Ideas for Next Dark Sector Search at Accelerators

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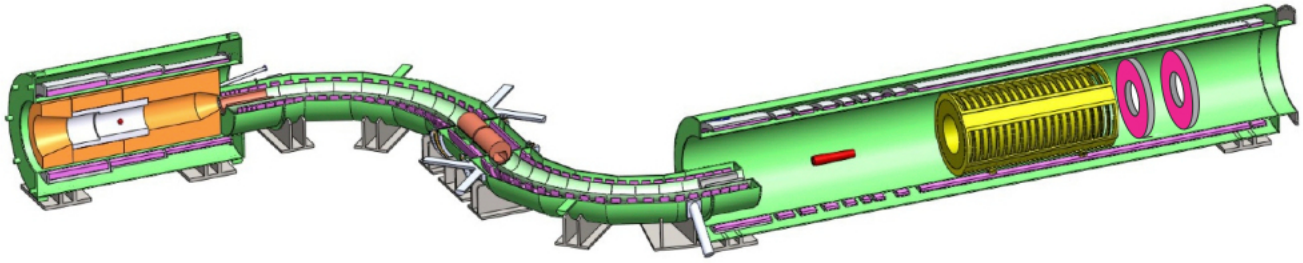
Workshop on Dark Sectors 2016
SLAC

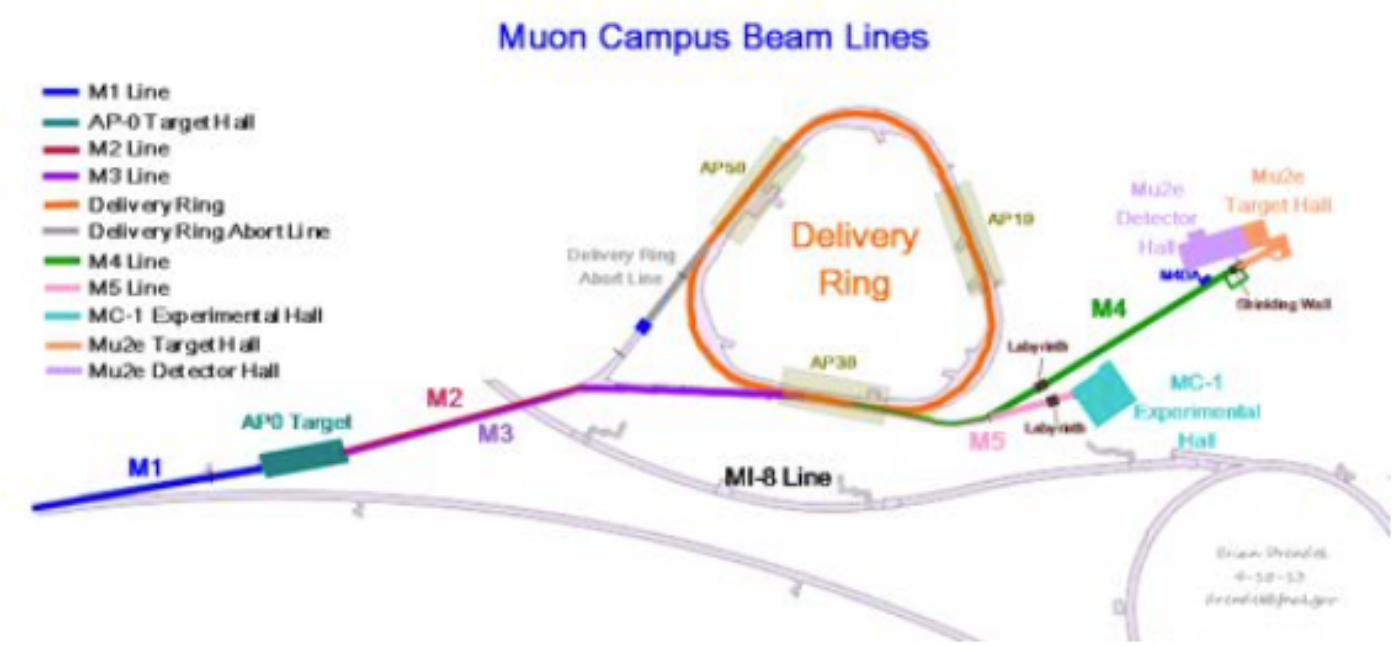
Mu2e Experiment at Fermilab

- Objective: to look for neutrino-less muon to electron conversion
- 3.2E20 POT to be delivered



