Simulation Campaign 1 Update

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July 1, 2022

Computing & Software / Simulation, Production & QA

Weekly CompSW meetings:

- https://indico.bnl.gov/category/410/
- **Wednesdays 11am EDT**

Weekly SimQA meetings:

- https://indico.bnl.gov/category/416/
  - And subcategories for fun4all and dd4hep office hours
- **Thursdays 2pm EDT**

Today's brief topics:

1. Timeline, goals, status for simulation campaign(s)
2. Background embedding

Timeline for Simulation Campaigns

Item	Task	Date
1	Acquire PWG physics/event requirements	June 2022
2	Aggregate and divide up the requirements for processing	June 2022
3	**First simulation campaign - June-July 2022 Concept**	June-July 2022
	Geometry/reconstruction feature freeze	**June 24**
	Bug fixing and benchmarking sprint	**June 24-July 1**
	Full simulation freeze and tag	**July 1**
4	Collaboration formation initiated (expected)	July 2022
5	Common Software Framework pieces decided on	August 2022
6	Develop common job submission framework	August 2022
7	**Second Simulation Campaign, October 2022 Concept**	November 2022
8	**Third Simulation Campaign, January 2023 Concept**	February 2023

You are here

Goals for Simulation Campaigns

- Provide data for PWGs to start analyzing in preparation for further campaigns
  - Get data in people's hands
  - Allow analysis workflows to continue developing
  - Not intended yet for final conclusions on physics performance or design, but a first step in an iterative process
- Provide target dates for inclusion of detector technology choices and designs
  - Implementation of the correct technology for simulation and reconstruction
  - Gradual improvement of detector and physics parameters
- Somewhat of an “exercise in exercising”
- Comparative studies between technologies will be targeted after this campaign, when robust comparisons can be made in a single software stack

Campaign 1 Status

- Live simulation request spreadsheet organized with various PWGs requests
  - Link here
  - Reminder: SimQA is not comparing frameworks. If WGs want to do that, that is up to you, but we don't think this is a useful use of time
  - This first campaign will utilize already developed tools. Campaign 2 will utilize the single Detector1 software stack that is actively being decided upon by S&C and SimQA
- Fun4All Status
  - Reference detector implemented, with some changes to tracking as instructed by tracking team
  - Build tagged and released on cvmfs
  - Exercising production scripts to begin job processing starting with single particles
  - Setup is ongoing (next a few pages)
- DD4Hep Status
  - Reference detector implemented, including barrel ecal, magnetic field, tracking layer configuration (except MPGDs), through event reconstruction (except track/cluster matching)
  - Cross-checks with DWGs will be required before parasitic simulation productions (coming soon)

Fun4All Simulation Status: SIDIS WG

https://docs.google.com/spreadsheets/d/1UNKtaVQ6oVSR7kthJ-2XwbQ27fh6-Ca-CdiWjJ2aMgI/edit#gid=0

WG	Description	Beam energies	Software stack	Input file location	Number of ever	Priority	Status
SIDIS	Pythia6 18x275 General Q2	18x275	Fun4all	S3: ECCE/ProductionInputFiles/SIDIS/pythia6/	20M	1	Requested
SIDIS	Pythia6 18x275 1 < Q2 < 100	18x275	Fun4all	S3: ECCE/ProductionInputFiles/SIDIS/pythia6/	20M	2	Requested
SIDIS	Pythia6 18x275 100 < Q2	18x275	Fun4all	S3: ECCE/ProductionInputFiles/SIDIS/pythia6/	4M	3	Requested
SIDIS	Pythia6 5x41 General Q2	5x41	Fun4all	S3: ECCE/ProductionInputFiles/SIDIS/pythia6/	20M	4	Requested
SIDIS	Pythia6 5x41 1 < Q2 < 100	5x41	Fun4all	S3: ECCE/ProductionInputFiles/SIDIS/pythia6/	20M	5	Requested
SIDIS	Pythia6 5x41 100 < Q2	5x41	Fun4all	S3: ECCE/ProductionInputFiles/SIDIS/pythia6/	4M	6	Requested
SIDIS	Pythia6 10x100 General Q2	10x100	Fun4all	S3: ECCE/ProductionInputFiles/SIDIS/pythia6/	20M	7	Requested
SIDIS	Pythia6 10x100 1 < Q2 < 100	10x100	Fun4all	S3: ECCE/ProductionInputFiles/SIDIS/pythia6/	20M	8	Requested
SIDIS	Pythia6 10x100 100 < Q2	10x100	Fun4all	S3: ECCE/ProductionInputFiles/SIDIS/pythia6/	2M	9	Requested

