10 TeV MC SI Hit Analysis

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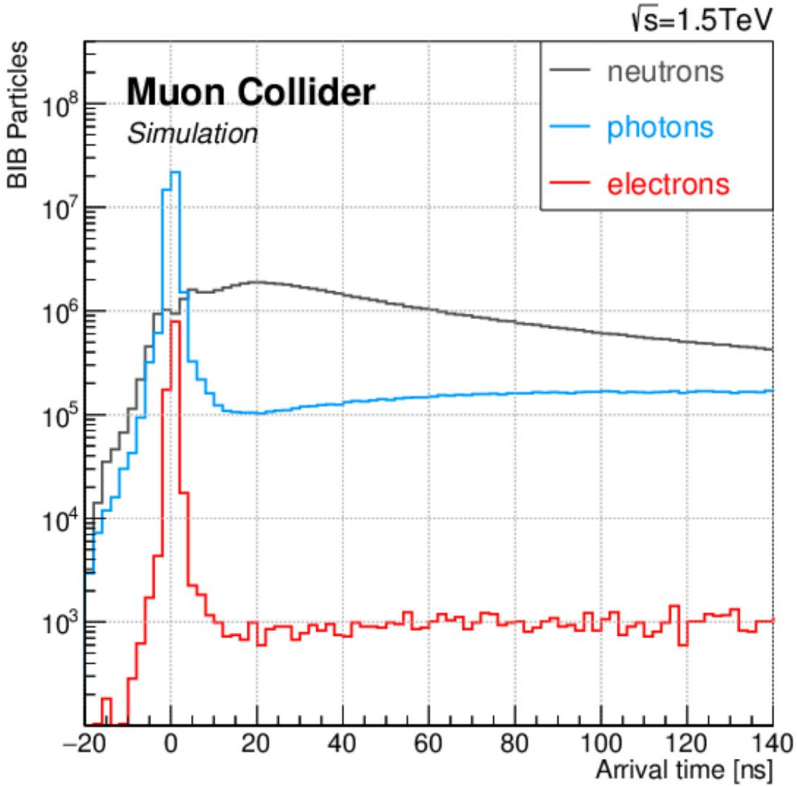
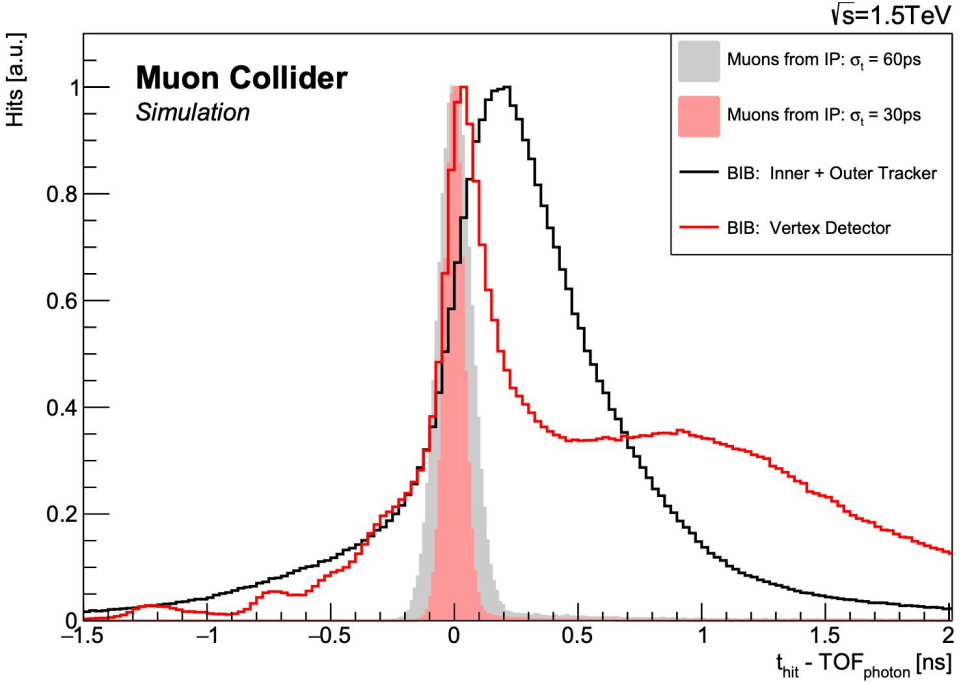
