Track reconstructions efficiency and fake rate plots

xi = 4,5 7 for e-laser phase0

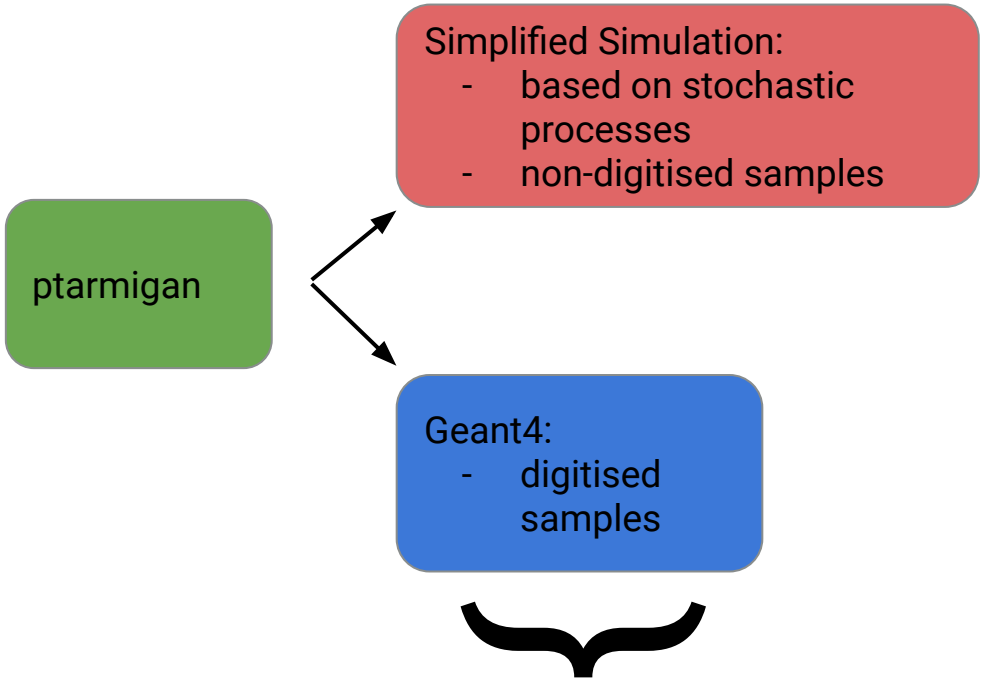
Spataro David
Hamburg, 04.08.2022

Track reconstruction with Quantum Computers

Workflow

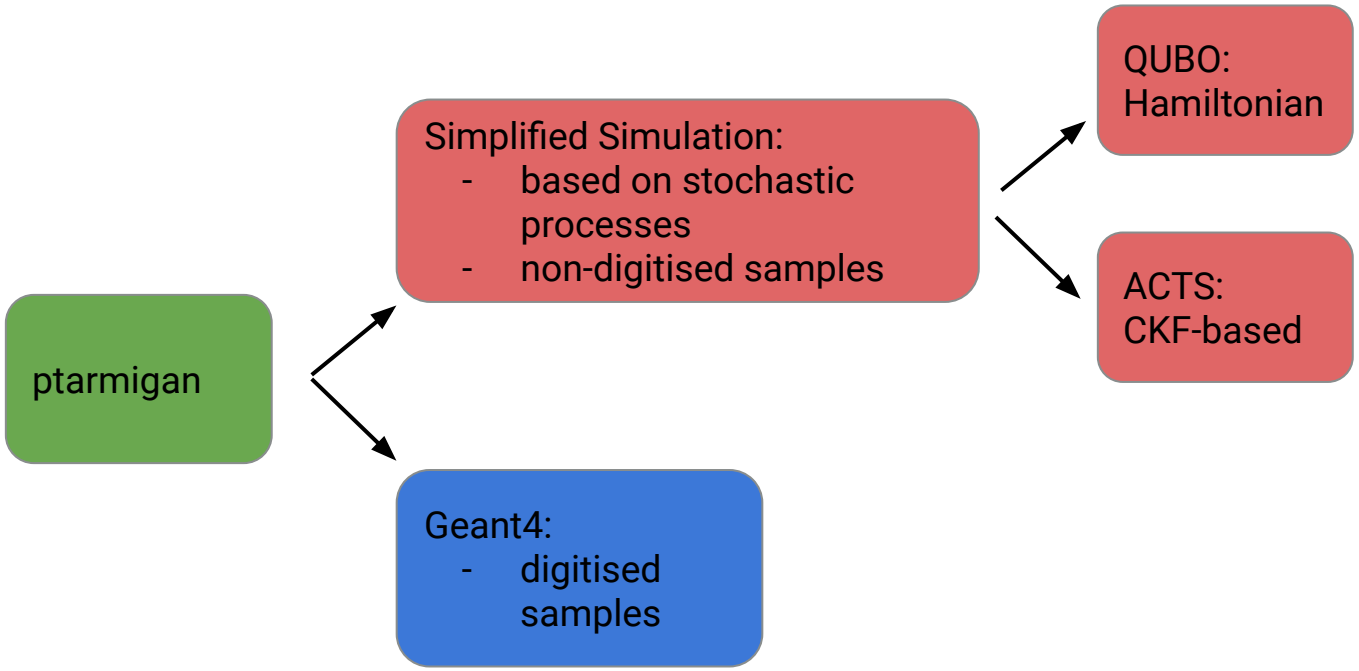
Track reconstruction with quantum algorithms

