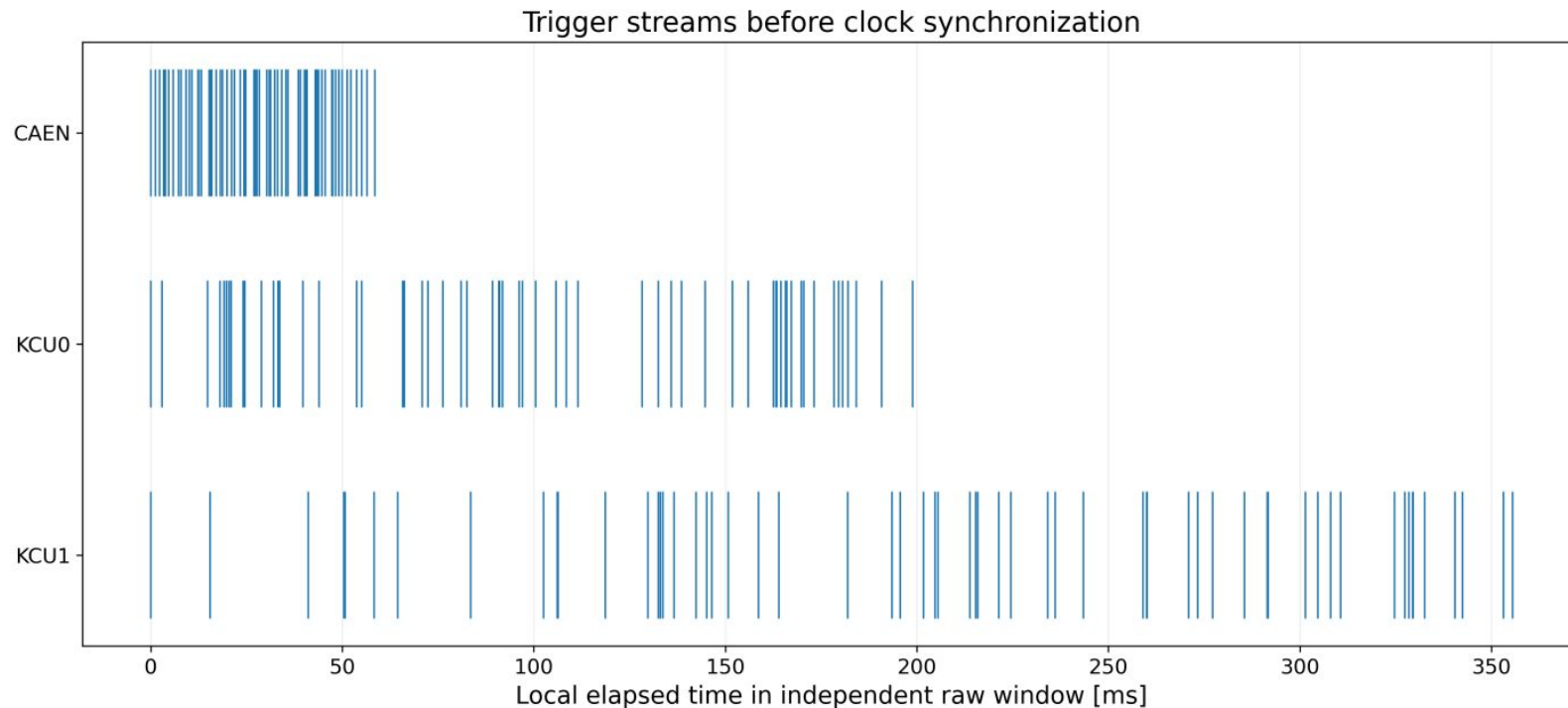
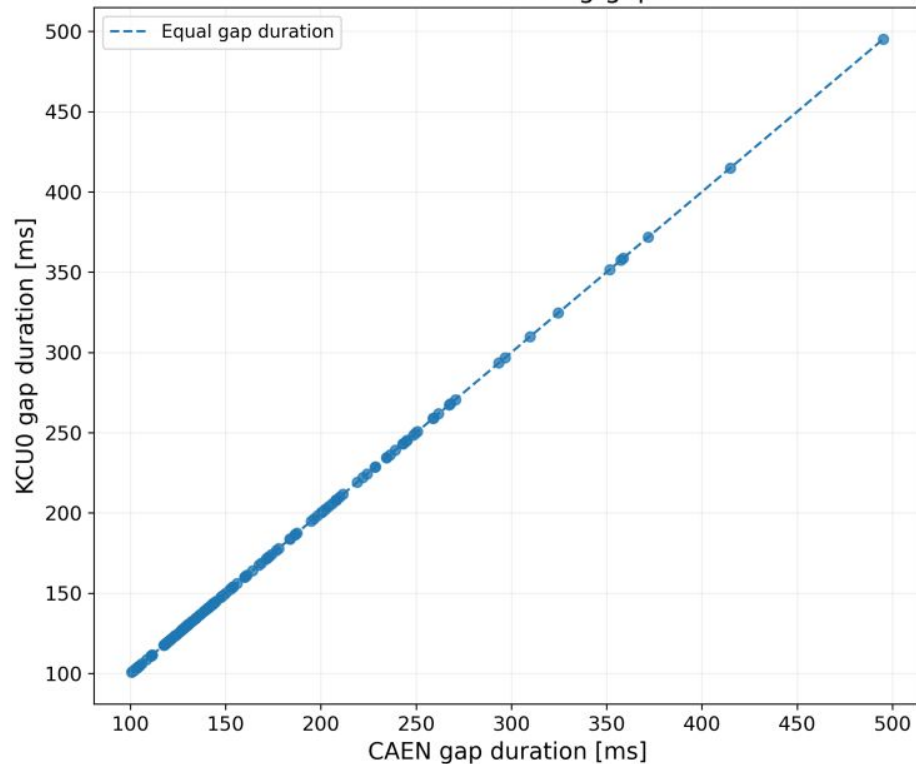




