

Status Update B-TOF

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On behalf of the Panda SciTil group

Panda Collaboration Meeting, GSI, 10.03.2021

Outline

- Measurements along the Rail-Board
 - Amplitude drop
 - Signal delay
 - Signal time difference
 - Time Resolution
- Scintillator Time Res Comparison
Cut/Uncut
- B-ToF Summary Document

Personel

- The SMI is **stepping out** of PANDA effective by the **end of the year**
- My contract had been extended up until the end of March
 - This is my last Panda Meeting

Rail-Board

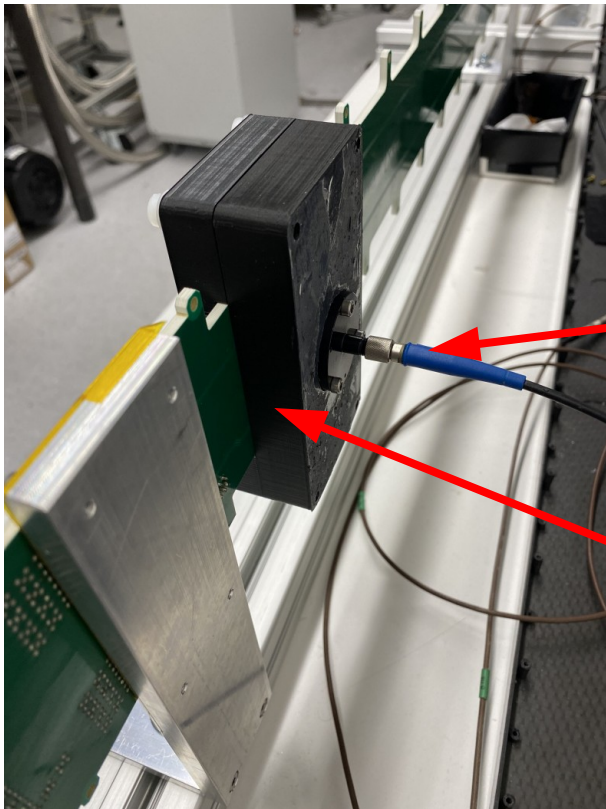
- Goal:
 - Measure the impact of the Rail-Board on the **time resolution** of the system
- Preliminary Measurements:
 - Amplitude Attenuation
 - Signal Rise Time Increase

Measurements along the Rail-Board

Settings: Generated pulse

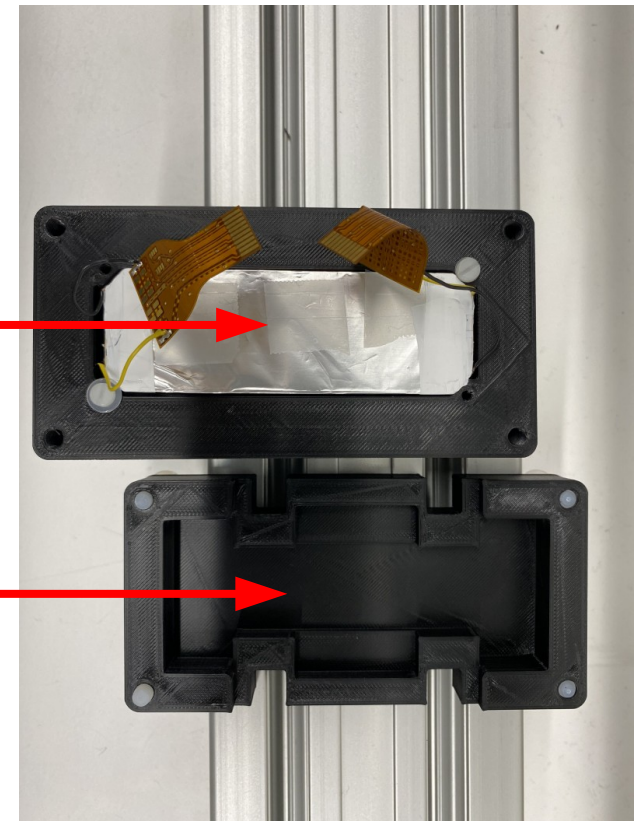
- $f = 50 \text{ kHz}$,
- 5 V ,
- width = 20 ns

is used to power the laser diode.