Workflow



Track reconstruction with quantum algorithms

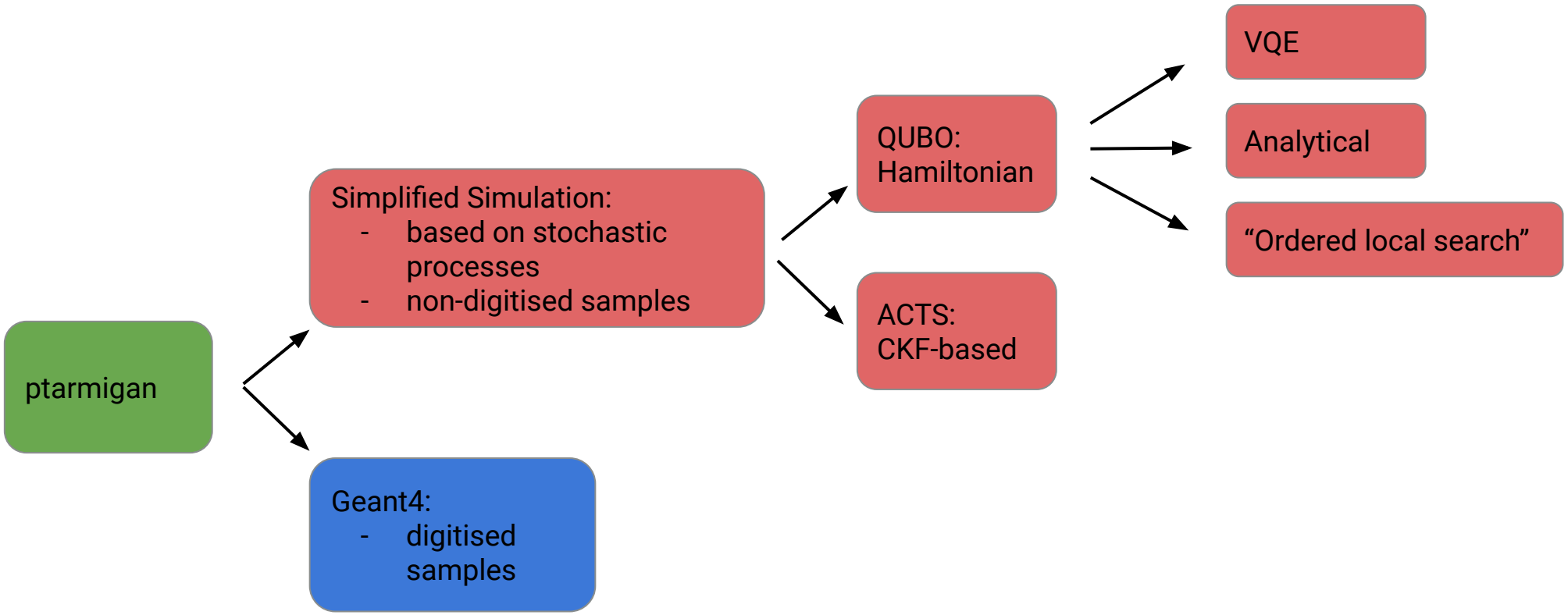
Workflow



“Coming soon…”

Track reconstruction with quantum algorithms

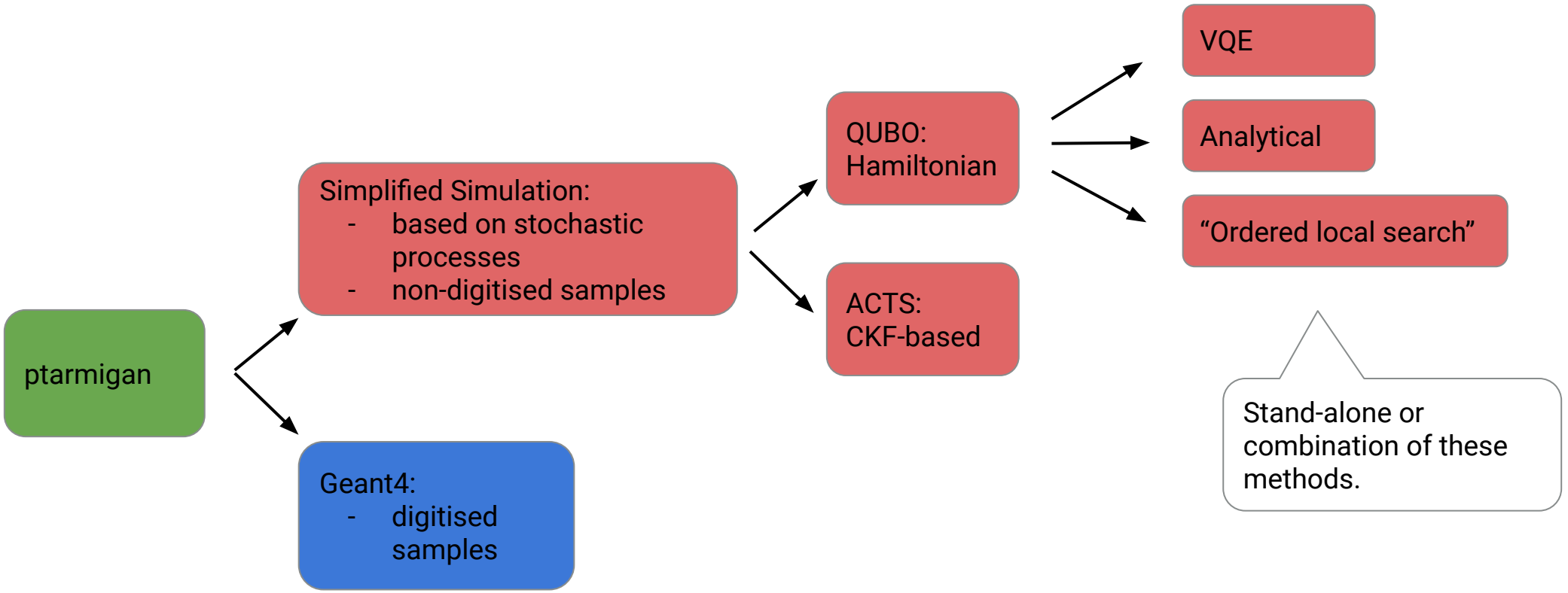
Workflow



“Coming soon…”

