Simulation studies of the radial time projection chamber for the ALPHA-g antihydrogen gravity experiment

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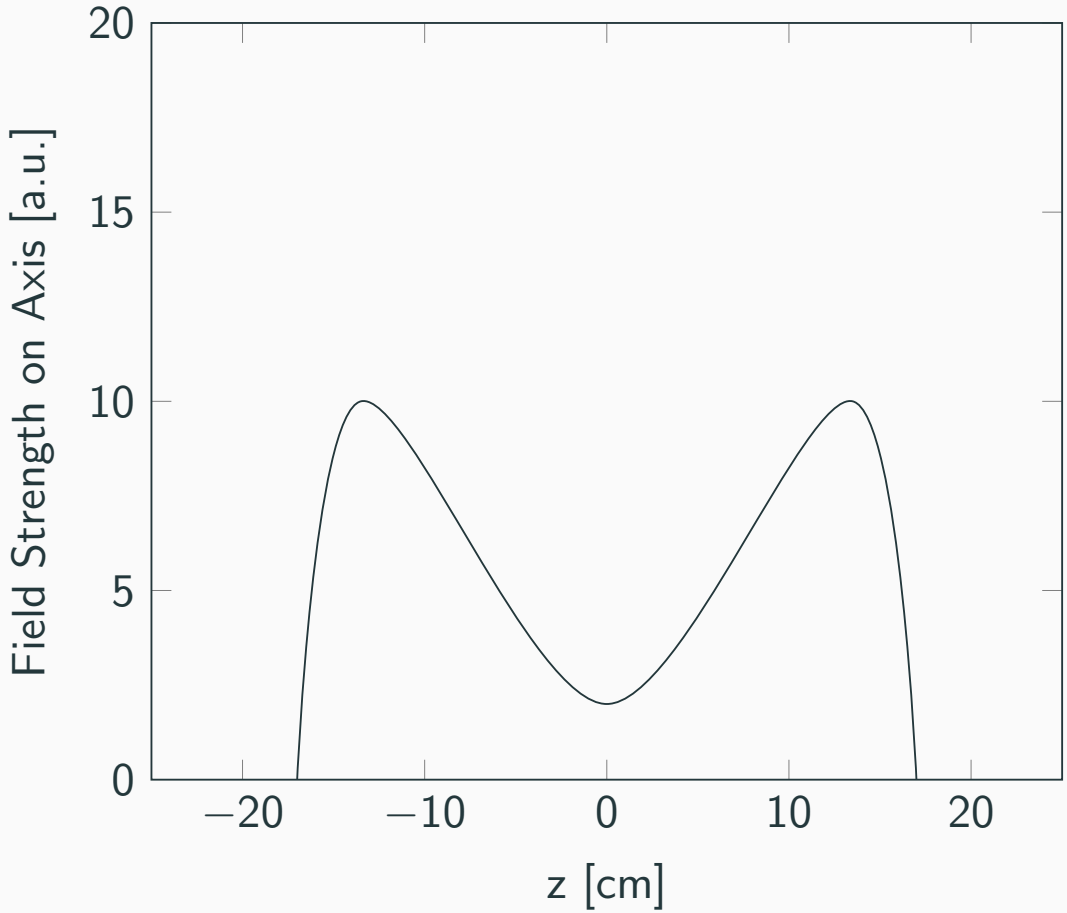
Introduction

