

$\phi(1020) \rightarrow K^+ K^-$ with nHcal

Alexandr Prozorov for CTU team

Czech Technical University in Prague

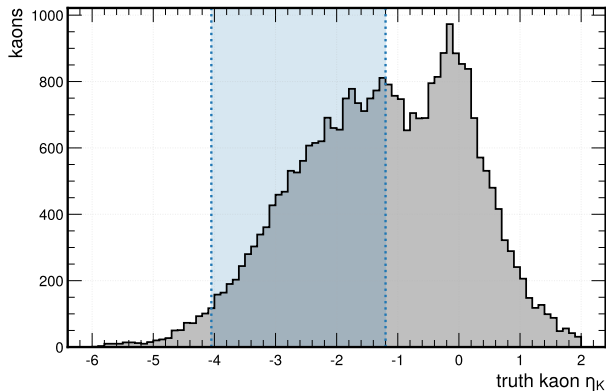
nHcal meeting — June 16, 2026

Goal & data

Data

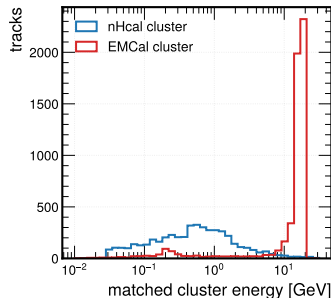
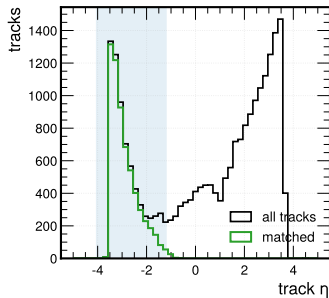
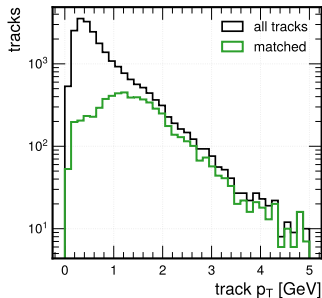
- Signal: 20 Sartre coherent $eAu \phi(1020) \rightarrow K^+ K^-$ files
RECO 25.10.2, $18 \times 110 \rightarrow 15,380$ truth ϕ
- Bkg: 10 Pythia8 NC DIS files
RECO 26.03.0, 18×275 , $Q^2 > 1 \rightarrow 30,825$ OS pairs
- epic_craterlake full Geant4 + EICrecon

Geometric acceptance of the nHcal

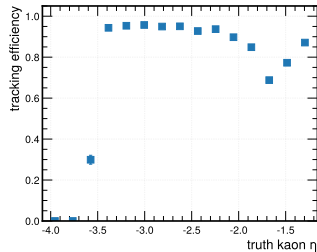
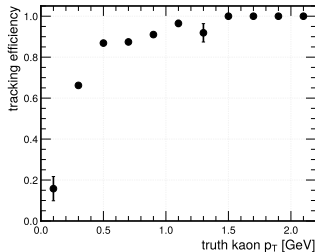


- 46.9% of kaons point into the nHcal η window.
- Per ϕ : 43.1% have *both* kaons in range.

QA

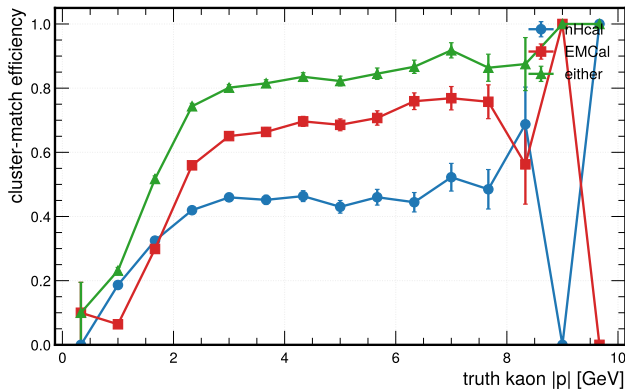


Tracking efficiency (kaons in nHcal η)



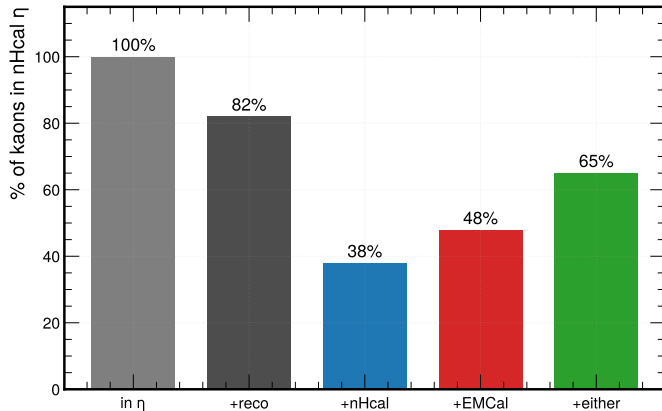
- Denominator: kaon truth η in nHcal window.
- Integrated **82.0%**; drops at low p_T .

