

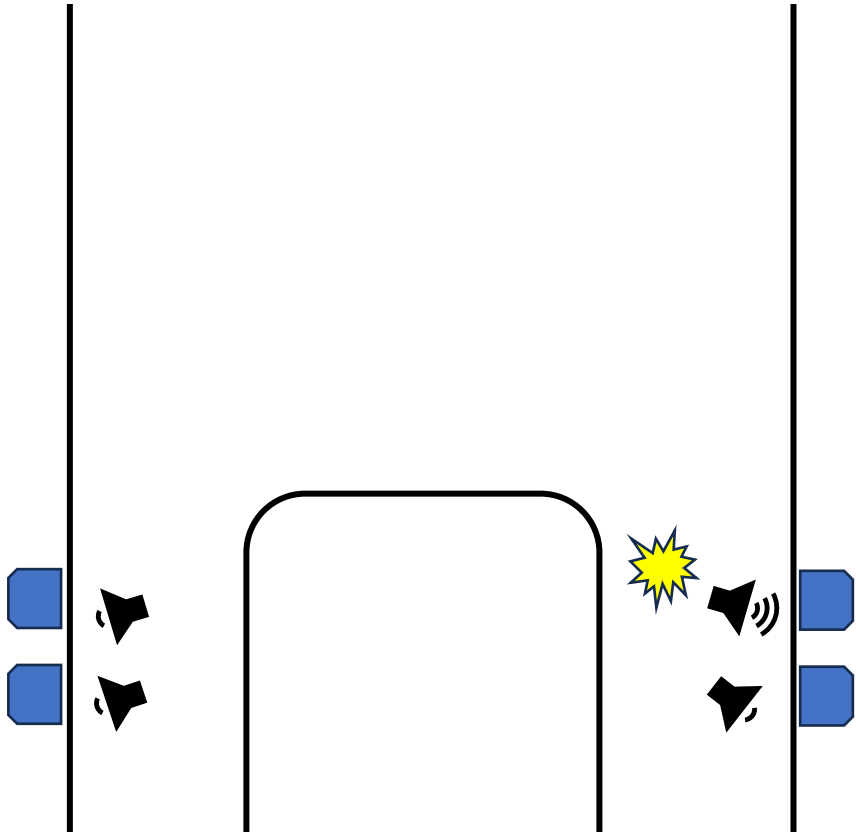
Analysis Efforts and Strategy for PICO-40L Data

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PICO Collaboration Meeting
SNOLAB
August 22, 2024

Ongoing Analysis Effort

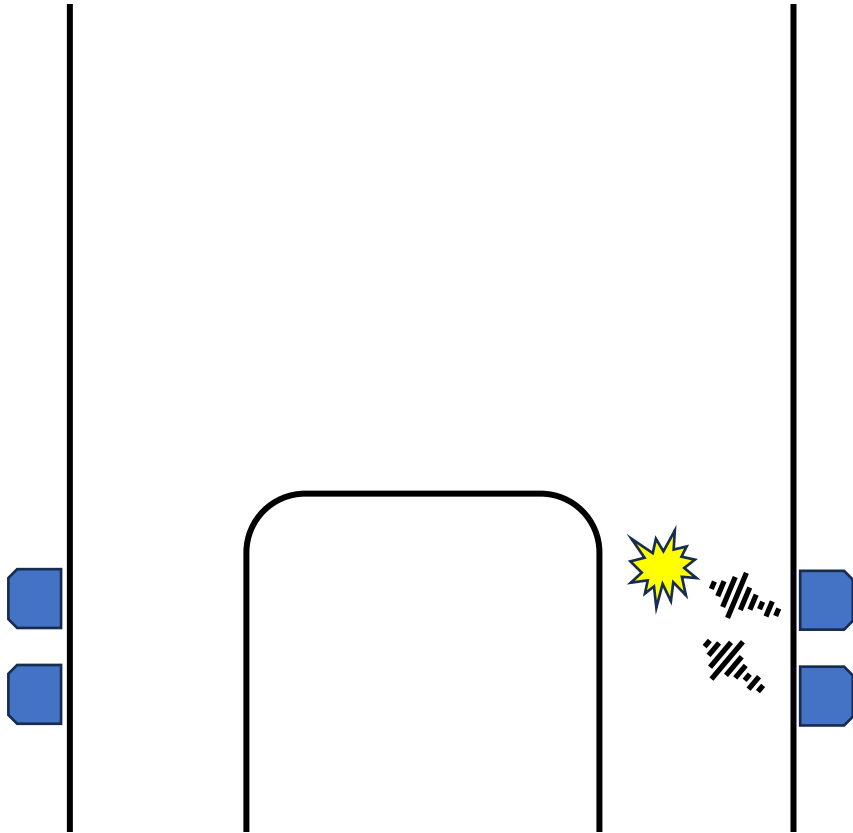
- In the past ~6 months, several new PICO members and lots of progress on various analyses.
 - See the following talk for where you can find out what has been happening, as well as all the talks in the following section.
- We need to continue progress on a few critical items (non-exhaustive):
 - **Low-AP Events** – Where are they coming from, can we discriminate them from WIMPs?
 - **Wall events** – Is there some structure to the events which may give us clues to why the rate is unexpectedly high?
 - **Optics** – XYZLookup is suboptimal for certain regions of the detector, and not working well for multi-bubbles. Can this be improved?
 - **Bellows events** – Are they happening preferentially somewhere in Z, or phi? What does this tell us for PICO-500.