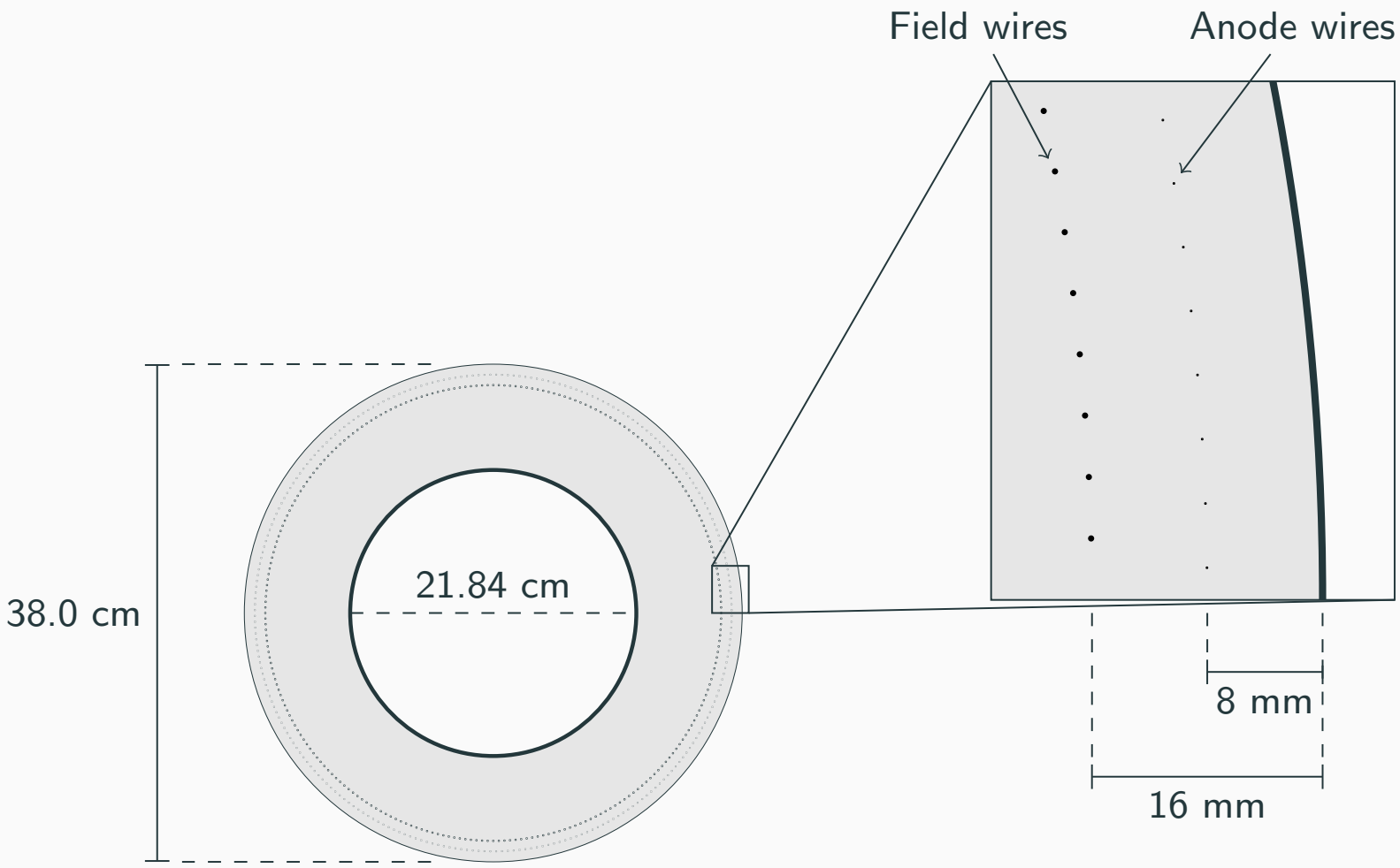
Introduction

Gravity experiment:

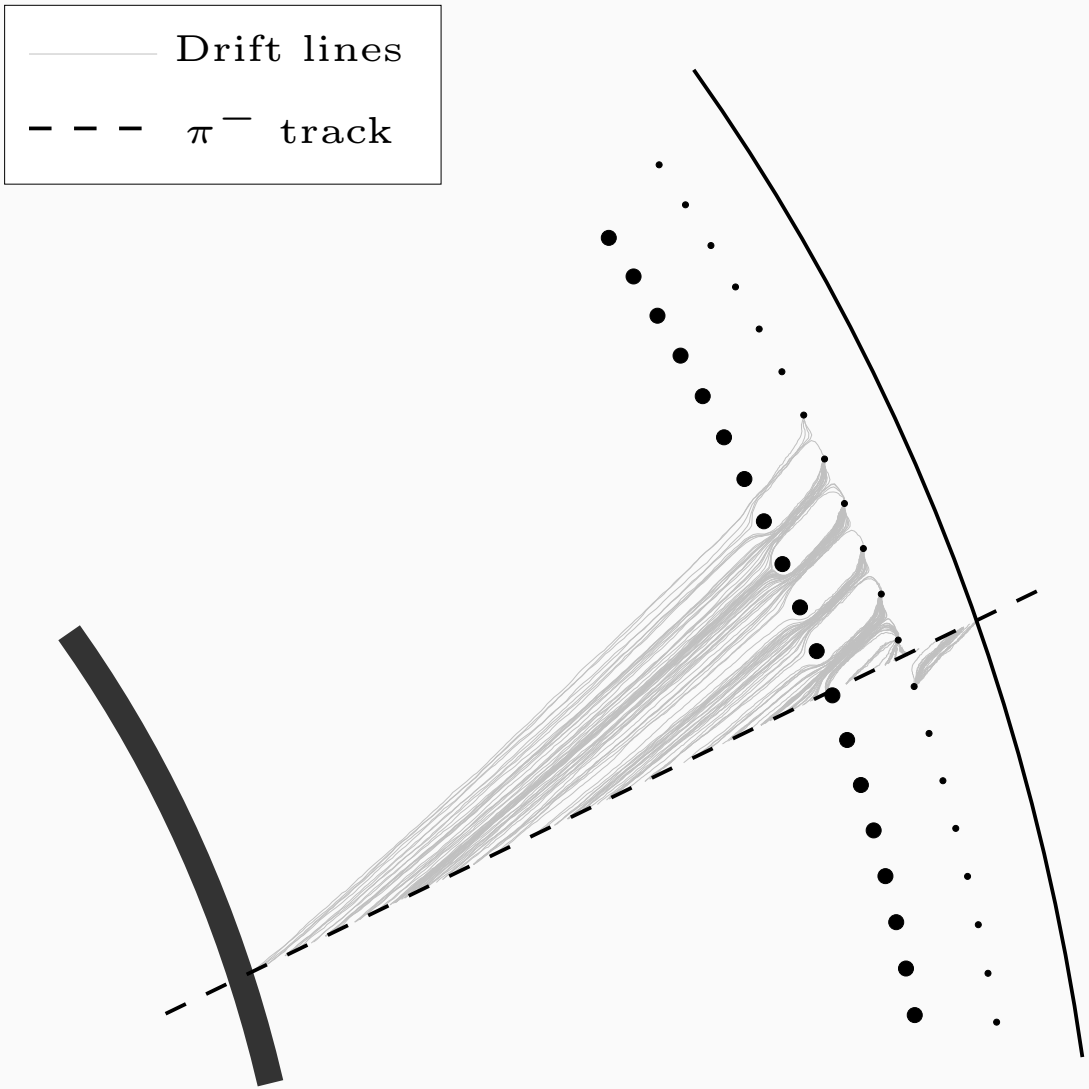
1. Magic.
2. Trapped antihydrogen.