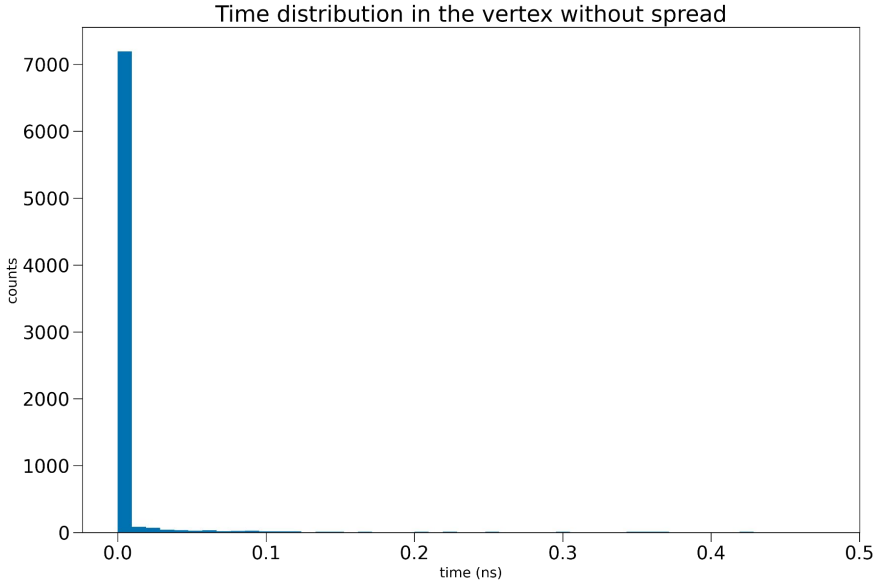
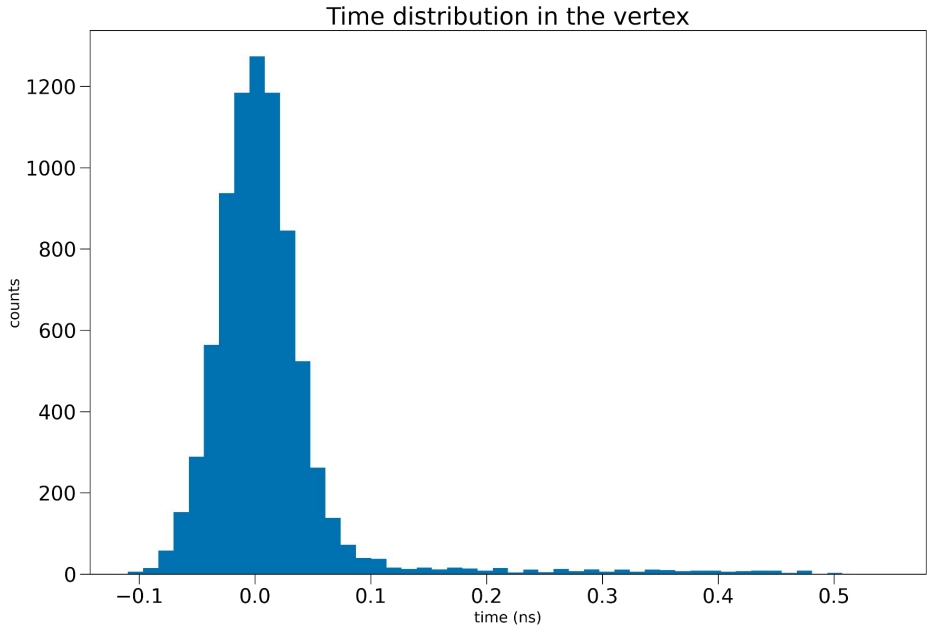
Previous work with 1.5 TeV muon collider simulations



