Mu2e-II Tracker Parallel Session Summary

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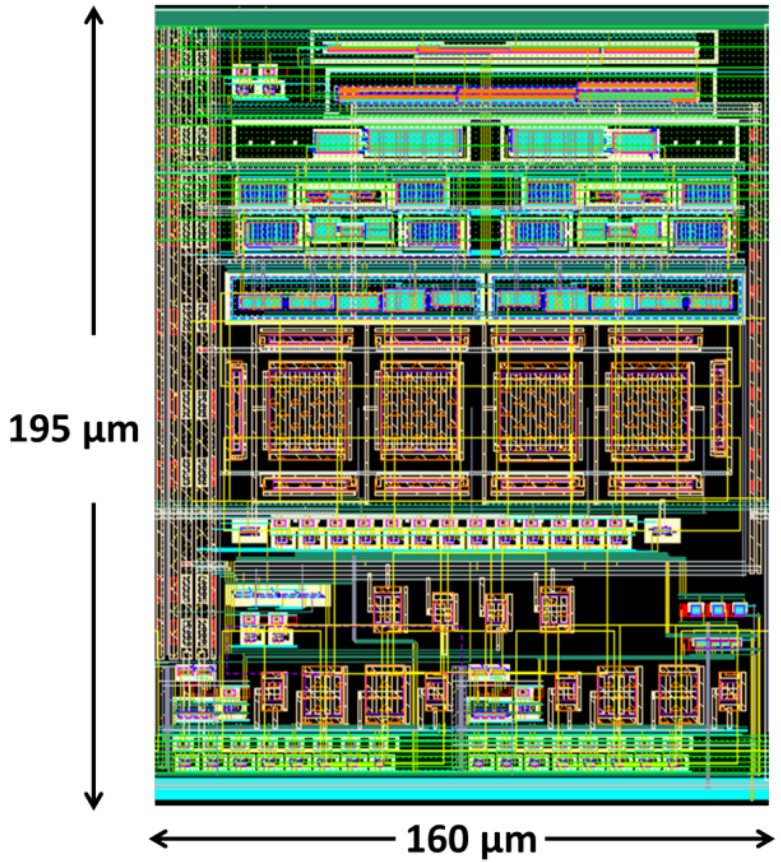
Mu2e-II Tracker Parallel Session

- Intro – Reviewed Feasibility Study and other past talks and suggestions
- Front end ASICs by Yury Kolomensky
- Next-Gen GEM-Micromegas by Stefano Miscetti
- Brainstormed new ideas and concerns
- Mostly filled out R&D

Using ASICs for front end electrics

Yury Kolomensky gave a talk on ASICs(application-specific integrated circuit) for the electronics.
ASIC's were the baseline in Mu2e til 2014, when it was switched to COTS products.
This allows us to design electronics which meets rad hard requirements
Much of the previous work done can be continued and used in Mu2e-II.
Berkley/LBL and ANL have expressed interest in pursuing this.