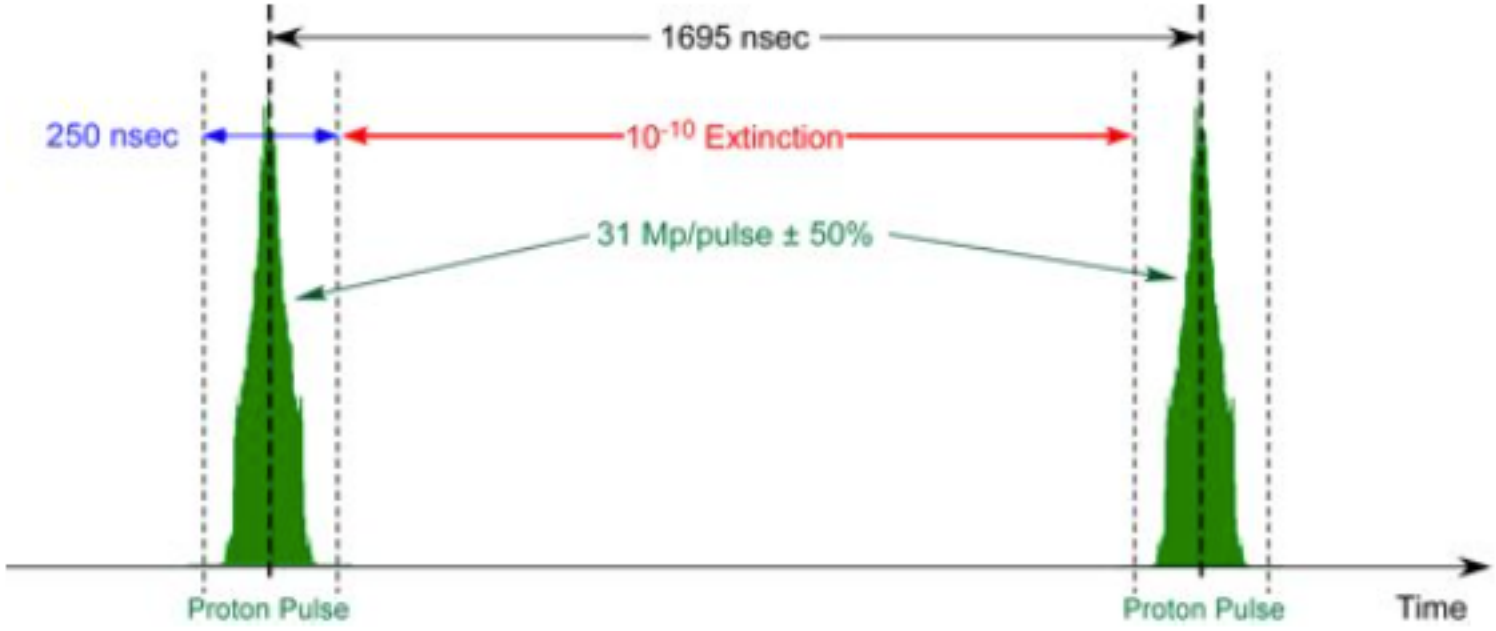
Mu2e Experiment at Fermilab

- 8 GeV protons from a Booster (via special Delivery Ring)



Mu2e Experiment at Fermilab

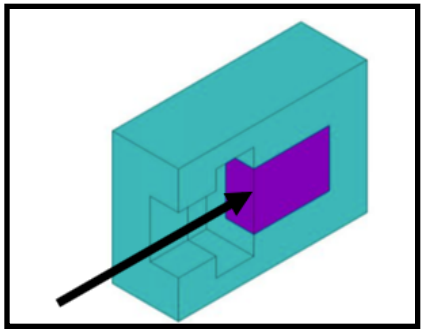
- Clean well separated proton spills by resonant extraction and extinction
- Possibility to control the spill separation (to some extent)

