

Summary of muon performance

BB2 issue

- 5~10% efficiency drop at $p < 1.5$ GeV/c
- (Almost) no impact on the efficiency at $p > 1.5$ GeV/c

(Slow) efficiency degradation in exp26 data

- The efficiency drop mainly comes from the degradation in KLM
- MC15rd reflects the efficiency drop → Data/MC is stable

μ ID efficiency vs beam background level

- No clear dependency of time since injection
 - The efficiency drop in exp 26 data is not related to beam bkg?

θ dependency

- The efficiency drop appeared in the specific region.

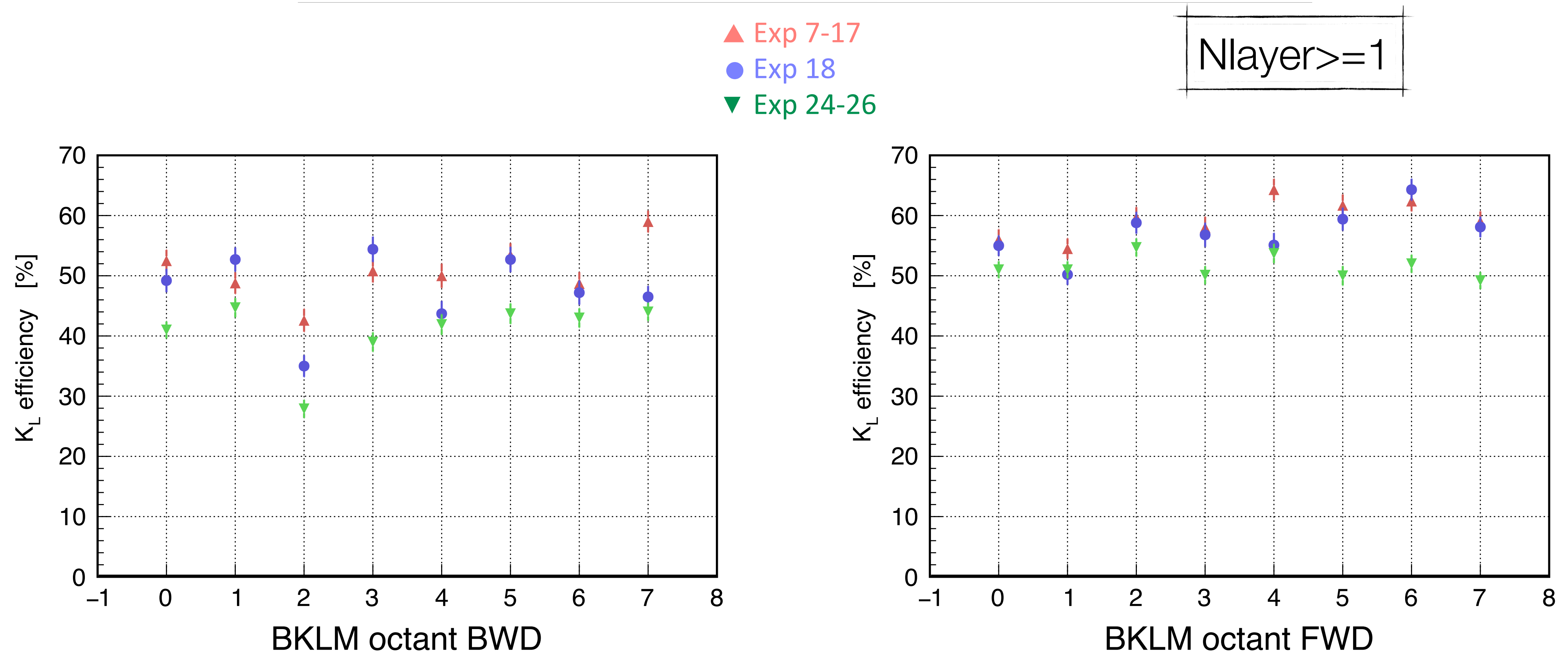
Summary of KL performance

- The phi-gamma sample provides a very effective sample to study the KLM performance for neutral hadrons. We investigated the KL detection efficiency in KLM for different data taking periods.
- BKLM: efficiency decrease vs. time in BB2 is apparent for hadronic showers, but the pattern seems common to the whole detector.
- BKLM: With current statistics it is hard to disentangle effects due to changes in scintillator and/or RPC performance in the KLM barrel.
- EKLM: average efficiency in EFW (~45%) smaller than in BF (~55%). More so since the momentum in the EKLM is larger. Small time-dependent efficiency changes if any.
- ECL: stable in time, data and MC agree at 10-15% level.
- **KL clusters observed in the detector are badly modelled in the Monte Carlo, where clusters start earlier, and are longitudinally more extended.**

