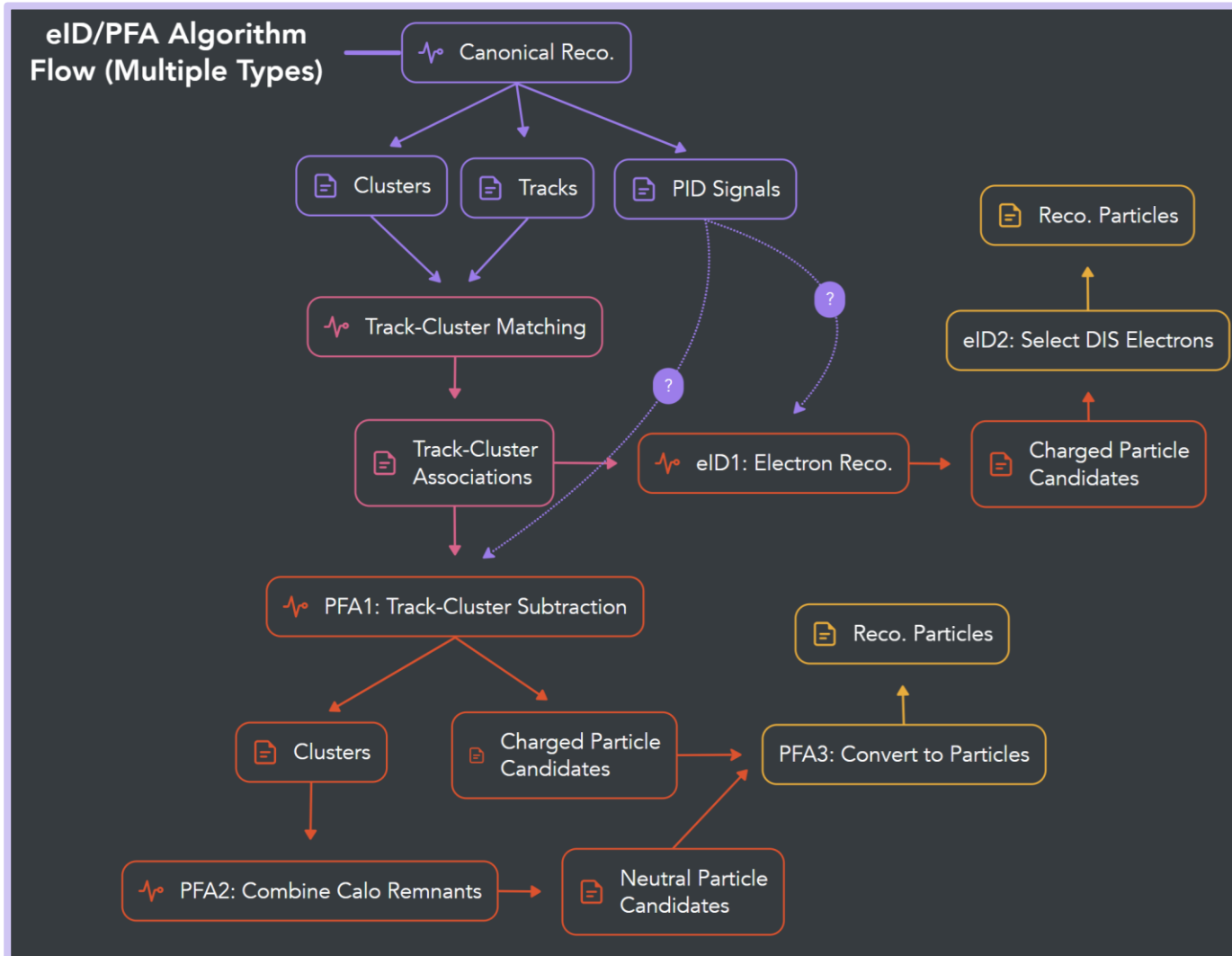
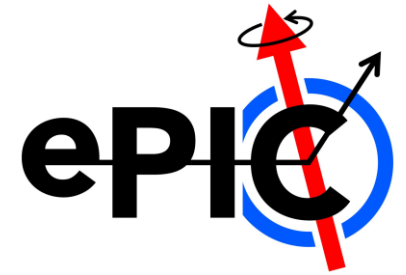