Track reconstruction with quantum algorithms

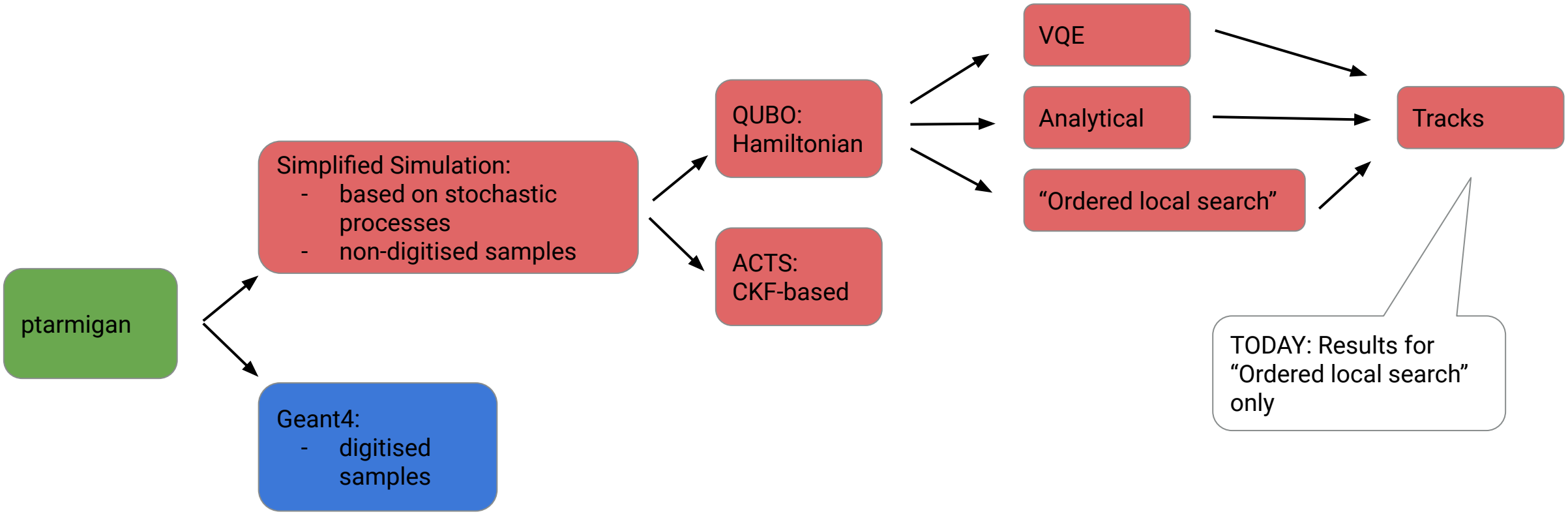
Workflow



“Coming soon…”