30k Job completed and successful

Setup completed, test job launch as soon as the meeting ends

Fun4All Simulation Status: Inclusive WG

https://docs.google.com/spreadsheets/d/1UNKtaVQ6oVSR7kthJ-2XwbQ27fh6-Ca-CdiWjJ2aMgI/edit#gid=0

Inclusive	Djangoh ep, 5x41, 1 < Q2	5x41	Fun4all?	/work/eic2/ECCE/users/tkutz/djangoh_files	0.5M	1	Requested
Inclusive	Djangoh ep, 5x41, 2 < Q2	5x41	Fun4all?	/work/eic2/ECCE/users/tkutz/djangoh_files	1M	2	Requested
Inclusive	Djangoh ep, 5x41, 10 < Q2	5x41	Fun4all?	/work/eic2/ECCE/users/tkutz/djangoh_files	0.5M	3	Requested
Inclusive	Djangoh ep, 5x41, 50 < Q2	5x41	Fun4all?	/work/eic2/ECCE/users/tkutz/djangoh_files	0.3M	4	Requested
Inclusive	Djangoh ed, 10x100, 1 < Q2	10x100	Fun4all?	/work/eic2/ECCE/users/tkutz/djangoh_files	0.5M	1	Requested
Inclusive	Djangoh ed, 10x100, 2 < Q2	10x100	Fun4all?	/work/eic2/ECCE/users/tkutz/djangoh_files	1M	2	Requested
Inclusive	Djangoh ed, 10x100, 10 < Q2	10x100	Fun4all?	/work/eic2/ECCE/users/tkutz/djangoh_files	1M	3	Requested
Inclusive	Djangoh ed, 10x100, 100 < Q2	10x100	Fun4all?	/work/eic2/ECCE/users/tkutz/djangoh_files	0.5M	4	Requested
Inclusive	Djangoh ed, 10x100, 500 < Q2	10x100	Fun4all?	/work/eic2/ECCE/users/tkutz/djangoh_files	0.1M	5	Requested
Inclusive	Djangoh ep, 18x275, 1 < Q2	18x275	Fun4all?	/work/eic2/ECCE/users/tkutz/djangoh_files	0.1M	1	Requested
Inclusive	Djangoh ep, 18x275, 2 < Q2	18x275	Fun4all?	/work/eic2/ECCE/users/tkutz/djangoh_files	1M	2	Requested
Inclusive	Djangoh ep, 18x275, 10 < Q2	18x275	Fun4all?	/work/eic2/ECCE/users/tkutz/djangoh_files	1M	3	Requested
Inclusive	Djangoh ep, 18x275, 50 < Q2	18x275	Fun4all?	/work/eic2/ECCE/users/tkutz/djangoh_files	1M	4	Requested
Inclusive	Djangoh ep, 18x275, 100 < Q2	18x275	Fun4all?	/work/eic2/ECCE/users/tkutz/djangoh_files	1M	5	Requested
Inclusive	Djangoh ep, 18x275, 1000 < Q2	18x275	Fun4all?	/work/eic2/ECCE/users/tkutz/djangoh_files	0.5M	6	Requested
Inclusive	Djangoh ep CC, 5x41, 1 < Q2	5x41	Fun4all?	/work/eic2/ECCE/users/tkutz/djangoh_files	1M	1	Requested
Inclusive	Djangoh ep CC, 18x275, 1 < Q2	18x275	Fun4all?	/work/eic2/ECCE/users/tkutz/djangoh_files	1M	2	Requested
Inclusive	Djangoh ep photo, 18x275, 2 < Q2	18x275	Fun4all?	/work/eic2/ECCE/users/tkutz/djangoh_files	6M	3	Requested

Job setup completed

Fun4All Simulation Status: Jet/HF WG

https://docs.google.com/spreadsheets/d/1UNKtaVQ6oVSR7kthJ-2XwbQ27fh6-Ca-CdiWjJ2aMgI/edit#gid=0