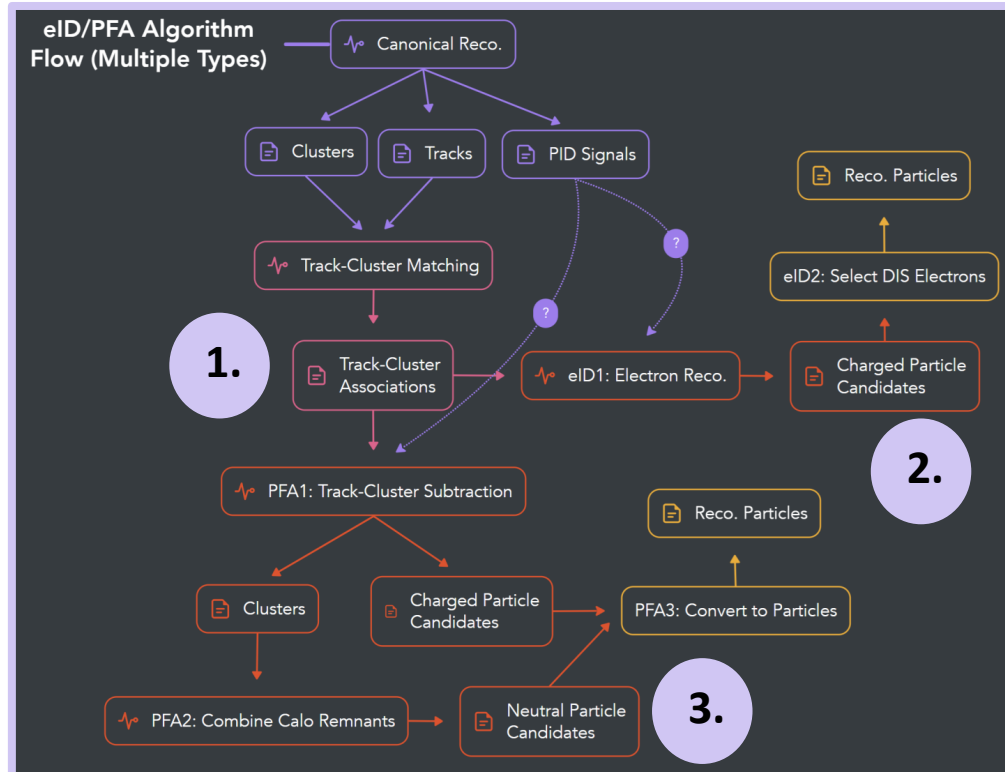
# Track-Cluster Matching | Update



- We are working towards addressing one set of (connected) action items from the July UGM
  - a) Modularizing and extending electron reconstruction;
  - b) Ensuring modularity of our baseline PF routine;
  - c) And developing new data types to easily facilitate these
- See past discussion on the topic:
  - a) The [UGM workfest](#)
  - b) [August 27<sup>th</sup>](#) reco meeting
  - c) [September 16<sup>th</sup>](#) reco meeting