Backup slides



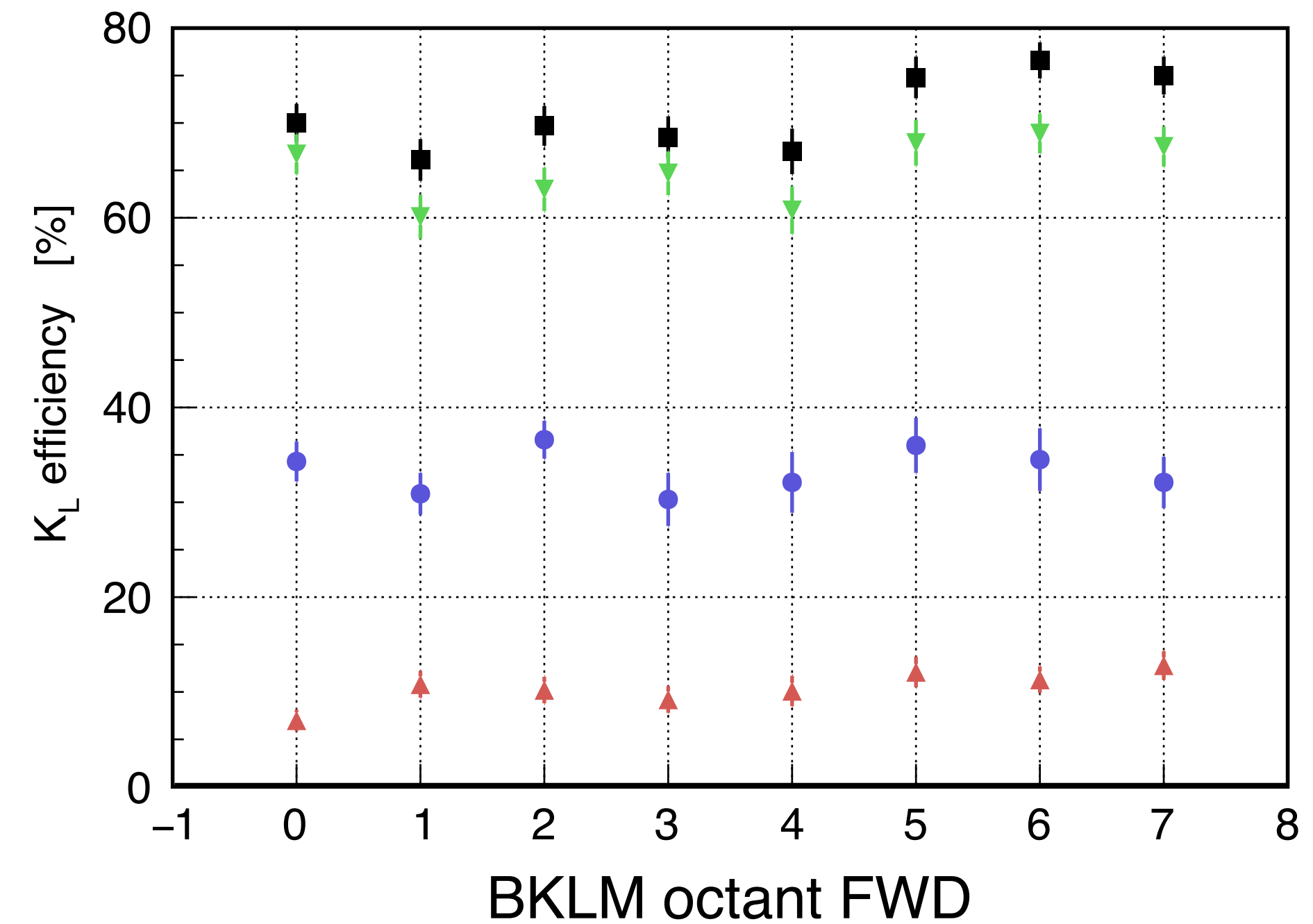
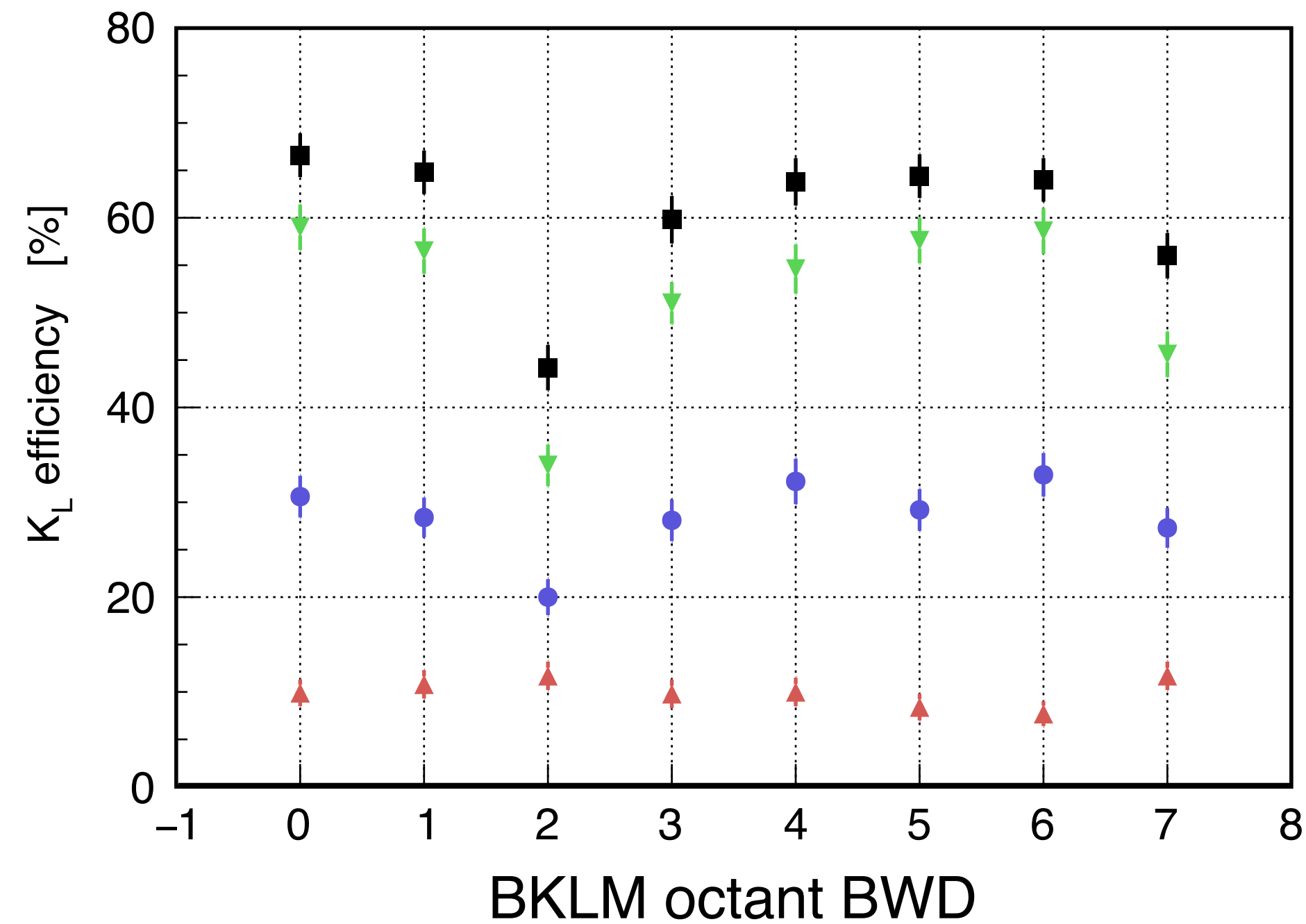
K_L efficiency in BKLM by octant



- Absolute efficiency decreases by about 20% requiring at least 2 layers in KLM clusters
- Inclusion of 1-layer KLM clusters if matched with an ECL cluster allows to recover about 10% absolute efficiency, with similar purity

