



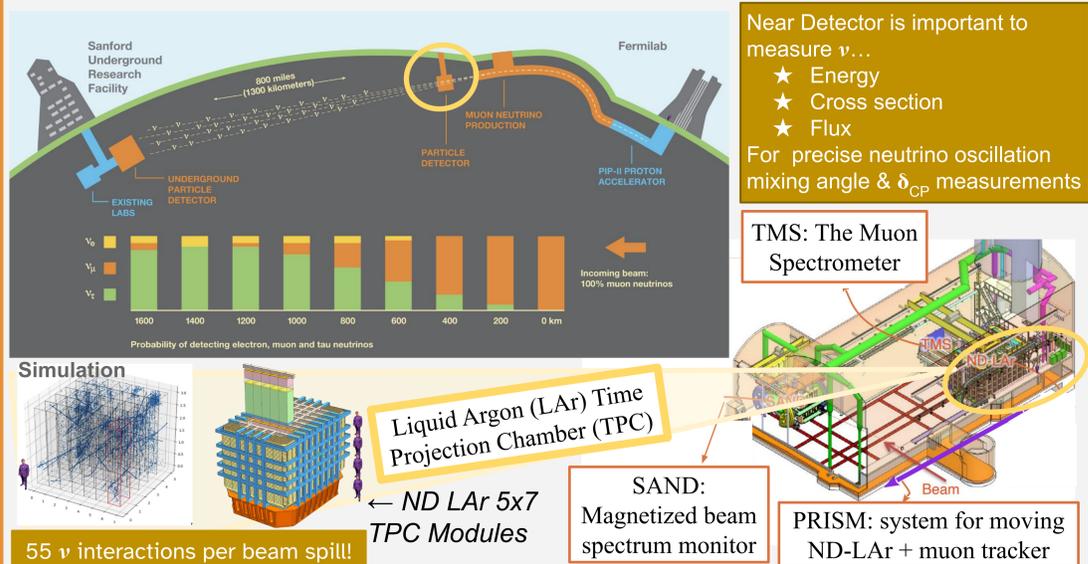
# Expanding DUNE's Machine Learning Framework with Multi-Detector Input for the 2x2 Demonstrator



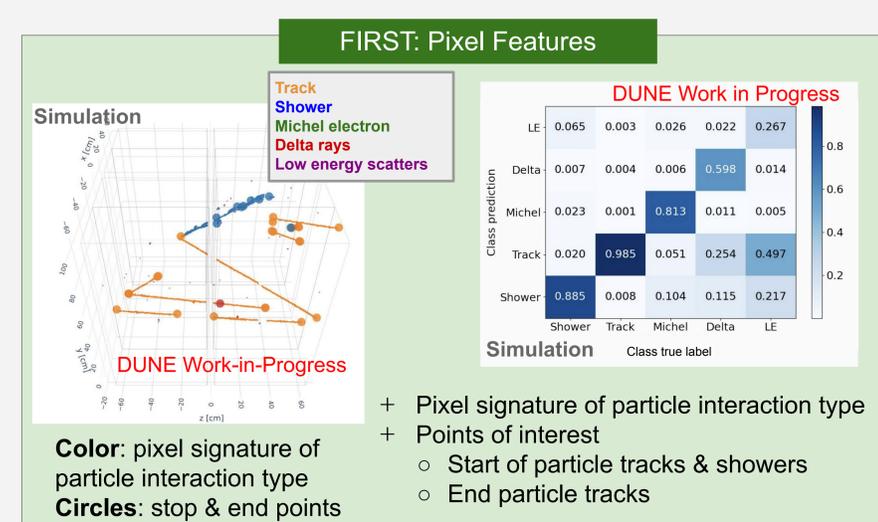
Jessie Micallef (she/they) for the DUNE collaboration  
 Institute for AI & Fundamental Interactions (jessiem@mit.edu)



