



Overview of π^0 tasks

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ProtoDUNE π^0 Meeting
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Available Tasks for π^0 Analysis

1. Ghost point removal
2. Shower dE/dx
3. Shower clustering
4. π^0 shower selection (proximity analysis to π^\pm)
5. Data/simulation discrimination

Available Tasks for π^0 Analysis

1. **Ghost point removal**
 2. Shower dE/dx
 3. Shower clustering
 4. π^0 shower selection (proximity analysis to π^\pm)
 5. Data/simulation discrimination
- Isochronous signals (tracks parallel to wire plane) cause disambiguation for reconstruction
 - “Ghost points” are a copy of real charge in the wrong location
 - Could be seen as a widening of tracks
 - Removing ghost points is necessary for further DL analysis

Available Tasks for π^0 Analysis

1. Ghost point removal
 2. **Shower dE/dx**
 3. Shower clustering
 4. π^0 shower selection (proximity analysis to π^\pm)
 5. Data/simulation discrimination
- “Easy to do along the way”

Available Tasks for π^0 Analysis

1. Ghost point removal
 2. Shower dE/dx
 3. **Shower clustering**
 4. π^0 shower selection (proximity analysis to π^\pm)
 5. Data/simulation discrimination
- Current DL methods identify showers, protons, delta rays, MIPs, etc
 - Disjoint showers could still be related to each other
 - Related showers should be associated / clustered together
 - This would be done with an additional DL network

Available Tasks for π^0 Analysis

1. Ghost point removal
 2. Shower dE/dx
 3. Shower clustering
 4. **π^0 shower selection (proximity analysis to π^\pm)**
 5. Data/simulation discrimination
- Reconnect showers back to the original track
 - Two showers should be original from same location if π^0
 - Likelihood method might be easier than DL

Available Tasks for π^0 Analysis

1. Ghost point removal
 2. Shower dE/dx
 3. Shower clustering
 4. π^0 shower selection (proximity analysis to π^\pm)
 5. **Data/simulation discrimination**
- Use DL network trained on simulation to see if it can distinguish between data tracks and simulation tracks
 - Can point out differences between simulation and data
 - “Blind” yourself to data/simulation differences by penalizing features that can tell the difference

Tasks CSU is interested in

1. Ghost point removal
2. Shower dE/dx
3. Shower clustering
4. π^0 shower selection (proximity analysis to π^\pm)
5. Data/simulation discrimination

- What tasks have people started working on already?
- What tasks are other people interested in working on?
- Any tasks missing from this list?