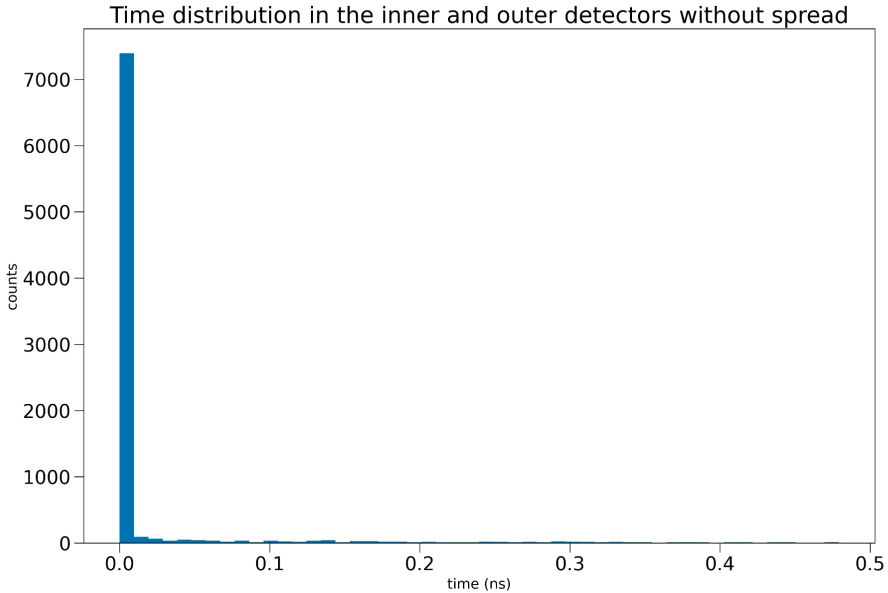


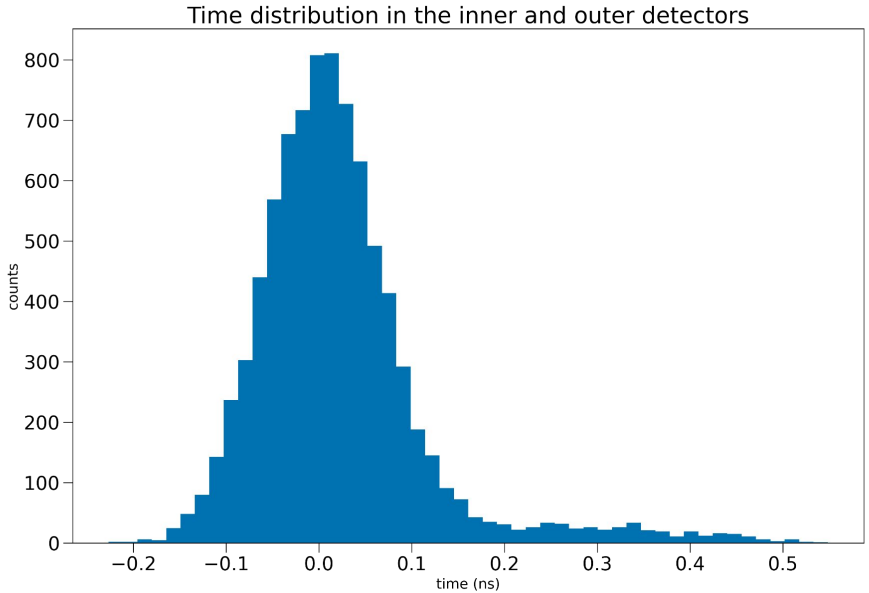
Truth muon hits in the vertex



