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## Key4hep

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Detector studies for future experiments rely on advanced software tools to estimate performance and optimize their design and technology choices. Similarly, machine learning techniques require realistic data sets that allow estimating their performance beyond simplistic toy-models. The Key4hep software stack provides tools to perform detailed full simulation studies for a number of different detector models for future Higgs factories, including a palette of different detector technologies for tracking or calorimeter subsystems. The Key4hep stack includes generic tools for full and fast simulation, reconstruction, such as tracking and particle flow clustering, and analysis. The presentation will detail how Key4hep can be used for full simulation studies for generic or specific detector models and give examples of the available detector models and reconstruction tools, and how the results can be converted into formats most convenient for machine learning tools.

### Significance

There have been major improvements in the Key4hep stack. Full simulation based on DD4hep is available for more detector models for the FCC. Tracking and Particle flow reconstruction can be used beyond what was available previously. Several full simulation studies using Key4hep are now the way.

### References

ACAT 2022: <https://indico.cern.ch/event/1106990/contributions/4991332/>

CHEP 2023: <https://indico.jlab.org/event/459/contributions/11535/>

### Experiment context, if any

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