Towards RapidSim projects

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What's RapidSim?

https://github.com/gcowan/RapidSim

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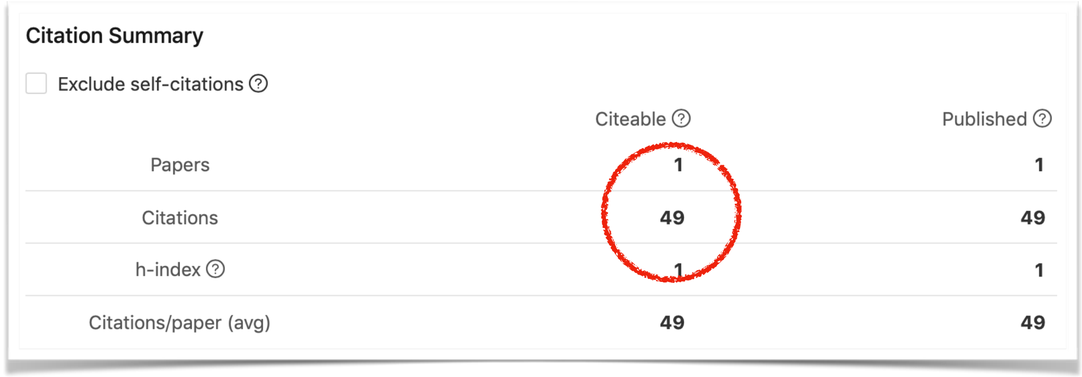
RapidSim is a fast Monte Carlo generator for simulation of heavy-quark hadron decays. It can be useful for generating background or toy data sets for acceptance studies.

- It uses `TGenPhaseSpace` to generate b/c quark hadron decays.
- FONLL is used to give the b/c the correct production kinematics for the LHC.
- The daughter particle momenta are smeared correctly using user-defined resolutions.
- Cuts can be made on daughter particle properties (pT, eta, etc).
- Particle mass hypotheses can be swapped to investigate effect of mis-identification.

A more detailed description can be found here https://arxiv.org/abs/1612.07489

Why we like it?



Citation Summary

Exclude self-citations

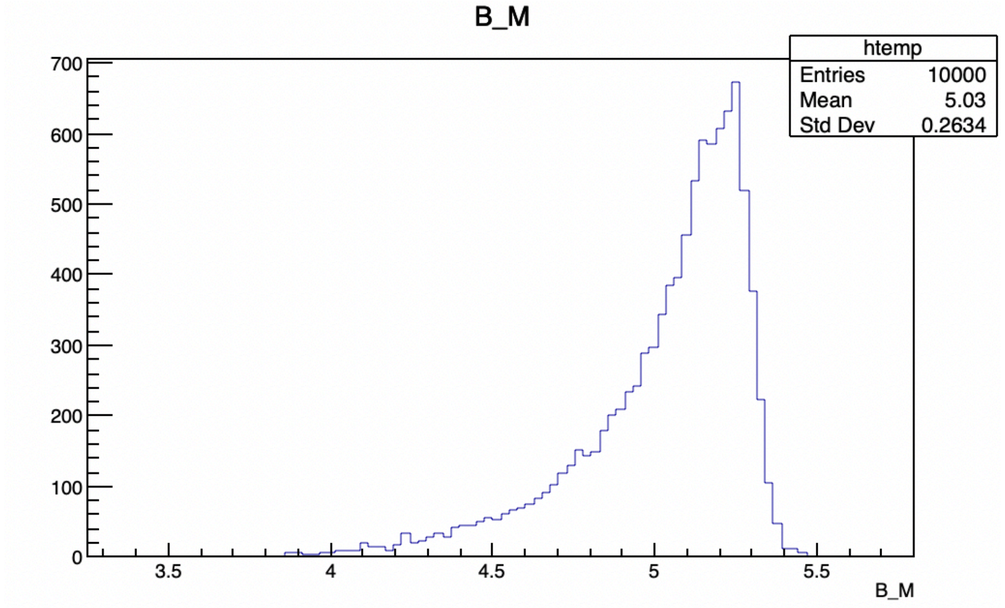
	Citeable	Published
Papers	1	1
Citations	49	49
h-index	1	1
Citations/paper (avg)	49	49

Very handy for quick feasibilities studies and/or backgrounds etc.
Quite easy to install and run.
Interface with EvtGen (though not much experience with it)

