

# Intro and miscellanea

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# Paper planning

Aim to publish ASAP a paper with what we have so far

- Continue in parallel to study/improve “multi-system” PFO objects (ele, pion, muon, taus) and follow-up with another paper as soon as ready

Proposal: drop all PFO objects that require some track-to-calo matching, and focus the paper on the "basic inputs"

This means:

- changing section IV to only discuss:
  - tracks, photons (as ECAL-only object) and kaons/neutrons (as ECAL+HCAL object)
  - maybe occupancies in the muon spectrometer
- removing section V
- expand section IV to show a roadmap of the next steps

# Concretely

Occupancies:

- trackers **DONE**
- calorimeters **DONE**
- Source of calorimeter hits in cell vs E, time → UTK?

Tracks: → UChicago - at least preliminary versions exist

- reco efficiency vs pT, eta
- fake rate vs pT, theta
- Track momentum resolution
- impact parameters resolution

Photons: → DESY/UTK

- reco efficiency vs E, theta **DONE**
- calibration **DONE**
- energy resolution vs E, eta **DONE**

Muons: → ?

- occupancy?
- segment finding efficiency? (warning: not trivial)

Kaons/neutrons (define as finding at least one ECAL/HCAL cluster?)

- reco efficiency vs E, theta **DONE**
- calibration **WIP** → Princeton
- energy resolution vs E, eta ?

# Calibrating neutral hadrons

Neutral hadrons are not just an HCAL cluster.

- Calibration less trivial than for photons
- To avoid particle flow messing with the calibration in pions (when the track is associated to the cluster, the track momentum overwrites the cluster energy) I propose to use a kaon ( $k_L$ ) particle gun sample

How do we define a reconstructed kaon?

- Run anti-kt4 on PFOs?

Two paths for calibration for the paper:

1. Use the “proper tools” within pandora to correct the HCAL energy  
→ Thomas on the case
2. Derive and apply our calibrations a posteriori outside of pandora/key4hep  
→ prefer this for paper
  - a. Agree on procedure today?

**Thank you!**

# Links

Documentation

[Google doc with notes, list of tasks](#)

[Muon Collider Software Tutorial](#)

[Shared Overleaf](#)

[Key4Hep Documentation](#)

[LCIO Documentation](#)

Snowmass Connect Documentation

Data files: `/tank/data/snowmass21/muonc/fmeloni`

Communication channels:

#10tev-simulations channel on SCHEMA slack.

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