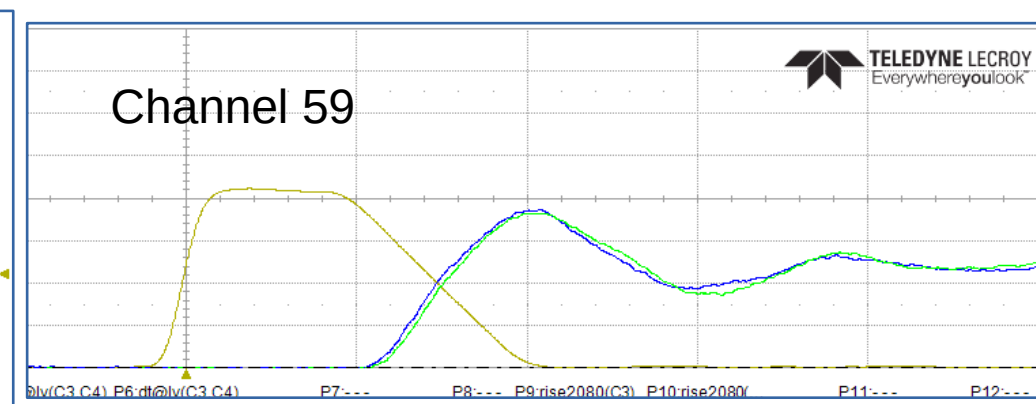
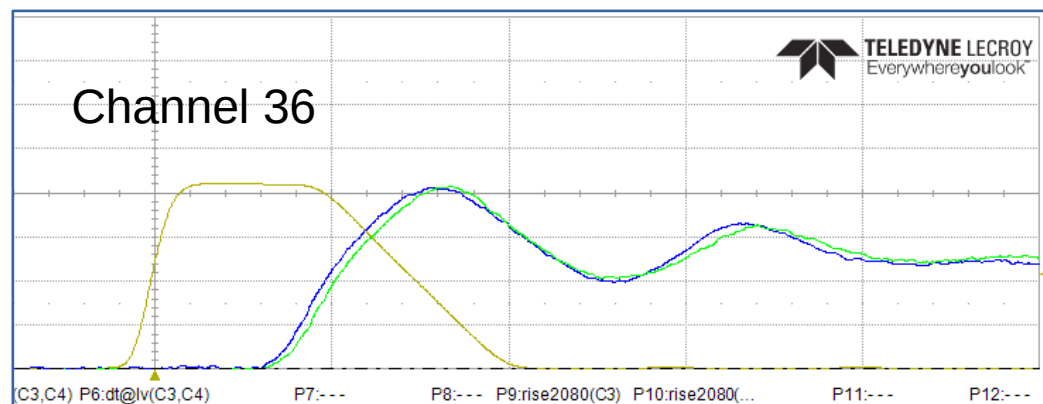
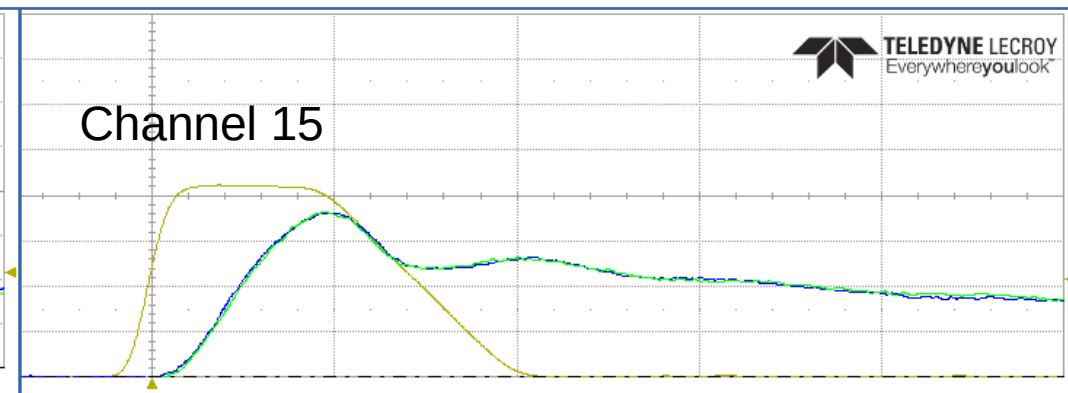


...the light signal is transmitted through an optical fiber to the middle of the scintillator plate