K_L efficiency in BKLM — MC14rd

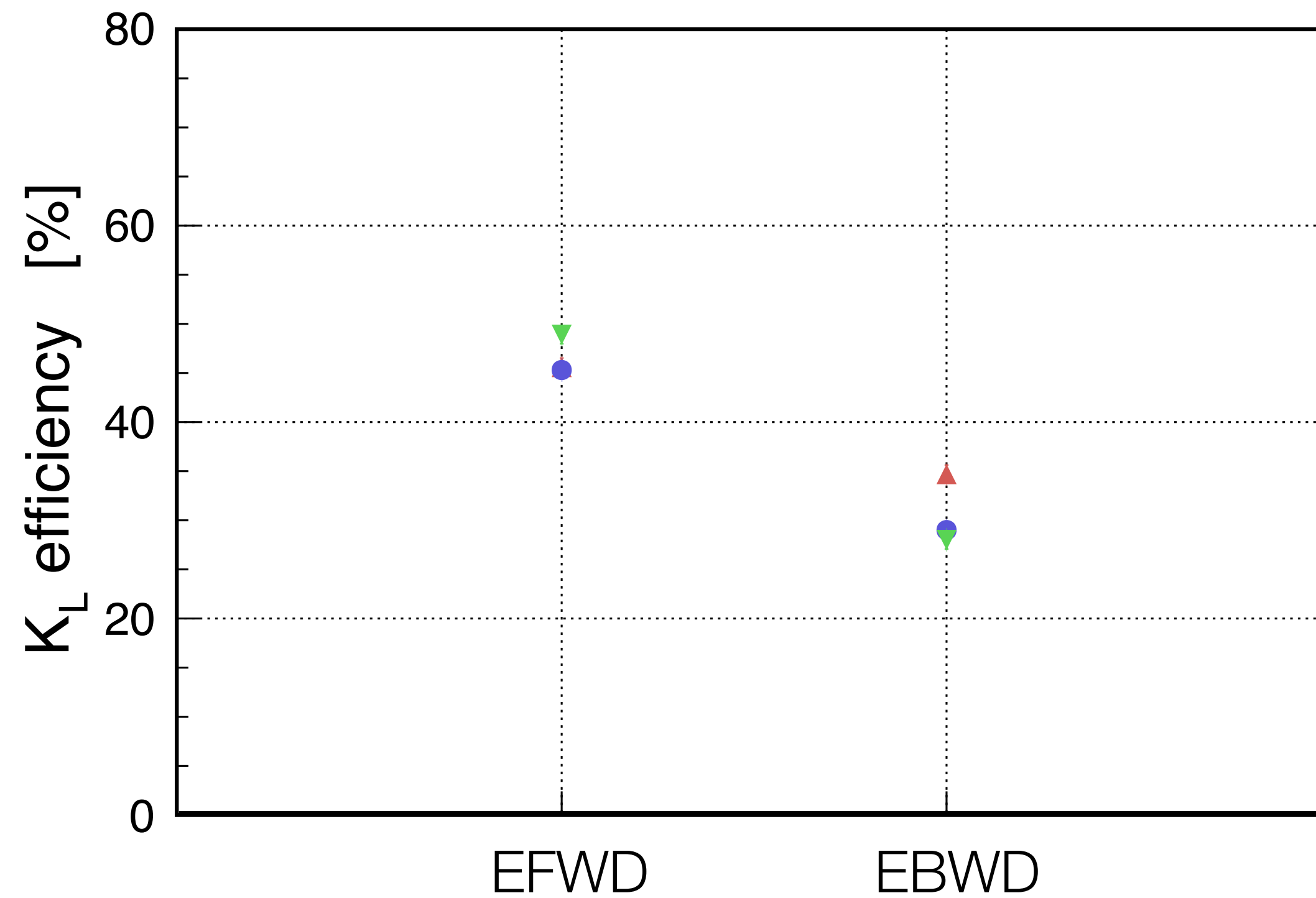
- All BKLM
- ▼ Starts in scintillators
- Scintillator only
- ▲ RPC only



- Fraction of RPC-only cluster is quite small in MC14 (correspondingly the scint. fraction is larger)

K_L efficiency in Endcap KLM

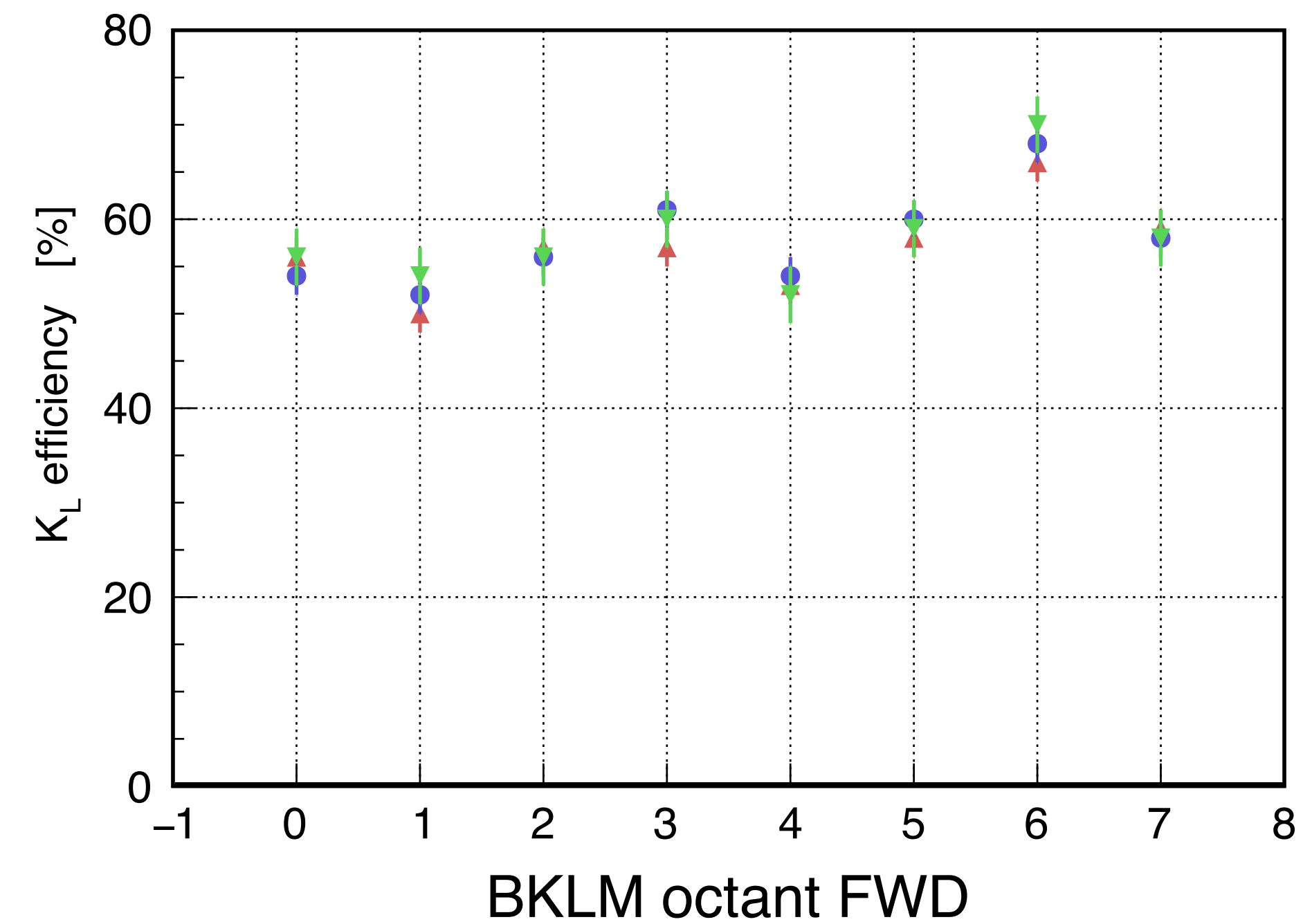
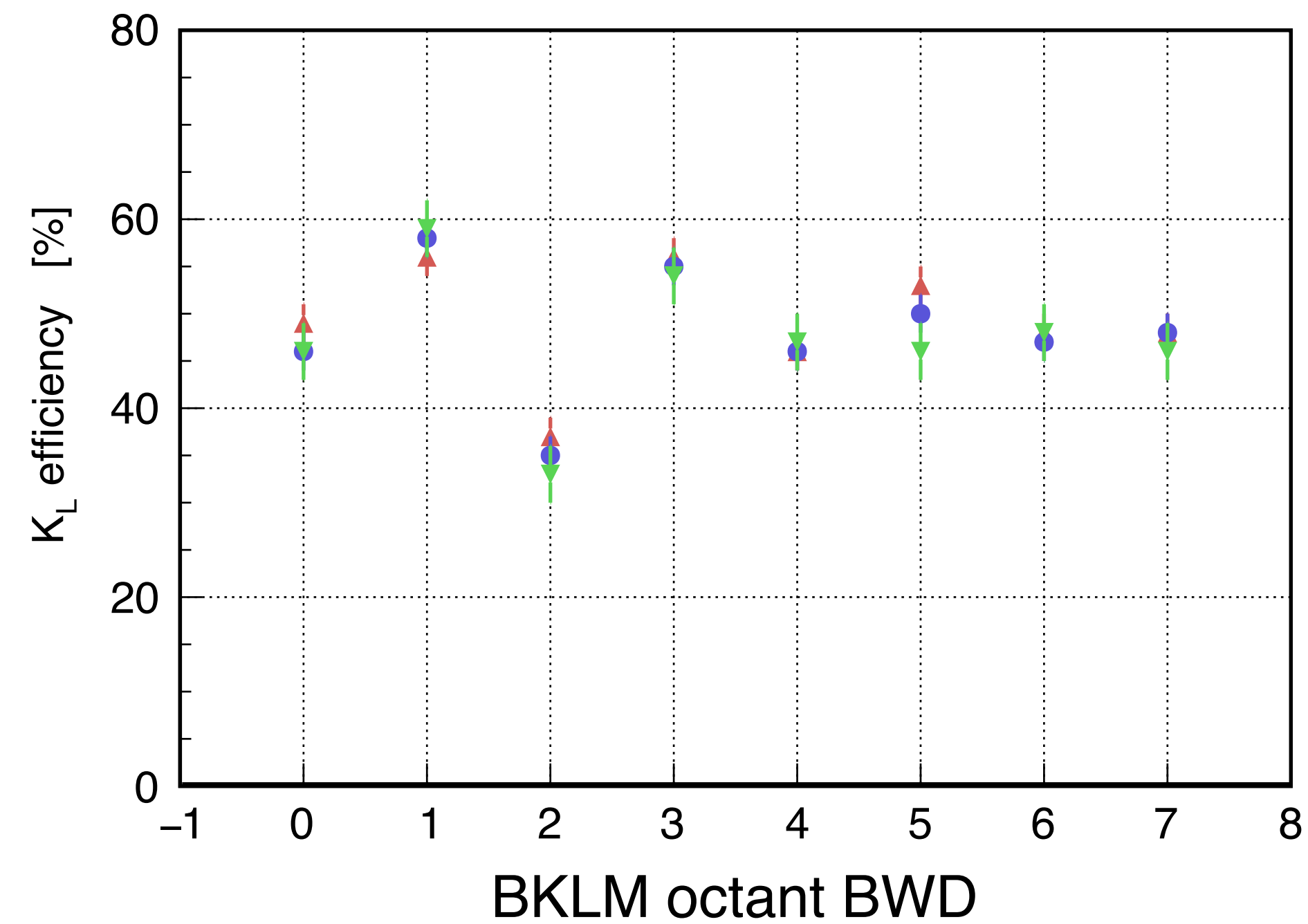
▲ Exp 7-17
● Exp 18
▼ Exp 24-26