# Track-Cluster Matching | New Types (1/3)

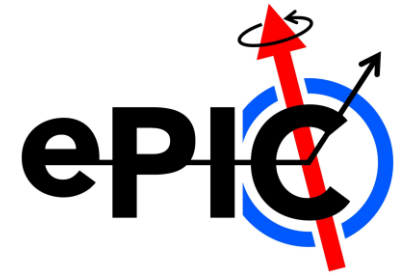


```

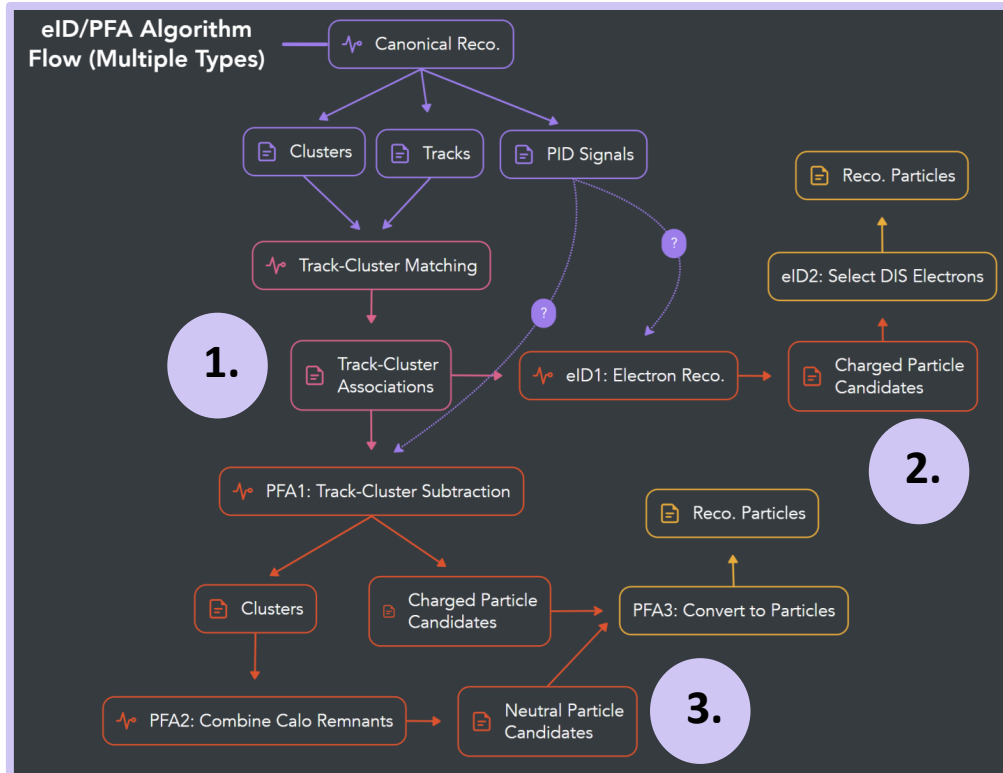
563 +
564 + edm4eic::TrackClusterMatch:
565 +   Description: "Match between a Cluster and a Track"
566 +   Author: "D. Anderson, D. Brandenburg, D. Kalinkin, S. Joosten"
567 +   Members:
568 +     - float          weight          // weight of this association
569 +   OneToOneRelations:
570 +     - edm4eic::Cluster cluster      // reference to the cluster
571 +     - edm4eic::Track track         // reference to the track

```

- Based on previous discussions, we are converging on three types for addressing this:
  - 1) A track-cluster association
  - 2) A charged particle candidate
  - 3) A neutral particle candidate
- **For type (1):** we can utilize the work that Daniel started in [edm4eic#52](#)
  - Code from the PR shown up above



