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Reducing Computational Resources for Muon Collider Simulations Using a Custom Sub-Nozzle Volume

For all particle colliders, accurate and efficient simulations are necessary for the research and development required to build them. Current muon detector designs have a tungsten nozzle that block beam decays from reaching the detector. These tungsten nozzles produce a significant amount of initial showering (around 95% of the total number of particles) that will never interact with our active sensors. Due to these showers, the computation time to run these simulations can become very long, and sometimes even impossible to perform. A potential fix for this issue is to cut off particle tracking to the particles that will not hit our sensors. This study uses Geant4 to explore options for minimizing computational resources while maintaining high accuracy simulation.

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