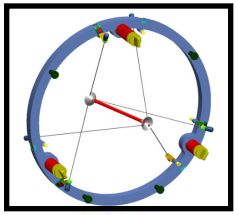


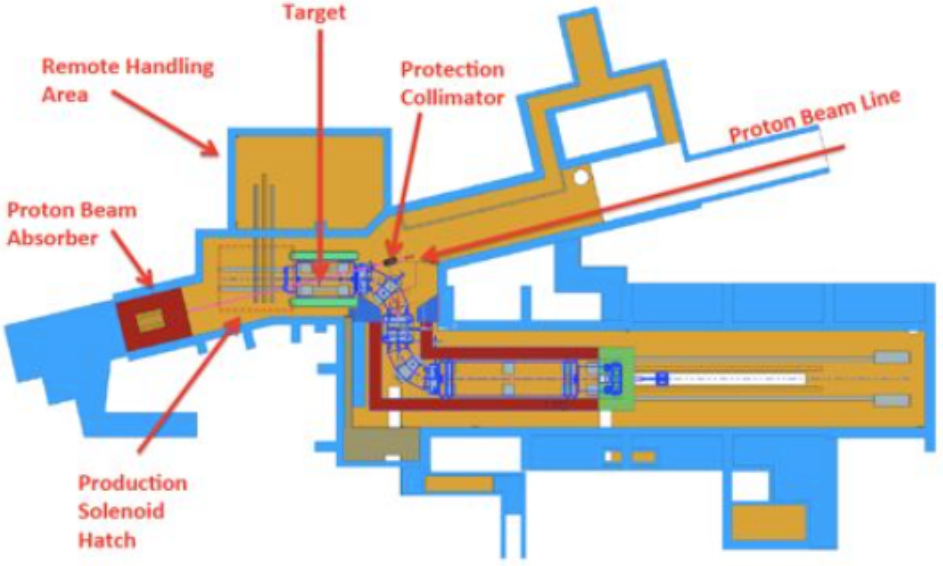
Mu2e Experiment at Fermilab

- Clean well separated proton spills by resonant extraction and extinction

Absorber:
Steel 1.5mX1.5mX2m
and concrete