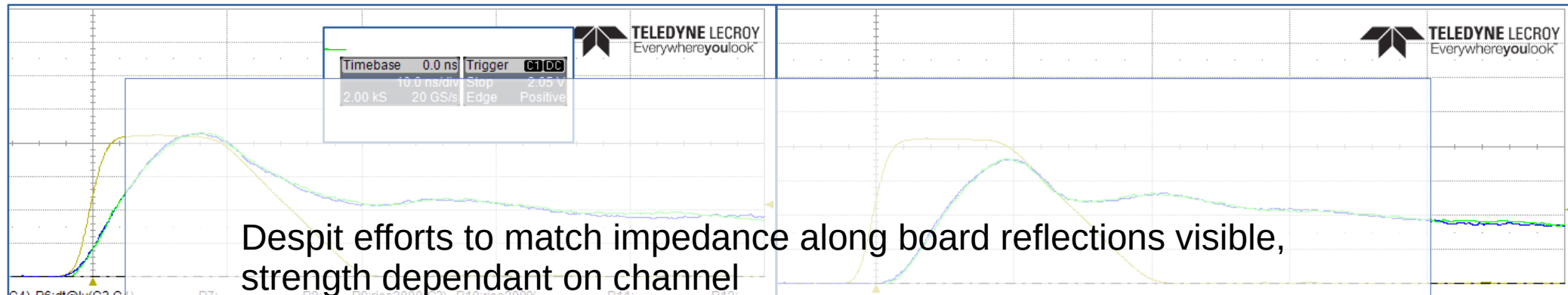
Plastic case protects SciTil from outside light and moves very neatly across the Rail-Board.



Snapshots of signals during measurements

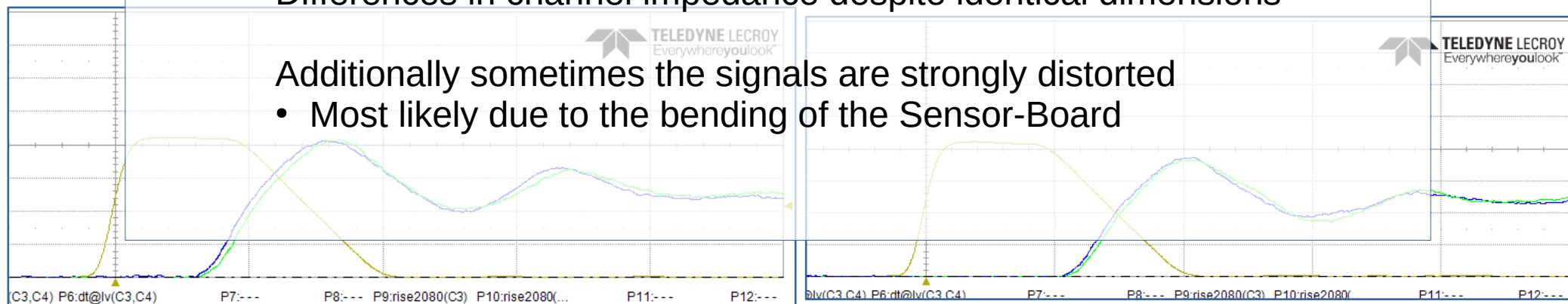


Snapshots of signals during measurements



Possible explanations:

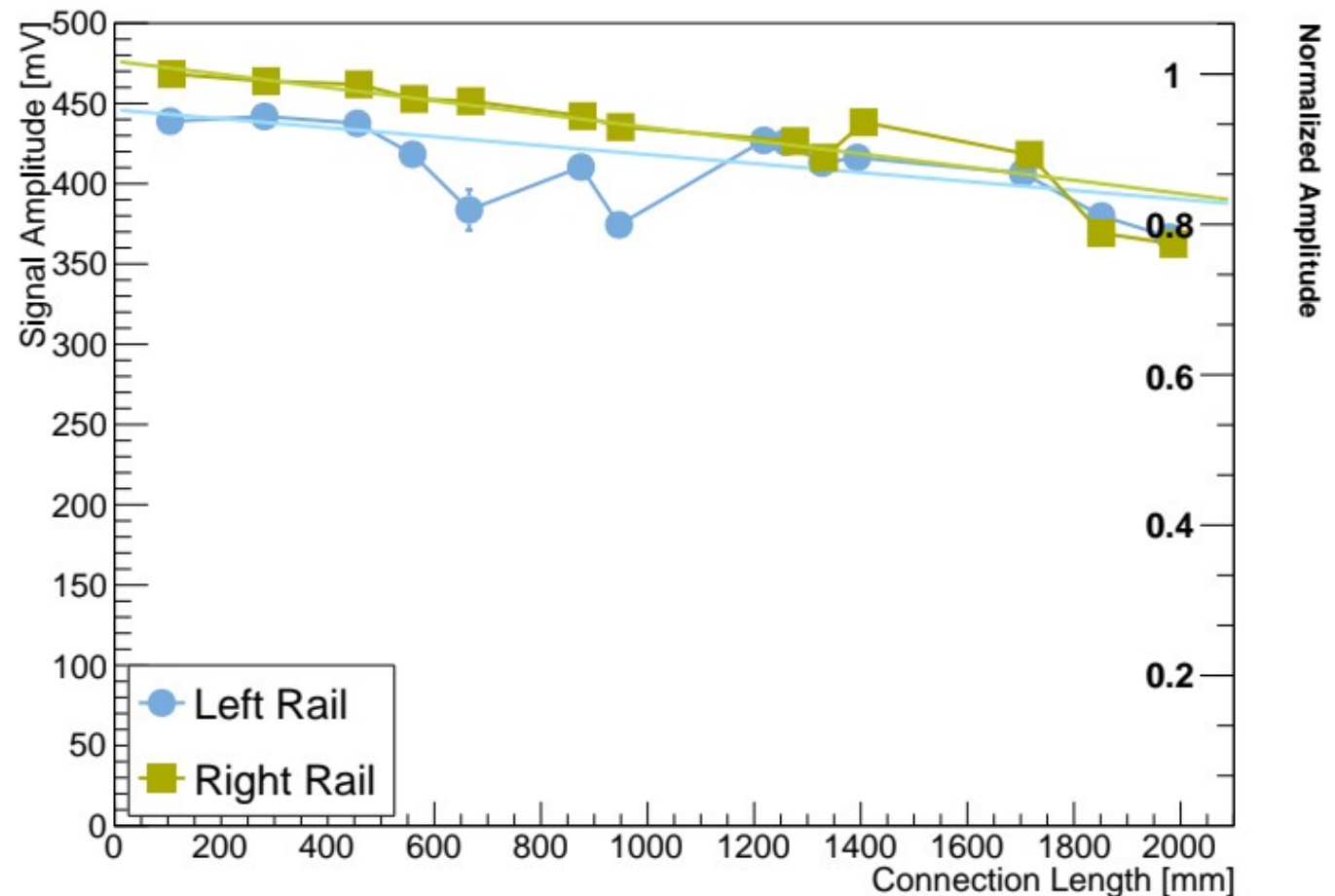
- Impedance on Sensor board not properly matched
- Connection between Railboard parts
- Differences in channel impedance despite identical dimensions