Bellows Events



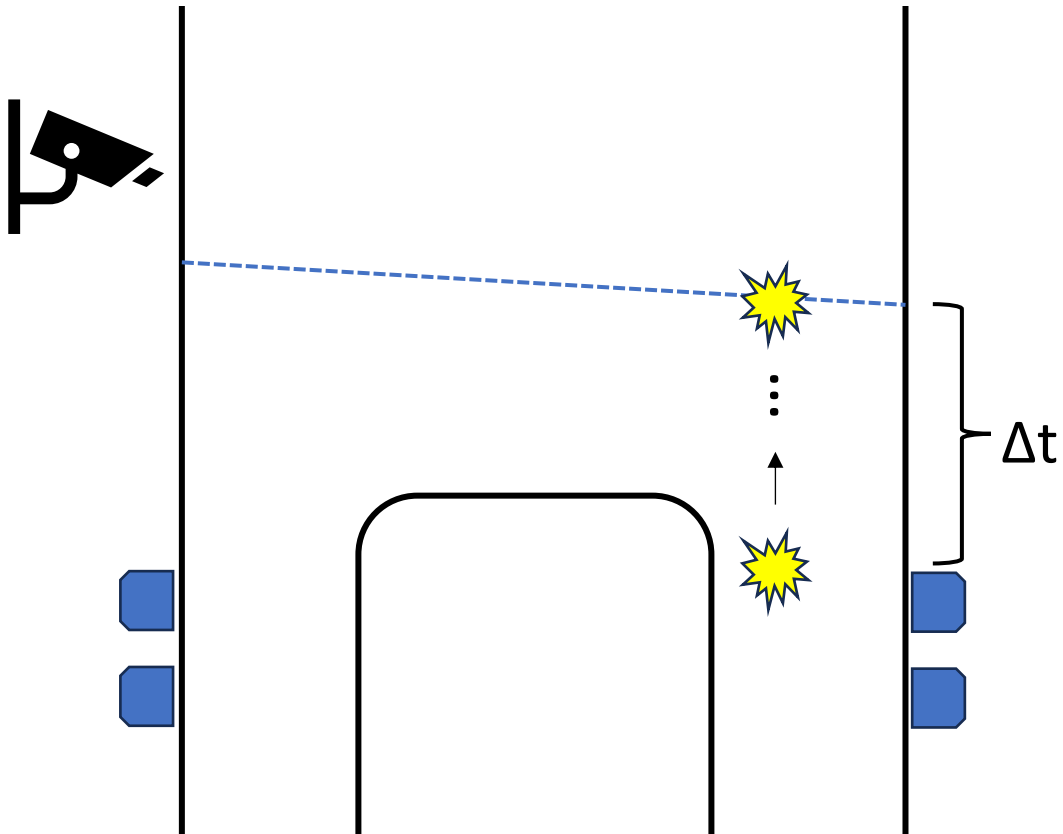
- **Use relative amplitude of signal in piezos to estimate bellows bubble Z and ϕ ?**
- Use relative phase of bubble shockwave in different piezos?
- Compare acoustic t_0 to first moment when bubble seen by camera to estimate Z ?
- Have some time to speculate as a group during William's acoustic discussion.