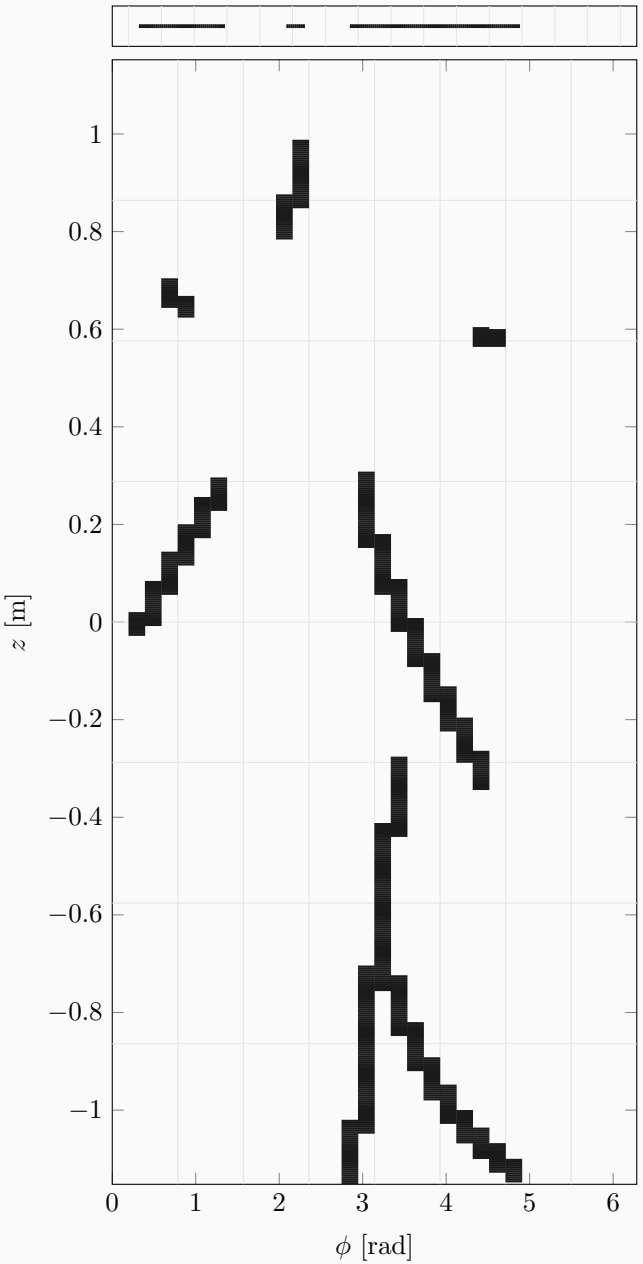
The radial Time Projection Chamber



rTPC: Electron drift

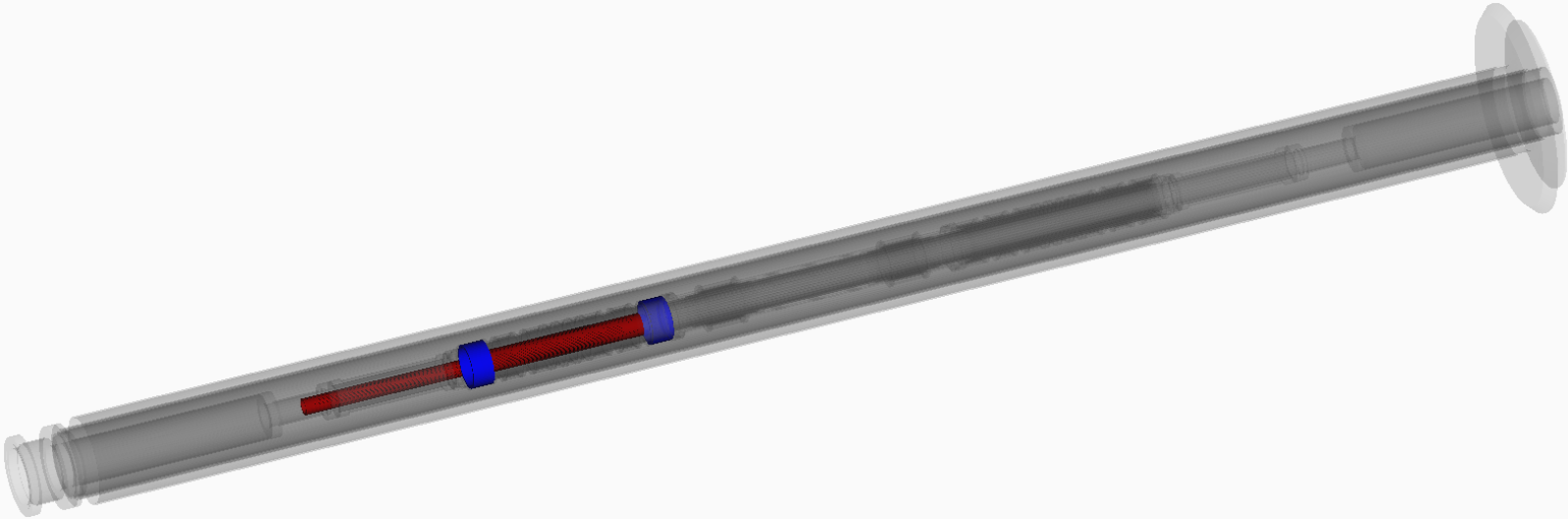


rTPC: Occupancy



Simulation Overview