Direct event-by-event matching is not possible.

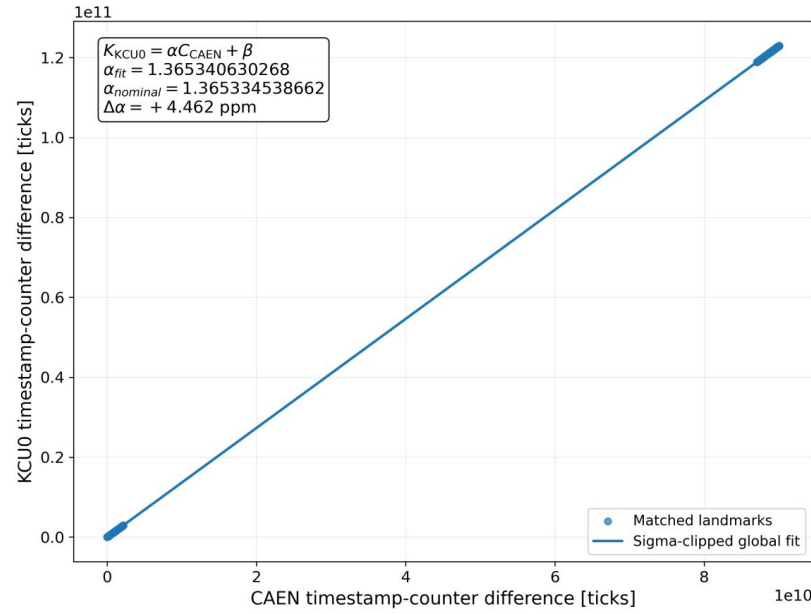
The CAEN and HGCROC use independent timestamp counters. Therefore, first synchronize CAEN with KCU0 and then use KCU0 as a bridge to KCU1, and finally construct a common three-stream event sample.

CAEN → KCU0: matched long-gap landmarks



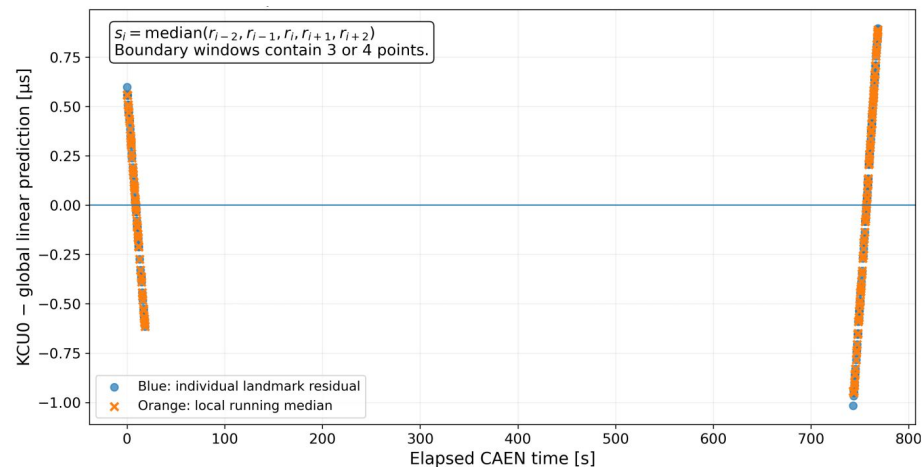
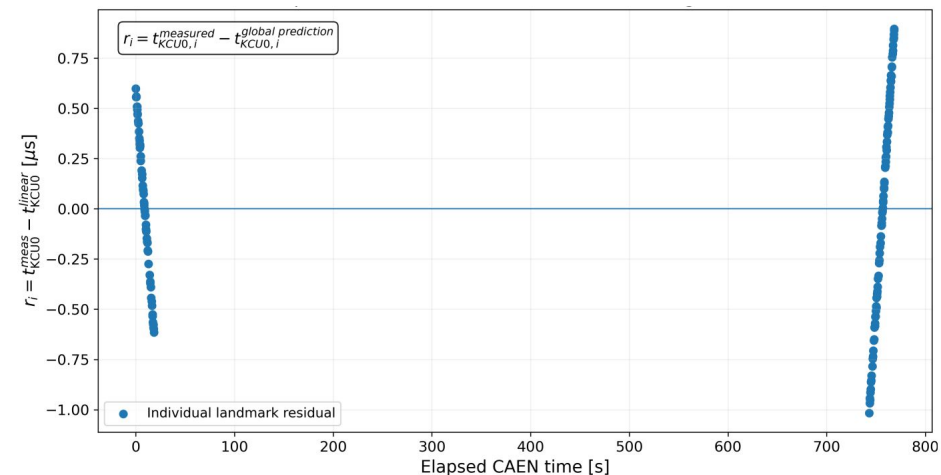
Identified long acquisition gaps, greater than **100 ms**, in both streams. These gaps used as recognizable timing landmarks. Paired gaps with similar durations between CAEN and KCU0.

