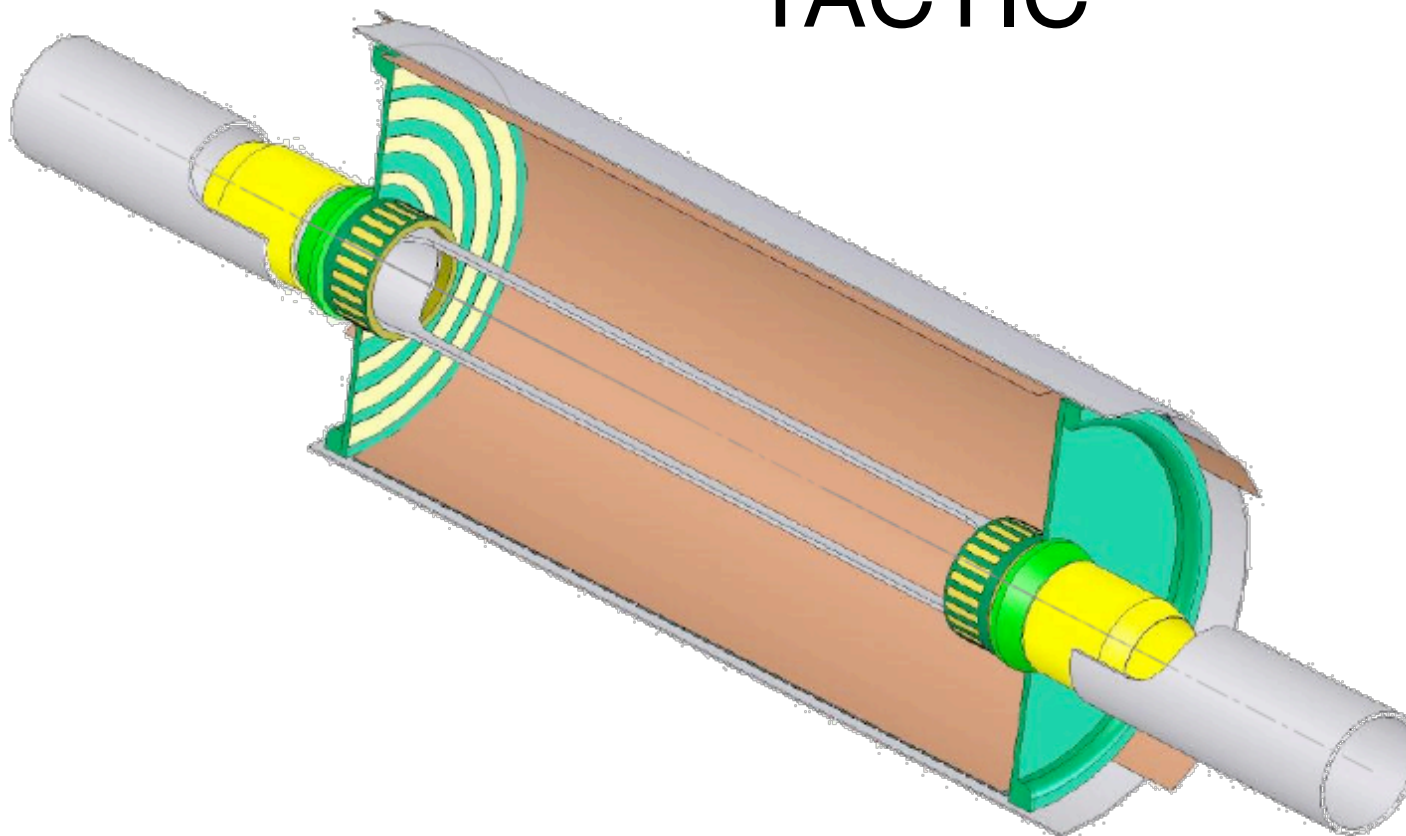
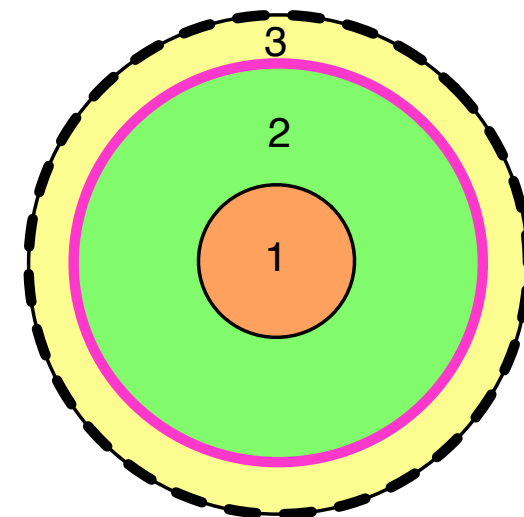