Jet/HF	Pythia8 ep, 18x275 1 < Q2	18x275	?	S3:eictest/ATHENA/EVGEN/DIS/NC	5M	1	Requested
Jet/HF	Pythia8 ep, 18x275 10 < Q2	18x275	?	S3:eictest/ATHENA/EVGEN/DIS/NC	5M	2	Requested
Jet/HF	Pythia8 ep, 18x275 100 < Q2	18x275	?	S3:eictest/ATHENA/EVGEN/DIS/NC	5M	3	Requested
Jet/HF	Pythia8 ep, 10x100 1 < Q2	10x100	?	S3:eictest/ATHENA/EVGEN/DIS/NC	5M	1	Requested
Jet/HF	Pythia8 ep, 10x100 10 < Q2	10x100	?	S3:eictest/ATHENA/EVGEN/DIS/NC	5M	2	Requested
Jet/HF	Pythia8 ep, 10x100 100 < Q2	10x100	?	S3:eictest/ATHENA/EVGEN/DIS/NC	5M	3	Requested
Jet/HF	Pythia8 ep, 5x41 1 < Q2	5x41	?	S3:eictest/ATHENA/EVGEN/DIS/NC	5M	1	Requested
Jet/HF	Pythia8 ep, 5x41 10 < Q2	5x41	?	S3:eictest/ATHENA/EVGEN/DIS/NC	5M	2	Requested
Jet/HF	Pythia8 ep, 5x41 100 < Q2	5x41	?	S3:eictest/ATHENA/EVGEN/DIS/NC	5M	3	Requested
Jet/HF	Pythia8 ep CC, 18x275 1 < Q2	18x275	?	S3:eictest/ATHENA/EVGEN/DIS/CC	5M	1	Requested
Jet/HF	Pythia8 ep CC, 18x275 10 < Q2	18x275	?	S3:eictest/ATHENA/EVGEN/DIS/CC	5M	2	Requested
Jet/HF	Pythia8 ep CC, 18x275 100 < Q2	18x275	?	S3:eictest/ATHENA/EVGEN/DIS/CC	5M	3	Requested
Jet/HF	Pythia8 ep CC, 10x100 1 < Q2	10x100	?	S3:eictest/ATHENA/EVGEN/DIS/CC	5M	1	Requested
Jet/HF	Pythia8 ep CC, 10x100 10 < Q2	10x100	?	S3:eictest/ATHENA/EVGEN/DIS/CC	5M	2	Requested
Jet/HF	Pythia8 ep CC, 10x100 100 < Q2	10x100	?	S3:eictest/ATHENA/EVGEN/DIS/CC	5M	3	Requested
Jet/HF	Pythia8 ep CC, 5x41 1 < Q2	5x41	?	S3:eictest/ATHENA/EVGEN/DIS/CC	5M	1	Requested
Jet/HF	Pythia8 ep CC, 5x41 10 < Q2	5x41	?	S3:eictest/ATHENA/EVGEN/DIS/CC	5M	2	Requested
Jet/HF	Pythia8 ep CC, 5x41 100 < Q2	5x41	?	S3:eictest/ATHENA/EVGEN/DIS/CC	5M	3	Requested

Job setup coming soon, ambiguity, Does these event need beam crossing after burner

Fun4All Simulation Status: Exclusive WG

Sartre samples						
	System	energy	Q2	VM	Breakup	Statistics
1	eAu	18x110	>1	J/psi -> ee	coherent	10M
	eAu	18x110	>1	J/psi -> ee	incoherent	10M
2	eAu	18x110	>1	Phi -> KK	coherent	10M
	eAu	18x110	>1	Phi -> KK	incoherent	10M
	eAu	18x108	>1	Phi->KK	coherent (bsat)	3.5 M
	eAu	18x108	>1	Phi->KK	incoherent	3.5 M
BeAGLE samples						
3	eAu	18x110	>1	Phi -> KK	incoherent	20M
EpIC samples	*(pay attention to the _novtx.hepmc, related to issue #2)*					
4	ep	18x275	>1	Photon	DVCS.coherent	1M
	ep	10x100	>1	Photon	DVCS.coherent	1M
	ep	5x41	>1	Photon	DVCS.coherent	1M
5	ep	18x275	>1	Photon	DVCS+BH+INT.coherent	1M
	ep	10x100	>1	Photon	DVCS+BH+INT.coherent	1M
	ep	5x41	>1	Photon	DVCS+BH+INT.coherent	1M