Signal Amplitude

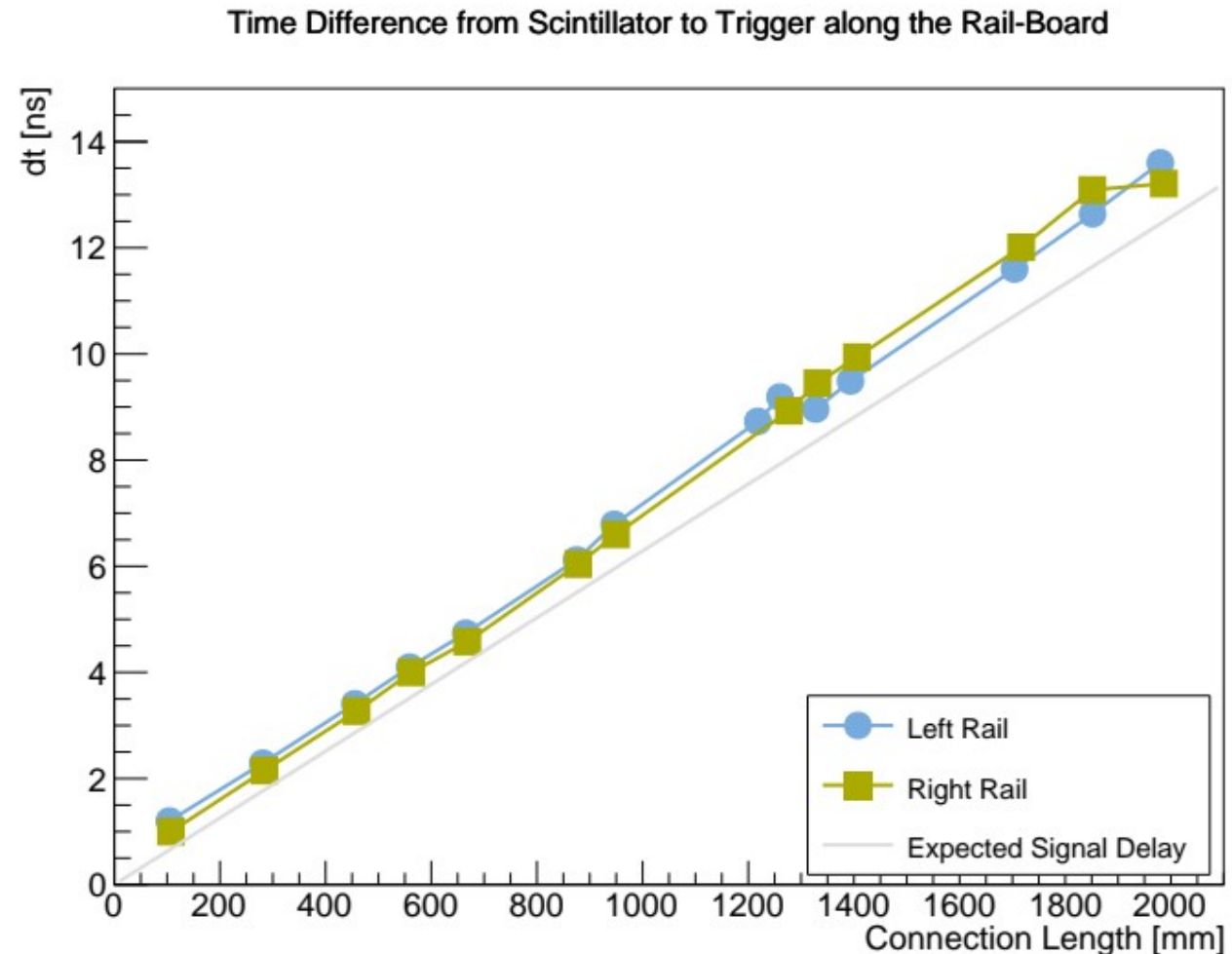
- A drop of up to 23 % was measured

Signal Amplitude along the Rail-Board