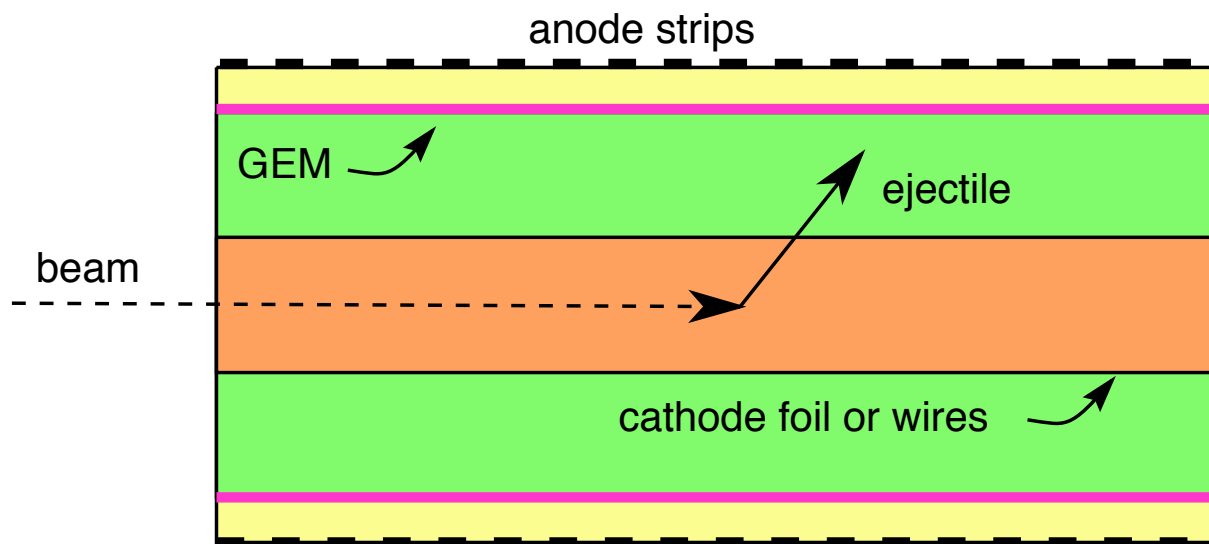


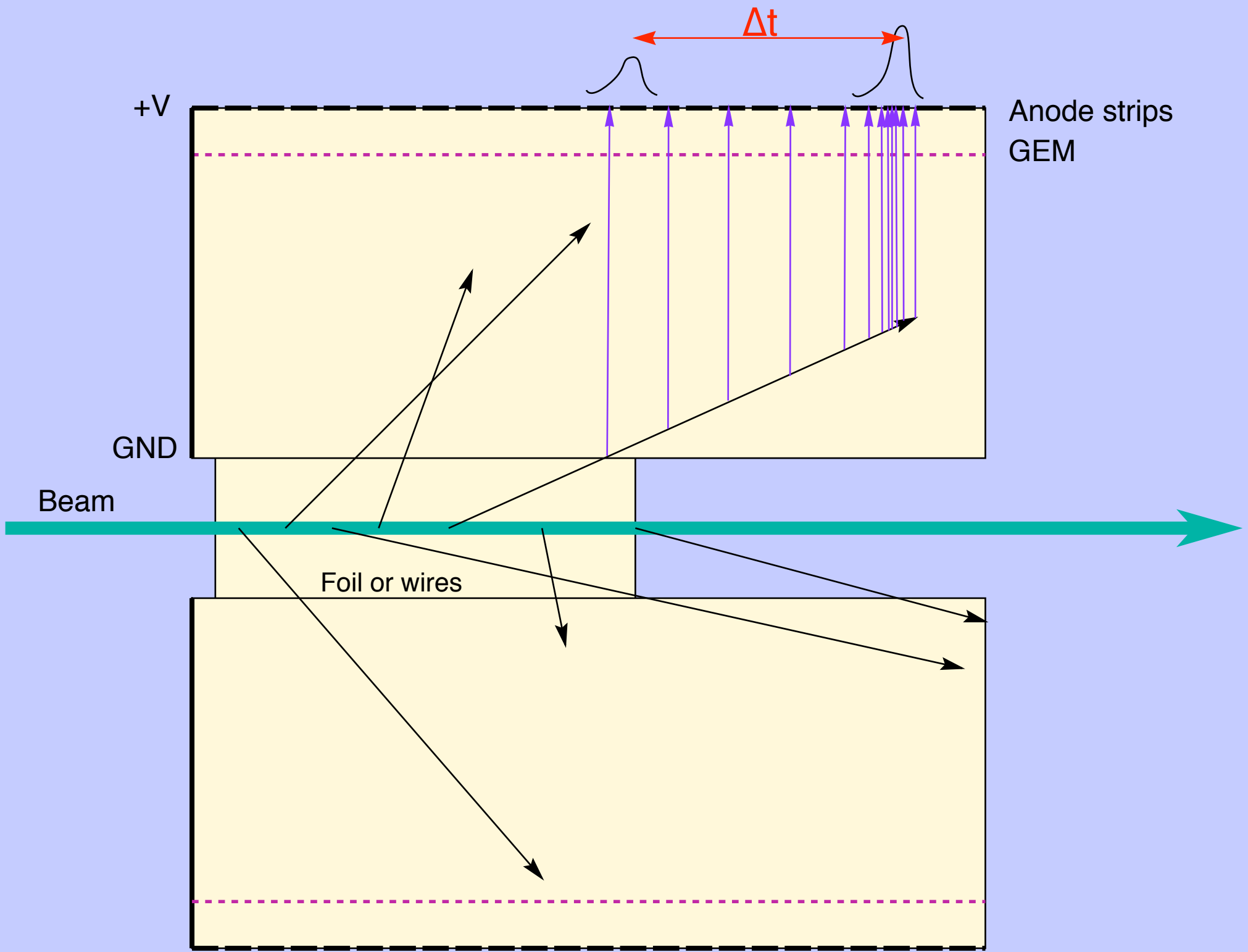