Track reconstruction with quantum algorithms

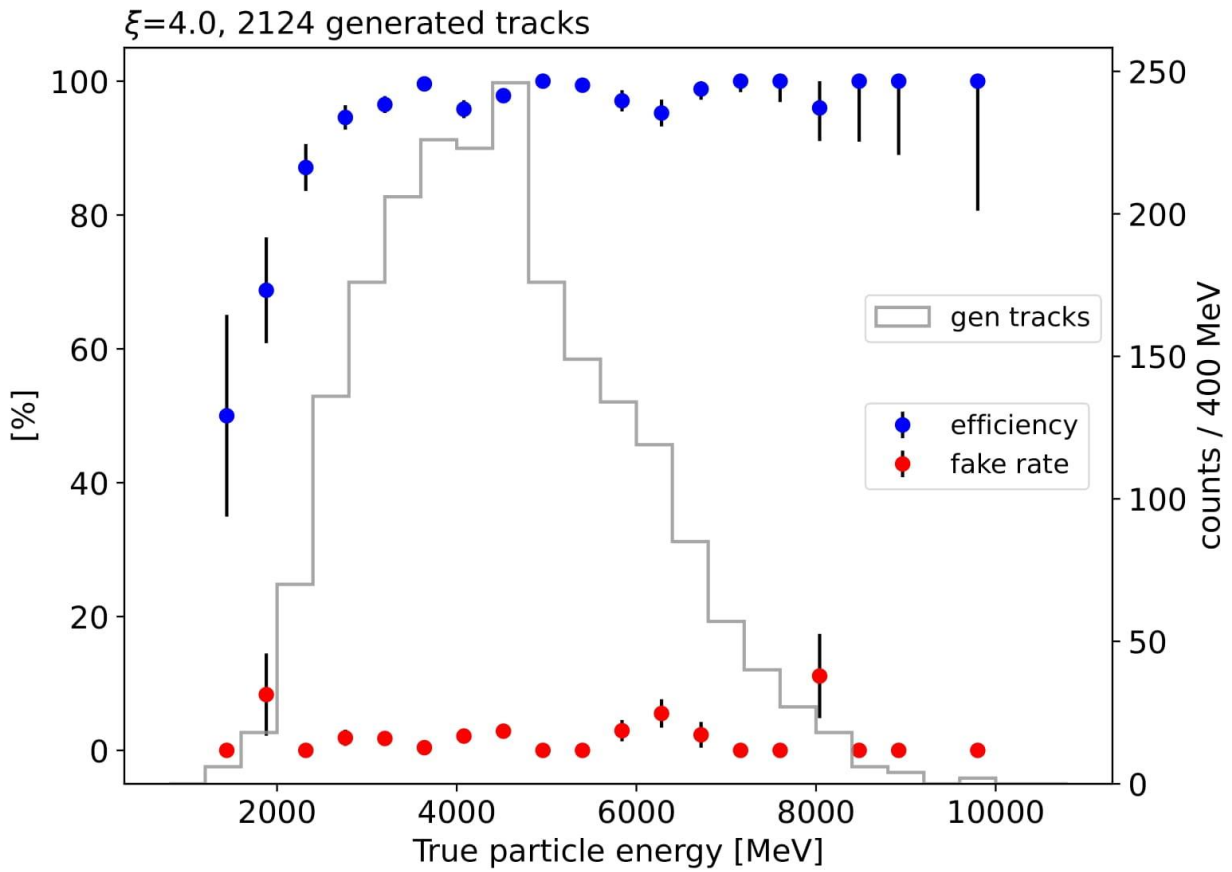
Workflow



"Coming soon…"