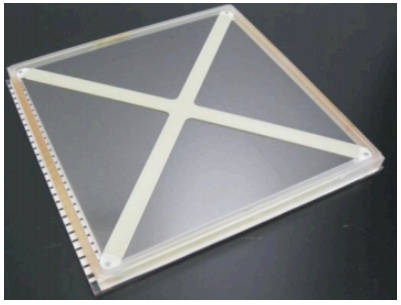


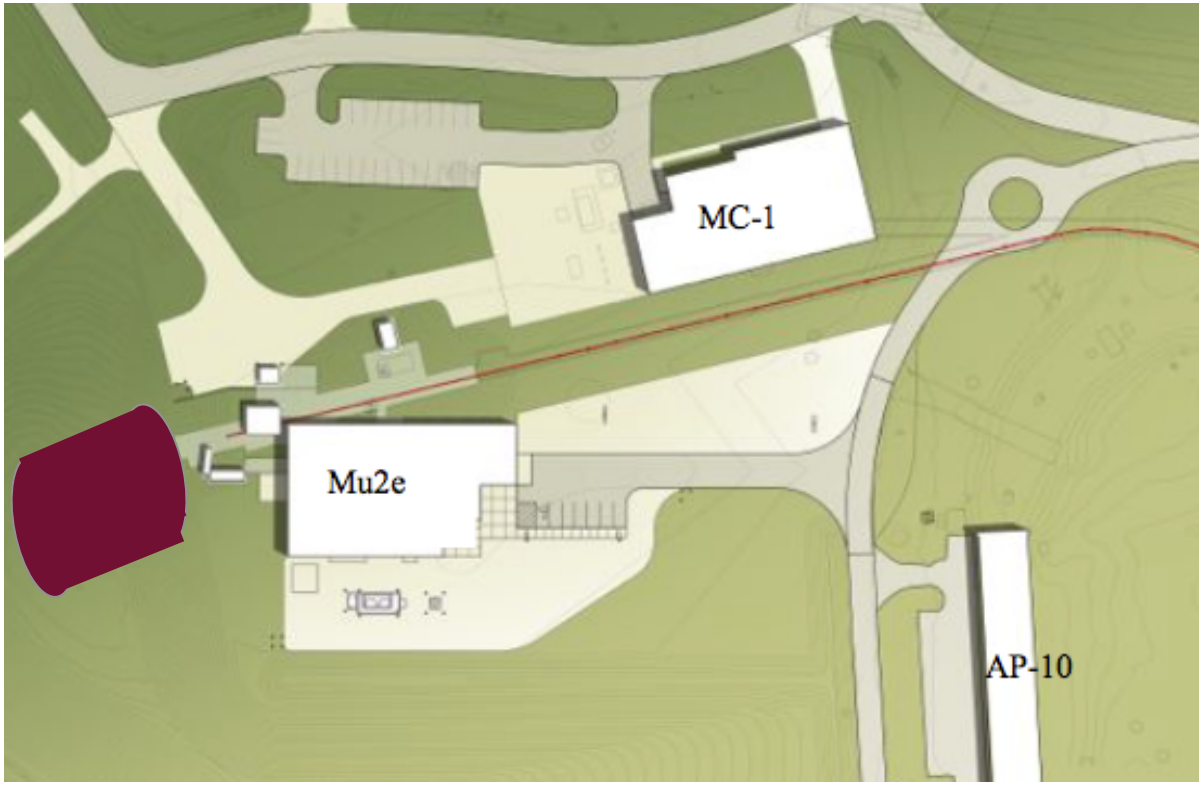




Ideal for a beam dump experiment

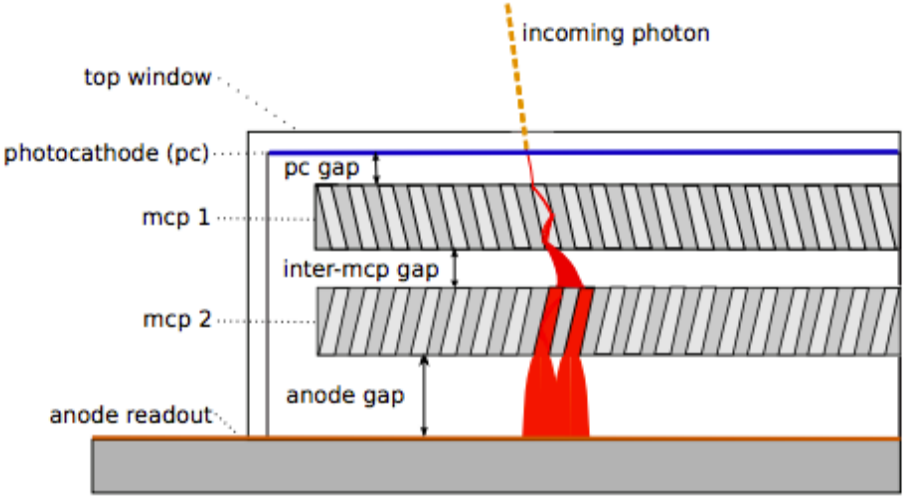
- Detector for time-of-flight type searches using next generation of fast photodetectors

