

Mu2e-II Tracker Workgroup Report

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Tracker Requirements

To increase electron momentum resolution, tracker needs to have less material

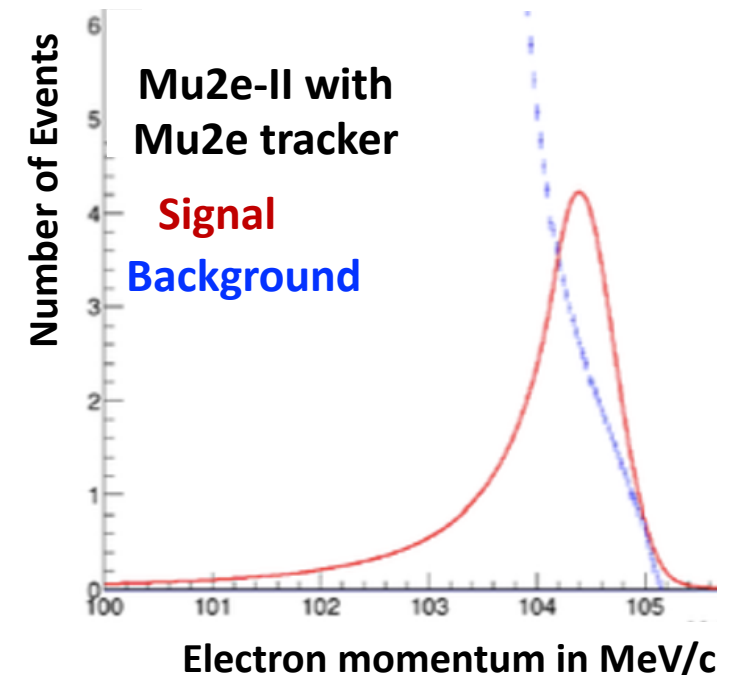
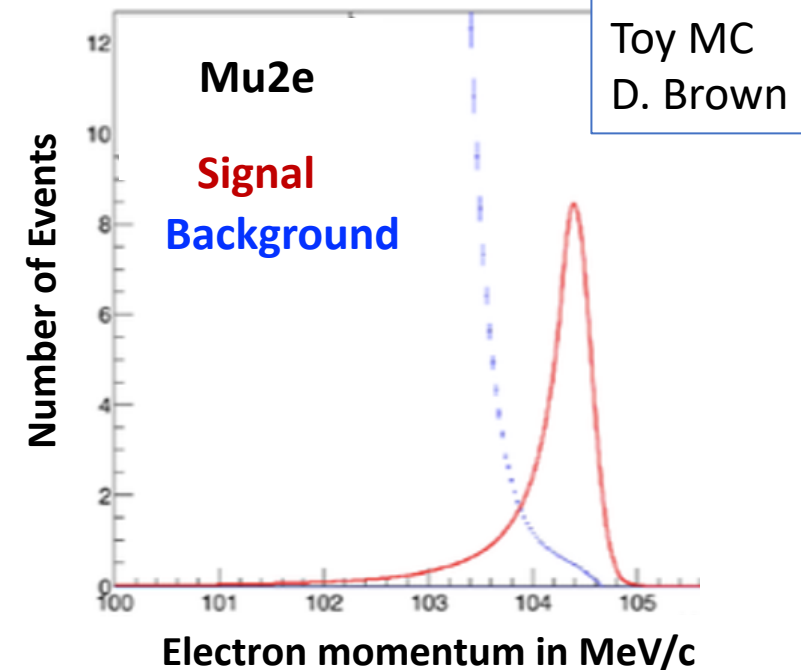
- Thinner walled straws
- Different tracker technology
- Different gas

Survive increased charge deposition and beam flash radiation

- Develop radiation-resistant front-end electronics
- Test material components

Function with Increased hit occupancy and timing window

New simulations needed to better understand tracker requirements.



Parametric Toy MC for Mu2e-II

The FastSim program could not be resurrected for Mu2e-II, so starting again.