TACTIC

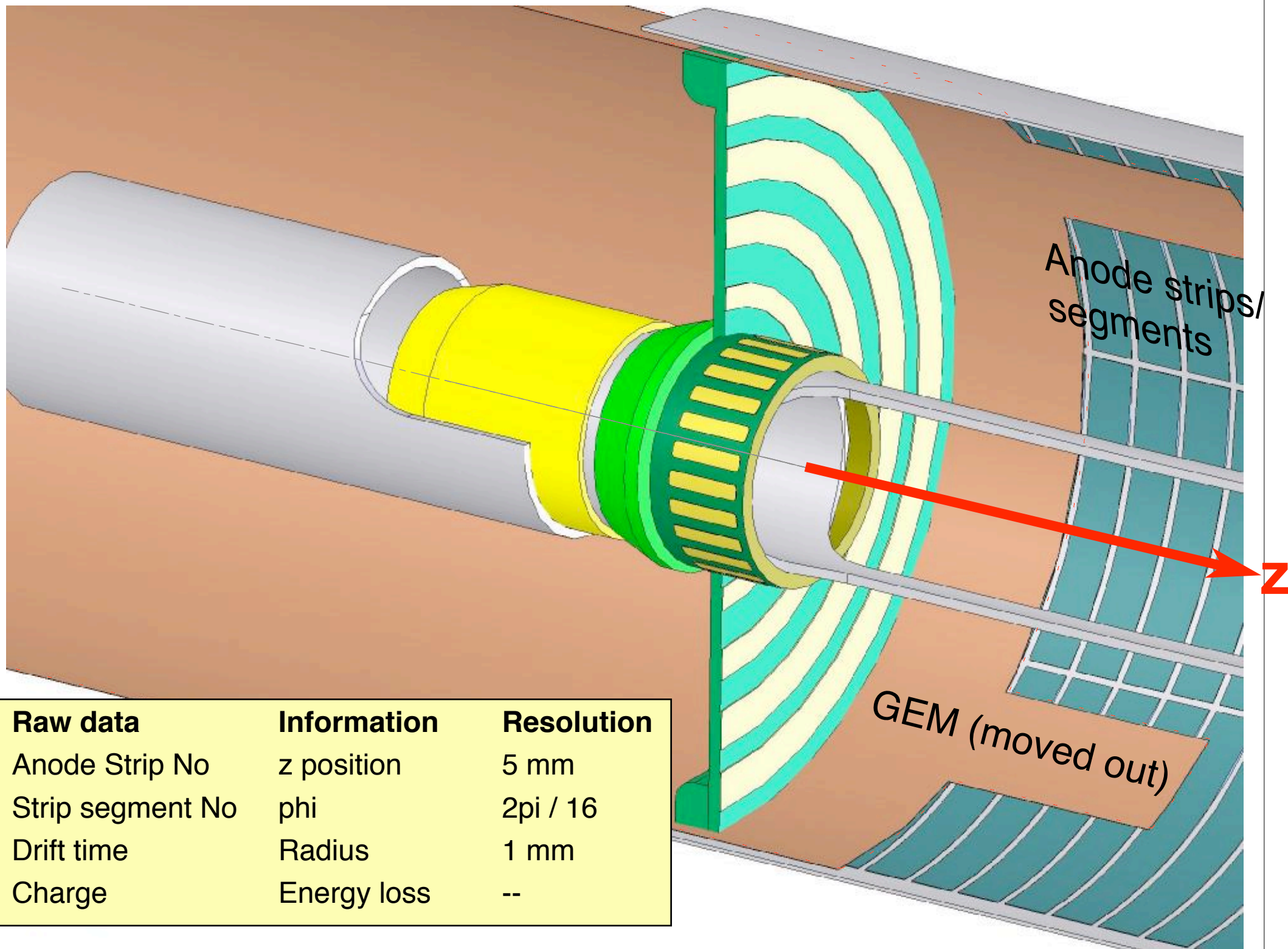
3D view