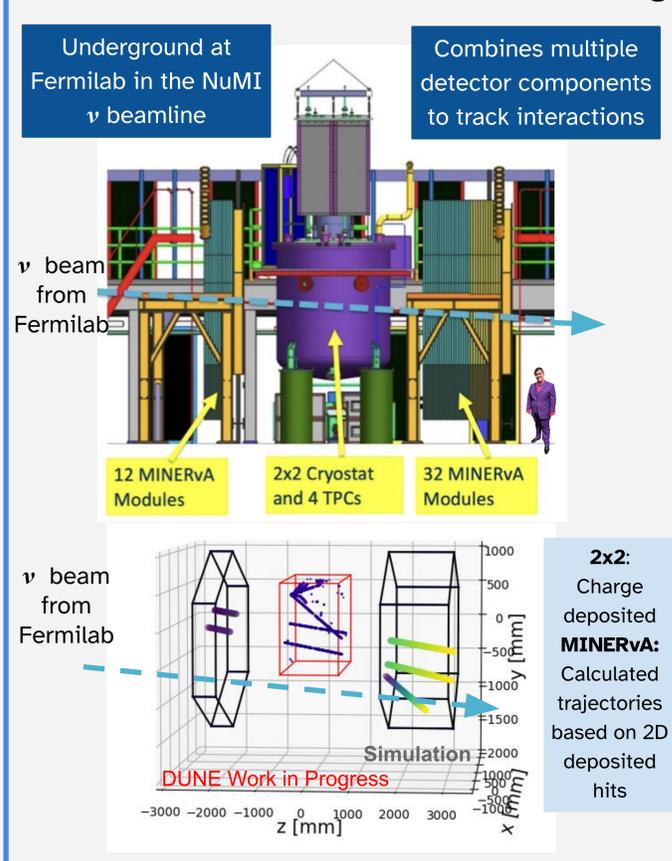
## Plan for DUNE's Intense $\nu$ Pileup at Near Site



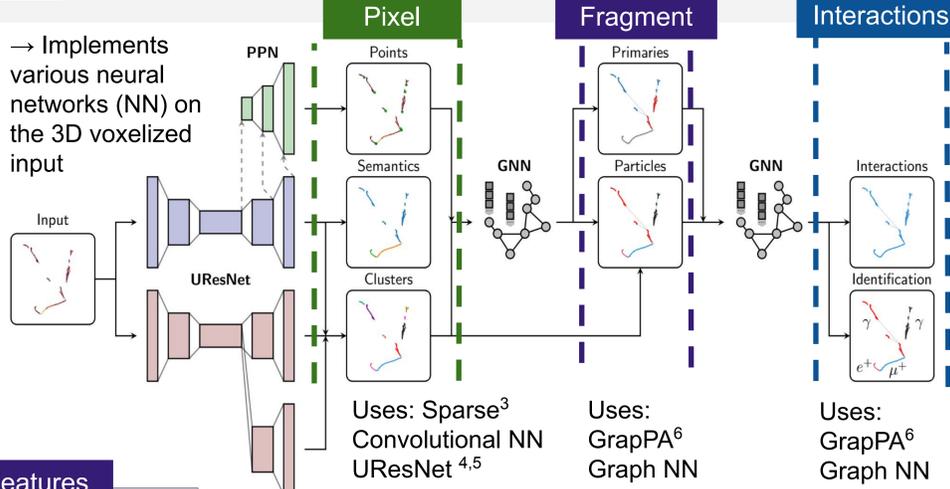
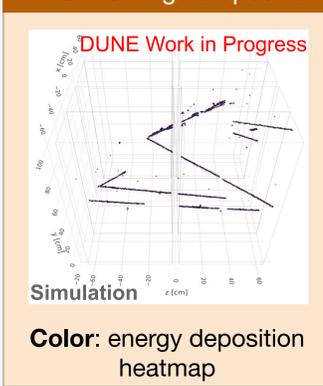
## Inherent 3D Machine Learning (ML) Reconstruction in LArTPCs