Material Interactions: CAD model



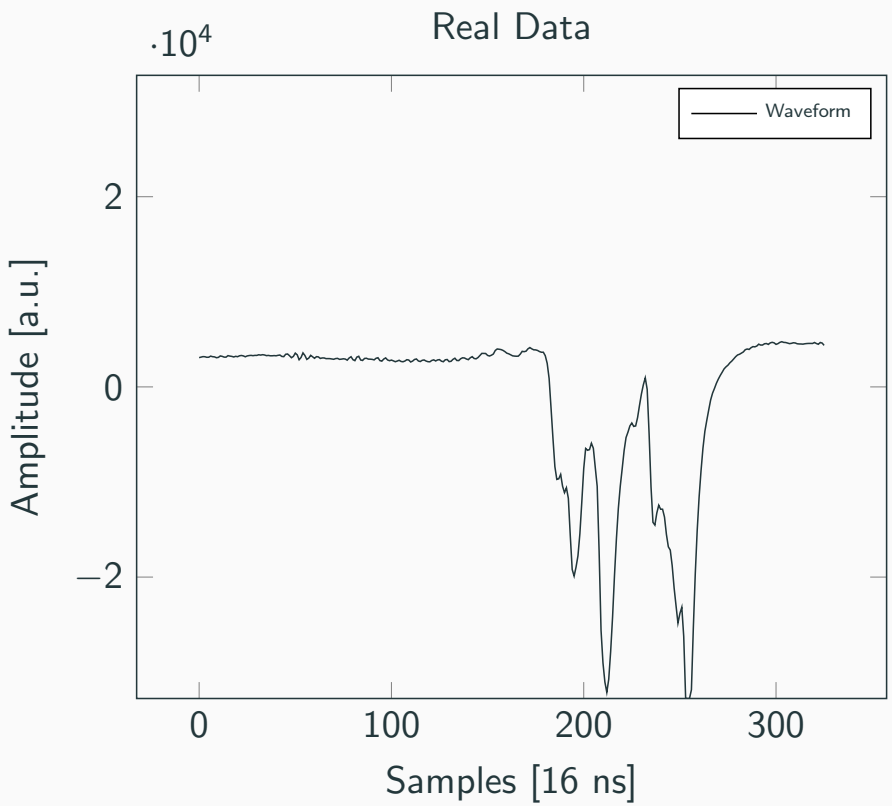
Simulation Overview

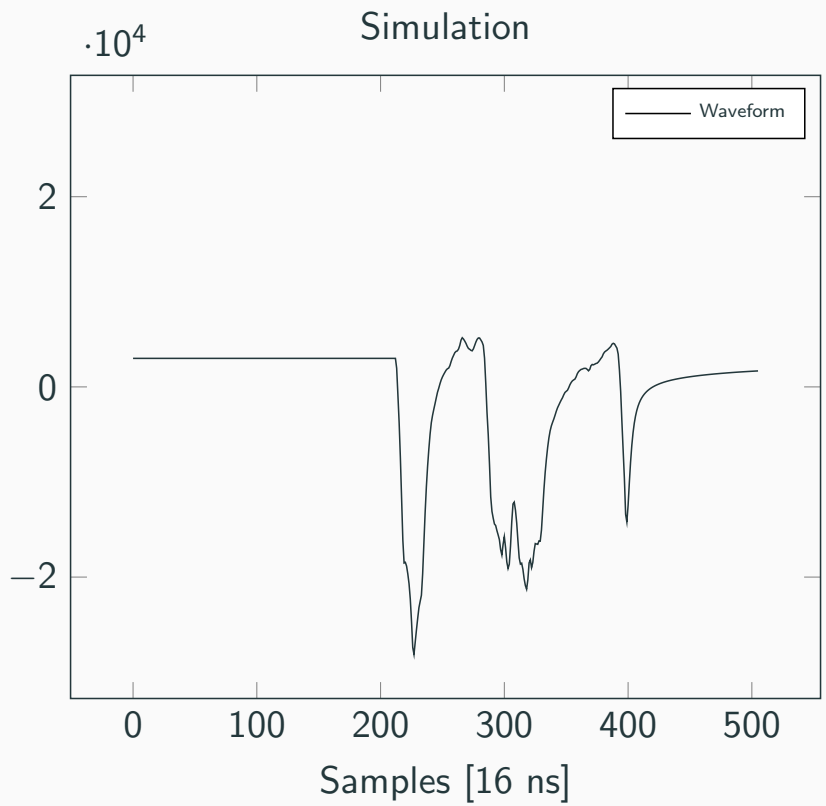
What does the simulation actually do?

