

# Simulation, Production, and Quality Assurance

Wouter Deconinck, Bill Li, Joe Osborn, Kong Tu  
July 26, 2022

# Computing & Software / Simulation, Production & QA

## Weekly CompSW meetings:

- <https://indico.bnl.gov/category/410/>
  - And subcategories for weekly EIC-Acts joint meetings
- **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 implementation
3. Plans towards October 2022 campaign

# 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	<b>First simulation campaign - June-July 2022 Concept</b>	June-July 2022
	<b>Geometry/reconstruction feature freeze</b>	<b>June 24</b>
	<b>Bug fixing and benchmarking sprint</b>	<b>June 24-July 1</b>
	<b>Full simulation freeze and tag</b>	<b>July 1</b>
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	<b>Second Simulation Campaign, October 2022 Concept</b>	November 2022
8	<b>Third Simulation Campaign, January 2023 Concept</b>	February 2023

You are here



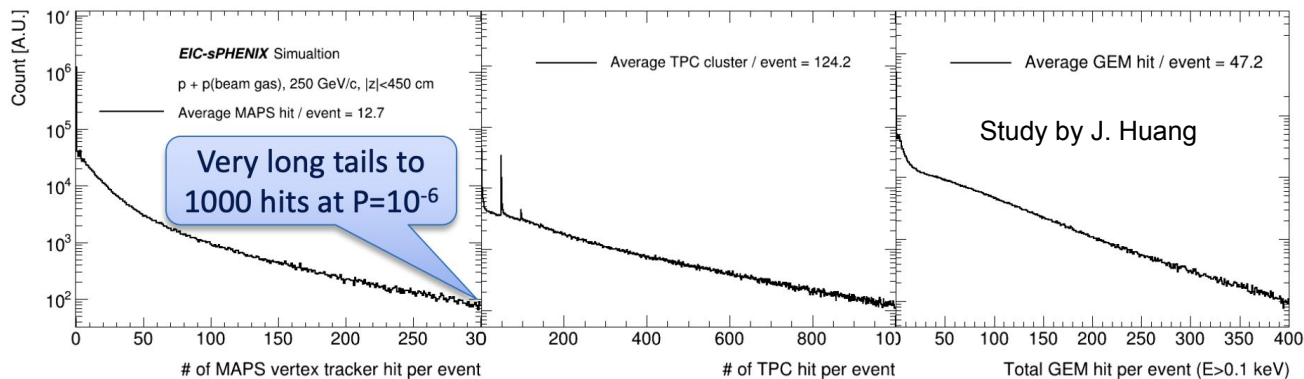
# Goals for Simulation Campaigns

- 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
  - Single particle production on S3 at S3://eicetest/DET1/Campaigns/22.1/General/particleGun
  - Physics simulations tests ongoing, ready to submit full jobs soon
- DD4Hep Status
  - Reference detector implemented, including barrel ecal, magnetic field, tracking layer configuration (except MPGDs), through event reconstruction (except track/cluster matching)
  - Naturally, cross-checks with DWGs will be required before parasitic simulation productions

# Background Simulation Studies



- Embedded background needs to become a major priority for all WGs
- Various background files exist (e.g. beam-gas)
- Best place to lead the discussion? SimQA in conjunction with others
  - Plan to propose an “architecture” for embedding for further discussion
- Very important effort that is getting underway now. Volunteers welcome!

# Background Embedding: Implementation Plans

- Single software stack for EIC: DD4hep, podio, EDM4hep, JANA2 → keep focus on Gaudi/juggler for expediency for summer studies
  - [Example code](#) exists as part of iLCSoft based on LCIO data model (= EDM4hep at MC level)
  - [Example code](#) also exists as part of HEP-FCC based on key4HEP ([PileUp tools](#) in v0.16)
- Chosen approach
  - Run backgrounds through current geometry (to be done automatically by CI)
  - Run physics events through current geometry (as part of CI and/or regular sim jobs)
  - Merge simulated hits (tracker, calorimeter) immediately before reconstruction
    - Apply time shifts, taking into account appropriate overall cross section weights
- Challenges from the outset: event-by-event different weights
- Inputs = physics event generators, equal weighting for all events in each file
- PileUp code into Gaudi/juggler:
  - Potentially have a lot of tools nearly ready ([here](#)): PileUpOverlay (with external background files); ConstPileUp, RangePileUp, PoissonPileUp (internal to data signal stream)

# Background Noise (i.e. not actual tracks)

DD4hep provides noise functionality during digitization, with [large number of models](#) but has not been enabled yet. This could be addressed by new contributors to the DD4hep description of the detector.