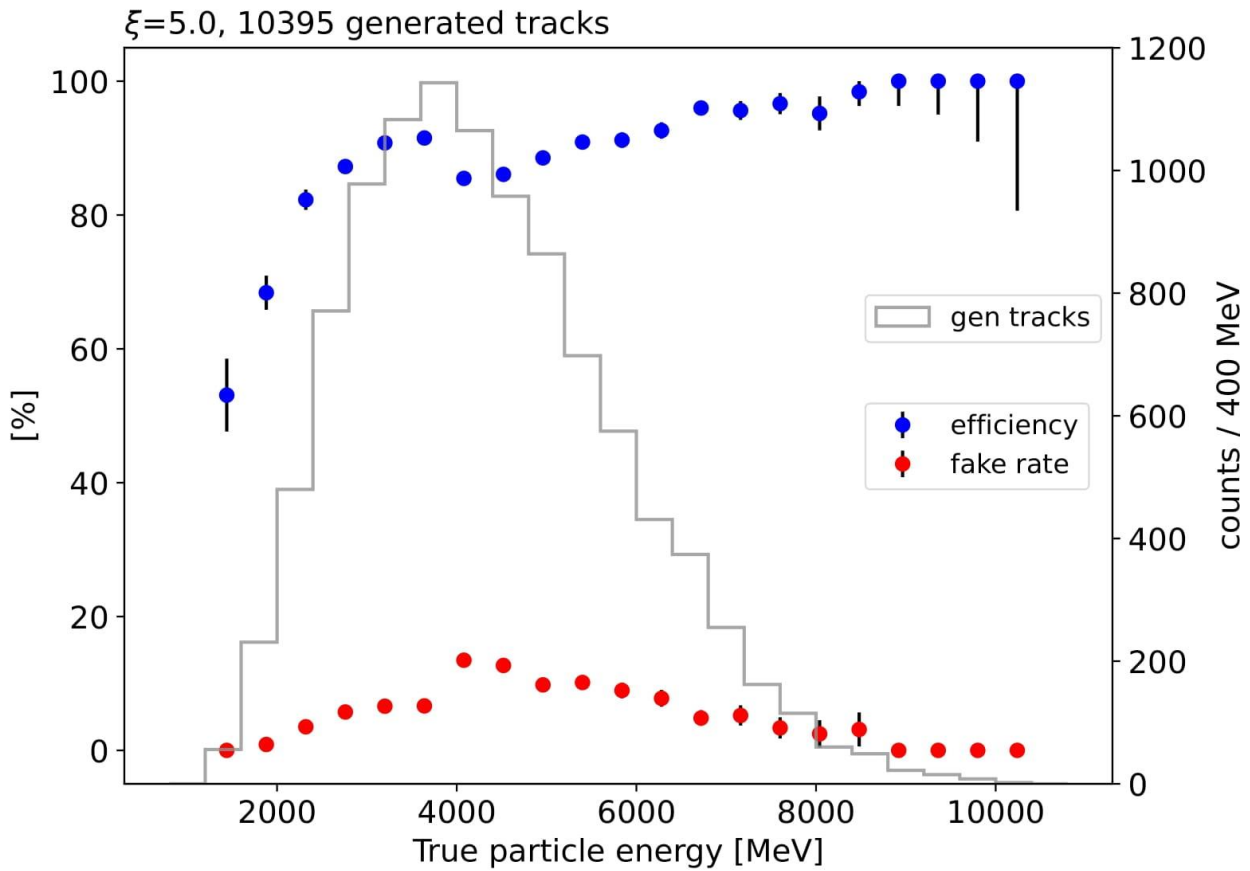
Phase0, xi=4

Efficiency, fake rate, generated tracks vs. true particle energy, Bayesian error bars