For example

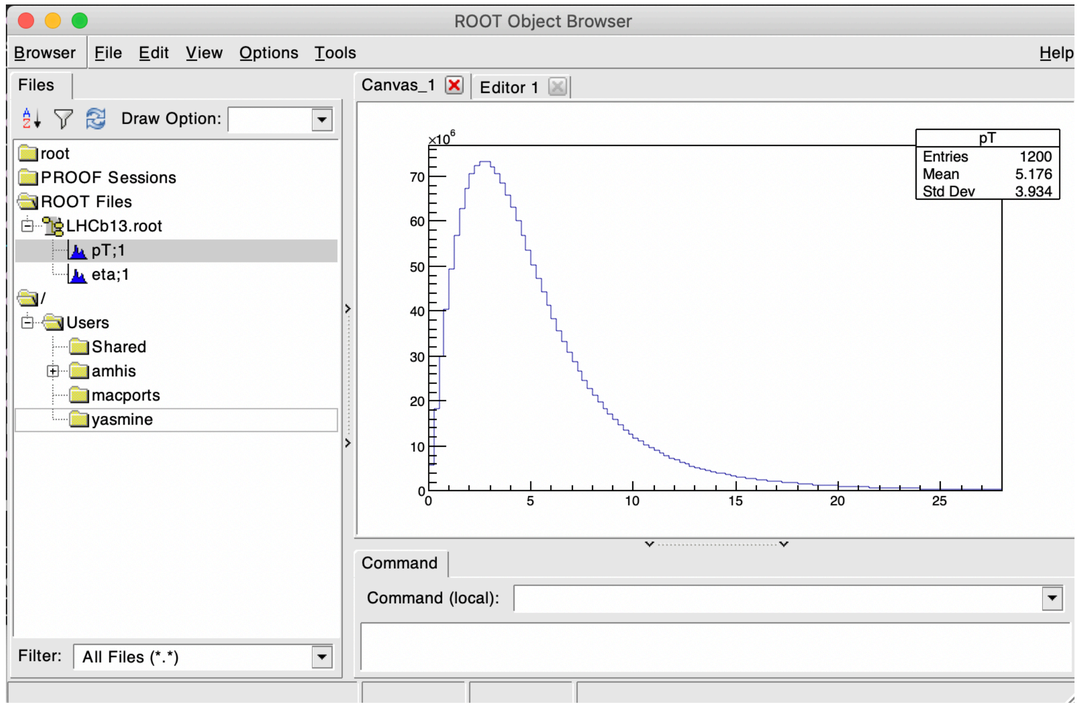
```
B0b -> {K*0b -> K- pi+} e+ e-
```

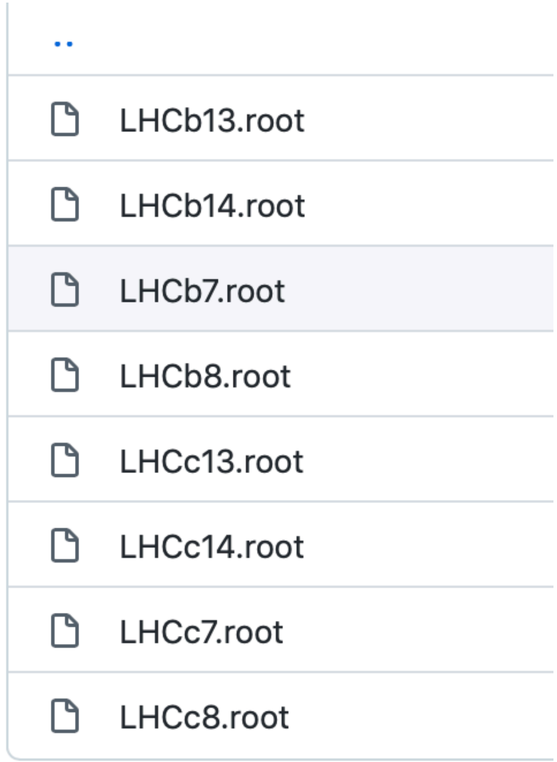
```
acceptance : AllIn
geometry : LHCb
energy: 13
pid : LHCbGenericPID
paramsDecaying : M, M2, MT, Mcorr, P, PT, PX, PY, PZ, vtxX, vtxY, vtxZ, IP, SIGMAIP, FD, eta
paramsStable : P, PT, PX, PY, PZ,  IP, SIGMAIP, FD, eta, ProbNNpi, ProbNNk
paramsTwoBody : M2, M, MT, Mcorr, P, PT
@0
        name : B
@1
        name : Kst
@2
        name : L1
        smear : LHCbElectron
@3
        name : L2
        smear : LHCbElectron
@4
        name : K
        smear : LHCbGeneric
        altMass: pi-
@5
        name : pi
        smear : LHCbGeneric
        altMass: K+
```