- DATA vs experiment number — no visible change is observed

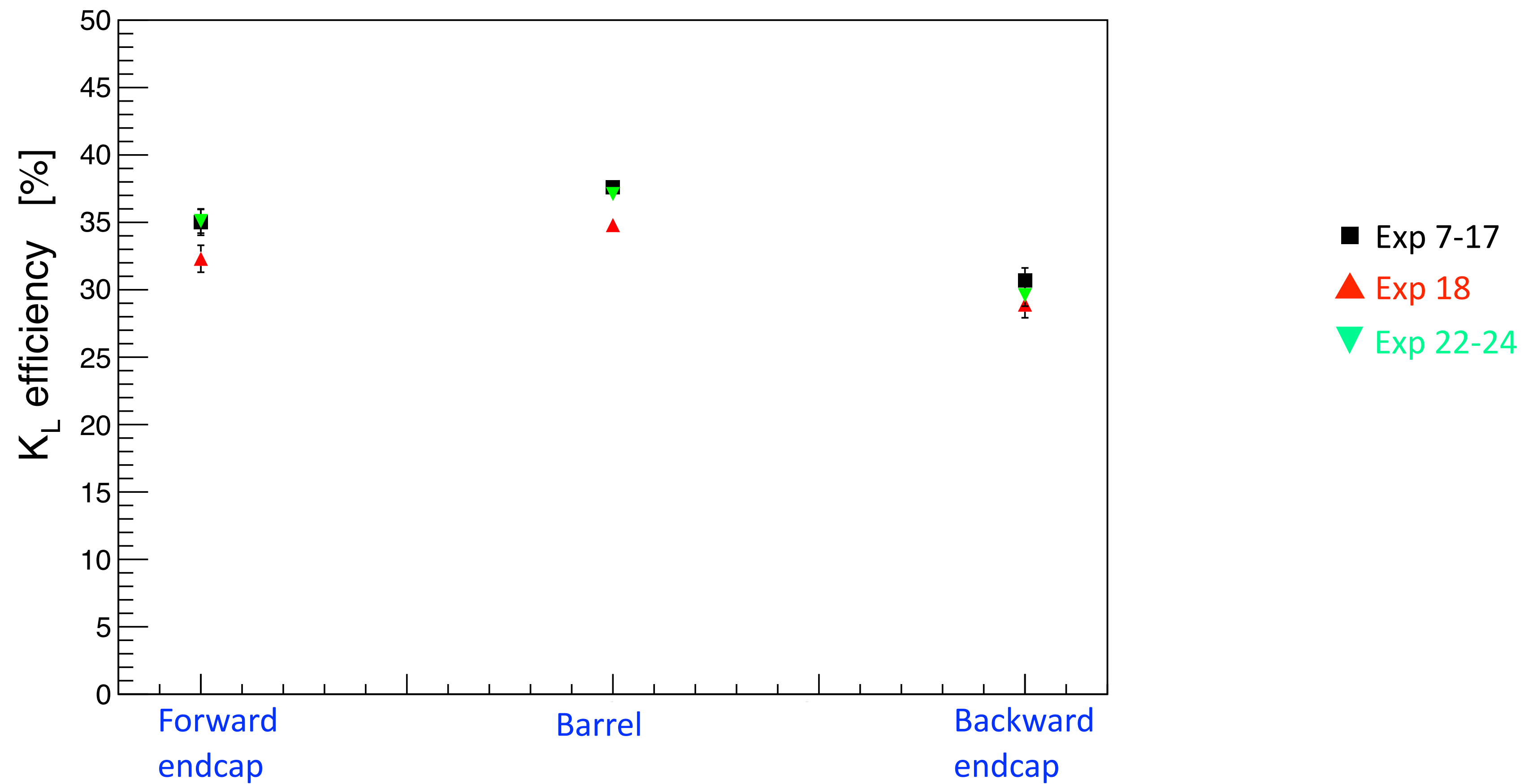
K_L efficiency in BKLM vs time since last injection

- ▲ Any timeSinceLastInjectionSignal
- ▼ timeSinceLastInjectionSignal < 50ms
- timeSinceLastInjectionSignal < 100ms