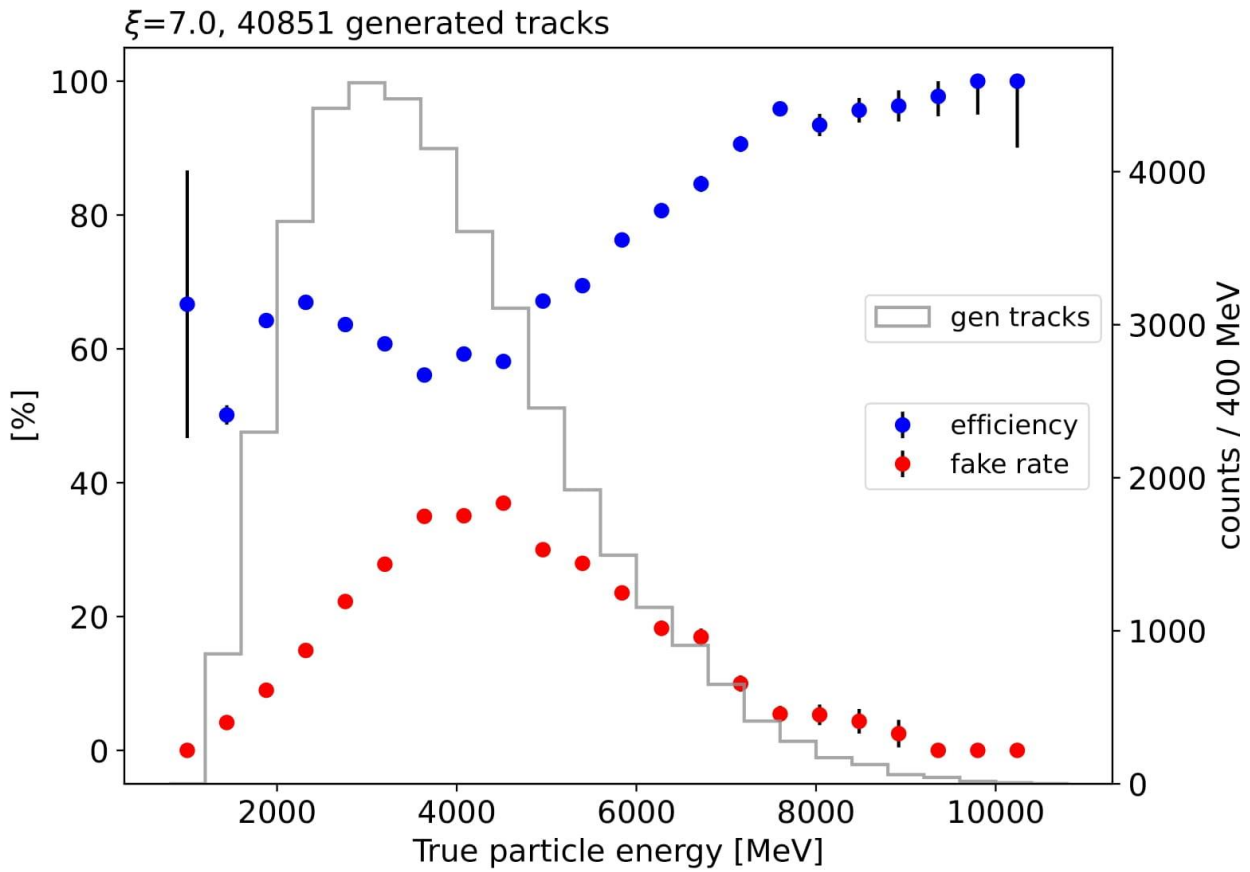
Phase0, xi=5

Efficiency, fake rate, generated tracks vs. true particle energy, Bayesian error bars



