

# Trigger-Level Charge-Light Matching in 2x2 Data

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11.20.2024



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- **CL-Matching at Trigger Level mostly works for 2x2 data**

**MATCHED FILES, EVERY 3 HOURS ACROSS FULL RUN: [here](#)**

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## Potential Issue:

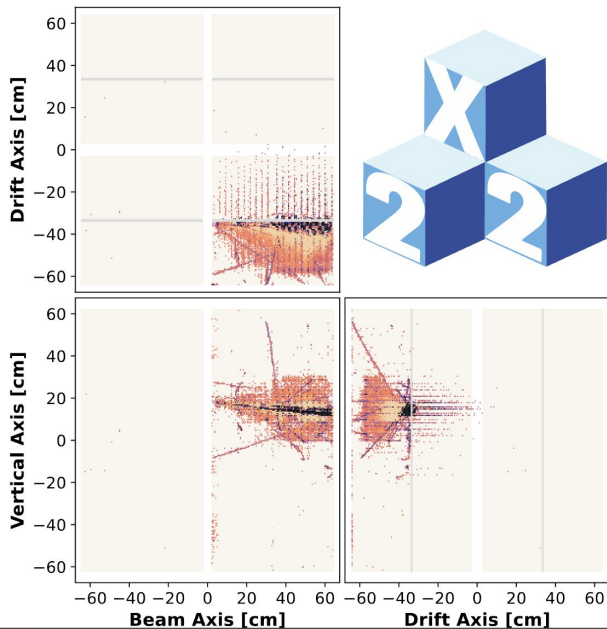
High-energy events with saturated pixels can be separated into multiple events, preventing accurate charge-light matching

**Requires Audit of Event Builder**

# Potential Event-Building Repercussions

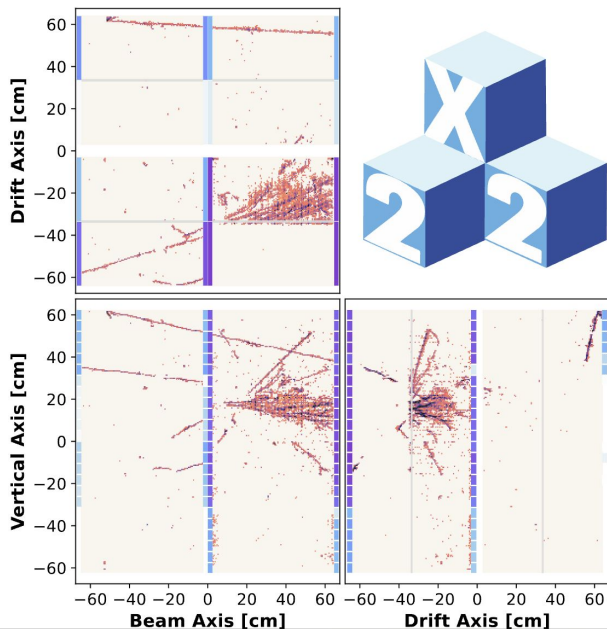
**Run 50017, Subrun 500170000008**

Event 4111: 2024-07-08 19:19:27 UTC



**Run 50017, Subrun 500170000008**

Event 4121: 2024-07-08 19:19:27 UTC

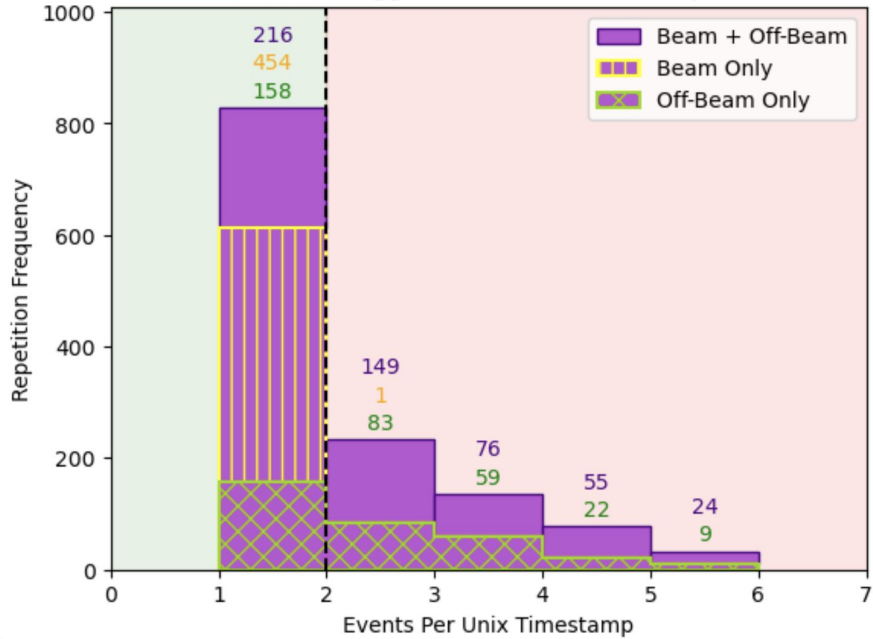


Light matched  
only to 4121:

Same event,  
same timestamp,  
10 event IDs  
apart

# Potential Event-Building Repercussions

Run: 50017, 2024-07-09T13:56:00-05:00  
External Triggers Per Unix Timestamp [s]



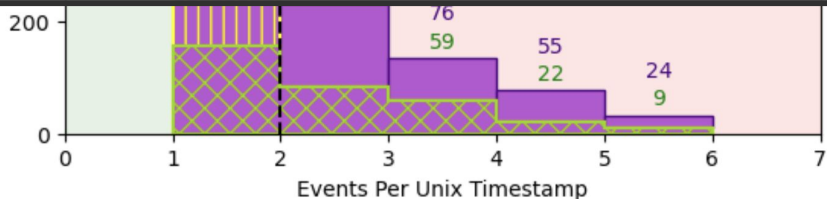
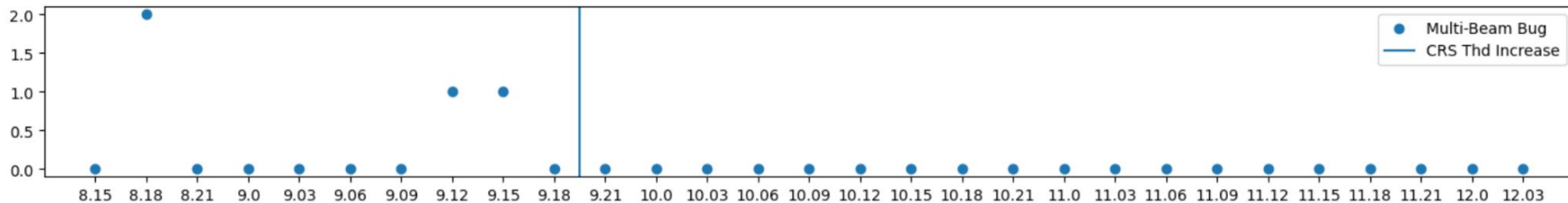
Multiple Beam Events in 1s timestamp

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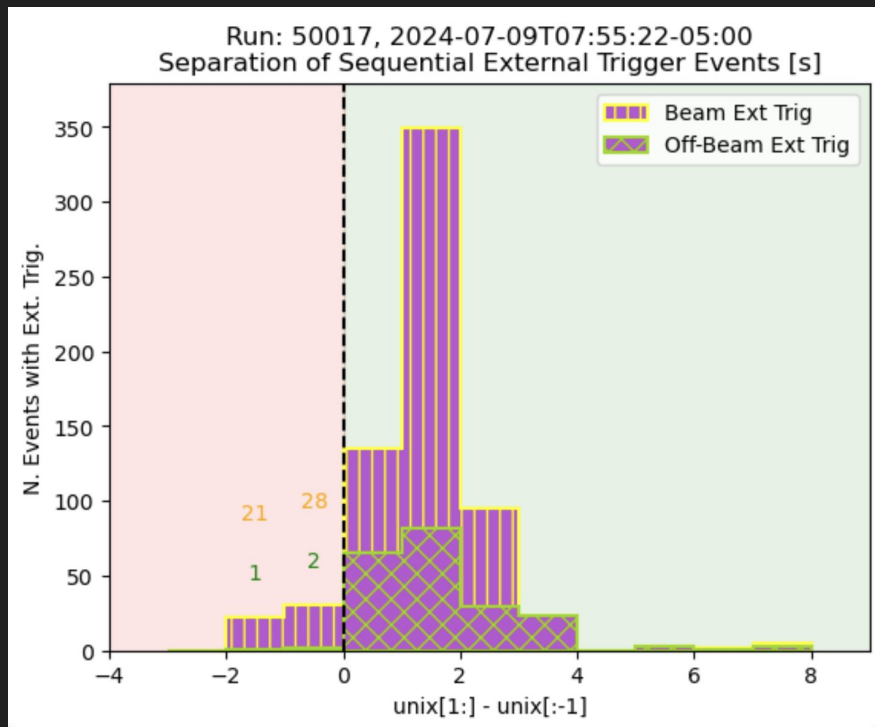
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## Multiple Beam Events in 1s timestamp