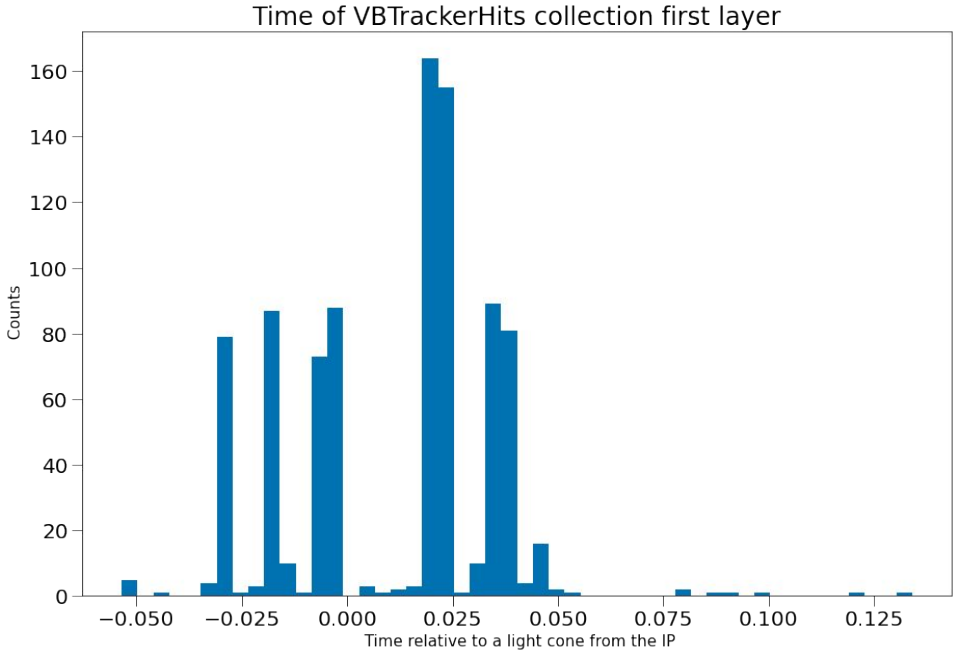


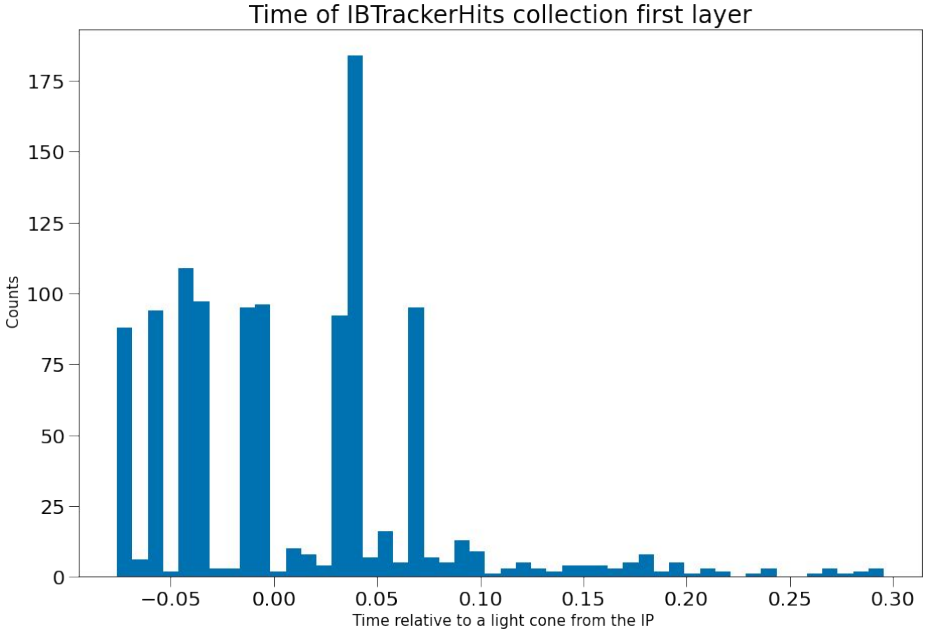
Truth muon hits in the inner and outer detector



