Tauola was updated to 2017 version.
- ⇛ It has everything that we need:
  - RCHL currents.
  - C++ interface.
  - Anomalous couplings.
  - Place holders to add new Matrix el. in C++.
  - Alternative parametrization of 3π currents.
  - Documentation: arxiv::1609.04617



(a) Simulated Dalitz distr. for Eq. 13.(b) Simulated Dalitz distr. for Eq. 14.

LHE KKMC interface

⇛ KKMC can now produce LesHouches file format events.

Open + /st

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```
 1 1 0 0 0 0 0 0         KAT1-KAT8        <- Input for the main program
    1000      NEVT number of events
----------ccccccccccccccccccccccccccccccccommenttttttttttttttttttttttttttttttttttt

BeginX
*********************************************************************************
*               ACTUAL DATA FOR THIS PARTICULAR RUN
*********************************************************************************
*indx_____data_____ccccccccc0ccccccccc0ccccccccc0ccccccccc0ccccccccc0ccccccccc0
*     Center-of-mass energy [GeV]
    1        91.0e0      CMSene =xpar( 1) Average Center of mass energy [GeV]
*********************************************************************************
*     Define process
  413              1      KFfin, muon
  100              1      store lhe file to (LHE_OUT.LHE)
************************ one can change the lhf file name between brackets
*********************************************************************************
EndX
```

LHE KKMC interface

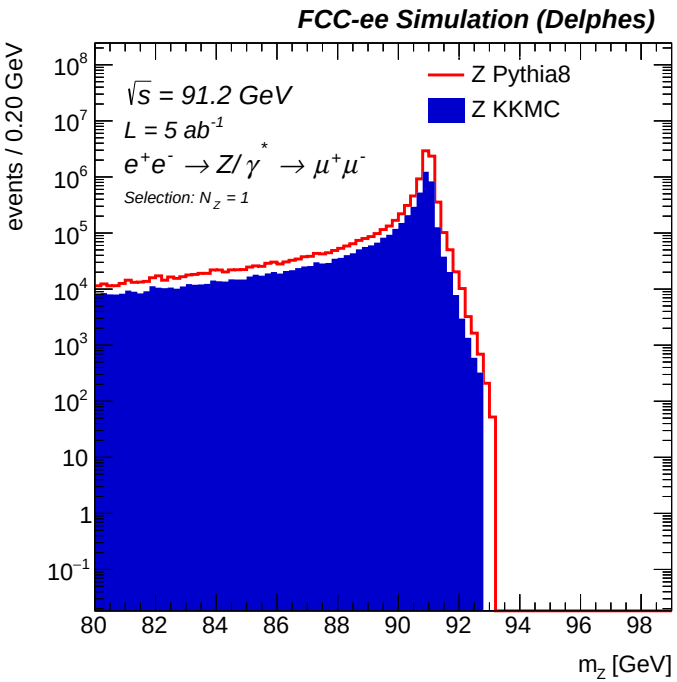
```
<LesHouchesEvents version="1.0">
<!--
   File Created with KKMC
-->
<init>
  11  -11     4.55000000E+01     4.55000000E+01  0  0  0  0  3  1
  0.1  1.0e-06  1.000000e+00   9999
</init>
<event>
         6        9999   1.00000000       91.000000000000000        7.297352566354975E-003  0.120178900000000001
        11          -1          0          0          0    0.000000000000000        0.000000000000000        45.499999997130551        45.500000000000000        5.109990699999998E-00
       -11          -1          0          0          0    0.000000000000000        0.000000000000000       -45.499999997130551        45.500000000000000        5.109990699999998E-00
        23           2          1          2          0   -2.429332329261058E-002   6.094193118379109E-003   -7.181800908707458E-003   90.973944616474597        90.973940885279760
        22           1          1          2          0    2.429332329261570E-002  -6.094193118380819E-003    7.181800908706835E-003   2.605538352540541E-002    0.000000000000000
        13           1          3          3          0   -42.907162615698134        7.858501710753388        -12.940473234764806        45.499974330585076        0.105653000000000
       -13           1          3          3          0    42.882869292405523       -7.852407517635090         12.933291433856098        45.473970285889514        0.105653000000000
</event>
<event>
```

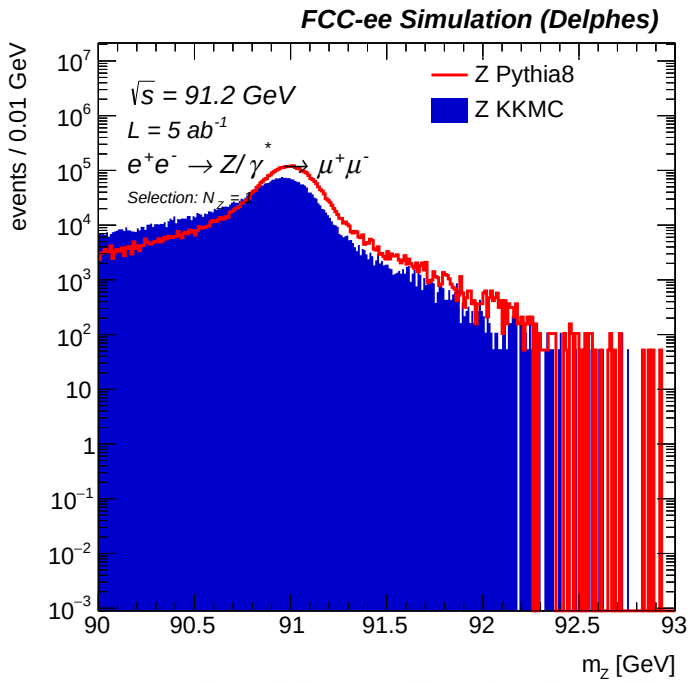
Beam information

Event information

⇛ The LHE files are accepted by the FCCSW software.
https://hep-fcc.github.io/fcc-tutorials/ Many thanks to Clement and Gerardo!

⇛ Simple test with $e^- e^+ \to \mu^- \mu^+$ @ $91\ \mathrm{GeV}$.





Other improvements

⇛ Now KKMC accepts ROOT6 (also backward compatibility to ROOT5 is maintained).
⇛ Dizet is installed in the v6.45.
⇛ Other versions: v6.42-cpc, v6.42, v6.21 are included and can be turned on if needed.

Future plans

⇛ Move everything to C++.
⇛ Full integration with FCCSW.

Special thanks to Jacek and Bartek for their hard work.

Backup