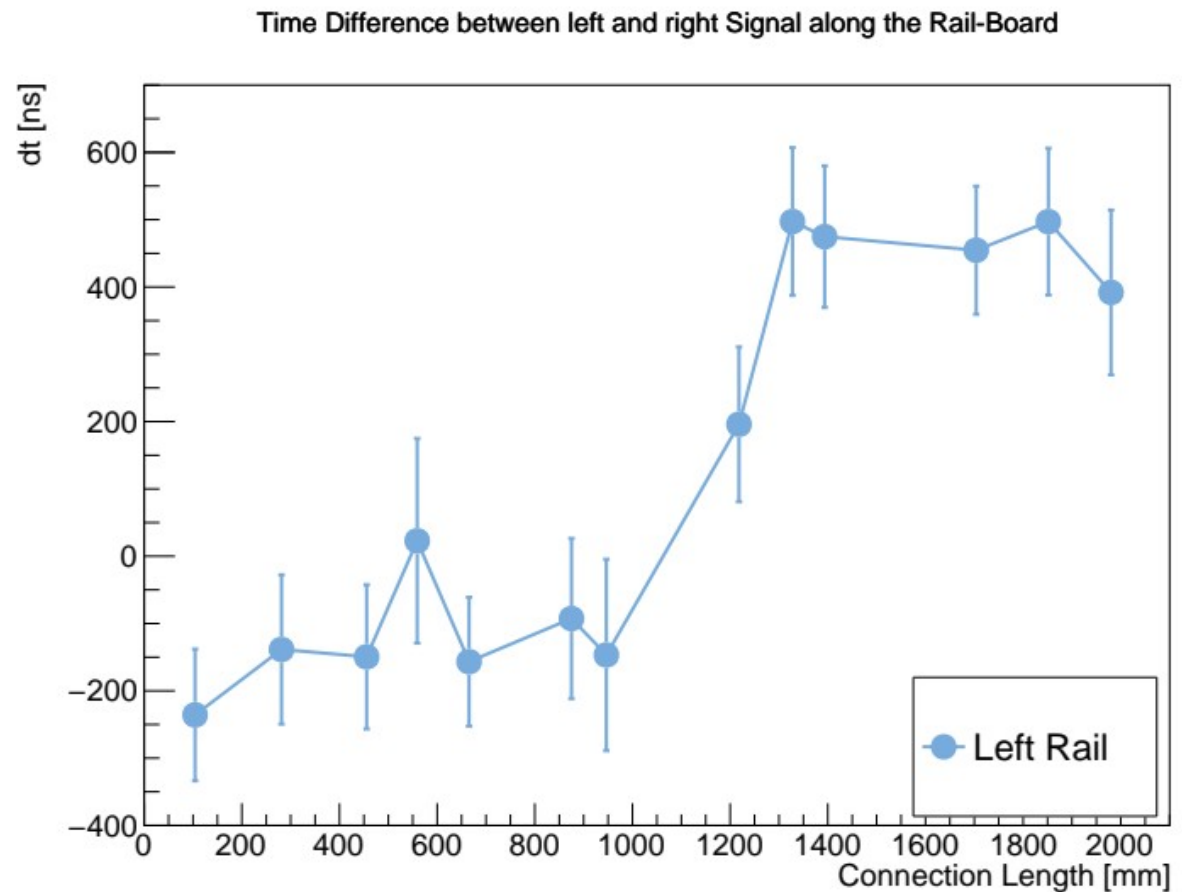
Signal Delay along the Board

- Measurements close to the expectations
 - Based on theoretical signal speed in copper