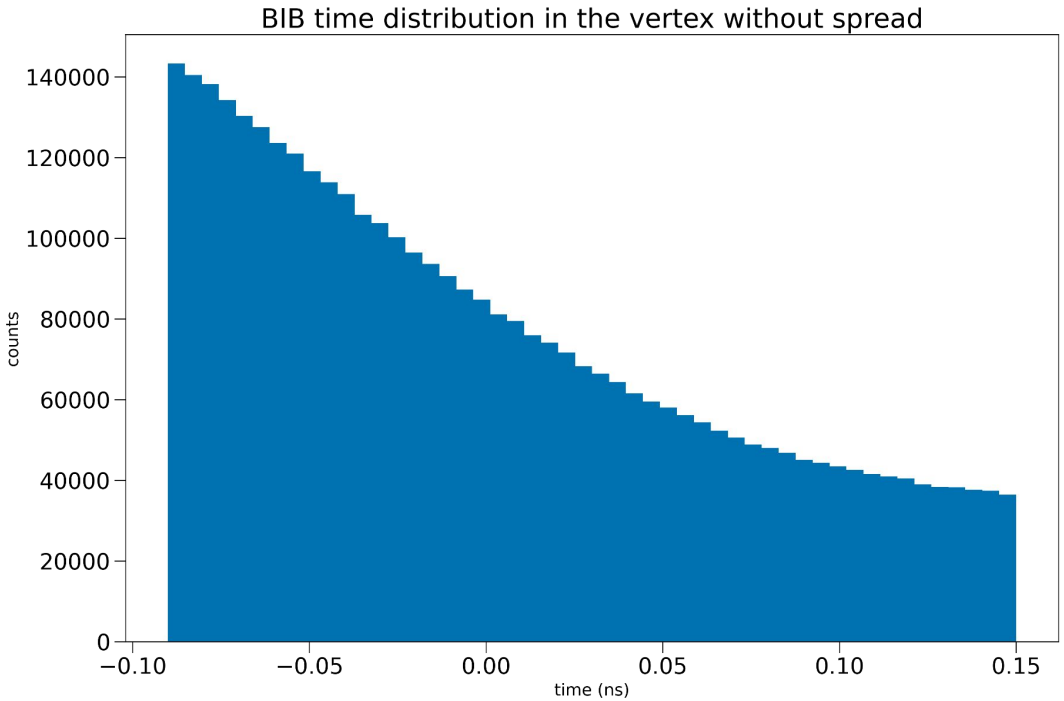


__TrackerHits Time Distribution

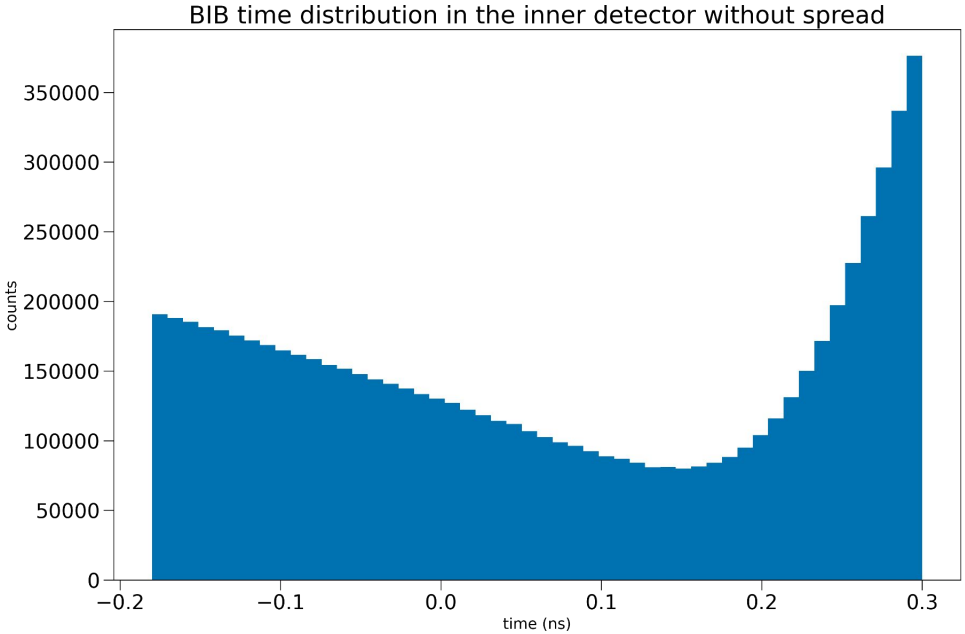


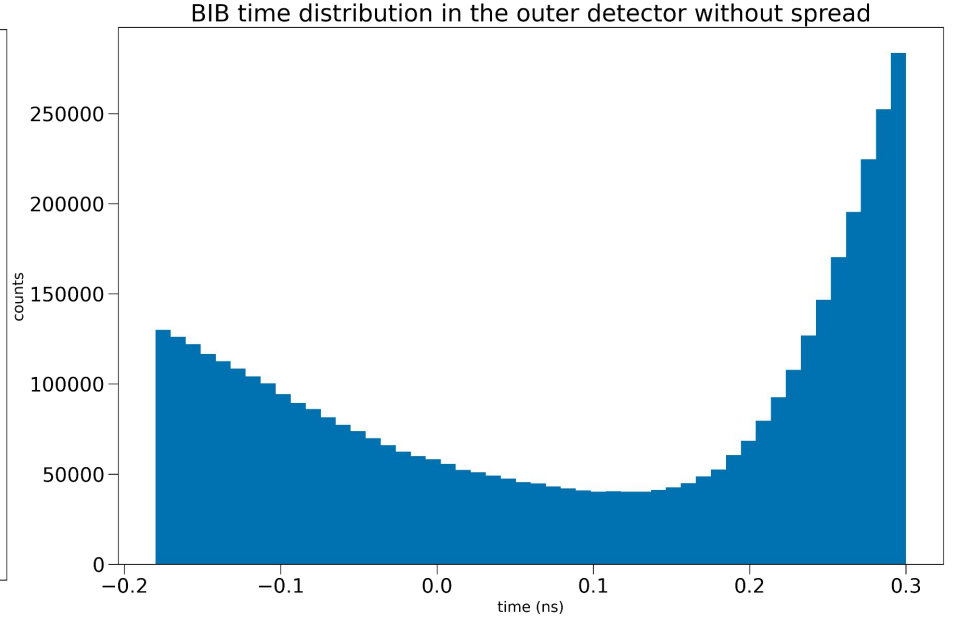


BIB in the vertex



BIB in the inner and outer detector

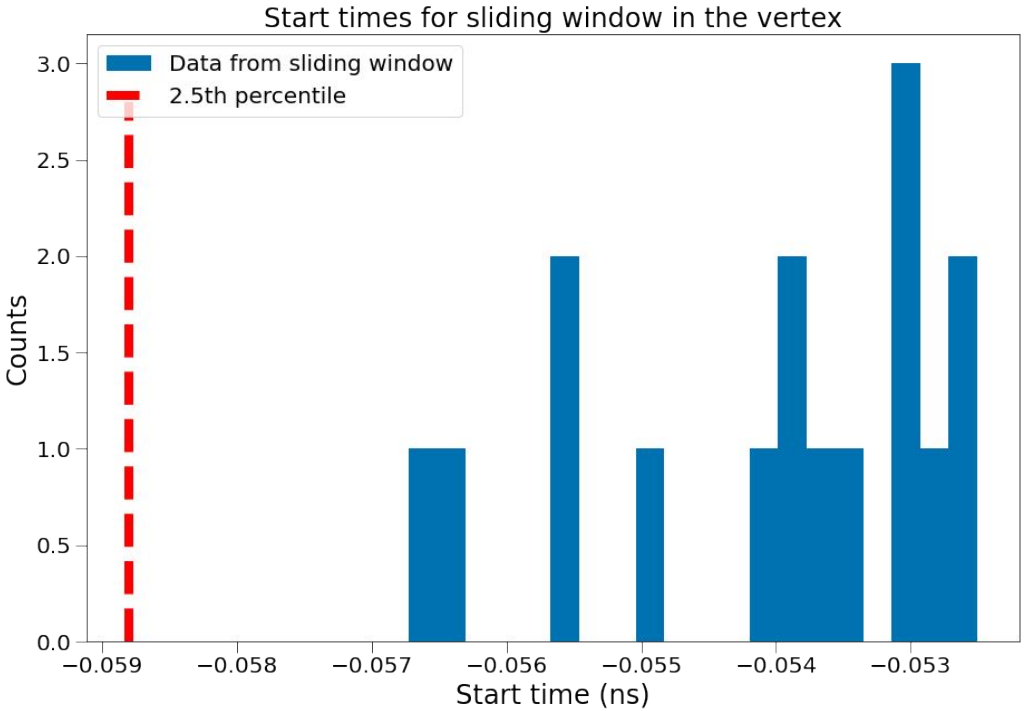




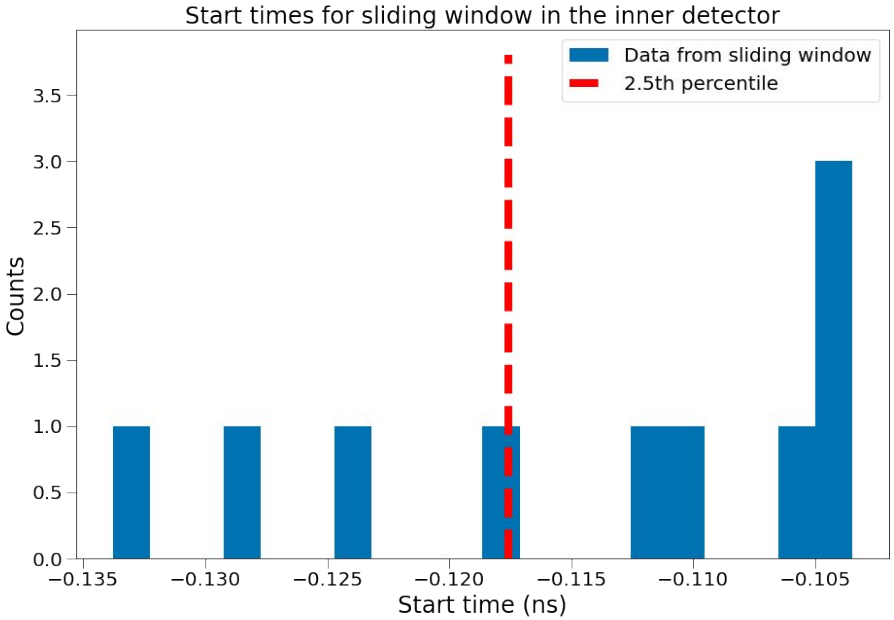