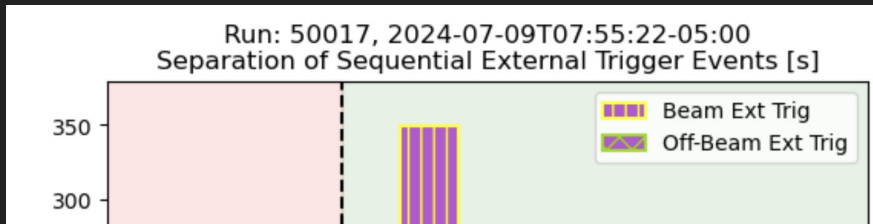
# Potential Event-Building Repercussions



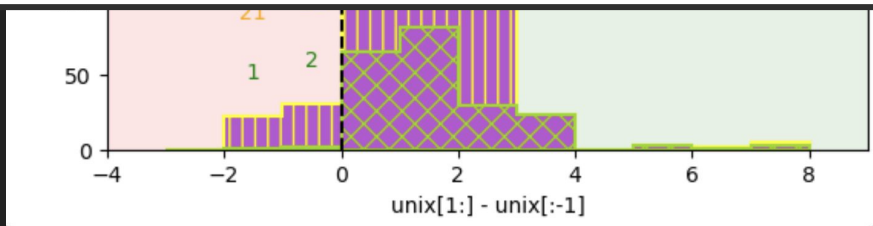
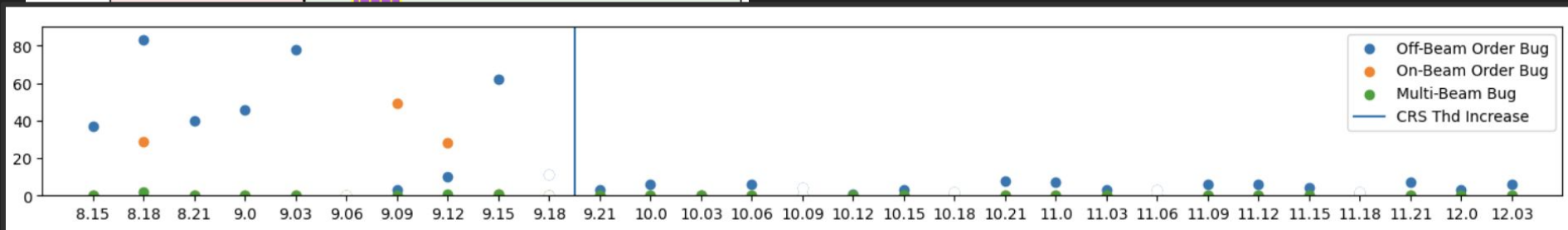
Timestamps Out of Order with Event ID