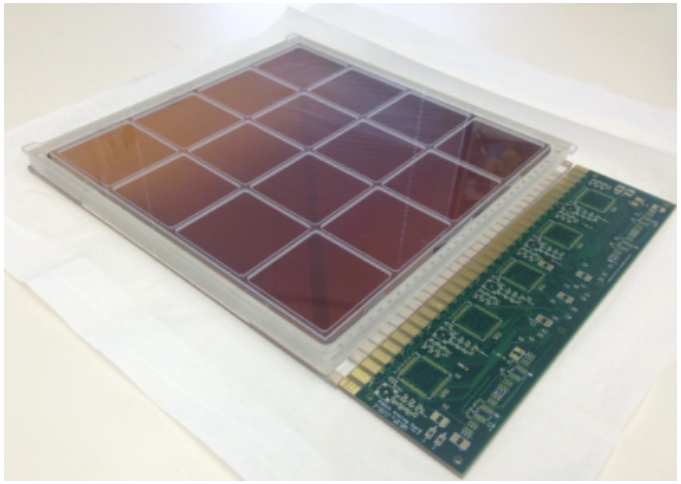


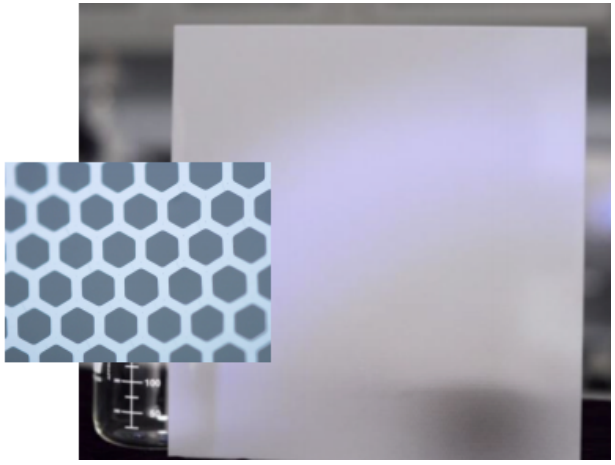


Next Generation of Photodetectors at Argonne

- LAPPD- Large Area Pico second Photodetector

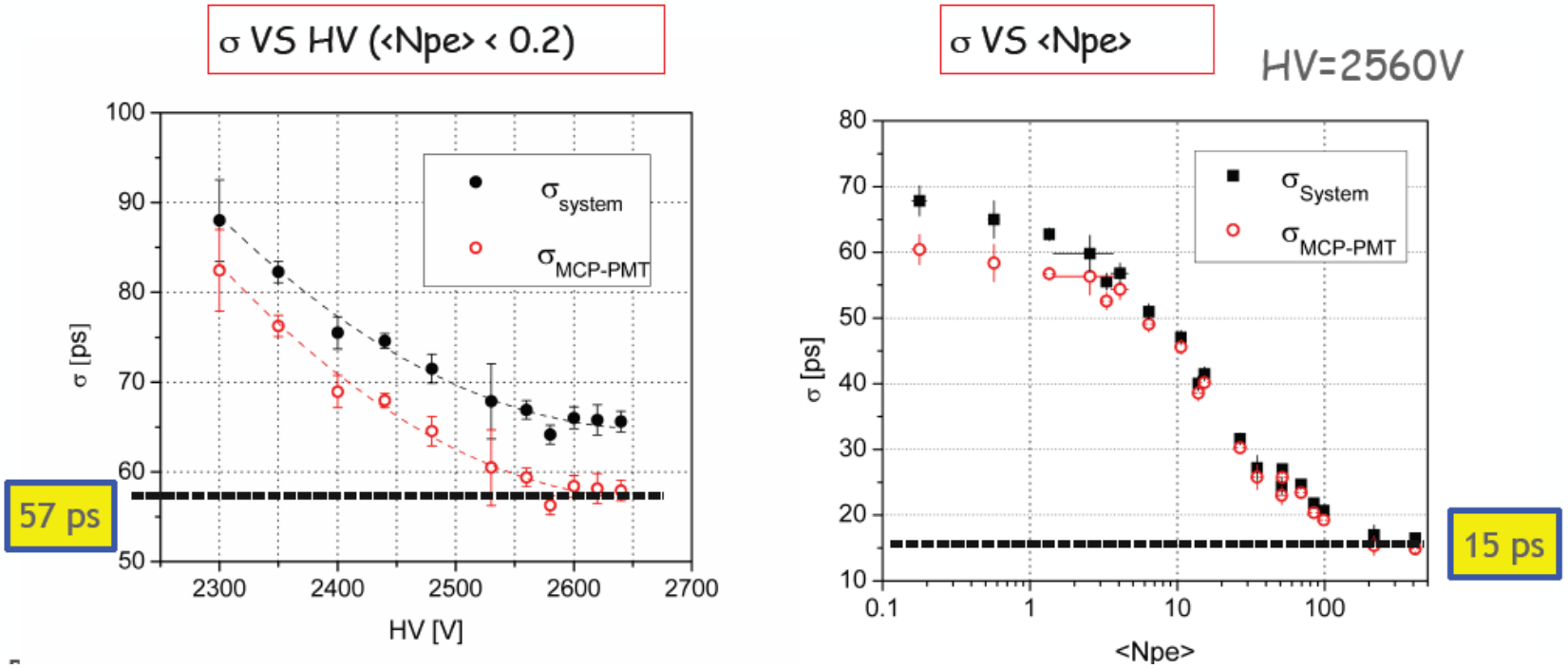






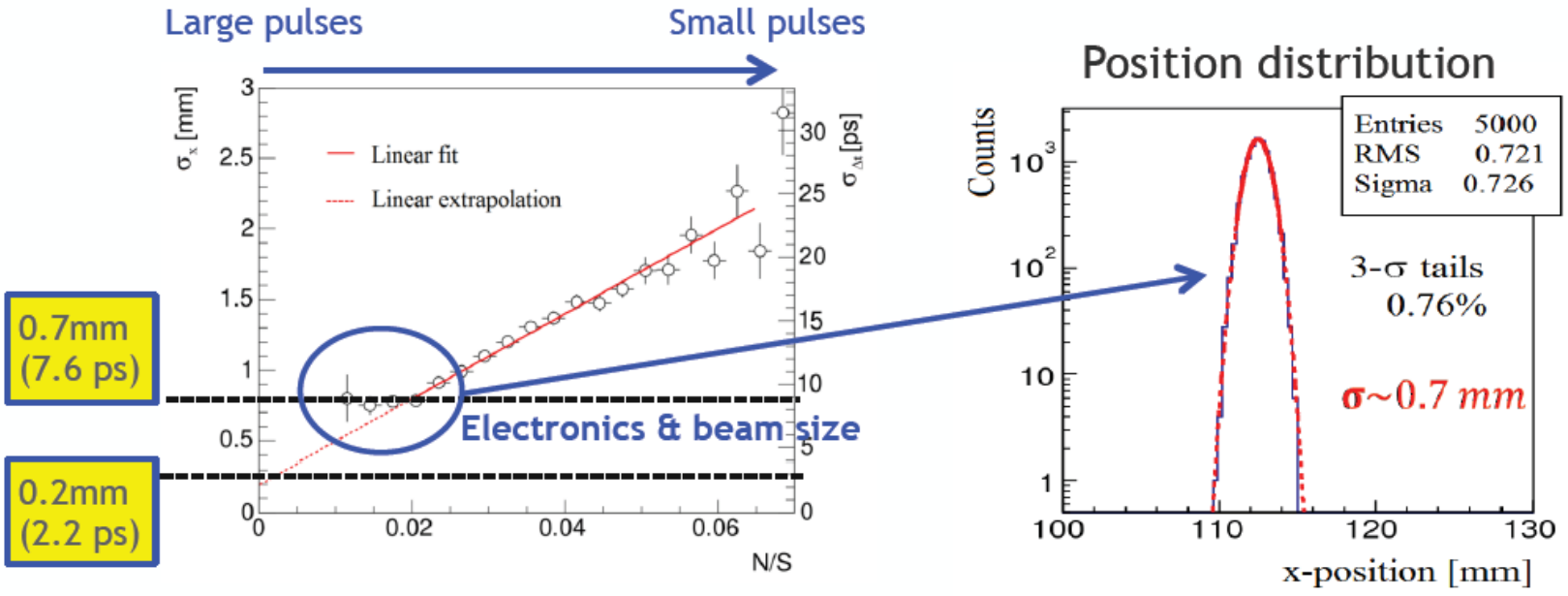