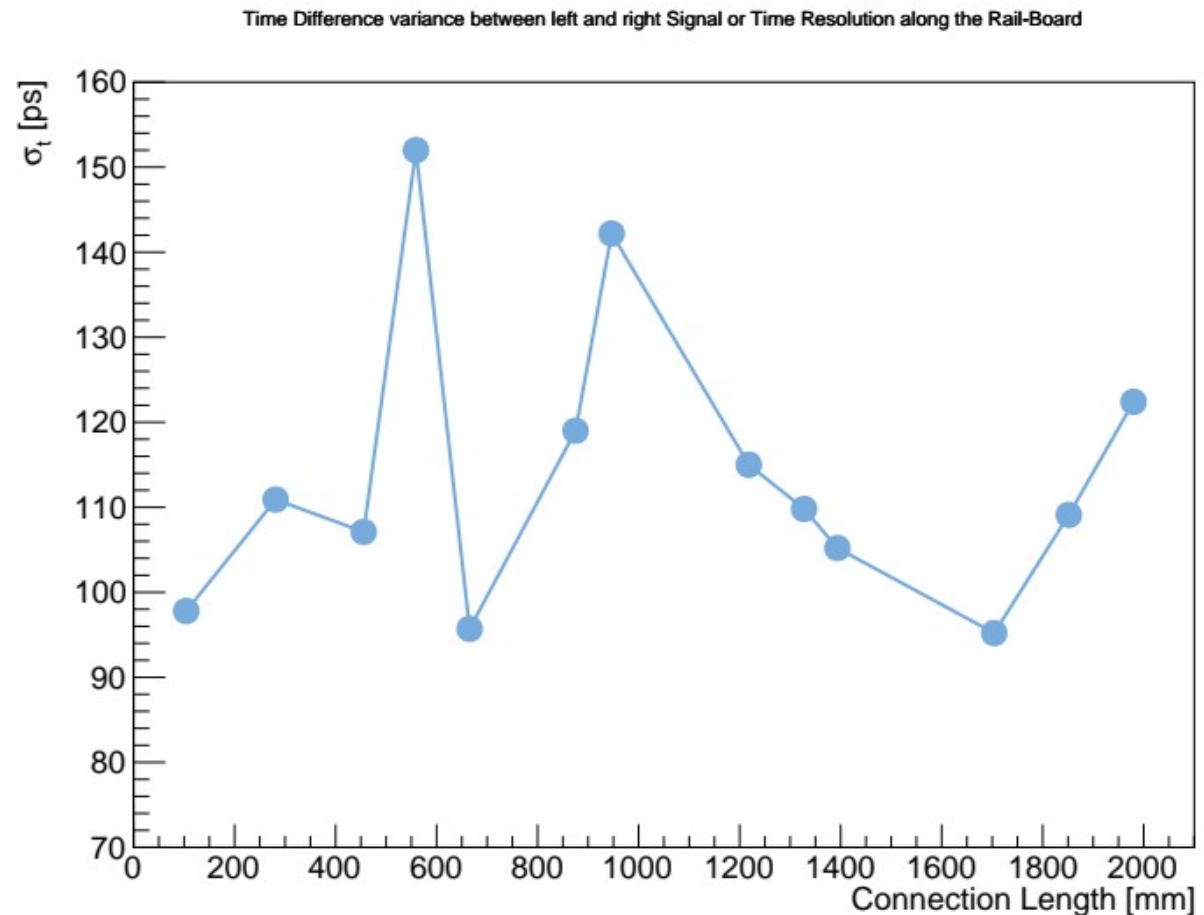
Signal Time Difference

- Time Difference (dt) between the left and the right signals
- No surprises in first board
- Second boards shift most likely due to connection between boards



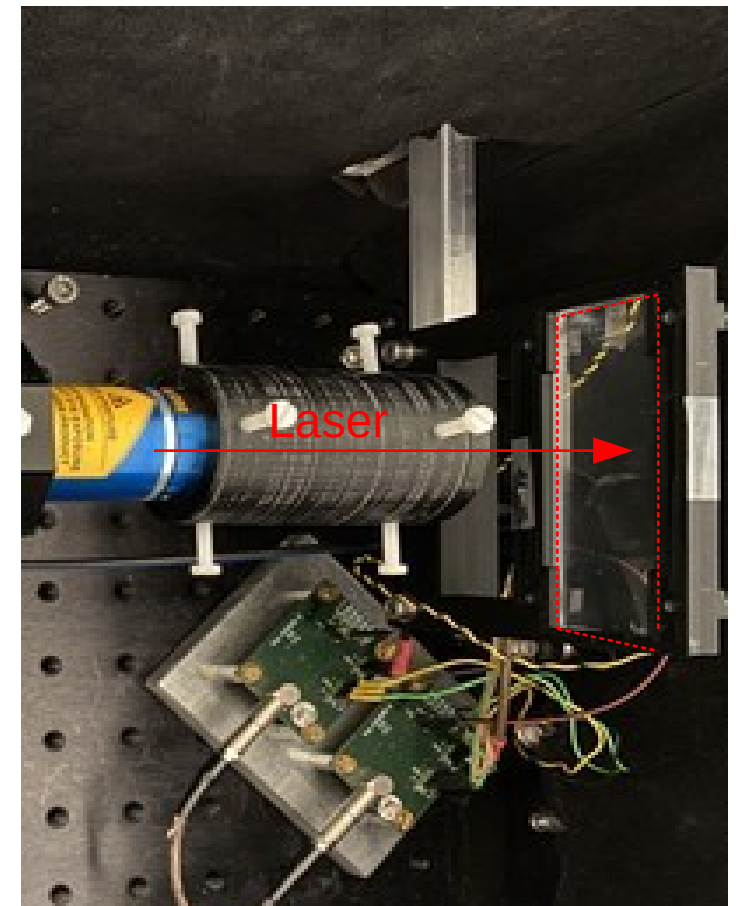
Time Resolution

- This is the left/right resolution
- To receive the event resolution it has to be divided by 2

