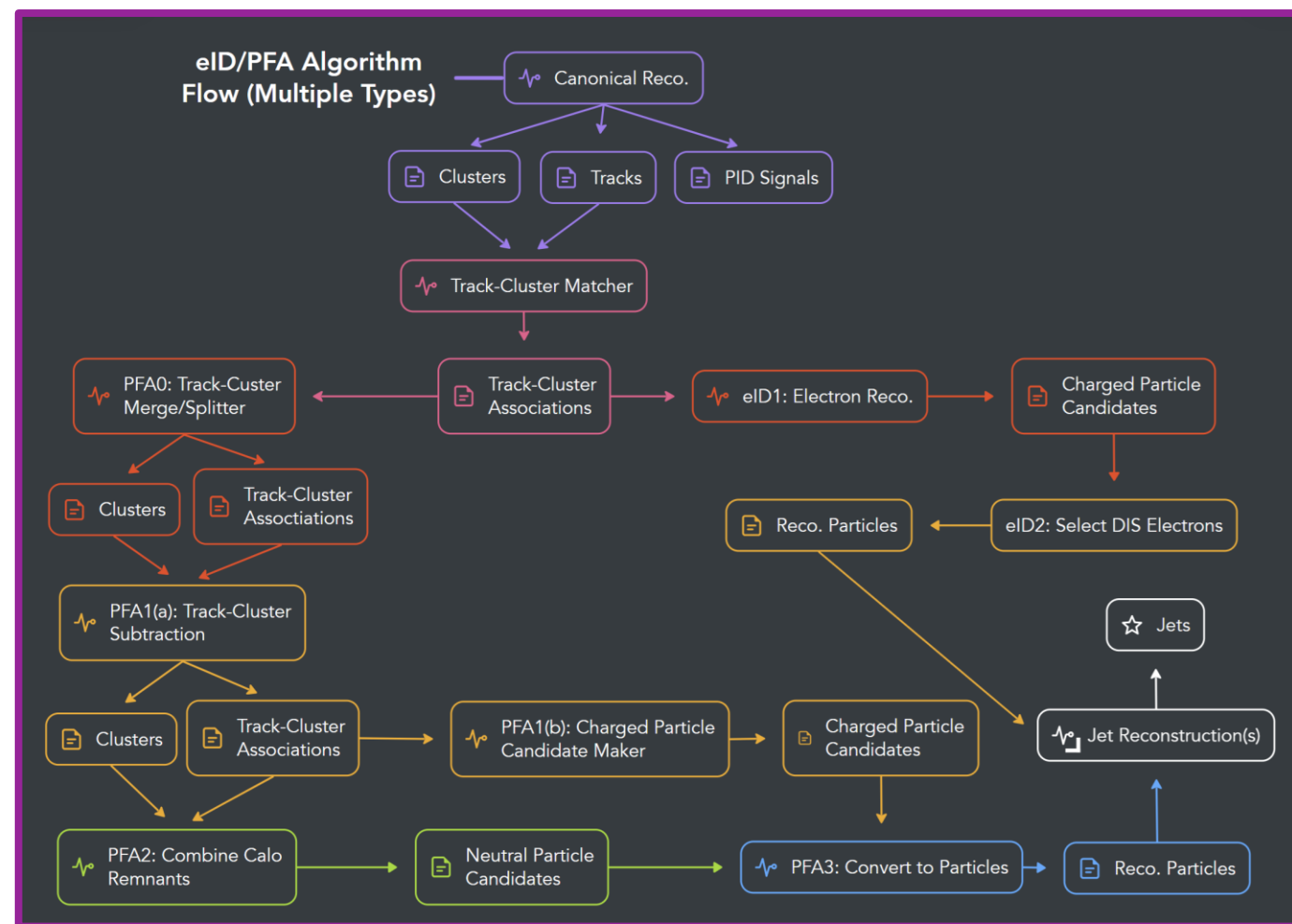


PF Work Planning | PFAAlpha Overview

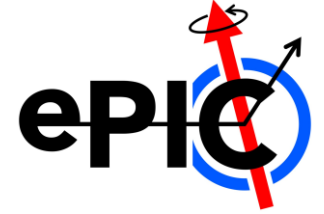


Reminder: gist of PFAAlpha is

- 1) **[PFA-1]** Match tracks to EMCal, HCal clusters
- 2) **[PFA0]** Merge clusters based on track E/p in a cone of size R_0
- 3) **[PFA1a]** Subtract expected track energy from merged clusters
 - › Split into tracks + expected energy, and remnant clusters (leftover energy)
- 4) **[PFA1b]** Convert tracks + expected energy to particle candidates
- 5) **[PFA2]** Combine remnant EMCal, HCal clusters in a cone of size R_1 , convert to particle candidate
- 6) **[PFA3]** Covert candidates to reconstructed particles



PF Work Planning | PFA0 and JANA2 2.4.3 Transition



- **PFA0 Status:** blocked until we upgrade to JANA2 2.4.3
 - But this is only needed to resolve bug exposed when using track-protocluster links
 - And PFA0 should be only place in PFAAlpha that uses track-protocluster links
 - ∴ We could approach development in a way that defers JANA2 2.4.3 dependency as long as possible
- **Proposal:**
 - 1) PFA0 work is paused until collaboration is ready for 2.4.3 upgrade (will leave note in PR)
 - 2) Output of track-cluster matcher is used as input to PFA1 and work continues downstream
 - ☞ This way we're maximizing our use of time AND the modular design of PFAAlpha