HIPPO : ASIC ADC

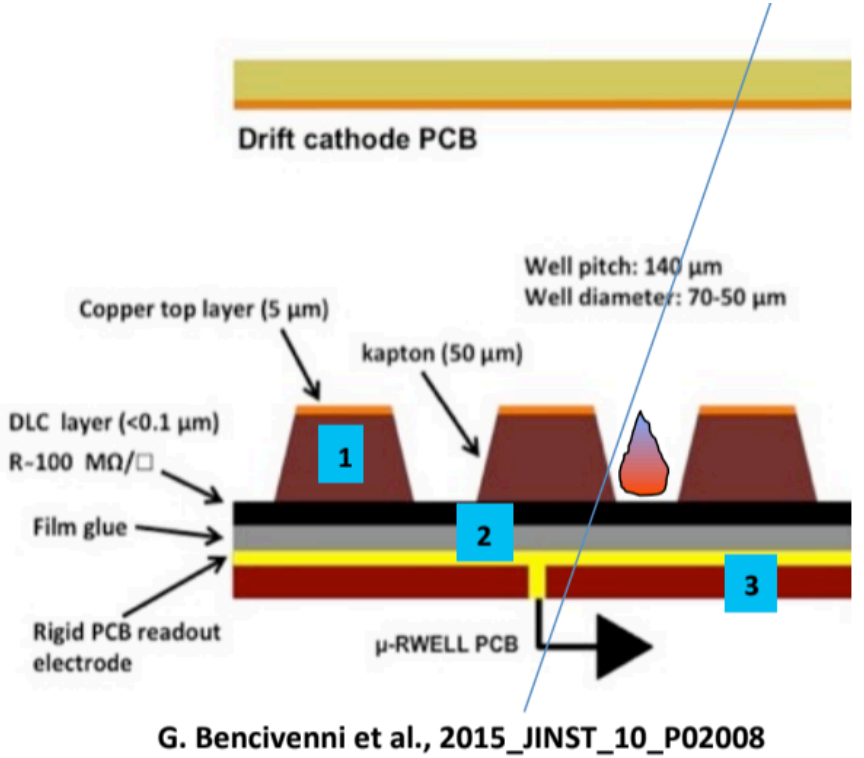
Next-Generation GEM-Micromegas

Stefano Miscetti proposed looking into µ-Rwell technology in the tracker.
The µ-RWELL is

- a single-amplification stage, intrinsically spark protected MPGD(Micro-Pattern Gas Detector).
- Combination of GEM and MicroMegas technology.

Initial advantages include ease of construction, material cost, and easily operated.

Simulations would need to be done to test feasibility, if momentum resolution is possible with given material budget.
Suggested inviting colleagues from Frascoti to discuss technology and possible design.



G. Bencivenni et al., 2015_JINST_10_P02008

Straw Tracker R&D

ID number	Experimental Challenge	Potential Technical Solution	Required R&D Task or Objective	Responsible Institution(s)	Priority	Estimated Resources	Comments	Target Funding Agency(s)	Other potential users
TRK-01	Improve mom. Resol.	Redo Simulation, vary conditions	Simulations		High		Now including hit resolution, Possible straw support structures, gas gain, Straw thickness, pressure, compositions, straw diameter reduction, straw location		
TRK-02	Improve mom. Resol.	Thinner straws	Produce Straws	University of MN	High		Long lead time	LDRD	MEG-III, OtherExperiment-A
TRK-03	Improve mom. Resol.	Thinner straws	Creep meas.		High	0.1 FTE $20k M&S	Long lead time	LDRD	MEG-III, OtherExperiment-A
TRK-04	Improve mom. Resol.	Thinner straws	Aging meas.		High	0.2 FTE $50k M&S	Long lead time Need source	DOE, LDRD	MEG-III, OtherExperiment-A
TRK-05	Improve mom. Resol.	Different gas	Gain meas., Simulations		Med.		Look at literature first	DOE	NuclPhysExperiment B, HEPExeriment C
TRK-06	Improve mom. Resol.	Gas < 1 atm	Simulations		High		quick simulation could have large effects		MEG-III, OtherExperiment-A
TRK-07	Improve mom. Resl.	Aluminum only straws	Aging meas.		High		Long lead time		MEG-III, OtherExperiment-A
TRK-08	Improve mom. Resol.	Different sense wire material	Aging meas.		low		low lead time		MEG-III, OtherExperiment-A
TRK-09	Reduce Aging effects	Reduce voltage to sense wire	Front end electronics		med.		Will be looked at with ASICs		MEG-III, OtherExperiment-A
TRK-10	Radiation dose on electronics	ASICs designed to be Rad hard	Evaluate	Berkley/LBL, ANL	High		long lead time		MEG-III, OtherExperiment-A
TRK-11	Alternate Tracking Technologies	Mu-Rwell tracker	Feasibility Study	Frascati	High		Very long lead time if we choose this path		MEG-III, OtherExperiment-A
TRK-12	Straw Production	Alternate Straw Production	Feasibility Study		med.		priority depends if current method is successful		MEG-III, OtherExperiment-A
TRK-13	Tracker Assembly	New Epoxies	Aging/outgas tests on epoxies		low		Long lead time		OtherExperiments
TRK-14	Tracker Assembly	Alternate construction methods	Feasibility of different gas seals, support structure		med.		Partially depends on Straw results		OtherExperiments
TRK-15	Alternative Tracking materials	Thin carbon tubes	Feasibility Study		med.				OtherExperiments
TRK-16	Alternative Tracking Technologies	Reuse back half of mu2e tracker, update front half	Feasibility Study		low				
TRK-17	Improve mom. Res	Digitize waveforms	Front end electronics, simulation		med.		Simulation sooner, will depend on other desisions, (gas, etc)		OtherExperiments