# Track-Cluster Matching | New Types (2/3)

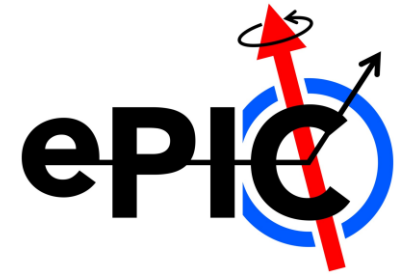


```

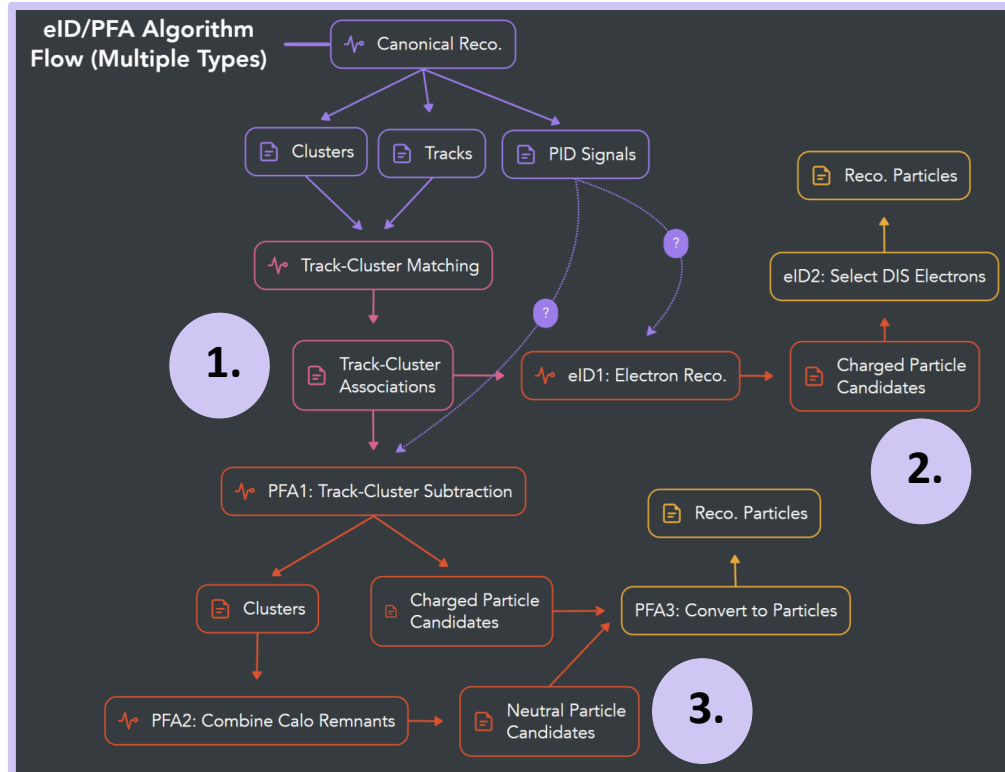
1  ## A charged particle candidate
2  edm4eic::ChargedRecoParticleCandidate:
3      Description: "Candidate charged reconstructed particle"
4      Author: Tyler Kutz, Derek Anderson, Shujie Li
5      OneToOneRelations:
6          - edm4eic::Track track // reconstructed track...other relations are matched to this
7      OneToManyRelations:
8          - edm4hep::ParticleID particleIDs // associated particle IDs
9          - edm4eic::Cluster ecalClusters // ECAL clusters matched to this track
10         - edm4eic::Cluster hcalClusters // HCAL clusters matched to this track
11      VectorMembers:
12         - float ecalWeights // weights of matched ecal clusters
13         - float hcalWeights // weights of matched hcal clusters

```

- **For type (2):** we can build on what we have been discussing
  - Some example code shown up above
  - **Reminder:** the spirit of the type here is `edm4eic::ProtoCluster` but for particles



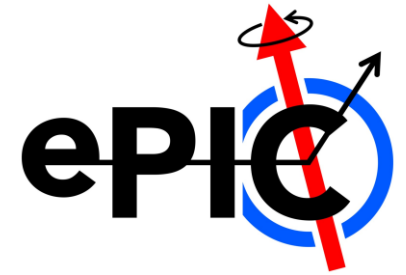
# Track-Cluster Matching | New Types (3/3)