PF Work Planning | IDing EMCal vs. HCal Clusters



- A crucial point for PF (and eID) is being able to distinguish EMCal vs. HCal clusters
 - **Currently there is no easy way to do this**
 - Two possible approaches to fix this
 - a) Using new datatypes with split EMCal, HCal cluster fields: [edm4eic#104](#)
 - b) Or use the Cluster::type field to flag EMCal vs. HCal, eg. [edm4eic#122](#)
- Latter can be done exclusively in ElCrecon, former requires change to data model
 - ☞ Preference in group was for latter at last discussion

○ **Proposal:**

- Follow [edm4eic#122](#) for now and use Cluster::type filled with system ID to flag EMCal vs. HCal clusters
- ☞ This allows development to proceed on PFA1(b) and PFA2 *without* a data model change
 - And is a minimal solution, so can be easily extended or phased out at a later date

PF Work Planning | Potential Development Strategy



- **Goal:** *actually* have implementation in by next collaboration meeting
 - **Only doable if we have additional people doing development!**
 - Will write technical note after implementation complete
 - ☞ **Potential to evolve into paper conditional on physics performance**
- More people means we can parallelize development
 - **Proposed development threads:**
 - › PFA-1
 - › PFA0 (see slide 2)
 - › PFA1
 - › PFA2
 - › PFA3

- **Proposal:**
 - 1) Flag EMCal vs. HCal clusters with Cell ID for now (see slide 3)
 - › **Target:** 25.10.0
 - 2) Develop threads proceed in parallel, aiming to complete at roughly same time
 - › Each developer *also* creates, submits benchmark for thread (see slides 6, 7)
 - › **Target:** 25.12.0
 - 3) Final PR to tie threads together into PFApha
 - › **Target:** 26.01.0
- ☞ **Note:** targets listed are target campaigns, erring on cautious side

PF Work Planning | Task List (1/3)



Tasks	Issue/PR/Note	Est. labor time*	Assignee
PFA-1: deprecate MatchClusters, replace w/ pure reco equivalent	EICrecon#1956	2 weeks	Tristan
PFA0(a): complete merge/splitter update (requires JANA2 2.4.3)	EICrecon#1699	1 week	Derek
PFA0(b): implement track-protocluster link promotion algorithm	EICrecon#1886	2 weeks	
PFA1(a): revive and finish track-cluster subtractor	EICrecon#1627	1 week	Derek
PFA1(b): track-cluster converter (synergy w/ PFA-1)	To-do	1 week	
EDM: flagging ecal vs. hcal clusters (may require data model change)	EDM4eic#104 , EDM4eic#122	1 week	Tyler, Derek, Dima, Shujie
PFA2: implement calo remnant combiner	To-do	2 weeks	
PFA3: implement particle regressor/convertor	To-do	2 weeks	

* Assuming 50% FTE, including code review time

PF Work Planning | Task List (1/3)



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EDM: flagging ecal vs. hcal clusters (may require data model change)	EDM4eic#104 , EDM4eic#122	1 week	Tyler, Derek, Dima, Shujie
PFA2: implement calo remnant combiner	To-do	2 weeks	
PFA3: implement particle regressor/convertor	To-do	2 weeks	

* Assuming 50% FTE, including code review time

PF Work Planning | Task List (2/3)



Tasks	Issue/PR/Note	Est. labor time*	Assignee
PFA-1 Benchmark - input: Sum eClust, sum pTrk, nClust, nTrk, E/p matched clusters, sum eGenPar, eGenPar, nGenPar - output: Sum eRecPar, eRecPar, ePar, nRecPar, nPar, PES/R of reco pars	To-do	1 day	
PFA0 Benchmark - input: Sum eClust, eClust, pTrk, nTrk, nClust, E/p matched clusters - output: Sum eSMClust, eSMClust, nSMClust, E/p SM clust, dRct SM	Some work done	1 day	Olaiya, Derek
PFA1 Benchmark - input: Sum eClust, eClust, sum pTrk, pTrk, nTrk, nClust, E/p matched clusters, sum pChrgPar, pChrgPar, nChrgPar - output (expected): sum eEXClust, eEXClust, nEXClust, E/p EX clust, dRct EX - output (remnant): sum eREClust, eREClust, nREClust - output: sum eEXClust + eREClust	To-do	2 days	

* Assuming 50% FTE, including code review time

○ **Notes:**

- PES/R = Particle Energy Scale/Resolution
- SM = Split/Merge, EX = Expected, RE = Remnant
- dRct = distance b/n cluster & matched track

PF Work Planning | Task List (2/3)



Tasks	Issue/PR/Note	Est. labor time*	Assignee
PFA2 Benchmark - input: sum eREClust (EM, H), eREClust (EM, H), nREClust (EM, H), sum eNeuPar, eNeuPar, nNeuPar - output: sum eRecPar, nRecPar	To-do	1 day	
PFA3: - input: Sum eClust, sum pTrk, nClust, nTrk, E/p matched clusters, sum eGenPar, eGenPar, nGenPar - output: Sum eRecPar, eRecPar, ePar, nRecPar, nPar, PES/R of reco pars	To-do	1 day	
PHYS Benchmark: JES/R	To-do (just need wiring)	0.5 day	
PHYS Benchmark^(a,b): Jets - E, mass, FFs (jt, z), Substructure (dRcst, angularity, EECs)	To-do	2 days	
PHYS Benchmark^(a): Events - TEECs, NECs	NECs in progress (see here)	3 weeks	Derek (NECs)

* Assuming 50% FTE, including code review time

a) Desirable, but not required

b) Could do inclusive, HF-tagged, etc.

Notes:

– EM = “Electromagnetic”, H = “Hadronic

– dRcst = constituent delta-R