



# Needs and status of implementation of benchmark channels

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# About this discussion session



- **Goals**

- This workshop is a perfect occasion gather people and to discuss how to prioritise the needs in terms of software developments
- We need clear inputs from the users, as software can not be developed without guidance.

- **Format**

- Discussion, we do not have detailed slides
- This morning we had talks about the type of precision physics we need to reach for FCC-ee. We now need to understand how to achieve this with detectors

- **Disclaimer**

- Focus is given on FCC-ee, as FCC-hh developments could wait a bit HL-LHC operation for synergies

# About the main drivers



## Need to support new/revolutionary/cheap and performant detector concepts

- Need to support physics and detector studies
  - Parameterised, fast and full simulation
- Aim to de-duplicate efforts
  - One software stack to support all the cases
  - All detector concepts and future (proto-)collaborations
- Aim to ease the comparison of a given benchmark
  - Between different detector concepts
  - For a same detector concept at different stage
- Systematically include new benchmarks
  - In a common format to ease comparaision

# Performance 1

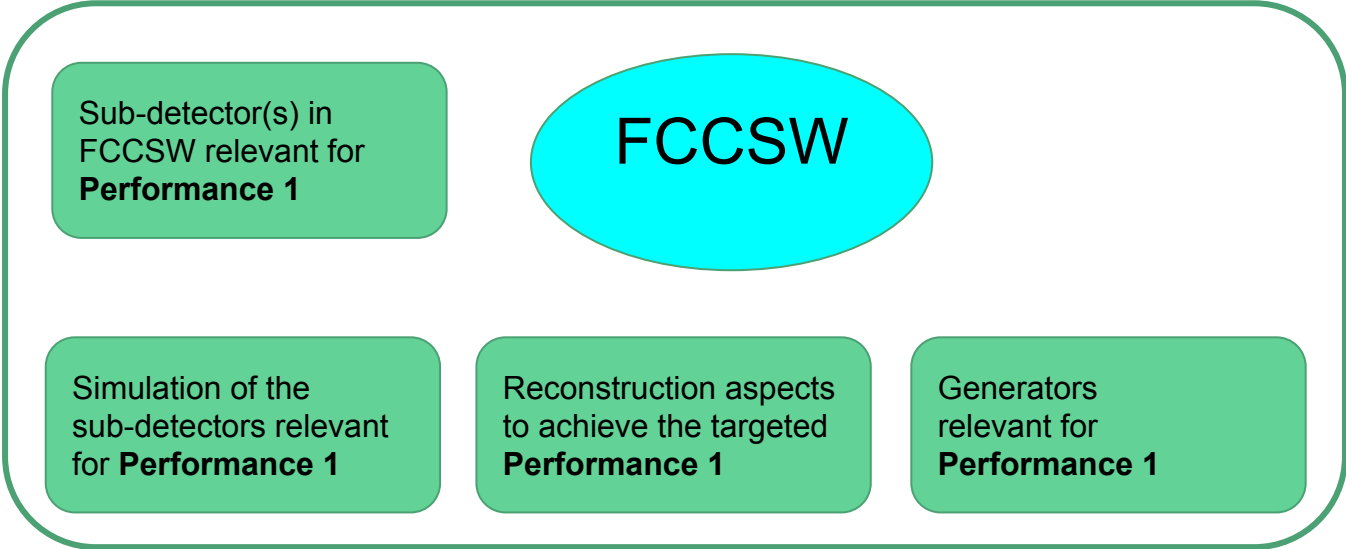


Detector concept 1

Details of performance 1  
Implications of not assessing it



Limiting factors to possibly achieve Performance 1



**Result:**  
Detector concept 1 for performance 1 with FCCSW version 1 is passing/Failing

# First list of benchmark use-cases



- A first list has been compiled and available at: [benchmark use-cases](#)
- Next slides summarize the situation from the reconstruction and Monte Carlo availability point of view
- Some of the required Monte Carlo generators still missing
- All cases should be already analyzable at Delphes level
  - Modulo the availability of the required Monte Carlo generator
- ...

# Reco requirements from benchmark use-cases



- Muon momentum resolution: tracking
- Charm, b tagging: tracking, vertexing, pi0
- Tau ID: tracking, vertexing, photon/pi0, {e, mu, pi} ID
- Very low angle particle: tracking, timing
- Jets: tracking, calo objs
- p / K / pi separation: dE/dx, timing
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# MC requirements from benchmark use-cases



Generator	latest version	LCG version
● Pythia8	8.244	8.243
● Whizard	2.8.2	2.8.1
● MadGraph5	2.6.7	2.6.7
● SuperCHIC	3.06	3.05
● KKMC	4_24a	
● KoralW	1.53.3	
● YFSWW3	1.18	
● EvtGen	1.7.0	1.7.0

# Preliminary list of possible benchmark use-cases



- ...
  - ...
- ...
  - ...
- ...
  - ...



# Next steps



- Where should we host the follow up discussions?
  - Detector meetings? Software meetings? Both? others?
- Is there a need to keep a detailed history of the performances
  - With the evolution of the detector design?
  - With the improvement of calibration/reconstruction
- How to keep this history?
  - If common format, could imagine to publish web pages to ease the comparisons