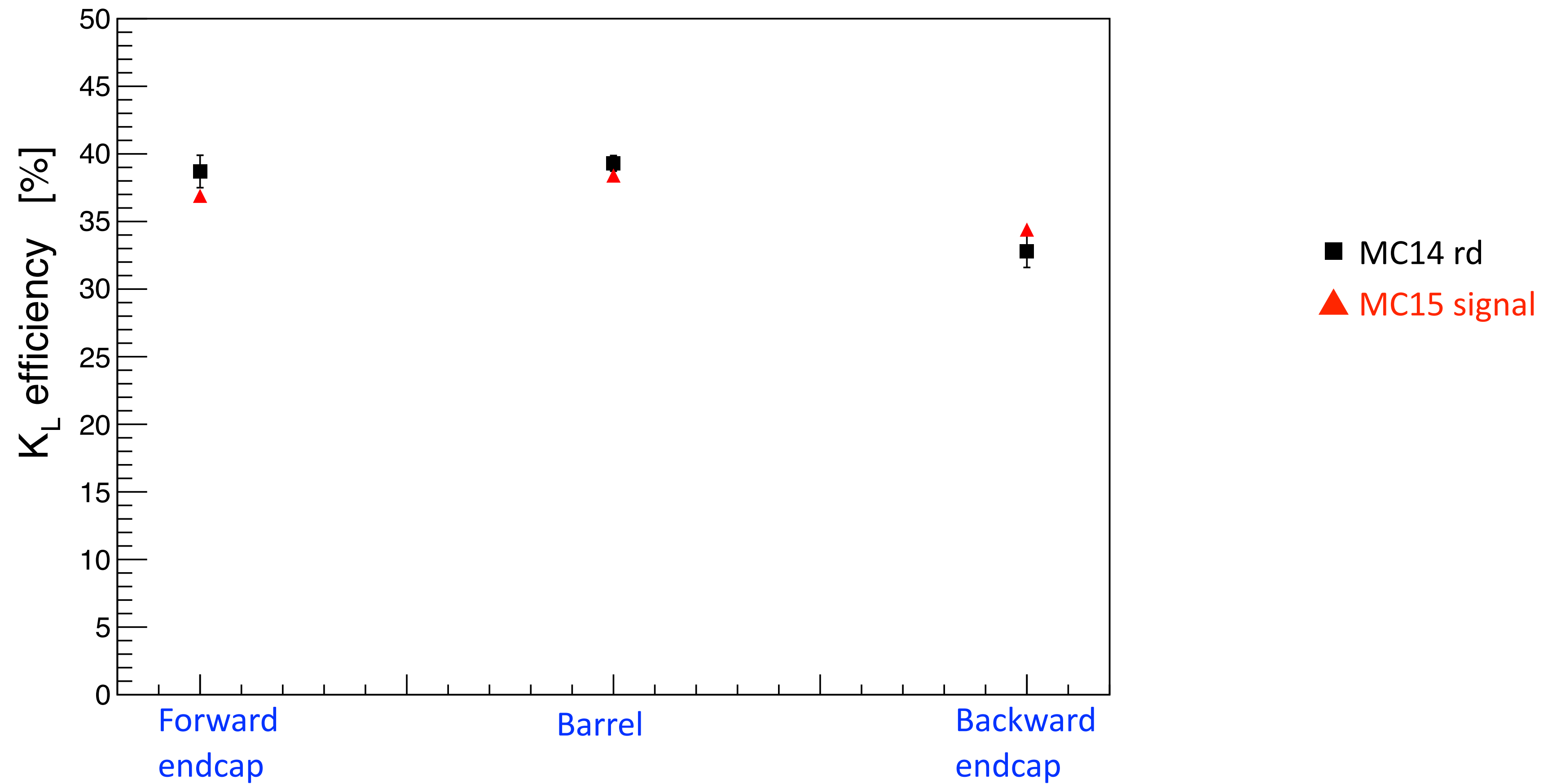
Interlude: K_L efficiency in ECL — data

$E_{\text{cluster}} \geq 0.5 \text{ GeV}$

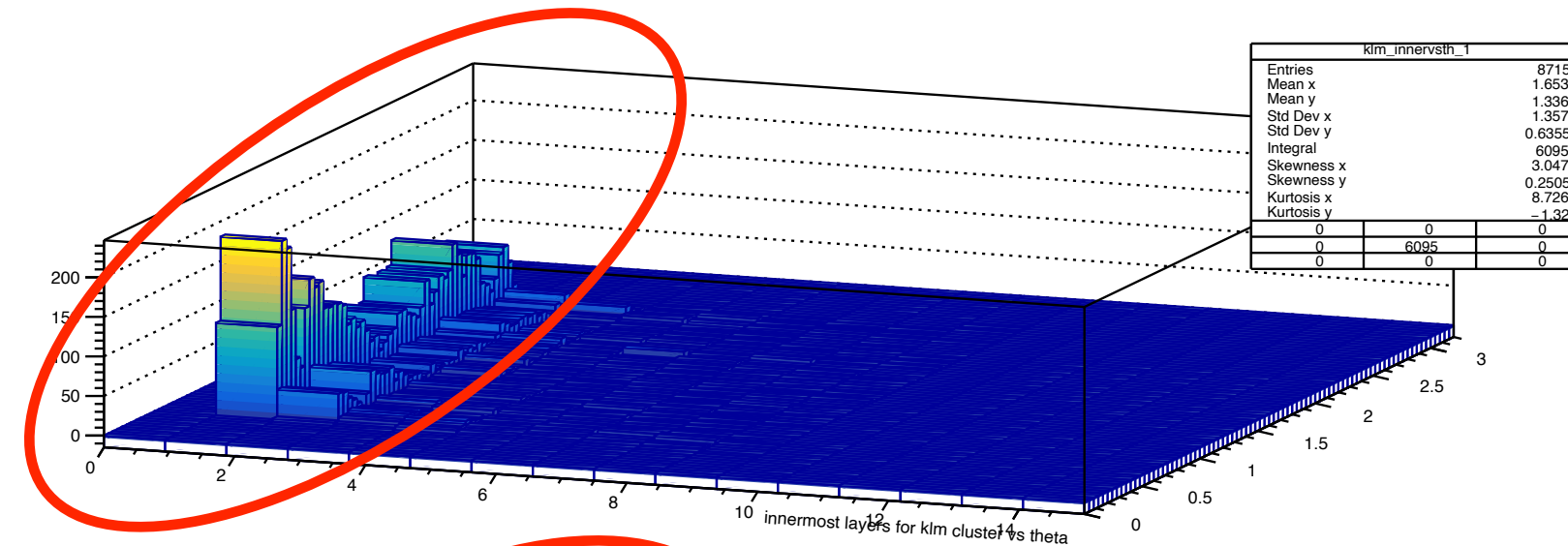


Interlude: K_L efficiency in ECL (signal MC)