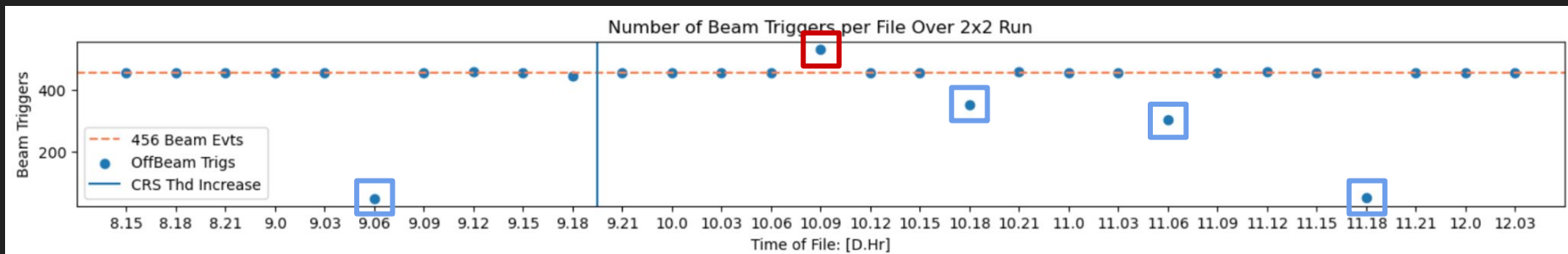
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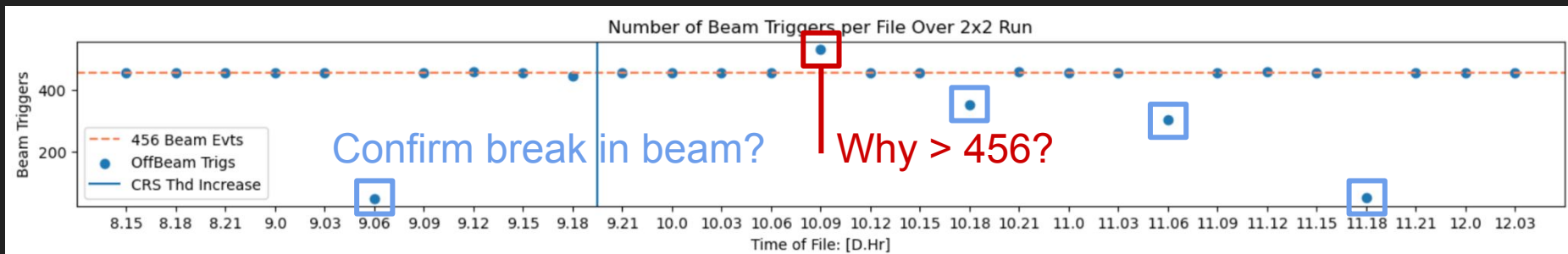
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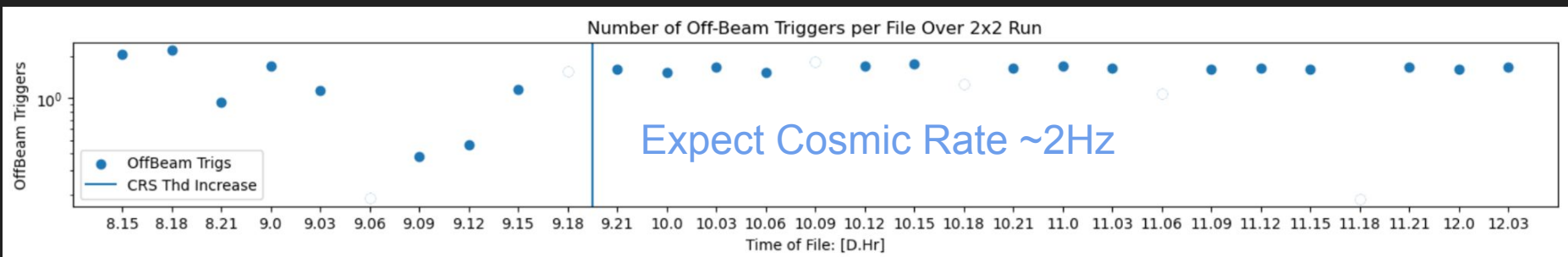
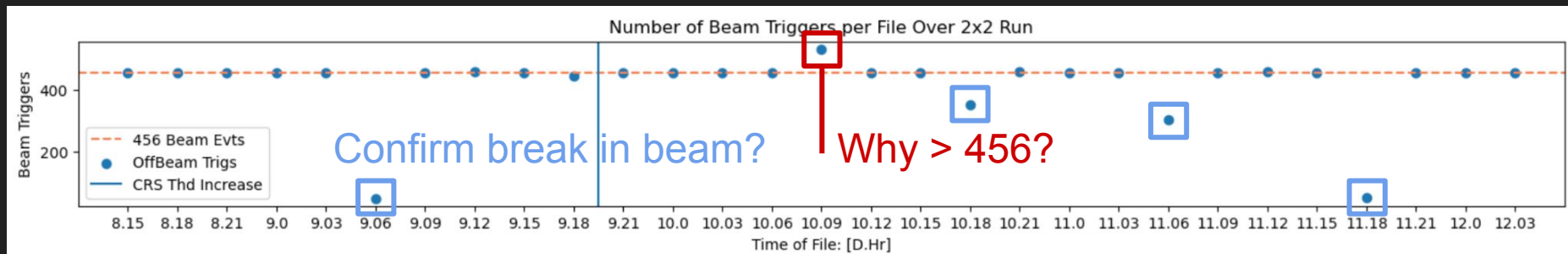
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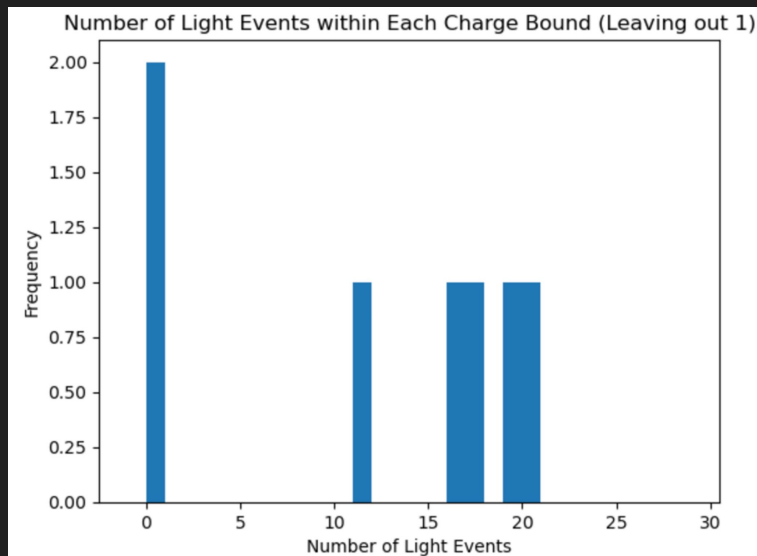
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# Light Events within a Charge Readout Window:

