Abstract Submitted
for the APR20 Meeting of
The American Physical Society

Grover's (Quantum) Algorithm and Searches with the ATLAS detector at the Large Hadron Collider ANTHONY ARMENAKAS[1], Collegiate School in New York City, OLIVER BAKER[2], Yale University — We demonstrate one method of applying a specific quantum algorithm, Grover's Algorithm (GA), to search for rare events in pp collisions at $\sqrt{s}$ =13 TeV in an unsorted ATLAS detector dataset using ATLAS Open Data. The procedure begins with casting the unsorted data in a proper (circuit) format followed by identifying a marked state (event) that the algorithm will then select. Using a Jupyter Notebook, a classical simulation of GA, and a few qubits, it is shown that this application makes the proper selection in the unsorted dataset. This method, and implementations on both a classical simulator and IBM's backend quantum computer hardware using the IBM QisKit Open Source Software, will be presented.

[1]In collaboration with O.K. Baker in the ATLAS collaboration at Yale University
[2]The authors gratefully acknowledge support from the Department of Energy QuantISED Award.

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Date submitted: 10 Jan 2020 Electronic form version 1.4