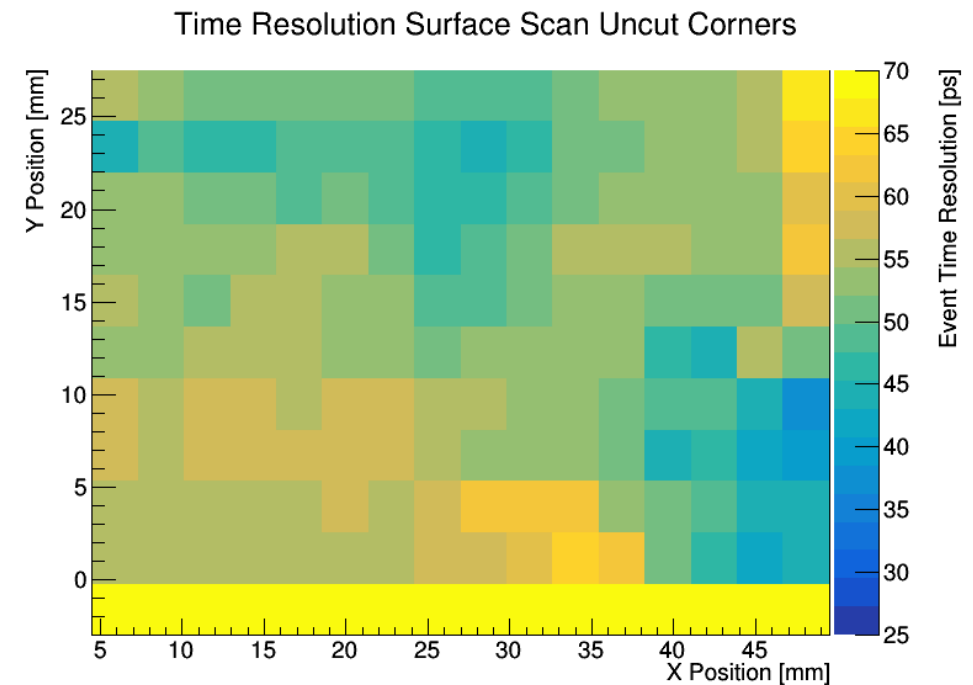
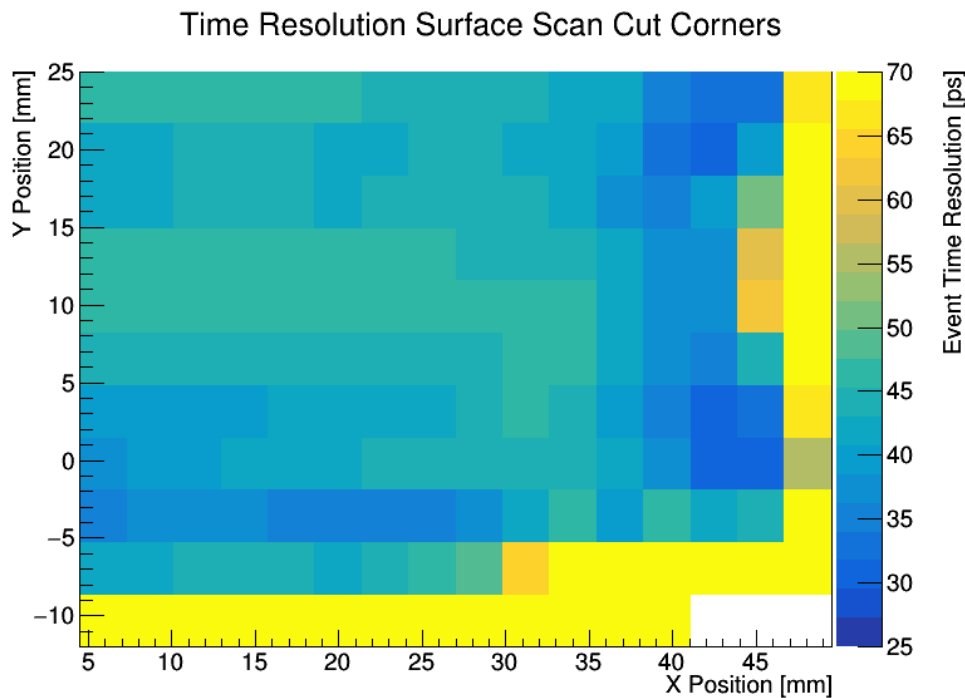


Time Resolution Cut Scintillator

- Limited hardware for this measurement
- Not fully automated
 - A lot of manual work
- Laser → Diffuser → Collimator → Scintillator
 - 3 mm laser spot
- Signal: SiPM → Preamp → Scope
- Plastic frame blocked some of the edge measurements



Scintillator Comparison (cut/uncut)



- Cut scintillator shows better performance than uncut
 - Most likely due to systematic error

B-ToF Summary Document

- For orderly hand over of project new developments and things left to do summarized in document
- Still in development
 - On Git Repository

The Barrel Time-Of-Flight Detector

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March 8, 2021

Aim of the Document

The aim of this document is to give a broad overview of the detector summarizing and expanding on the established Technical Design Report written by K. Suzuki et al.

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Thank You for your Attention!