Billy Yang defined CRS event window: [earliest hit tstamp, latest hit timestamp]

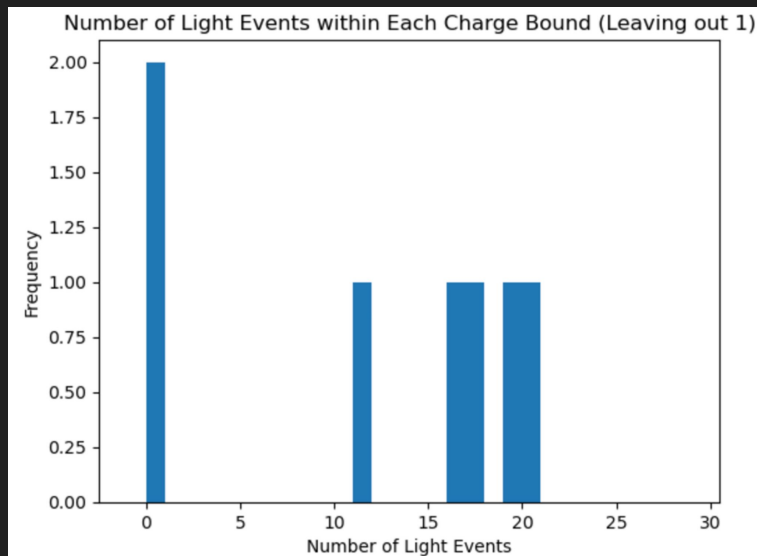
File: /global/cfs/cdirs/dune/users/ajwhite/2x2\_Data/CL\_MATCHING/2024\_07\_10\_10\_16/packet-0050018-2024\_07\_10\_10\_16\_18\_CDT.CLmatched.hdf5



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File: /global/cfs/cdirs/dune/users/ajwhite/2x2\_Data/CL\_MATCHING/2024\_07\_10\_10\_16/packet-0050018-2024\_07\_10\_10\_16\_18\_CDT.CLmatched.hdf5



Still looking into this:

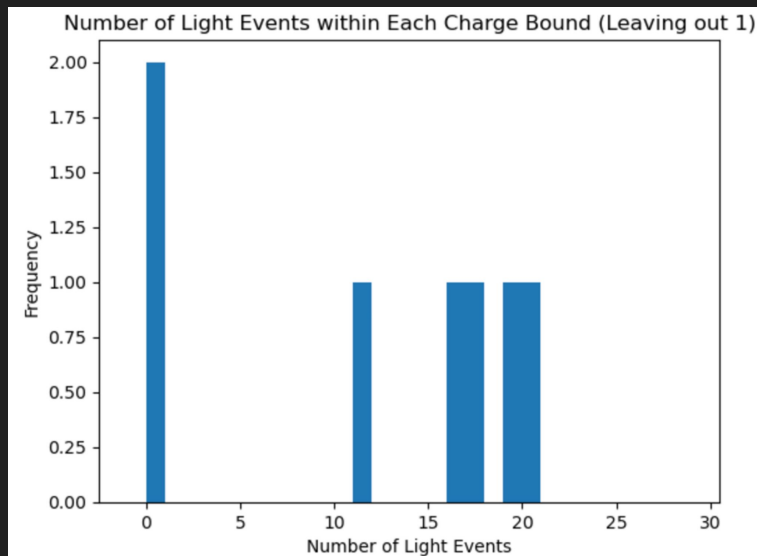
In matching, 1 charge event is assigned 2 light events **0.05%** of time.

Billy's check **does not use flow** matching.

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File: /global/cfs/cdirs/dune/users/ajwhite/2x2\_Data/CL\_MATCHING/2024\_07\_10\_10\_16/packet-0050018-2024\_07\_10\_10\_16\_18\_CDT.CLmatched.hdf5



## Tentative Conclusion:

It is valid to assume one light event per charge event, once charge event building is resolved.