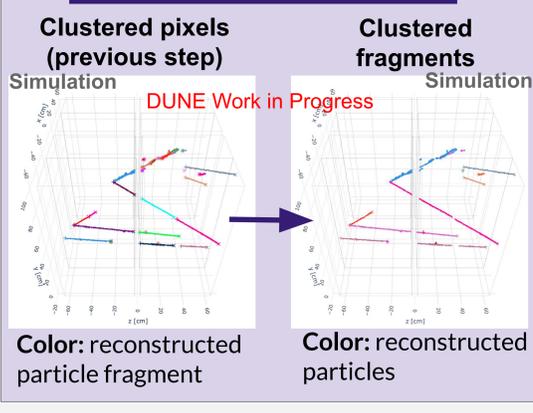
## Multi-Module & Detector Testing



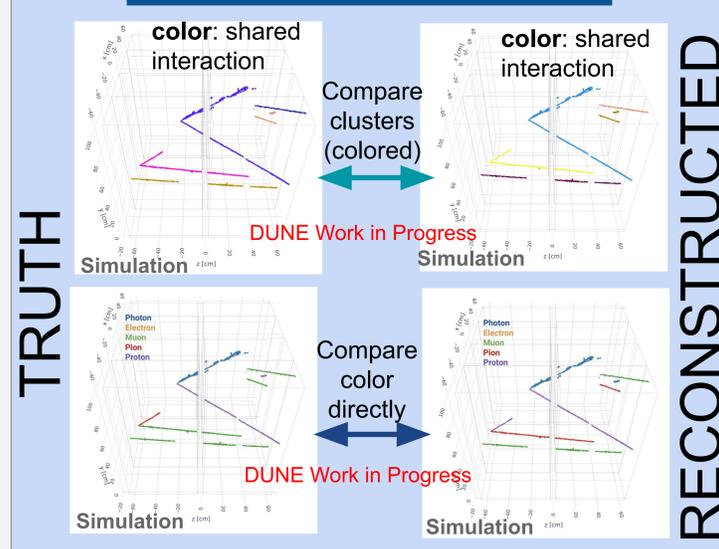
## INPUT: Charge Deposition



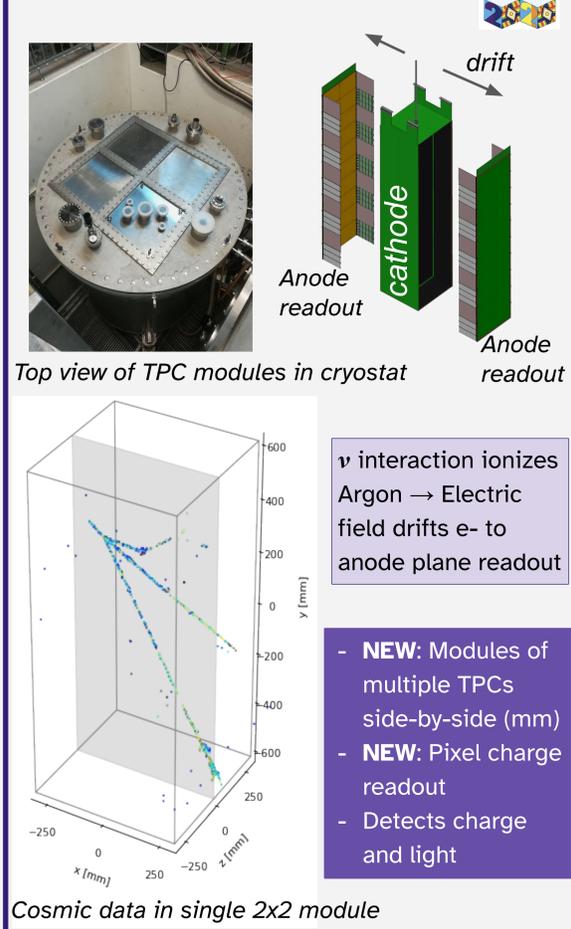
## MIDDLE: Fragment Features



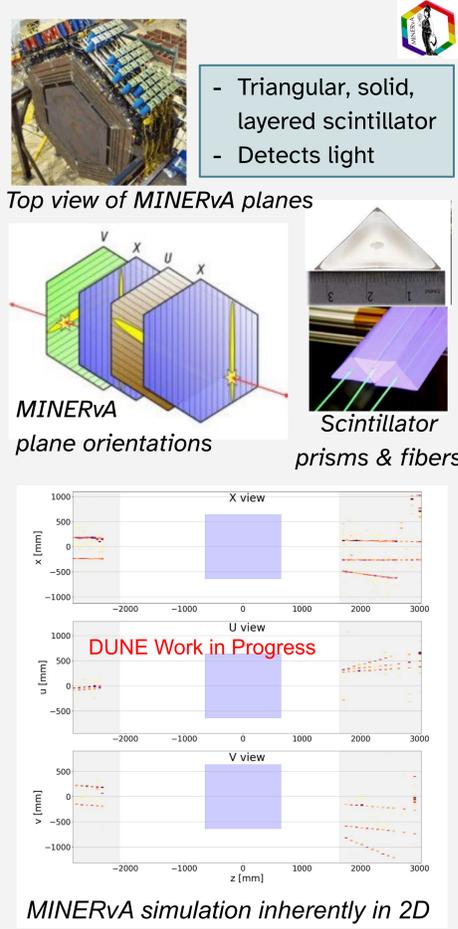
## FINAL: Identification & Interactions



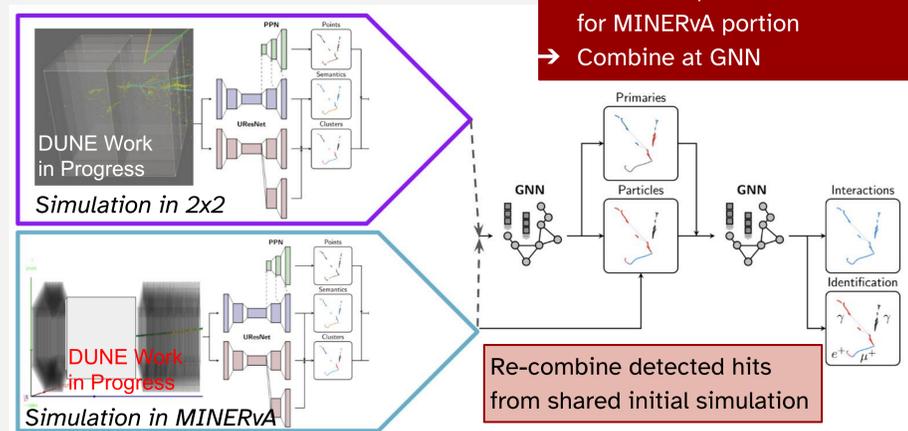
## 3D Detection: 2x2<sup>2</sup>



## 2D Detection: MINERvA<sup>3</sup>



## Adding MINERvA Input into ML Reconstruction



## References

[1] - DUNE collaboration. [2020 JINST 15 T08008](#).  
 [2] - B. Russell on behalf of DUNE collaboration. [PoS \(TAUP2023\) 221](#).  
 [3] - MINERvA Collaboration. [Nucl. Inst. and Meth. A743 \(2014\) 130](#).  
 [4] - Laura Dominé, Kazuhiro Terao. [PhysRevD \(102\) 012005](#).  
 [5] - Laura Dominé, et al. [Phys Rev D \(104\) 032004](#).  
 [6] - François Drielsma. [PhysRevD. 104. 072004](#).

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