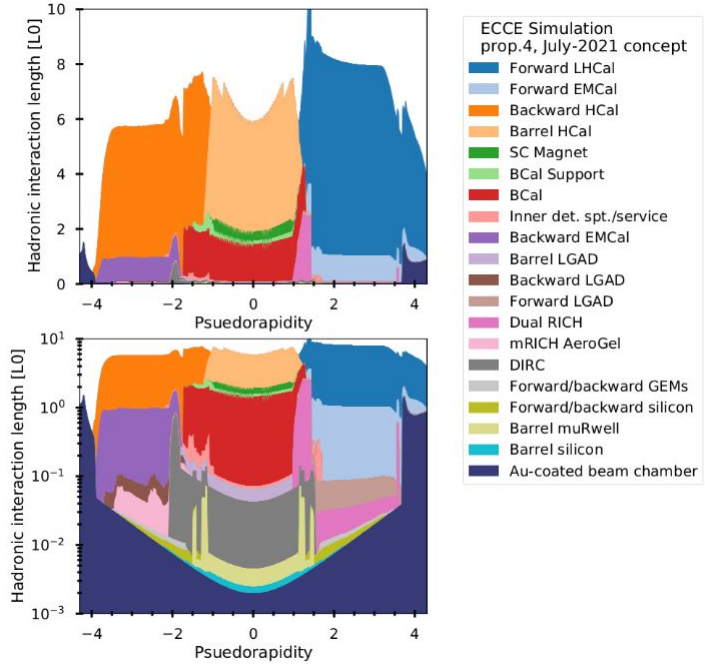
DEMPgen	(Stephen Kay, Garth Huber, University of Regina)					
15	ep	5x100		ep -> e pi+ n	DEMP.coherent	500k
EIC_mesonMC	(Richard Trotta, The Catholic University of America)					
	ep	5x41	>1	ep -> e + n		1M
	ep	5x100	>1	ep -> e + n		1M
	ep	10x100	>1	ep -> e + n		1M
	ep	18x275	>1	ep -> e + n		1M
MILOU3D	(Igor Korover, MIT)					
16	ep	5x41		Photon	DVCS.coherent	1M
		10x100		Photon	DVCS.coherent	1M
		18x275		Photon	DVCS.coherent	1M

eSTARLight samples	(Yuanjing Ji for Upsilon, Zachary Sweger for backward production)					
7	ep	18x275	<1	Upsilon 1s	Coherent	50k(?)
8	ep	18x275	<1	Upsilon 2s	Coherent	50k(?)
9	ep	18x275	<1	Upsilon 3s	Coherent	50k(?)
	ep	10x100	<1 (W<25GeV)	Upsilon 1s	Coherent	50k
	ep	18x275	<1 (W<25GeV)	Upsilon 1s	Coherent	50k
10	ep	18x275	<1	Backward produ	Coherent	100k
11	ep	10x100	<1	Backward produ	Coherent	100k
IAger samples	(N. Santiesteban)					
12	ep	5x41		J/psi -> ee	DVMP.coherent	874181
	ep	5x100		J/psi -> ee	DVMP.coherent	1582104
	ep	10x100		J/psi -> ee	DVMP.coherent	2370469
	ep	18x275		J/psi -> ee	DVMP.coherent	5331724
TOPEG samples	*(G. Penman, University of Glasgow)*					
13	e-He4	5x41	>1	Photon	DVCS.coherent	1M
	e-He4	10x100	>2	Photon	DVCS.coherent	1M
	e-He4	18x137	>5	Photon	DVCS.coherent	1M

Job completed

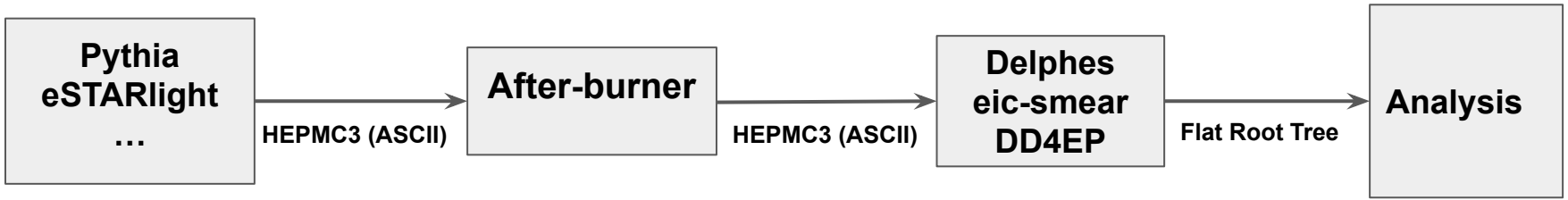
Remaining work

- Awaiting for the validation from Tyler (thanks Tyler!)
- Launch large statics samples
- Tackle Exclusive group request
- Making the material map in Fun4all and DD4HEP (vision comparison?)
- Paracitis campaign for DD4HEP.