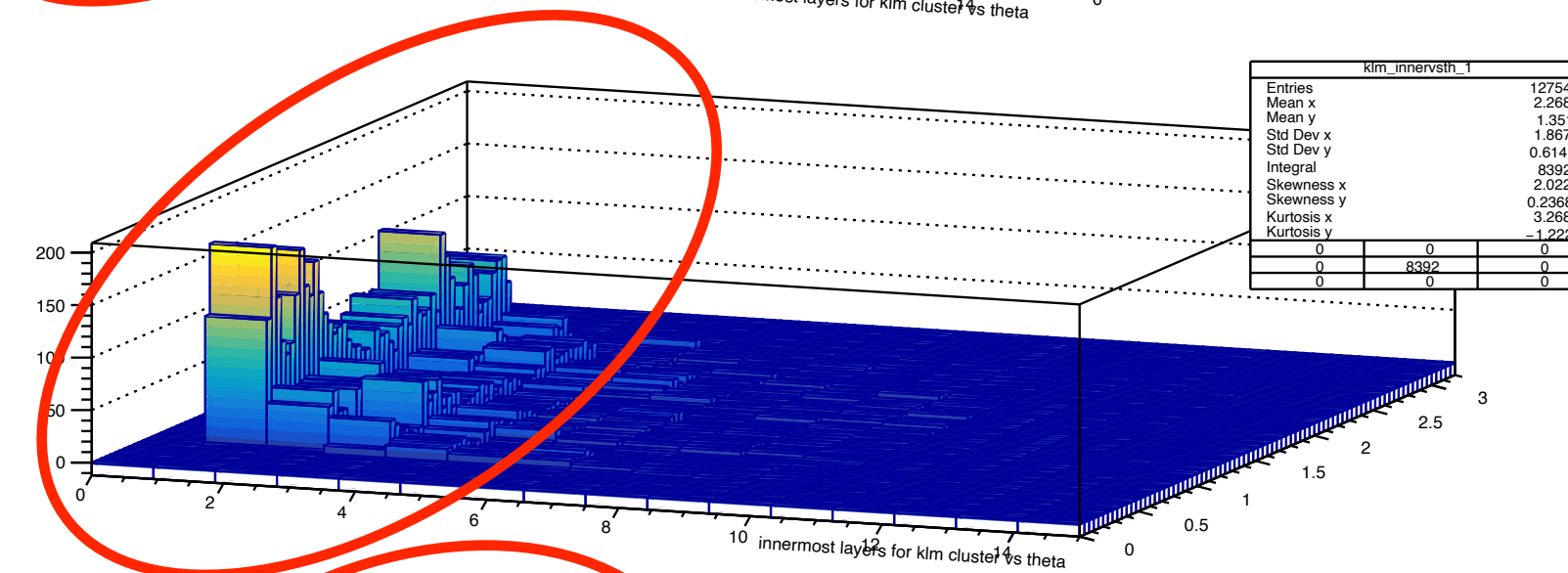
$E_{\text{cluster}} \geq 0.5 \text{ GeV}$



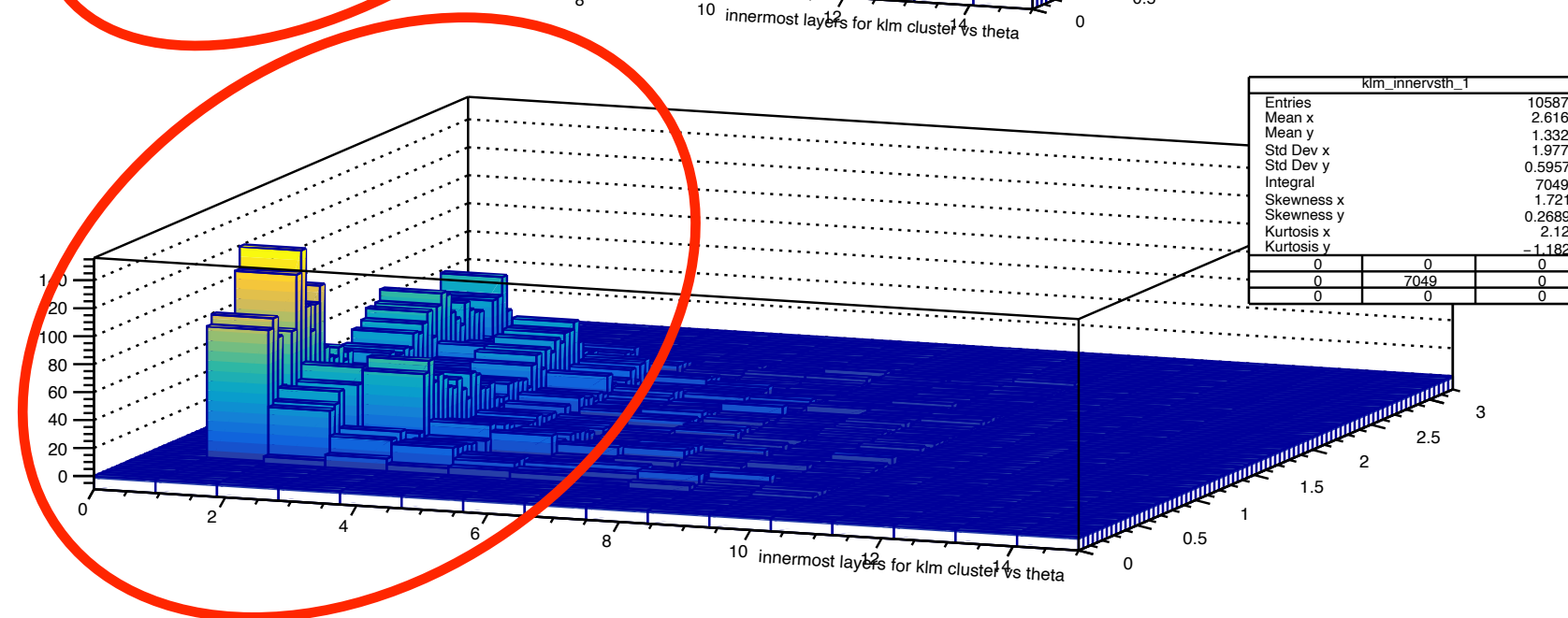
First cluster layer vs θ for MC and data



