Prototyping an Analysis Workflow for MINERvA

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A key aspect of any High Energy Physics experiment is reproducibility. In a publication where reproducibility is kept in mind, the results of its analysis can be easily verified, and future research in similar areas can use the analysis framework as a springboard for new investigations, featuring, for example, altered signal definitions or revised values for systematic uncertainties.

This project will explore analysis preservation in the MINERvA experiment. MINERvA was a Fermilab-based experiment which observed neutrino interactions inside a near detector, and results from this experiment have been important in preparing neutrino experiments currently under development. Although MINERvA has stopped collecting data, the data analysis process is still ongoing, so progress can still be made in ensuring the reproducibility of these analyses, which would aid future research using MINERvA data.

Specifically, this project will involve containerizing software and prototyping a simple workflow for a MINERvA analysis. Once completed, the workflow will be run using REANA. This project will be conducted under the mentorship of Kyle Cranmer, Matthew Feickert, and Abe Megahed. Additionally, similar analysis preservation projects with the ATLAS experiment will be used as a model to guide this work. The end goal of this project is to create an example of a preserved MINERvA analysis that can be re-executed with REANA and facilitate reuse by others in the future.

Timeline

Weeks	Goals
1-2	Become familiar with the MINERvA analysis and the process of creating a workflow.
3-5	Containerize software used in MINERvA analysis.
5-8	Create baseline MINERvA analysis workflow.
9-11	Troubleshoot, and eventually run a finished version of the workflow on REANA. If time permits, explore further additions or improvements to the workflow.
11-12	Prepare a presentation and create instructions facilitating easy use of the workflow tool.