Phase0, xi=7

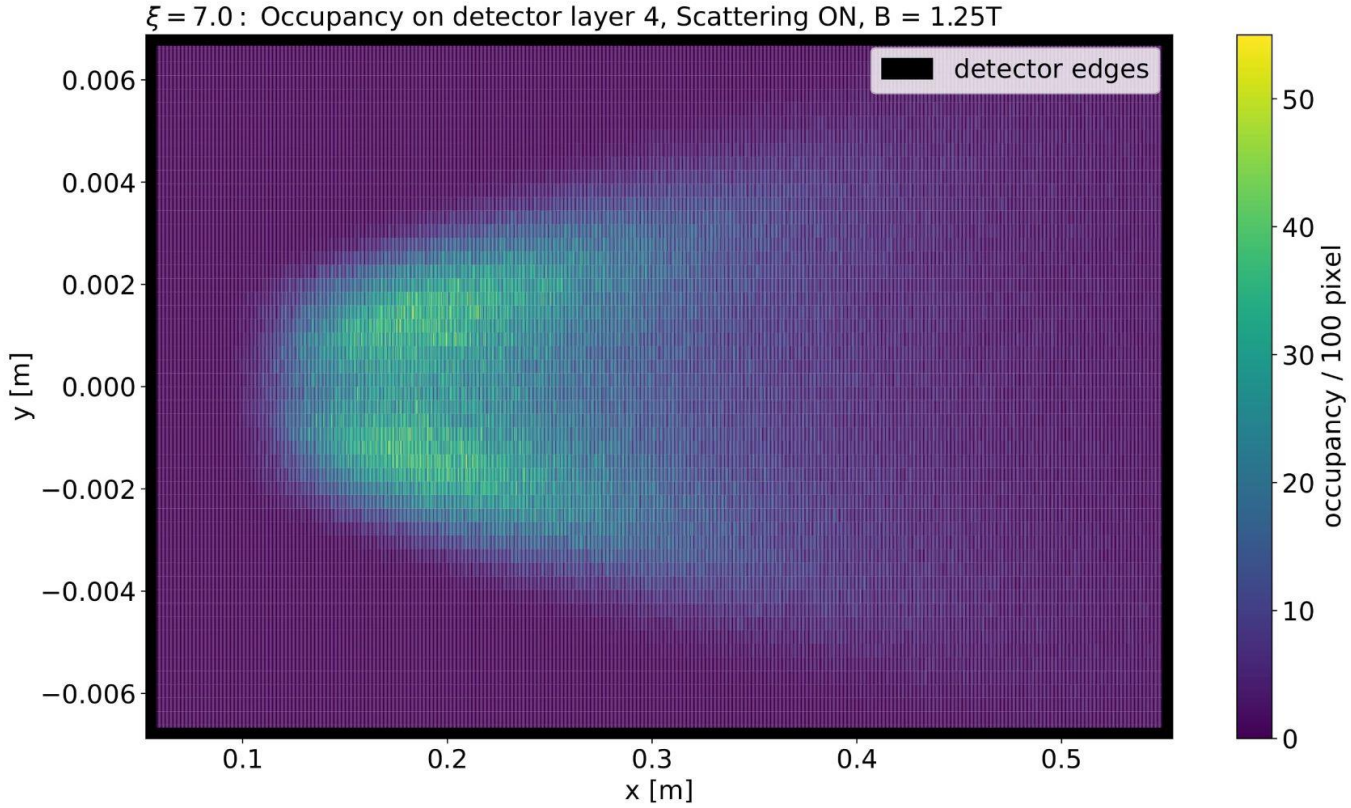
Efficiency, fake rate, generated tracks vs. true particle energy, Bayesian error bars