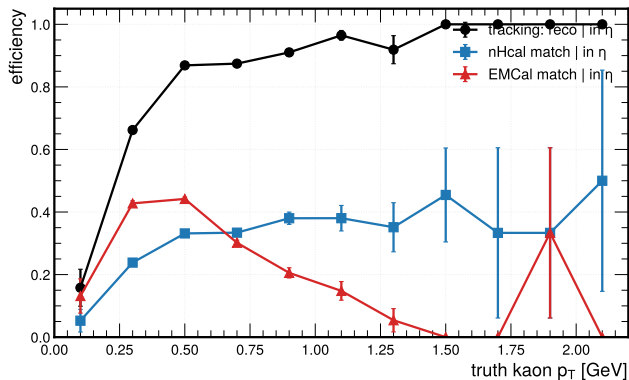
Cluster-match efficiency: nHcal vs EMCal



- Denominator: kaon in η & reconstructed.
- **nHcal 37.9%, EMCal 47.9%, either 65.0%.**

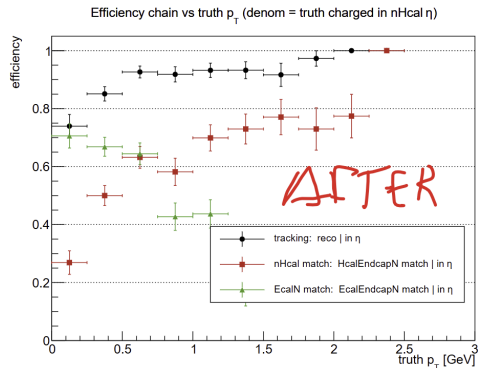
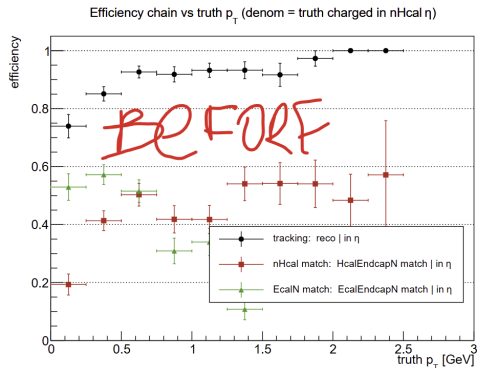
The per-kaon efficiency



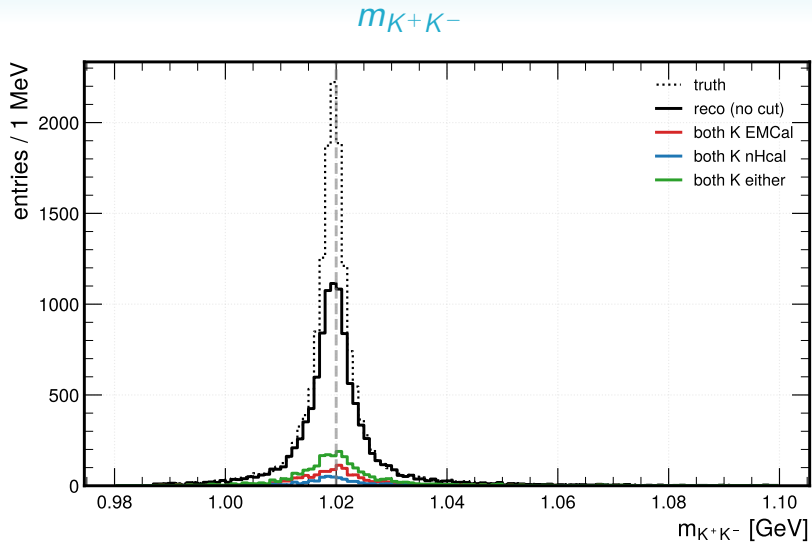
Efficiency vs kaon p_T 

- denominator = truth kaon in nHcal η .
- Tracking (black) up to $\sim 90\%$ for $p_T \gtrsim 0.5$ GeV.
- **EMCal** match peaks at low p_T and *falls* at high p_T ; **nHcal** match stays flatter

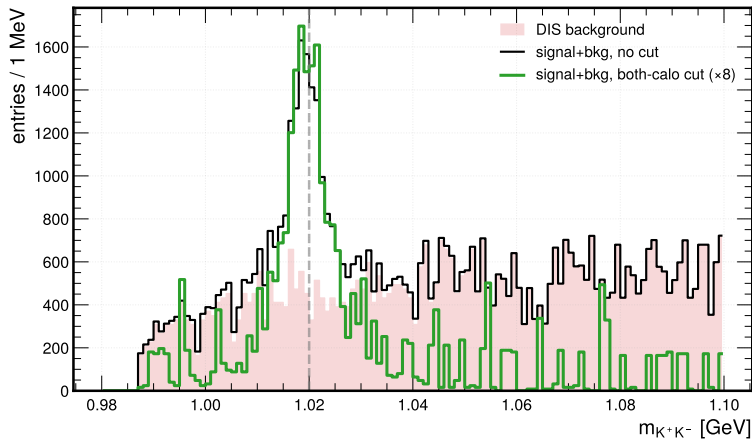
Bug in hungariam matching algorithm



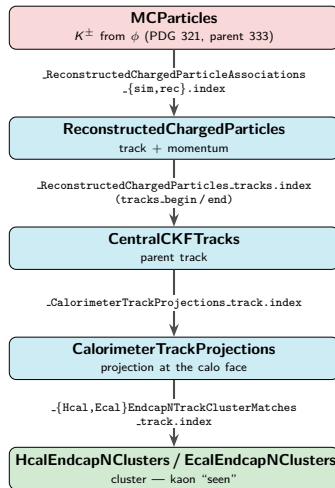
<https://github.com/eic/EICrecon/pull/2498>



SARTRE + Pythia8 DIS



How a kaon is matched to a backward-calo cluster



Match = the kaon's projection index appears in the calo's TrackClusterMatches