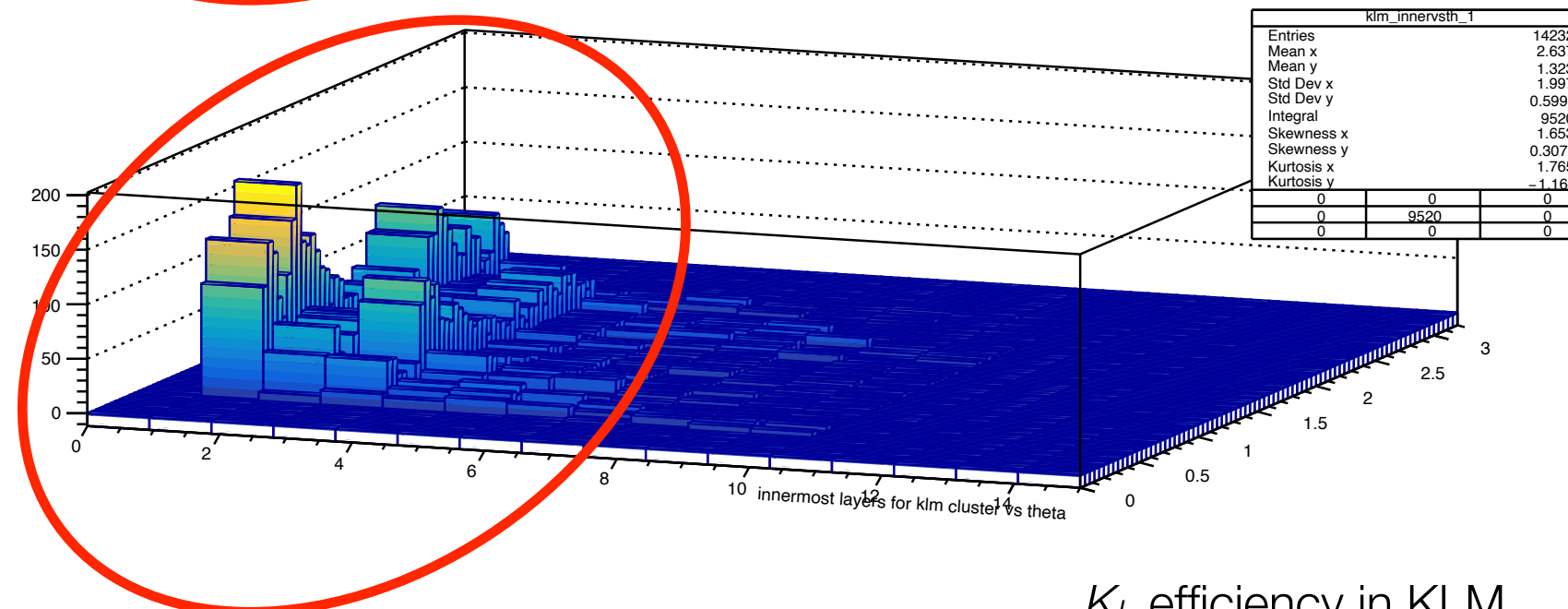
MC exp18



DATA exp7-17



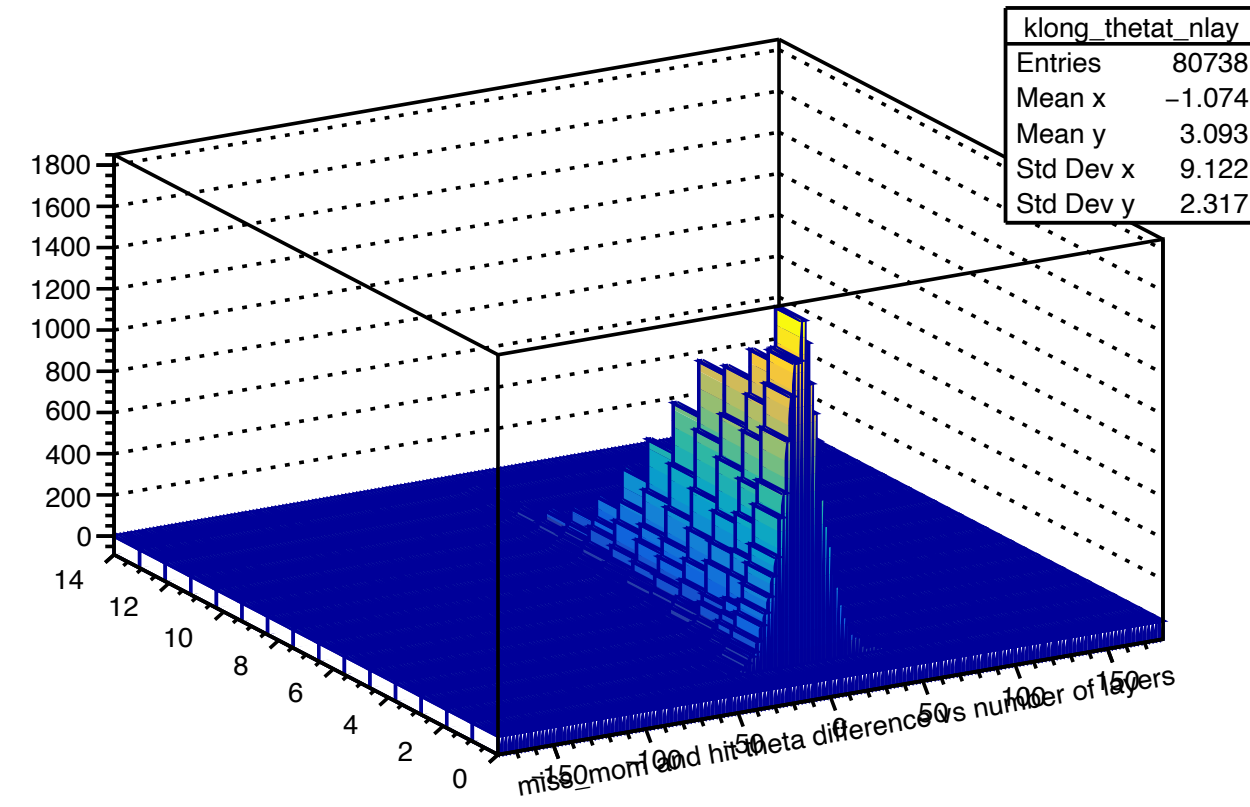
DATA exp18



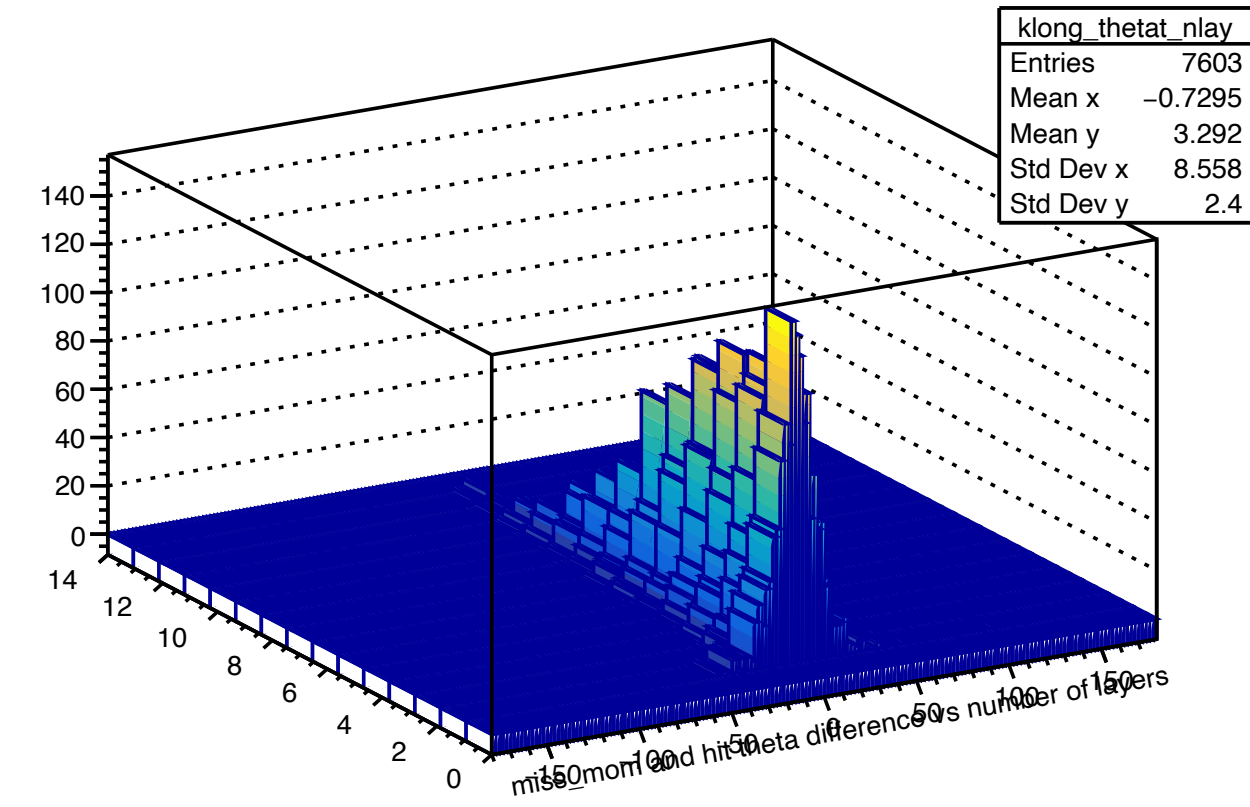
DATA exp24-26

N layer vs $\Delta\theta$ for MC and data

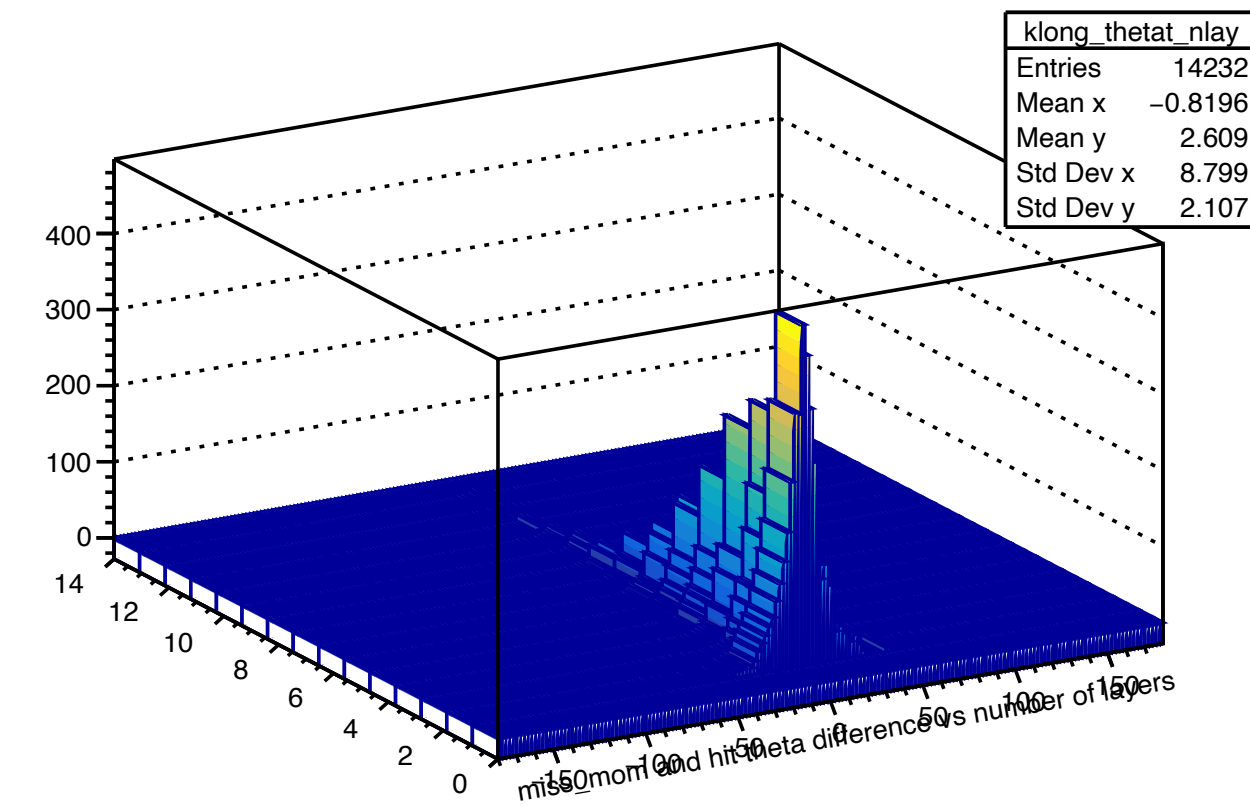