General Idea :

Building a simple toy MC to study the effect of general design options on track resolution ($Ce^- \leftrightarrow$ DIO sensitivity/separation power)

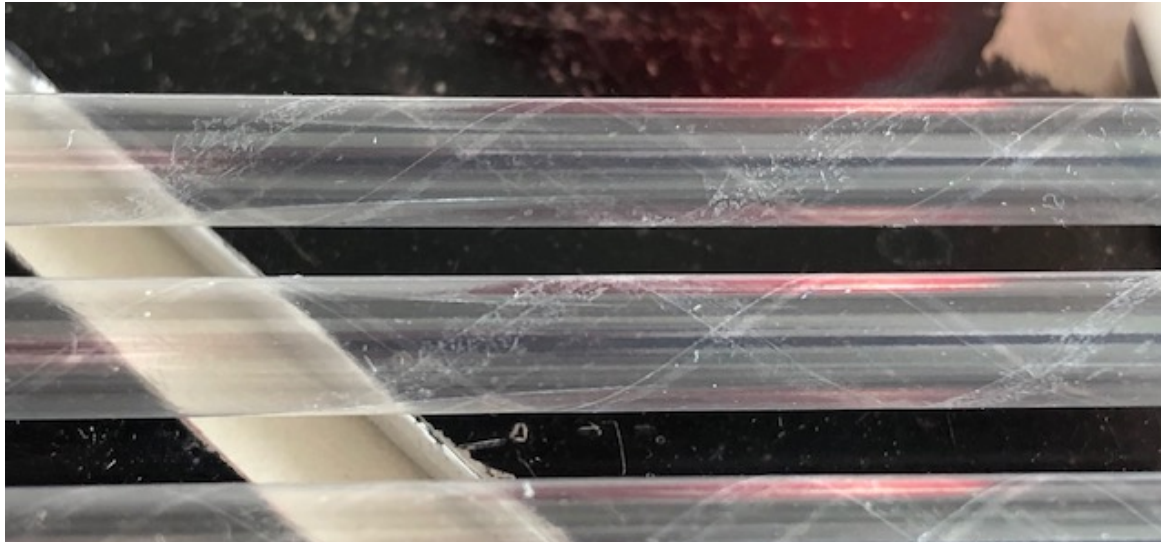
Start with radiative spectra of e^- from muons stopped on Al

- Czarnecki and Szafron calculations

The toy will scale, shift and smear those distributions

- Scaled by muon stopping rate
 - depends on target mass
- Shifted and smeared by energy loss and straggling
 - Target, IPA, and Straws separately
- Smeared by momentum reconstruction resolution
 - Straw multiple scattering
 - Intrinsic straw resolution
 - Tails due to background rates
- Scaled by acceptance X efficiency
 - Geometry affects acceptance
 - Background hit rate effects efficiency

Straw Prototypes in the works



Pressurized 8 μ m Mylar Straws



8 μ m Mylar Straw

Test structure: 3.5 μ m Mylar + 1 μ m adhesive + 3.5 μ m Mylar double helical wrap straws

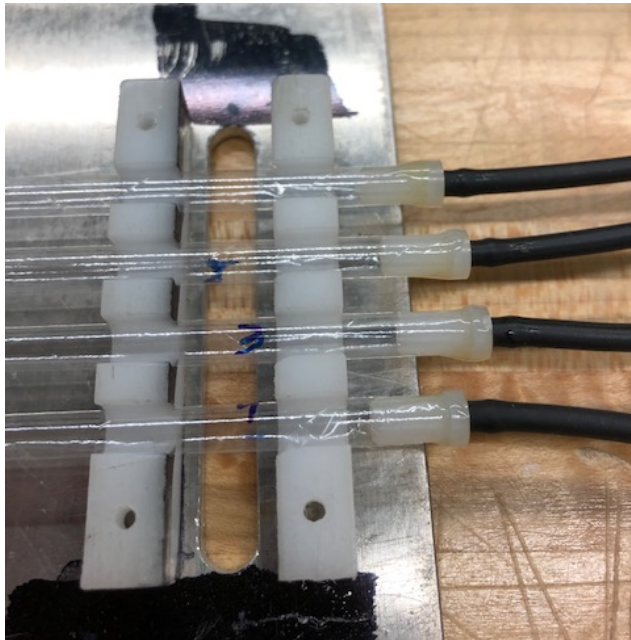
**These straws held 15 PSI for multiple days and 400 g Tension without visible distortion.
Looking into what the needed initial tension to limit sag an acceptable distance (< .3 mm).**

Delayed in production of metalized prototype straws. This is being actively perused.

