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Targeting Studies for Mu2e-II

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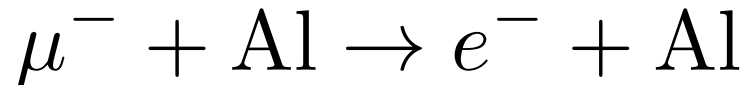
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Background

- Mu2e is an experiment searching for charged lepton flavor violation (CLFV) in muons.



Mu2e-II aims to achieve $\times 10$ Mu2e sensitivity.

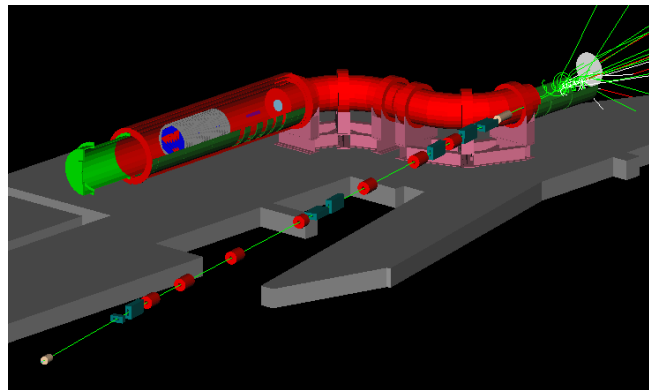
- Only modest changes to the Mu2e design are required to pursue Mu2e-II. (Proton Improvement Plan-II)

	Mu2e	Mue2-II
Beam Kinetic Energy	8 GeV	800 MeV
Beam Power	8 kW	8-100 kW
Protons-On-Target (POT)	3.6×10^{20}	$3.6 \times 10^{21} - 4.5 \times 10^{22}$
Run Duration	3 years	3 years
Run Time	2×10^7 sec/year	2×10^7 sec/year
Duty Factor	0.32	-
POT Pulse Full Width	200 ns	-
POT Pulse Spacing	1695 ns	-
POT Extinction	10^{-10}	10^{-12}

Simulation Details

How does a 800 MeV proton beam have an effect on muon production rate?

- Simulated two scenarios (8GeV and 800 MeV) using G4beamline
- Simulated Events: 40×10^6 (8GeV), 100×10^6 (800MeV)
→ Computation time: ~2 days using 100 nodes

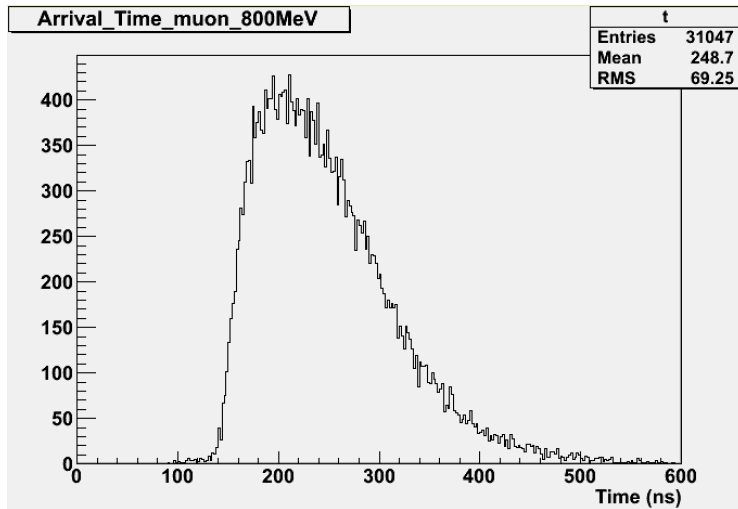


Early Results & Future

Kinetic Energy	Stops/POT	Stops/Power	Stops / Survived muons after TS
8 GeV	1.690×10^{-3}	1.690	0.3760
800 MeV	1.035×10^{-4}	1.035 *	0.3795

*Assuming a 8 kW scenario

Muon Arrival Time



- Muon Production/Power dropped by a factor of 1.63.
- The arrival time is independent of beam energy.

Future:

- Study on momentum distribution of stopped muons
- Background study