correctly associated gaps lie close to the equal-duration diagonal.



Once the common landmarks are identified, their absolute timestamp positions are used to determine the relationship between the two clocks.

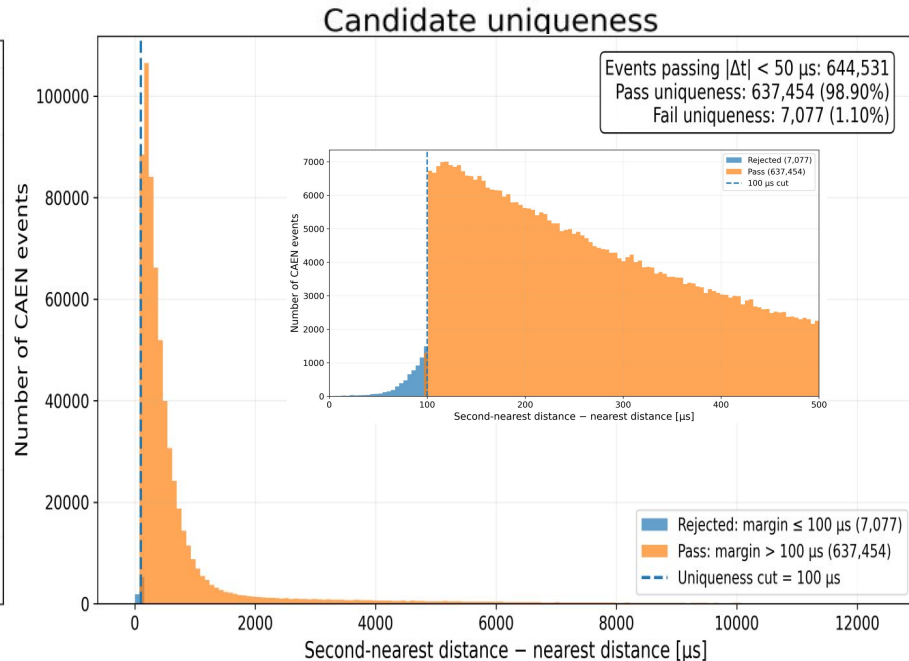
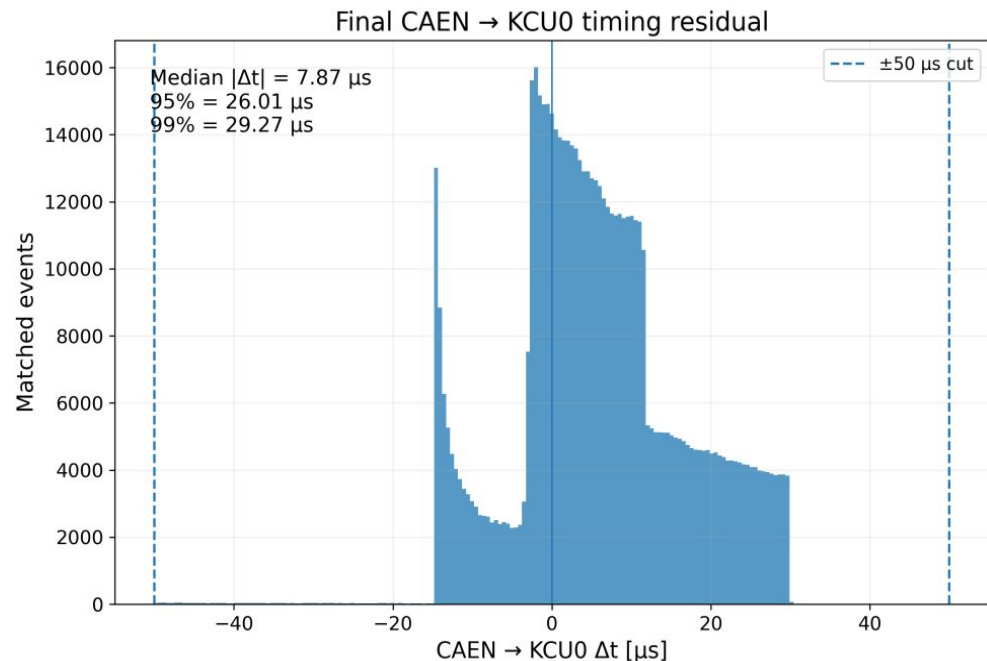
Fitted a linear transformation from CAEN time to KCU0 time. The fitted scale factor is 1.36534065, only about 4.5 ppm away from the nominal ratio expected from the two clock periods



