



Task 12.5: Particle Flow Reconstruction

John Back



on behalf of the Task 12.5 institutes

5 February 2025



This project has received funding from the European Union's Horizon 2020 Research and Innovation programme under grant agreement No 101004761.

Introduction

- Final report: deliverable D12.4
- Updates for today:
 - Dual Readout Calorimeter: No news
 - APRIL (Algorithm for Particle Reconstruction @ ILC): No news
 - DUNE Near Detector reconstruction

Final report: D12.4



PFA RECONSTRUCTION ALGORITHMS

Deliverable: D12.4

Date: 31/12/2024

TABLE OF CONTENTS

1. INTRODUCTION	4
2. DUAL-READOUT CALORIMETERS	4
2.1 RECONSTRUCTION USING NEURAL NETWORKS.....	5
2.1.1 DNN Approach.....	5
2.1.2 CNN Approach.....	6
2.1.3 Outcomes.....	8
3. APRIL FOR HADRONIC JETS	8
3.1 ALGORITHM DEVELOPMENT.....	8
3.2 ENERGY CALIBRATION.....	10
3.3 PANDORA FRAMEWORK.....	11
4. DUNE NEAR DETECTOR	11
4.1 3D RECONSTRUCTION DEVELOPMENTS.....	12
4.2 DEEP LEARNING VERTEXING.....	14
4.3 HIERARCHY TOOLS.....	16
4.4 COMMON ANALYSIS FILES.....	16
5. SUMMARY	17
6. REFERENCES	17
ANNEX: GLOSSARY	19

Reconstruction for the DUNE Near Detector (ND)

- Pandora LArRecoND package [v01-01-04](#)
- Pandora ND CAFs (common analysis files) available for DUNE physics analysis
 - Preliminary studies started for “2x2” LArTPC demonstrator July ‘24 data & MC
 - Integration underway for producing Pandora CAFs for full “7x5” ND-LAr MC studies
- Recent DUNE collaboration meeting talks @ CERN:
 - “Pandora for 2x2” & “Pandora for ND-LAr”
- Pandora ND reco improvements planned:
 - Adapt 2D clustering algorithms to 3D
 - Add & use scintillation light information with existing LArTPC charge CaloHits