DigiActionSequence.h

DigiAttenuator.h

DigiContext.h

DigiDDG4Input.h

DigiData.h

DigiEventAction.h

DigiExponentialNoise.h

DigiFactories.h

DigiGaussianNoise.h

DigiHandle.h

DigiInputAction.h

DigiKernel.h

DigiLandauNoise.h

DigiLockedAction.h

DigiPoissonNoise.h

DigiRandomEngine.h

DigiRandomGenerator.h

DigiRandomNoise.h

DigiSegmentation.h

DigiSignalProcessor.h

DigiSignalProcessorSequence.h

DigiStore.h

DigiSubdetectorSequence.h

DigiSynchronize.h

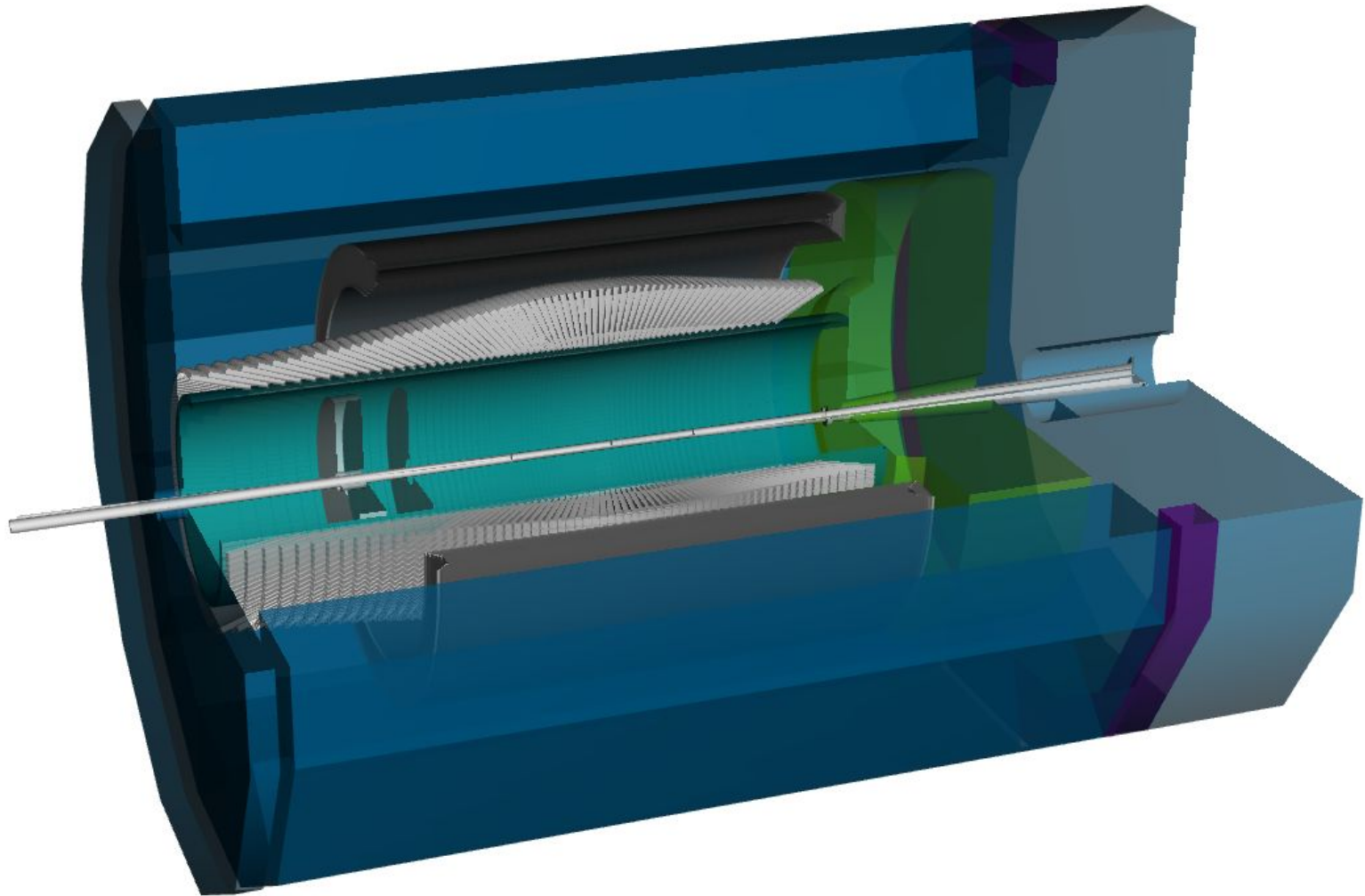
DigiUniformNoise.h

FalphaNoise.h



# Plans Towards October Simulation Campaign

- Next campaign: October 2022
  - To be based on single software stack (DD4hep, podio, EDM4hep, JANA2)
  - Geometry implementation in DD4hep being implemented by SimQA, compSW, and contributors of entire collaboration
  - Algorithms in Gaudi/juggler are being converted to JANA2 by Jefferson Lab EPSCI
- Development of geometry needs reconstruction validation:
  - Verification of geometry through tests of expected sampling fractions, resolutions, etc
  - We are keeping the Gaudi/juggler algorithm benchmarks active until JANA2 algorithms are validated to produce compatible results
- Switch to [github.com/eic](https://github.com/eic) for primary development of geometry
  - Benchmarks will remain on eicweb because load unable to be accommodated on github.com
  - Other repositories will follow in switch to github.com





# Electron-Ion Collider (EIC) Software

Electron-Ion Collider (EIC) software, documentation and resources

<http://www.eicug.org/web/content/ei...> [eicug-software-core@eicug.org](mailto:eicug-software-core@eicug.org), eicug...

Unfollow

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README.md



This organization collects all Electron-Ion Collider (EIC) software, repositories, documentation and resources. It is maintained by the EIC Software Group and the EIC Detector Working Groups.

## How to join?

All EIC users may request to become part of this organization. Simply email the [EIC User Group Software Working Group conveners](#) from your institutional email address with your GitHub account and whether you or your sponsor/advisor is a member of the EIC User Group listed on the [Phone Book](#).

### Pinned

Customize pins

**ecce** Public



DD4hep Geometry Description of the ECCE Experiment

1 2

**ip6** Public



DD4hep Geometry Description of the IP6 Beamline

View as: **Public**

You are viewing the README and pinned repositories as a public user.

### People



View all

Invite someone

### Top languages

C++ C Python Shell

# 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!](#)



# Software & Simulation Office Hours and Helpdesk