Sliding window analysis

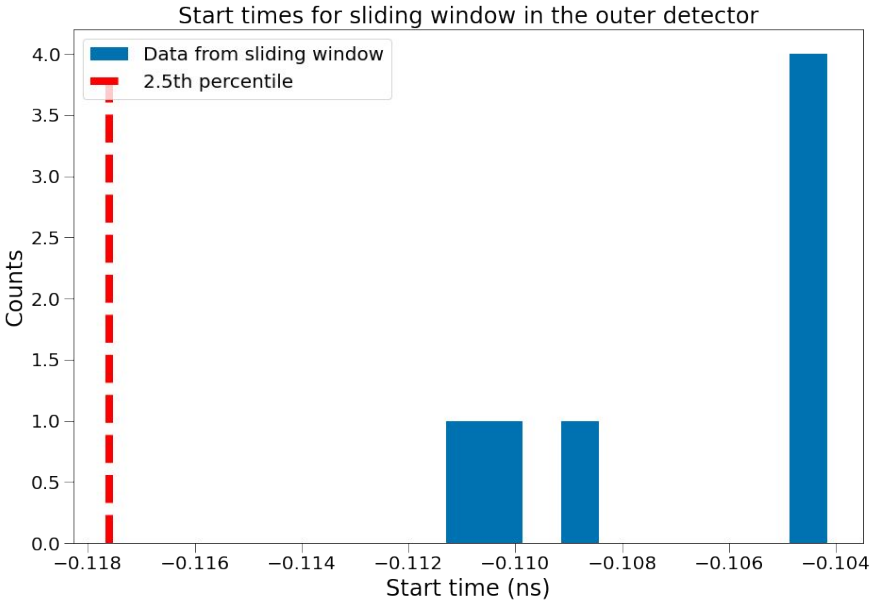
- Assumes gaussian distributions in time of 30 ps for vertex hits, and 60 ps for inner and outer detector hits–both centered on zero.
- Analyzes 200 windows for 95% signal efficiency and 40 windows for 80%, 90%, and 99%
- Windows are uniformly spread in start percentile from the minimum to maximum window locations
- Examples for 95% windows: 0.2%-95.2%, 0.4%-95.6%,... 4.6%-99.8%
- Recorded window with maximum BIB reduction for each layer in each detector

Windows temporal spread in the vertex for 95% S.E.

