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Analysis of the impact of different hit finding techniques on charge and energy reconstruction for ICARUS

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An accurate calorimetric reconstruction is an integral component of liquid argon time projection chamber (LArTPC) experiments such as ICARUS. Energy, more specifically energy loss per unit length or $\frac{dE}{dx}$, is used in higher levels of data reconstruction like particle identification, so it is crucial that reconstructed energy is as accurate as possible. Calculating $\frac{dE}{dx}$ starts by reconstructing the waveforms from the wire plane channels of the detector into hits using the Gauss, ICARUS raw, or hybrid hit finder. Next, the charge displaced per unit length, $\frac{dQ}{dx}$, is calculated from the hits. Finally, $\frac{dE}{dx}$ is calculated by calibrating $\frac{dQ}{dx}$ with an optimized calibration constant and using that calibrated $\frac{dQ}{dx}$ in a charge to energy conversion formula. There are two procedures used to optimize the calibration constants in this study, one from MicroBooNE and one from LArIAT. The goals of this study are to investigate which hit finding techniques best reconstruct energy and charge data and to optimize the calibration constants using the previously mentioned procedures.

Summary

My name is Isabella Ginnett, and I am currently a SULI summer intern advised by Minerba Betancourt and the ICARUS Collaboration. I would greatly appreciate the opportunity to share the results from my summer work at the Users Meeting. I would be sharing this work via poster. I have the abstract for the poster's content included in the "Content" box as well as in the attached PDF.

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