- Look-up table for branching ratios.
- Geant4 for particle propagation through materials and detector.
- Look-up table for drift of electrons in gas (Garfield++).
- Generate signals on wires and pads based on a template.

Simulation Results

Simulation Output: Anode Wire Signals





Simulation Results: Event Reconstruction

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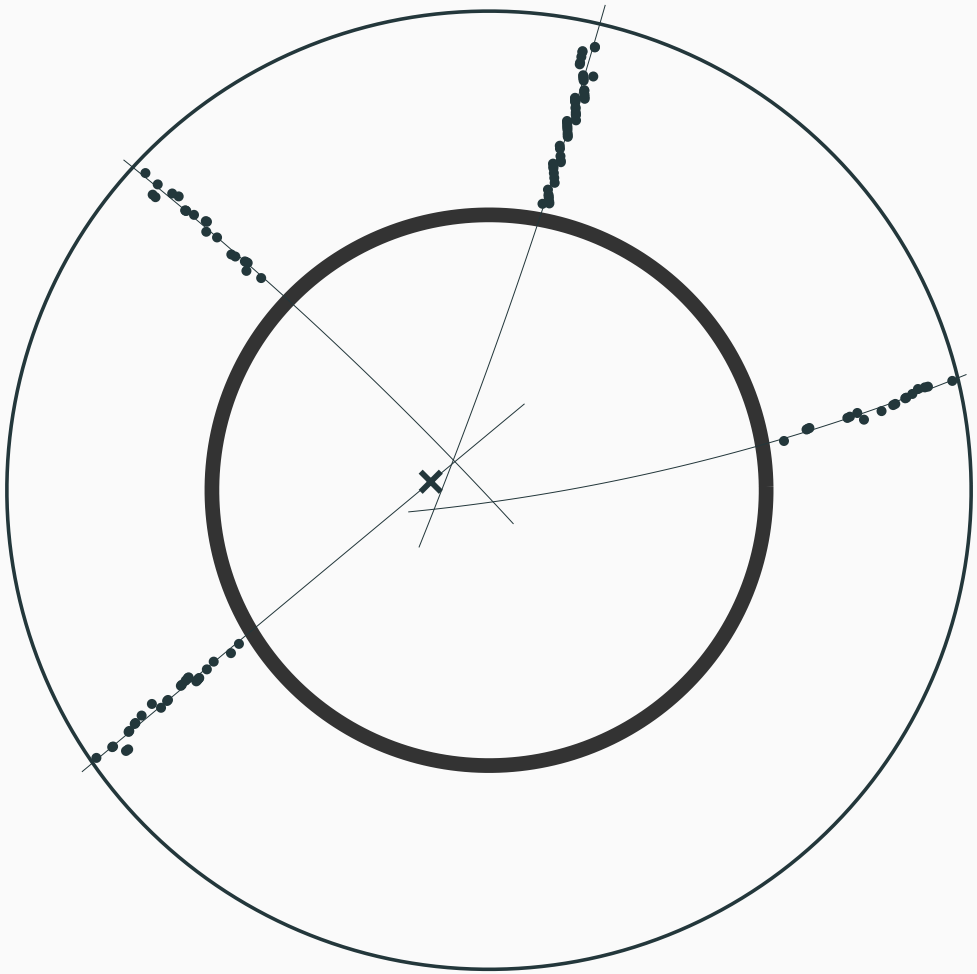
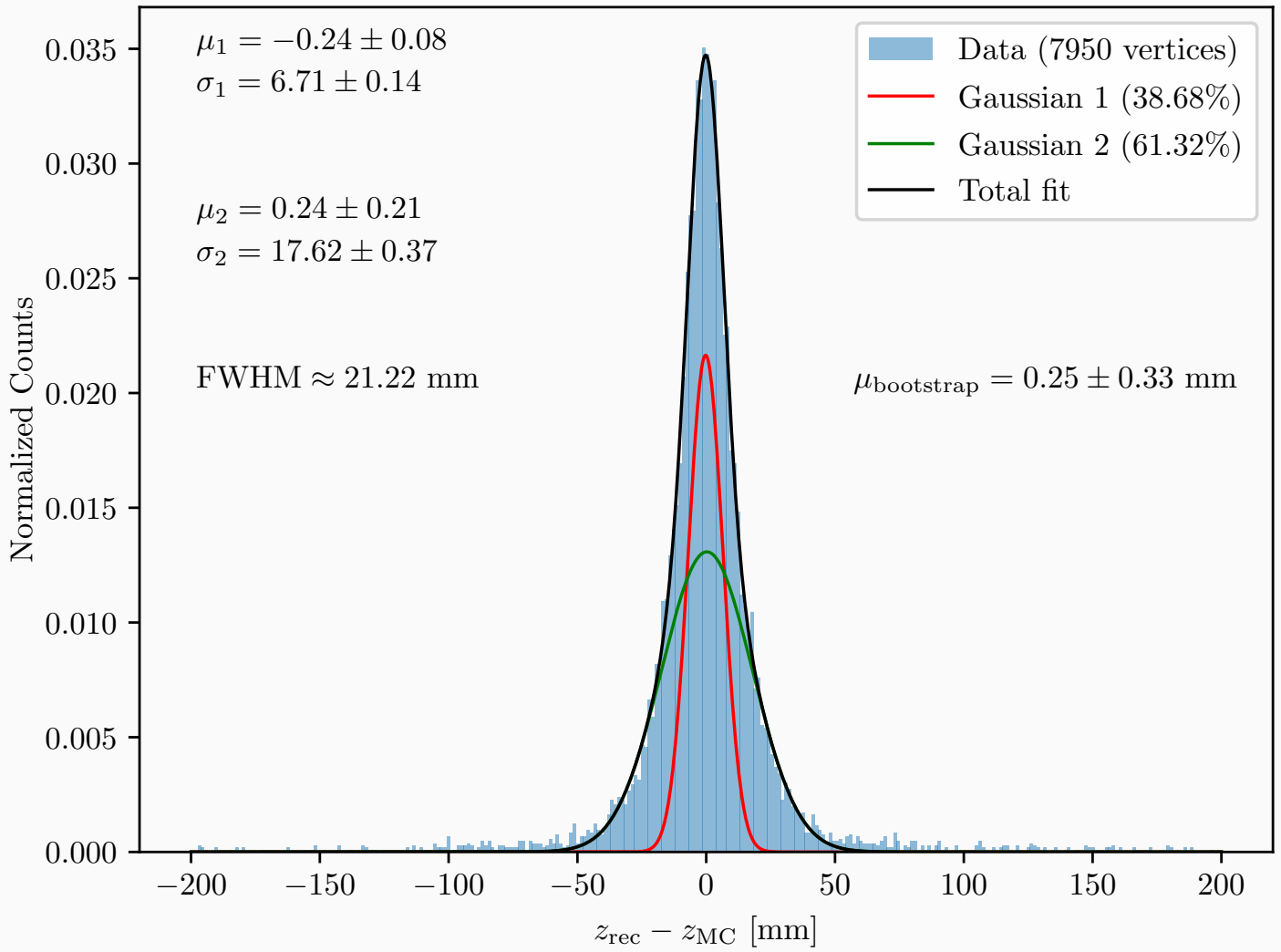
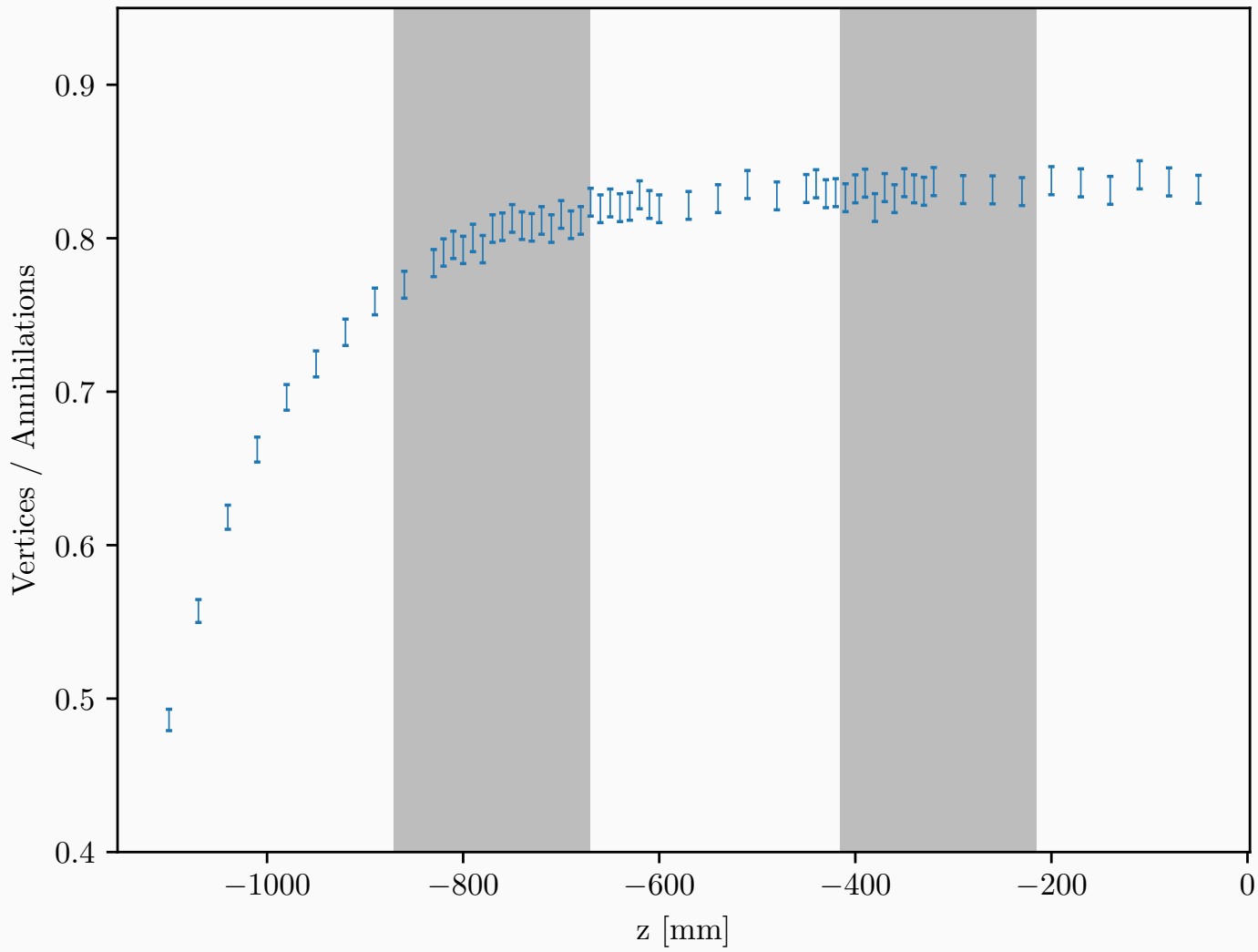


Simulation Results: Vertex Resolution



Simulation Results: Reconstruction Efficiency



Conclusion

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- Work in progress.
- Major components are in place.
- Provides a controlled environment for testing.

Thank you!

Questions?

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