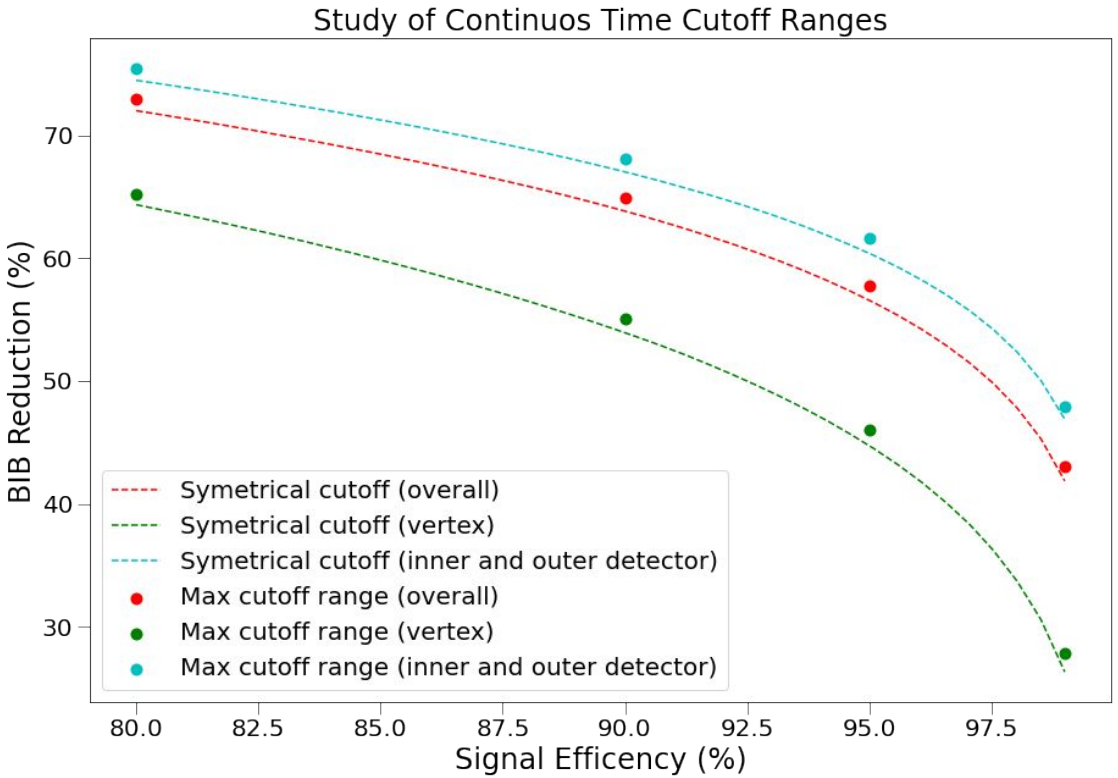


Windows temporal spread in the inner and outer detectors for 95% S.E.





Overall results for sliding window analysis vs symmetrical



Signal Efficiency	Symmetrical BIB Reduction	Sliding Window BIB Reduction
80%	71.99%	72.92%
90%	63.82%	64.92%
95%	56.56%	57.77%
99%	41.86%	43.04%
99.7%	31.92%	33.25%

Takeaways and next steps

- Time cutoffs can produce large reductions in the BIB at a small cost
- Sliding windows can produce BIB reductions ~1.2% higher than symmetrical windows
- BIB is reduced most in the inner and outer detectors
- More analysis should be done to find the optimal trade off between signal efficiency and BIB reduction
- Hits for MC particles other than muons have not been accounted for