Schematic view

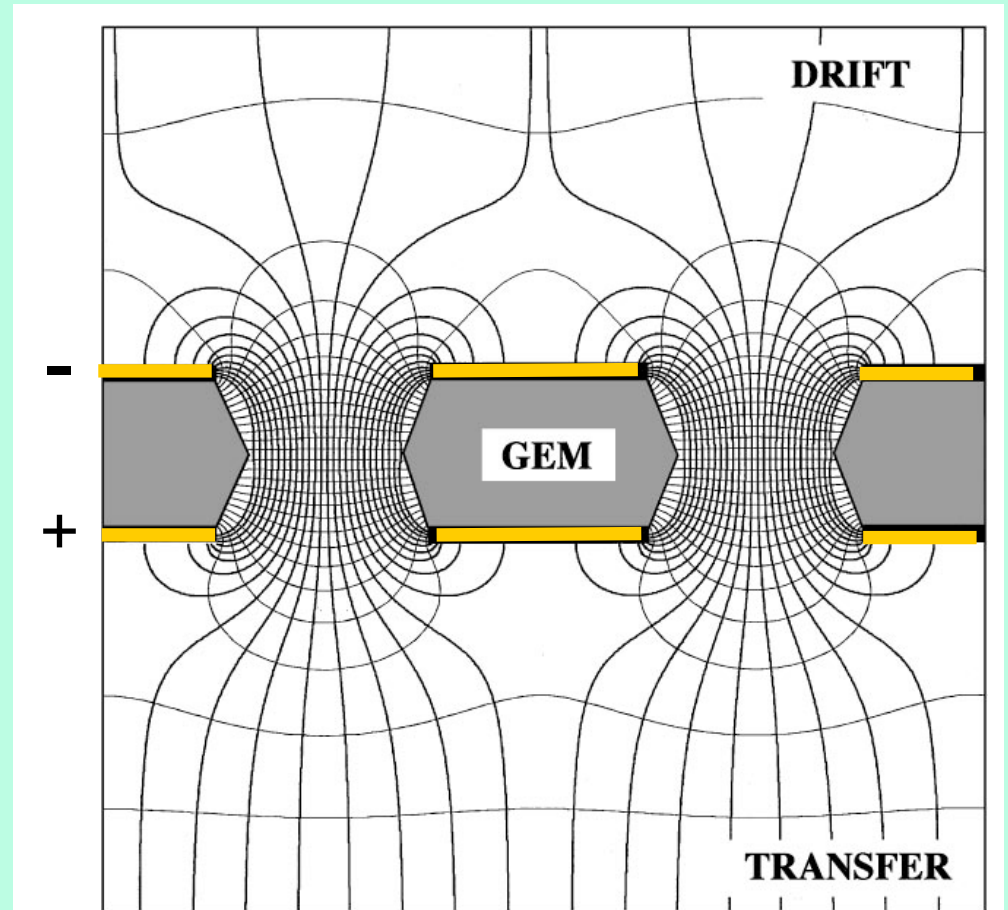