Bellows Events



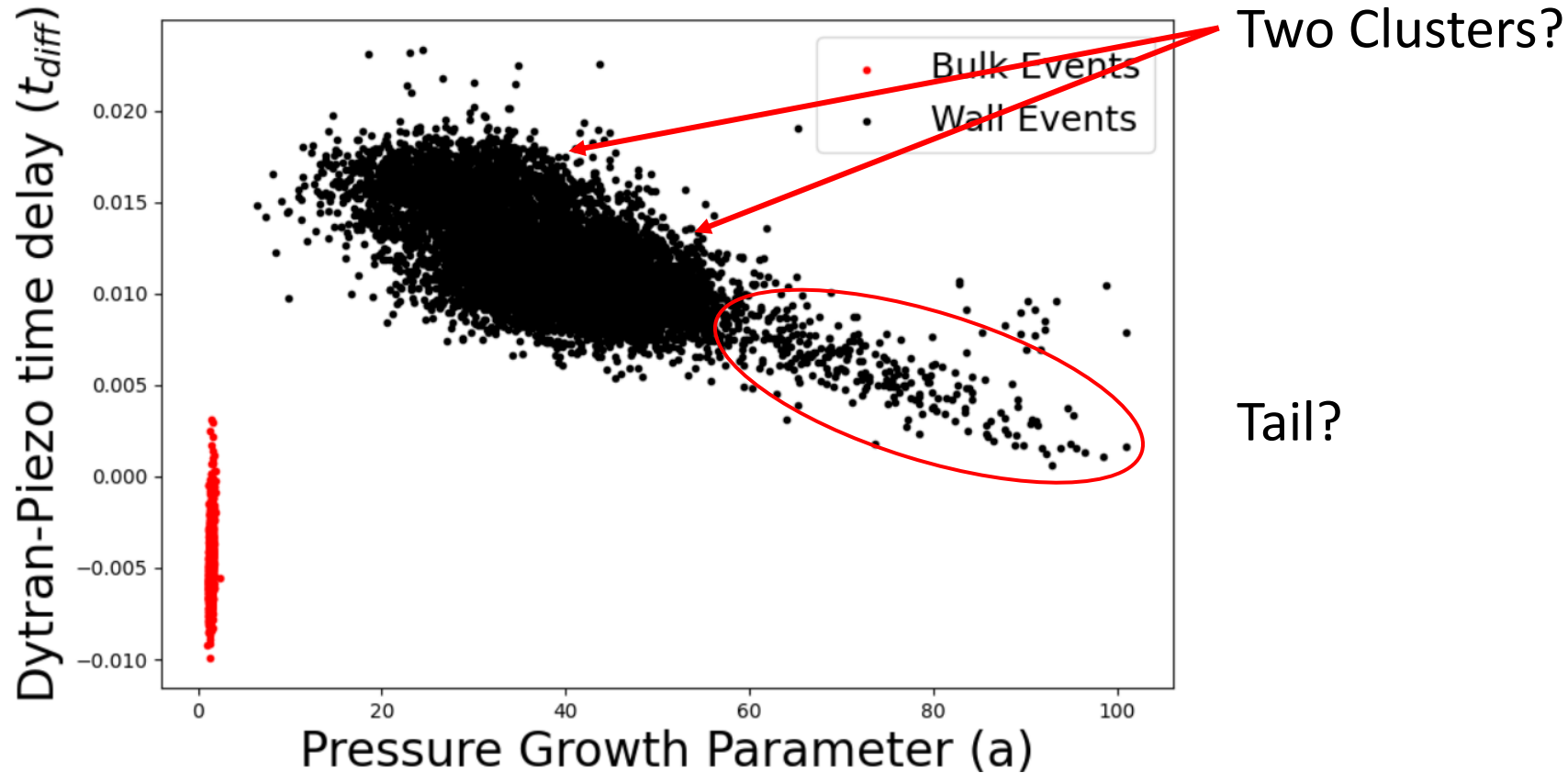
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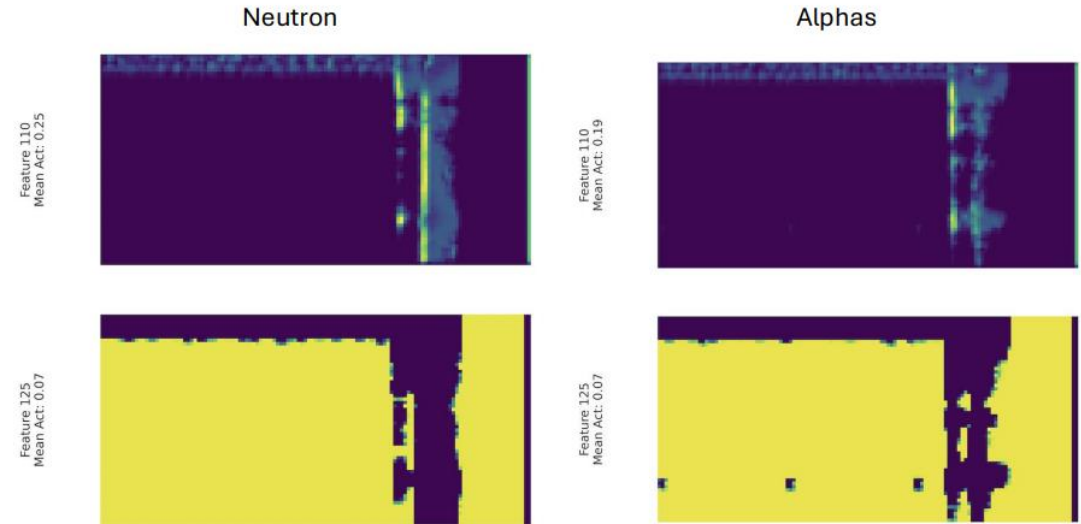
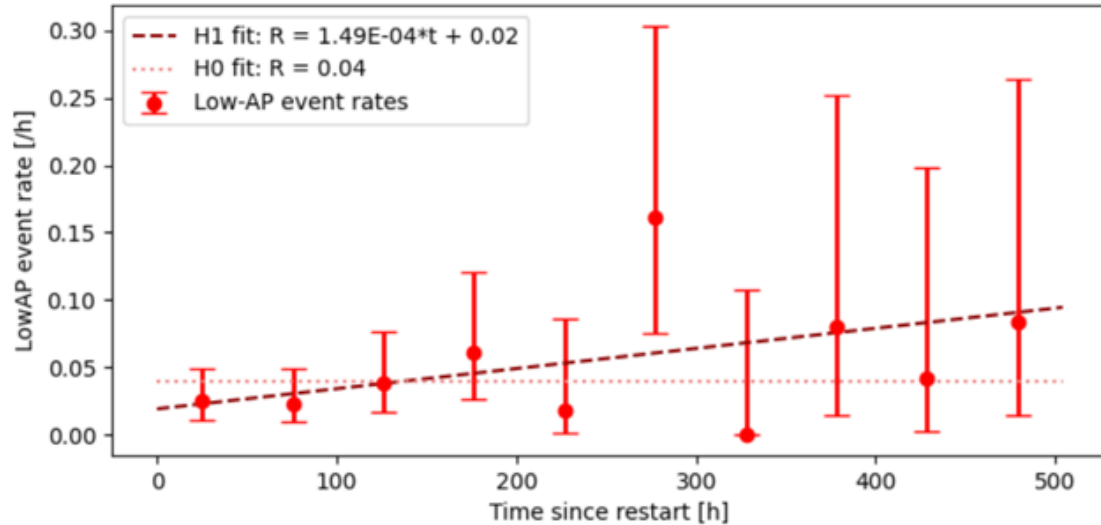
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Wall Events



- Bulks are quite tight in growth parameter. What causes this structure in wall growth rate? Z , ϕ , d_{wall} , different surfaces (inner vs outer jar)?
- There was a small dedicated wall group that made some progress here, but some members moved to other things. We need to pick this back up.

Low AP Events



- Evidence of a weak reduction of Low-AP events after an operation pause.
- I am ~~cautiously~~ recklessly optimistic about the ongoing DNN work to discriminate Low-AP events from neutrons, but we will see.
- [Fairly detailed](#) plan to explore the how Low-AP events are affected by changing operating conditions.
- What are the questions we want answered for the 27.5 PSIA data we have in the bag?