MCP-PMT Characteristics

- Pico-second timing resolution achieved



MCP-PMT Characteristics

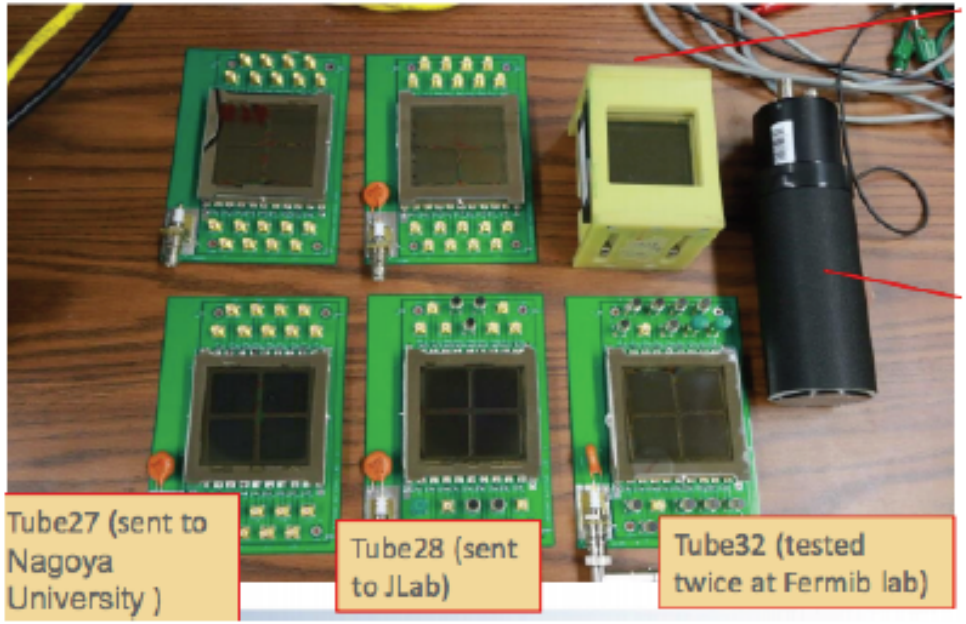
- Sub mm position resolution



Towards commercialization

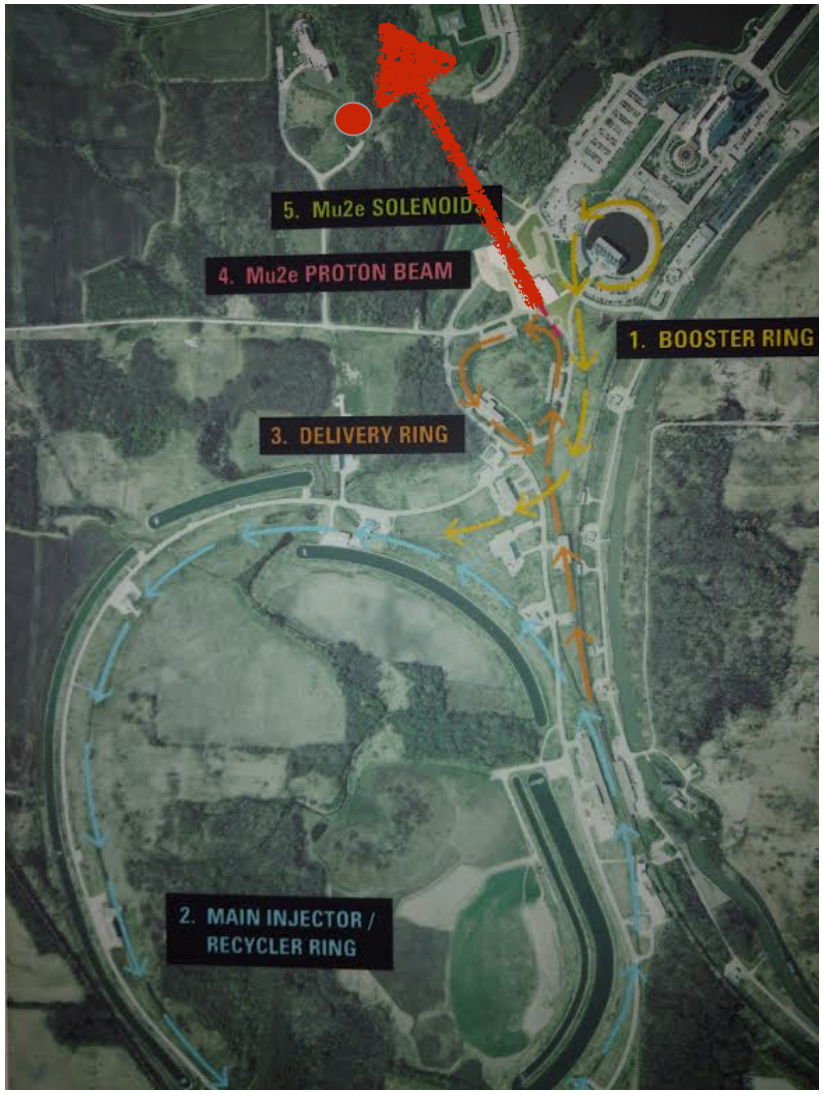
- Successfully demonstrated at Argonne
- Transferred to a commercial manufacturer

INCOM
Bright Ideas in Fiberoptics



MiniBooNE at right place again?

Almost!



Summary

- Mu2e experiment provides another possible location for a sub-Gev dark matter search experiment at Fermilab