Example 1

https://github.com/gcowan/RapidSim/tree/master/rootfiles/fonll

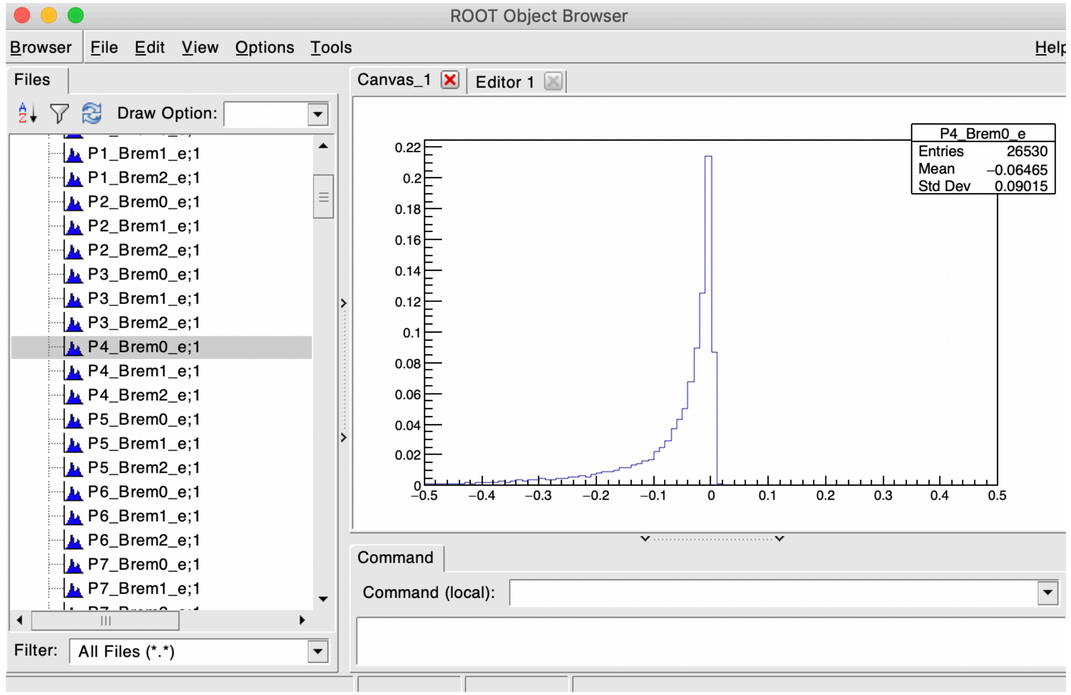


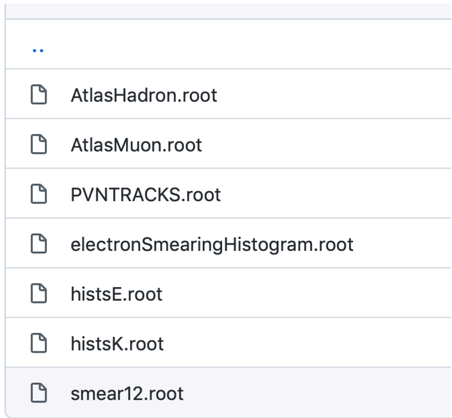


Could we have the kinematics at the Z pole or the Upsilon 4S?

Example 2

https://github.com/gcowan/RapidSim/tree/master/rootfiles/smear





Can we have a smearing for a Tera Z machine and/or B factory ?

Example 3

- Add more particles to `particles.dat`
- Add derived class for particle specific parameters to simplify RapidParam interface
- Combine `.decay` and `.config` files to simplify interface

Many more possible pieces of work to be clarified later.

The projects will be kick off in spring

We are in contact with one of the authors, who will help us.
If you are interested please contact Olcyr/Dorothea/Yasmine

Don’t hesitate to sign up !

https://codimd.web.cern.ch/RapidSimSignUp