Each blue point is the remaining error after the global fit.

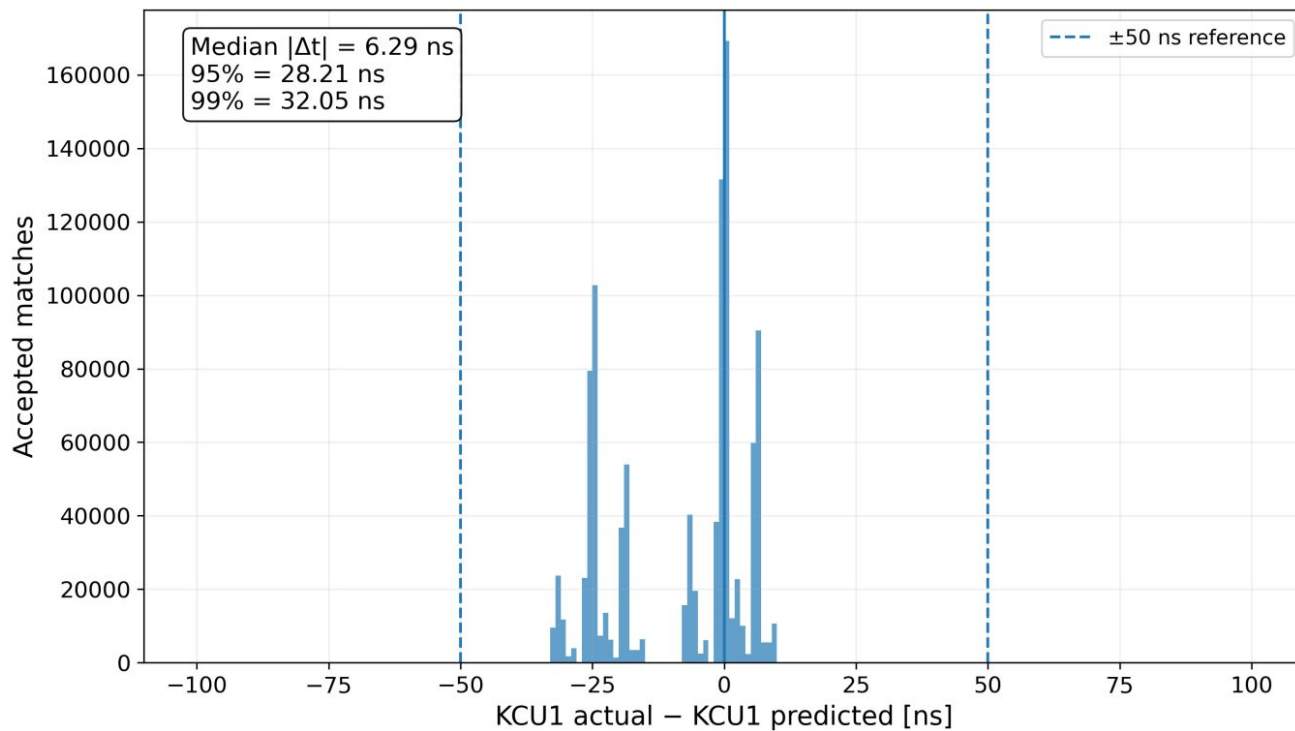
Zero means perfect agreement with the linear model. The orange local-median values is the small residual timing correction applied before individual event matching.

CAEN → KCU0: candidate quality



For every CAEN event, the corrected clock model predicts its KCU0 position. The nearest and second-nearest KCU0 triggers are tested so that the accepted candidate is close in time.

KCU0-KCU1 timing residual throughout Run 595



KCU0 and KCU1 share the same nominal KCU clock scale.

Example of final CAEN–KCU0–KCU1 event alignment : 60 consecutive matched events shown