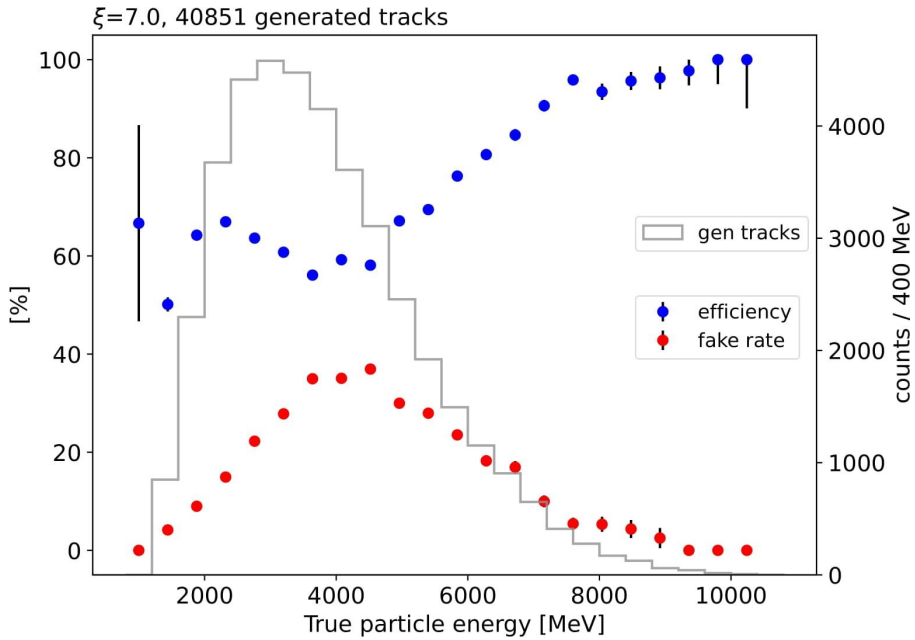


- good efficiency for xi = 4, 5 and low fake rate
- efficiency drop at high density areas for xi = 7
- not exactly matching of most occupied bin and lowest efficiency → look at 2D- occupancy

Phase0, xi=7

Efficiency, fake rate, generated tracks vs. true particle energy, Bayesian error bars





What’s next?

- Creating similar plots with efficiency vs. track angle with respect to the beam line
- Also efficiency plots with:
  - analytically solved (Sub-)QUBO’s
  - VQE, noiseless sim and Fake Devices
- Efficiency might be not improved with our current optimisation strategy →explore other strategies