MC 15ri



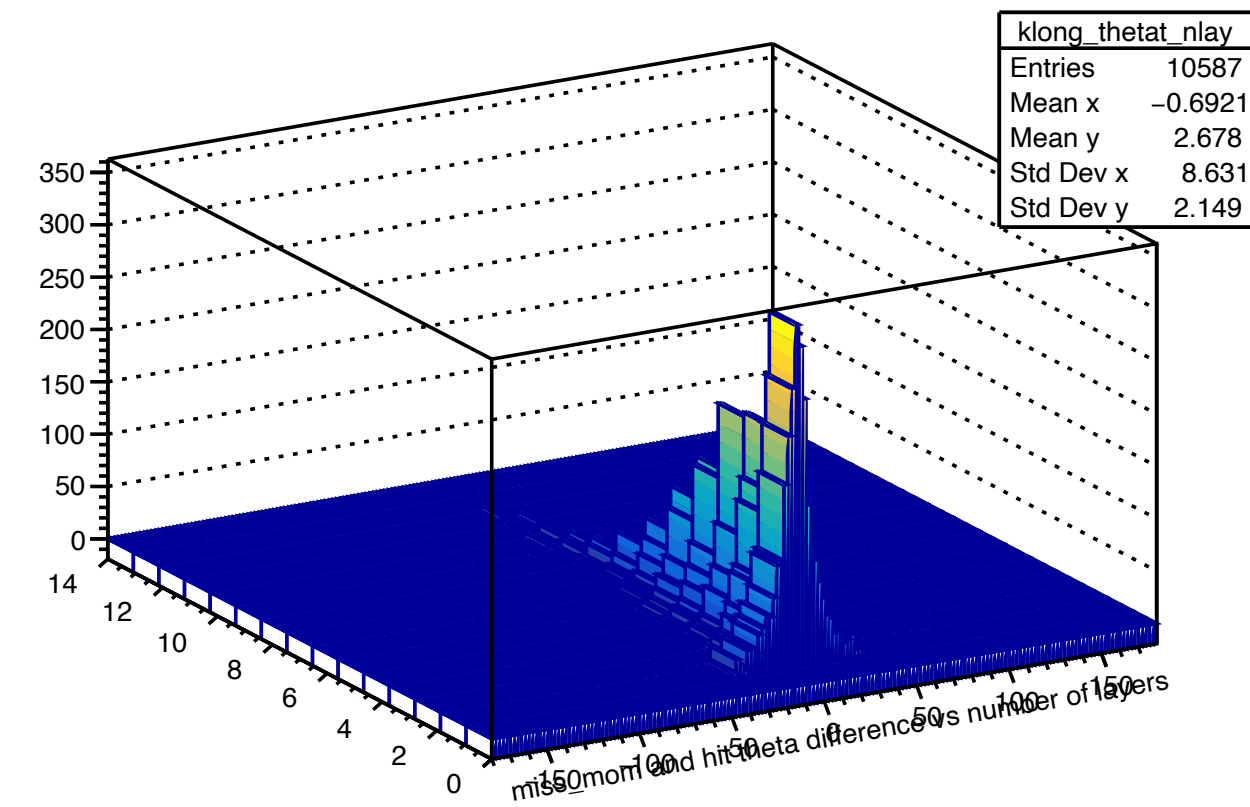
MC 14rd



DATA exp24-26



DATA exp18



- No bias of cluster position for different number of layers in MC, nor in data
- Consistently, clusters in MC are significantly longer than in DATA