

BIB muons updates

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Last time: muon oversampling

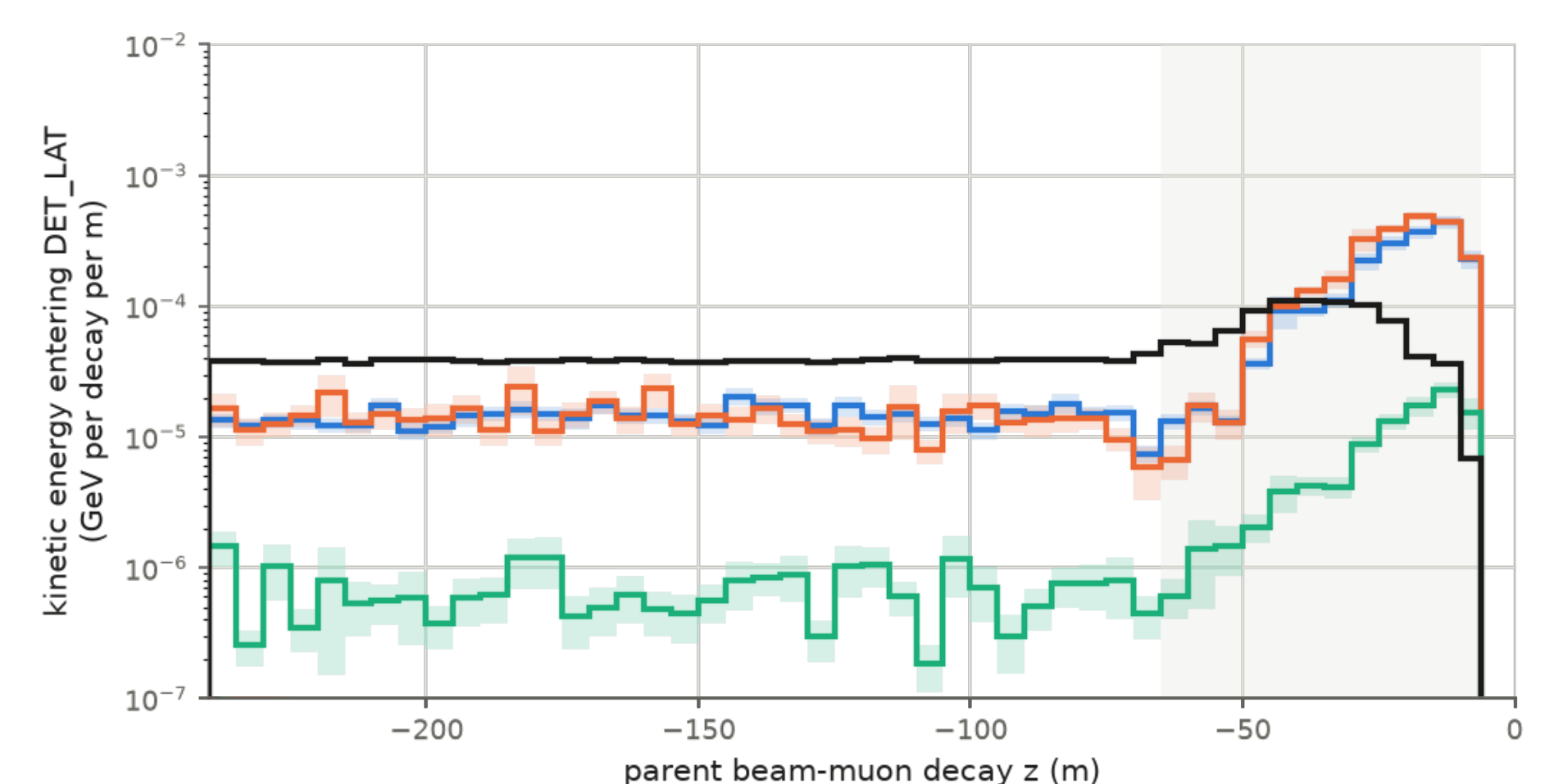
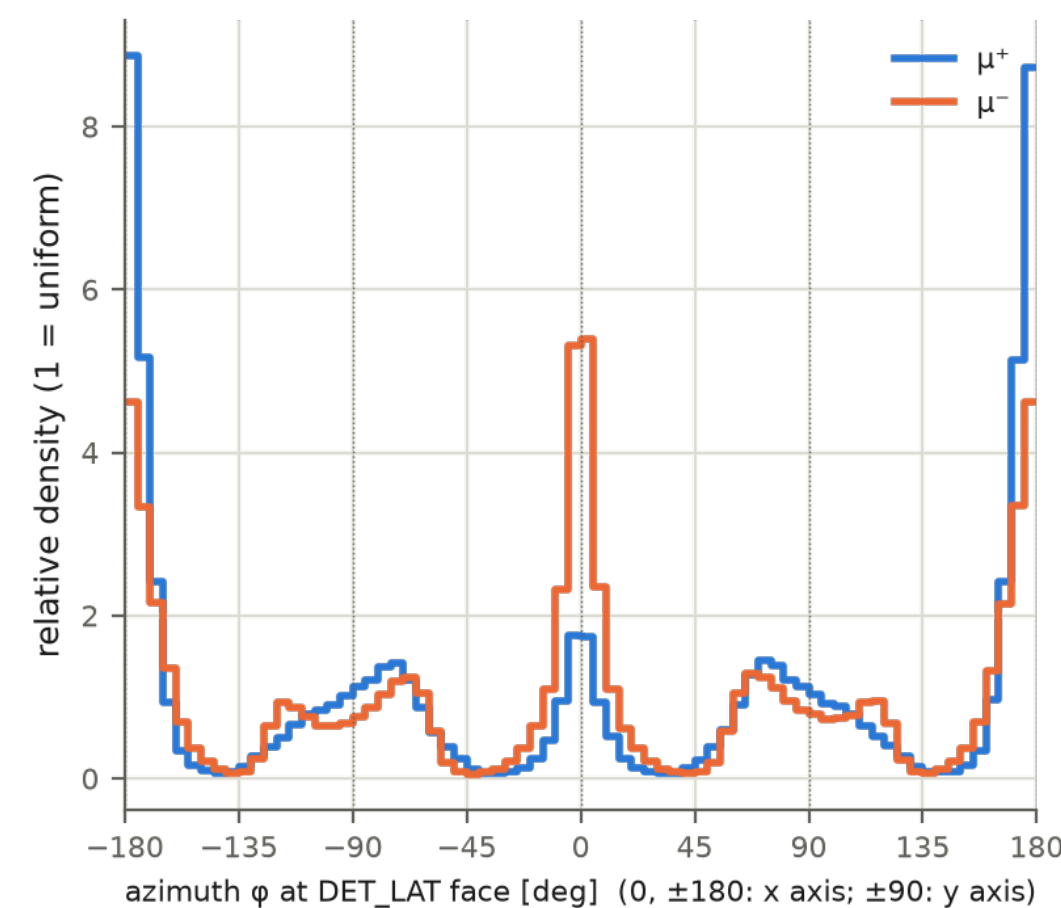
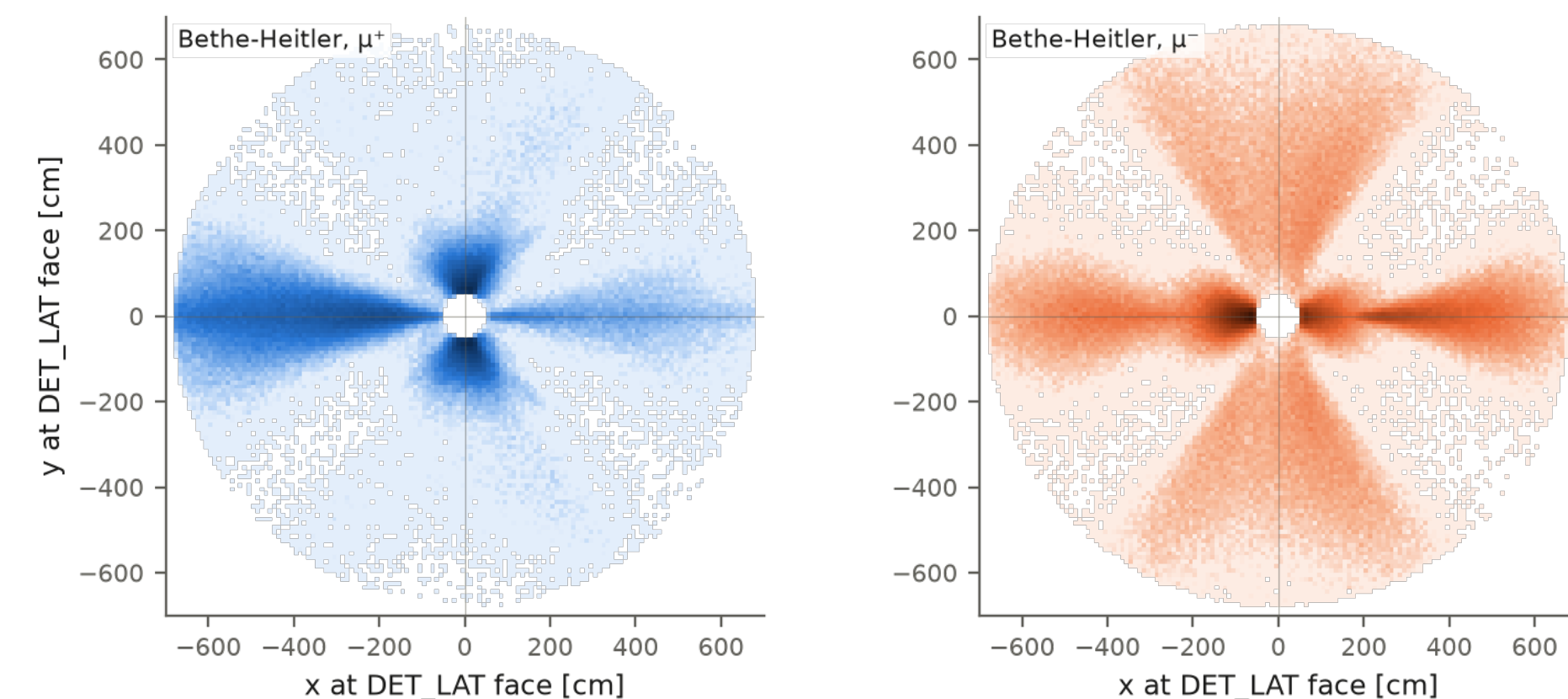
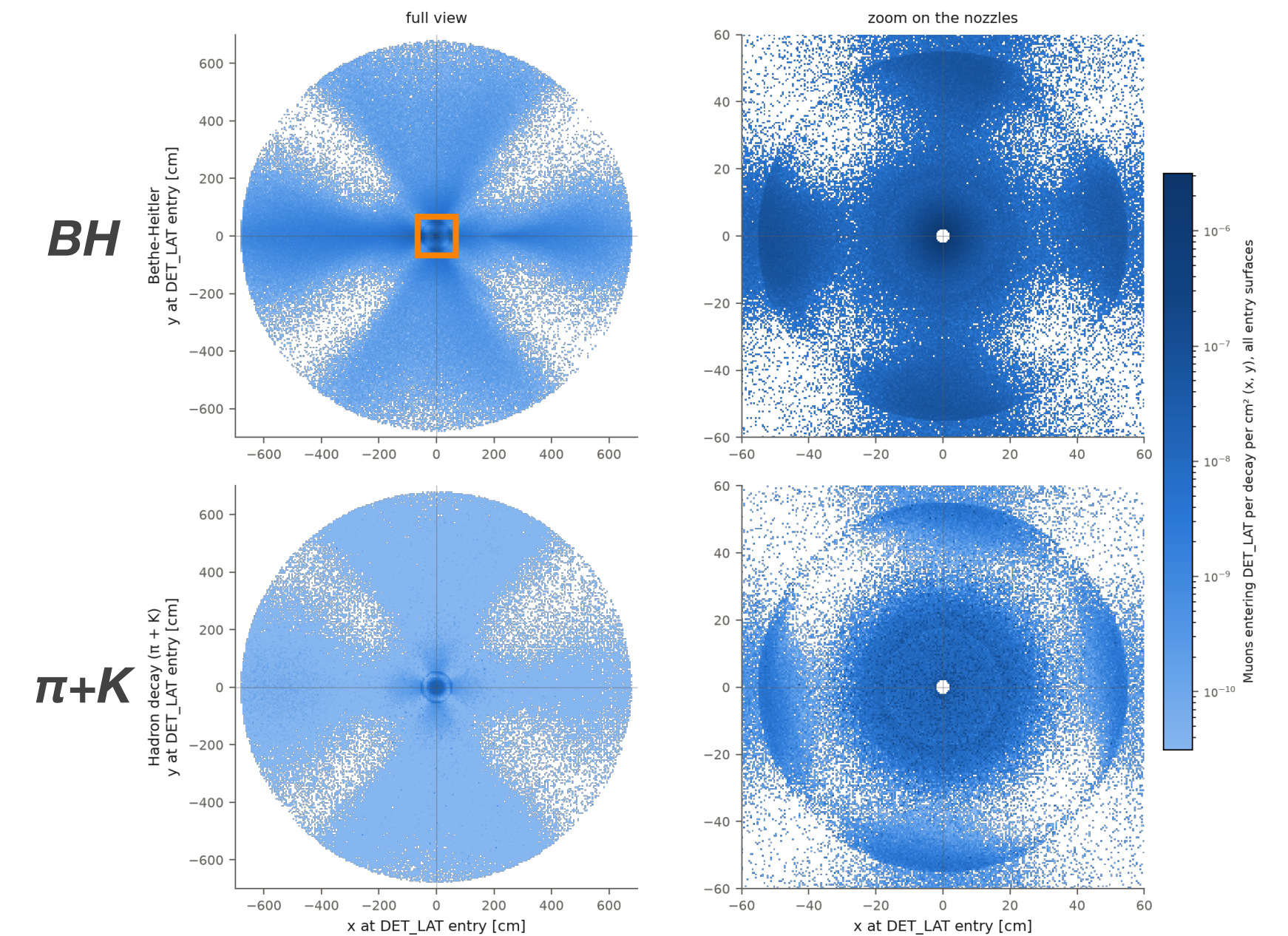


BIB muons recap

- Bethe-Heitler process + meson decay muons produce outsize impacts in detector but are undersampled in BIB sim
- Rotate+replicate method manufactures stats but erases asymmetries

BIB factorizability + optimization

- Can we create a physically “true” sample that is comprised of separately-produced muon and non-muon components?
- Do we need the non-muon component simulated out to $z=-240$?
 - i.e. are the needs of a detector reco pipeline the same as an irradiation study?



Optimizing BIB simulation



Treating upstream decays to make BIB cheaper

- Divide beamline into regions upstream and downstream (inclusive) of the chicane
- Take a slice of the upstream region and simulate all (non-muon) particles in that slice
- Weight particles in slice by $w = f_{\text{up}}/N_S$ where
 - f_{up} is the path fraction
 - N_S is the number of decays simulated in slice
- Consider 20m slice and choose z_{cut} to define upstream region →
- Provenance study shows certain things never reach the detector... → implement kill mode
 - SR photons at $z \leq -10\text{m}$
 - Decay $e^\pm$ showers in chicane

How much cheaper?

- Combining region slicing + muon biased sampling...