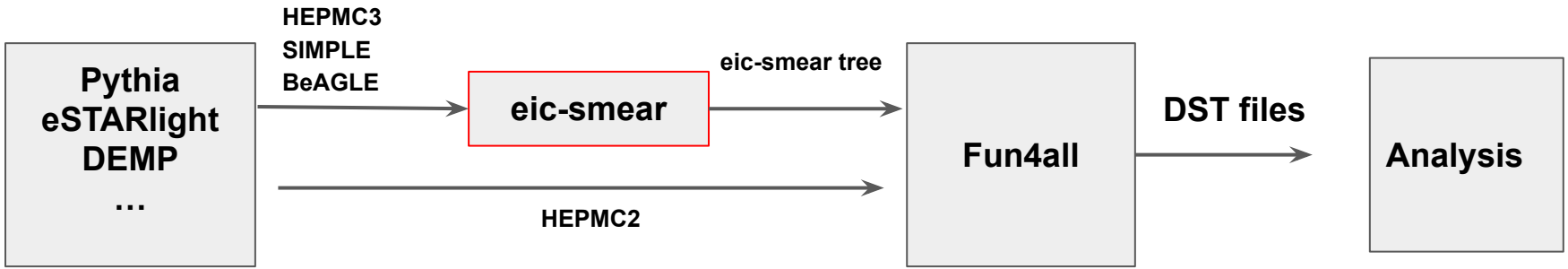


Input files

For DD4HEP

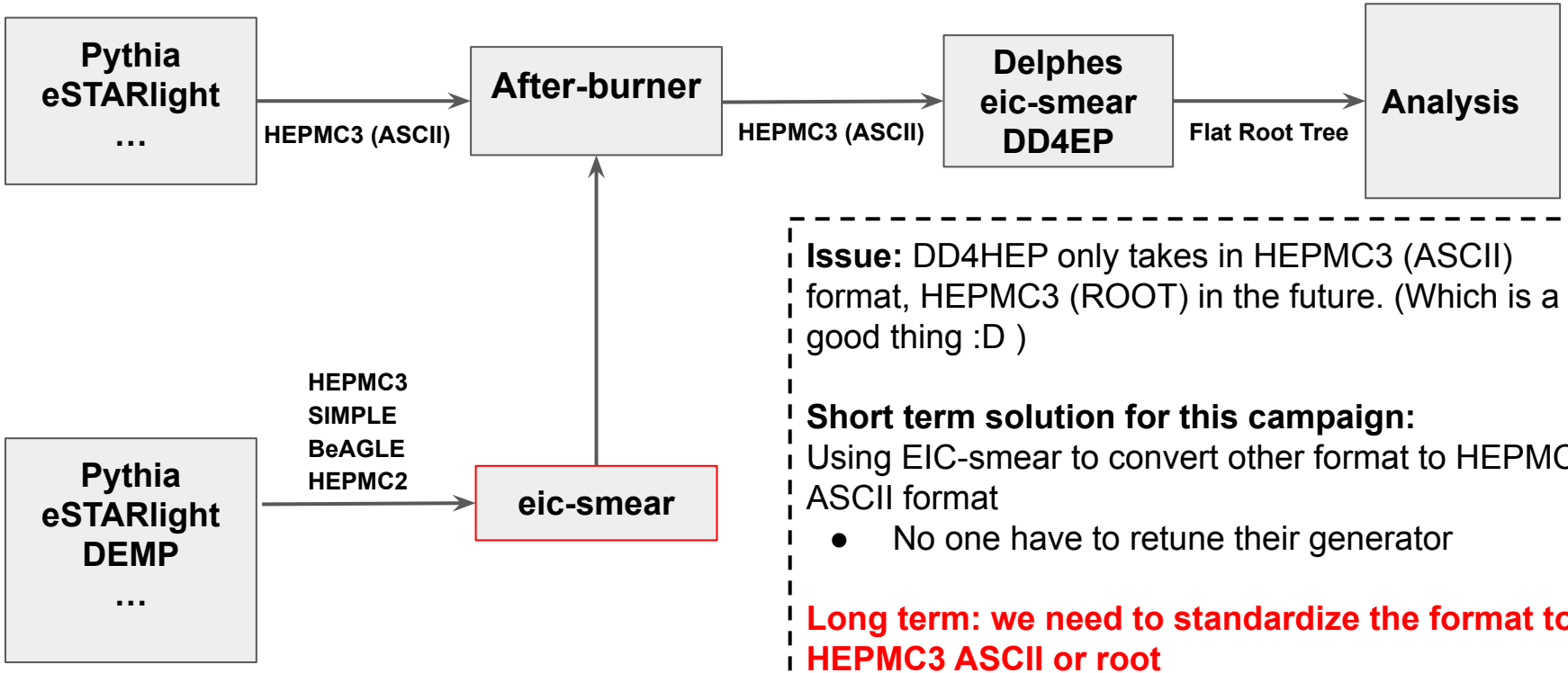


For Fun4All



Issue for DD4HEP and proposed solution

For DD4HEP



Issue: DD4HEP only takes in HEPMC3 (ASCII) format, HEPMC3 (ROOT) in the future. (Which is a good thing :D)

Short term solution for this campaign:
Using EIC-smear to convert other format to HEPMC3 ASCII format

- No one have to retune their generator

Long term: we need to standardize the format to HEPMC3 ASCII or root

Instruction from other formats to HEPMC3

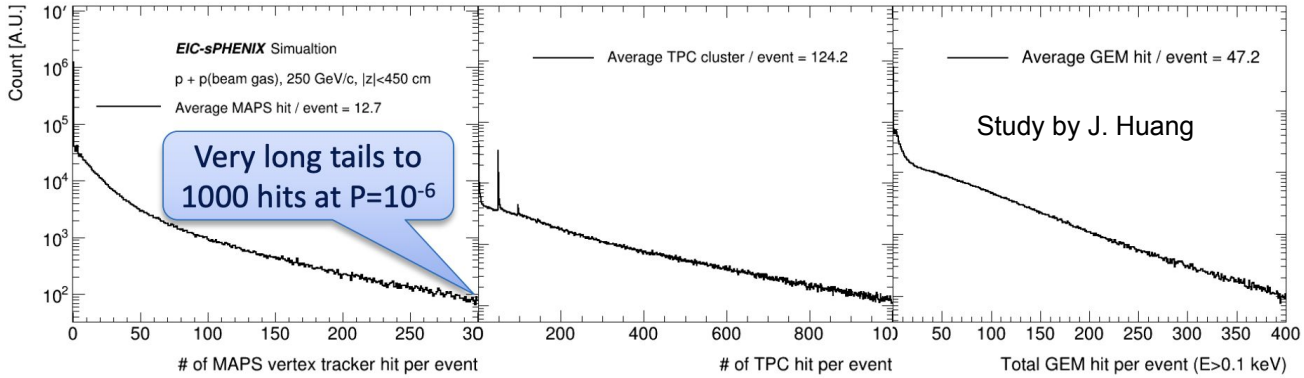
Instruction from other formats to HEPMC3 ASCII: [Yes]

- https://github.com/eic/eic-smear#creation-of-hepmc-output

Thanks to Kolja

Instruction from other formats to HEPMC3 ROOT: [Yes]

Background Simulation Studies



- Embedded background needs to become a major priority for all WGs
  - Discussed in SimQA meetings in context of tracking, but relevant for everyone
- Various background files exist (e.g. beam-gas)
- Very important effort that needs to get underway ASAP, ongoing now
- Background implementation plan.
  - DD4Hep + Gaudi , DD4Hep + Janna 2: https://indico.bnl.gov/event/16414/contributions/65719/attachments/42059/70436/Background%20Embedding_%20Implementation%20Plans.pdf
    Fun4All approach: https://indico.bnl.gov/event/16414/contributions/65720/attachments/42058/70431/2022.07.11%20Background.pdf

Software & Simulation Office Hours and Helpdesk

- **DD4hep-based software stack**:
  Monday, Friday, 2pm EDT
  Wednesday, 2pm ⇄ 9pm EDT
- **Fun4all-based software stack**:
  Tuesday, 3pm ⇄ 8:30pm EDT

Or contact us on the Helpdesk channel on the EIC Mattermost! Click here!

Mattermost