Straw Handling Updates

Investigation into handling the new prototype straws.

Building a prototype container to seal around a straw and apply a small vacuum outside while paper is removed.

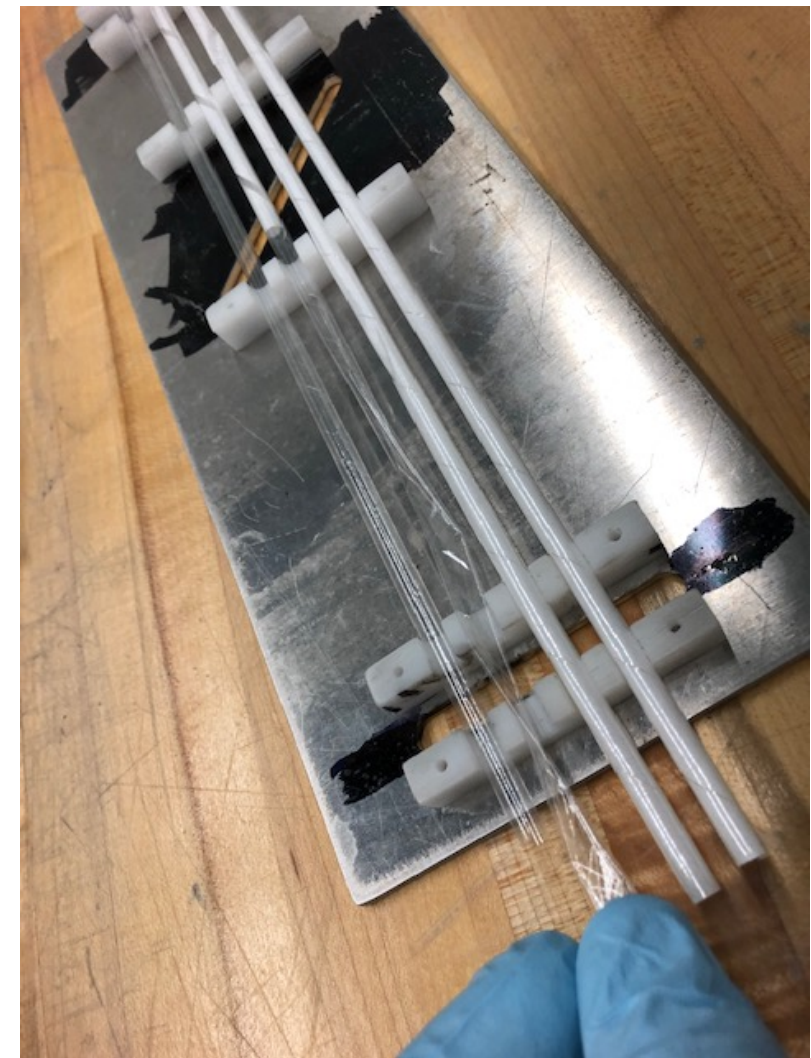


Plugged end allows for easy handling of inflated straws

Inflate straws for leak test and until ready to be installed.

Inflated straws could be epoxied in place under tension. Cutting straws to length after epoxy has cured.

Tests to observe the practicality of these procedures are being designed.



Straw twisting under tension as paper is removed

Mu2e-II Tracker Workgroup:

Join the list-serve : MU2EII-TRACKER@fnal.gov

Meeting Schedule : Bi-weekly Tuesdays 12:00 PM CST. Next one is May 12th.
Zoom link sent through list-serv

Workshop : Next workshop Wednesday July 7th, 2021 (Online)

We would gladly welcome more interested people.

Please contact Gianfranco(giovanni.tassielli@le.infn.it), me(ambr0028@umn.edu), or come to the workgroup meeting though the list-serve