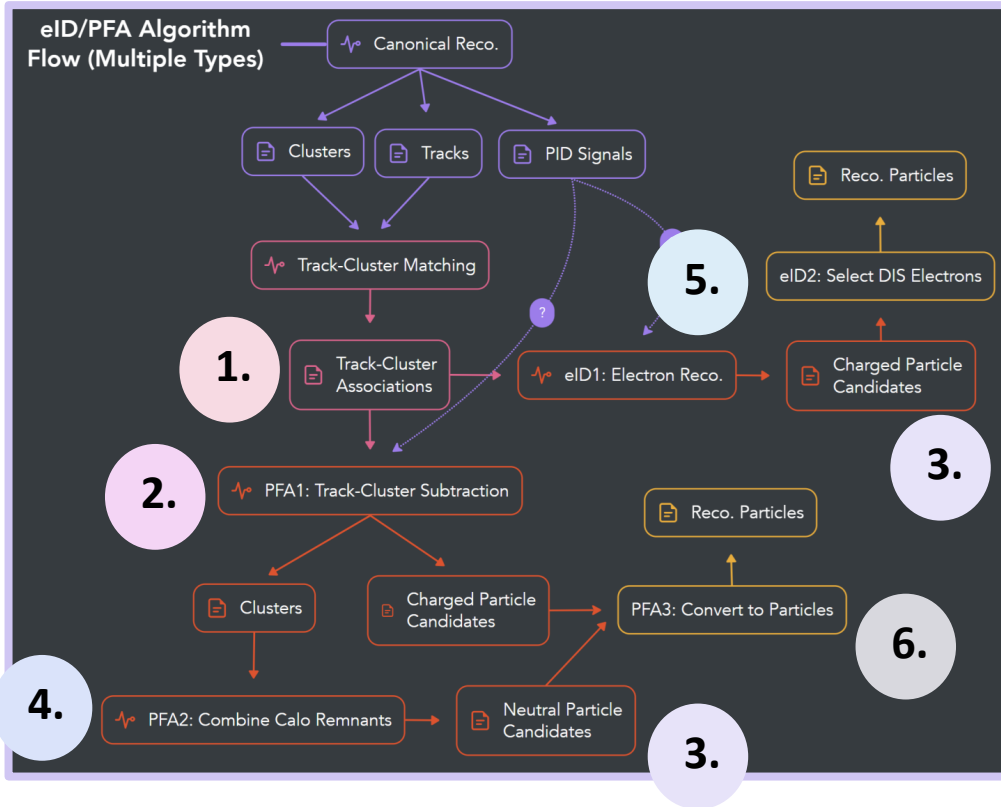
```

15  ## A neutral particle candidate
16  edm4eic::NeutralRecoParticleCandidate:
17      Description: "Candidate neutral reconstructed particle"
18      Author: Tyler Kutz, Derek Anderson, Shujie Li
19      OneToManyRelations:
20          - edm4hep::ParticleID particleIDs // associated particle IDs
21          - edm4eic::Cluster   ecalClusters // associated ECAL clusters
22          - edm4eic::Cluster   hcalClusters // associated HCAL clusters
23      VectorMembers:
24          - float ecalWeights // weights of associated ecal clusters
25          - float hcalWeights // weights of associated hcal clusters
  
```

- **For type (3):** we can also build on what we have been discussing
  - Some example code shown up above
  - **Reminder:** the spirit of the type here is `edm4eic::ProtoCluster` but for particles



# Track-Cluster Matching | Possible Rollout



- Here's a possible development timeline for getting all of these in:

- 1) [Oct.] Merge [edm4eic#52](#)
- 2) [Oct.] Complete [EICrecon#1627](#) (sans the charged particle candidate)
- 3) [Nov.] Open PR for charged/neutral particle candidates
- 4) [Nov.] Open PR for PFA2
- 5) [Nov. - Dec.] Open PR to modify eID1, 2 to use new charged candidate type
- 6) [Dec.] Open PR for PFA3

- **Notes:**

- Need to touch base w/ group assigned to track-cluster matching algorithm
- Months listed here are when most of the development work happens
- Need some thought on how PFA1 charged candidate output relates to Charged Reconstructed Particles...