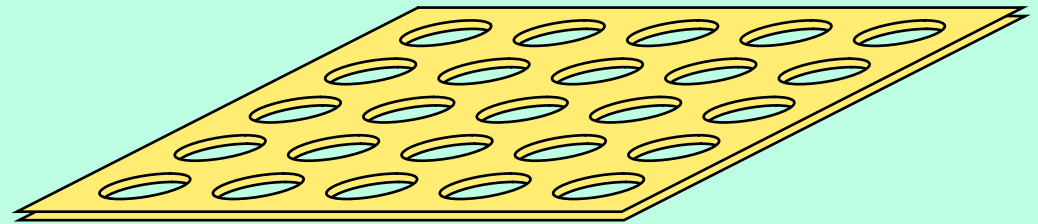
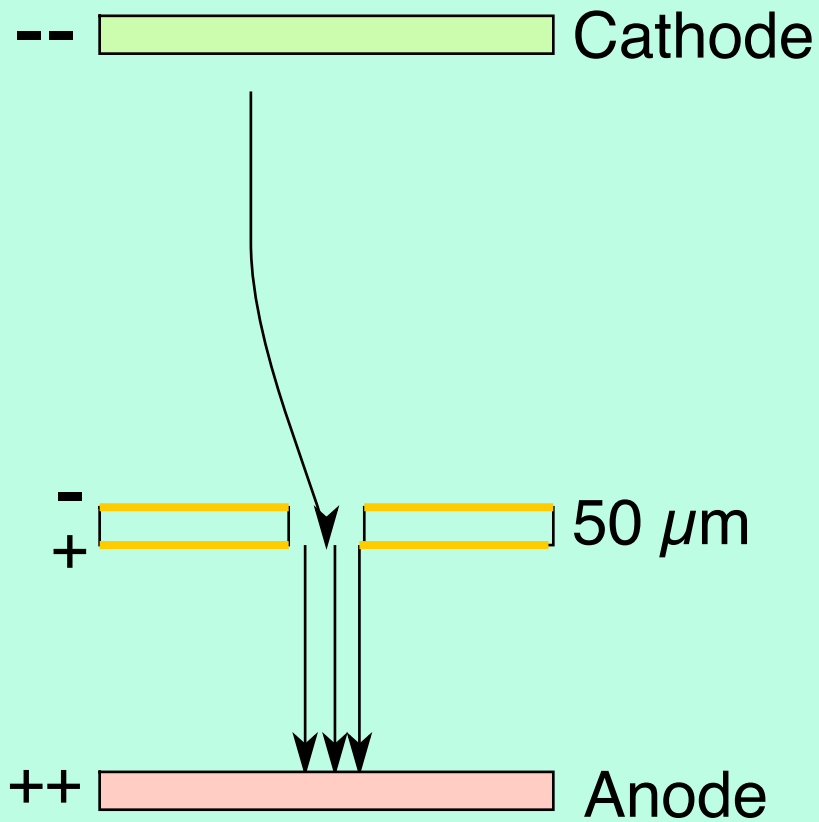






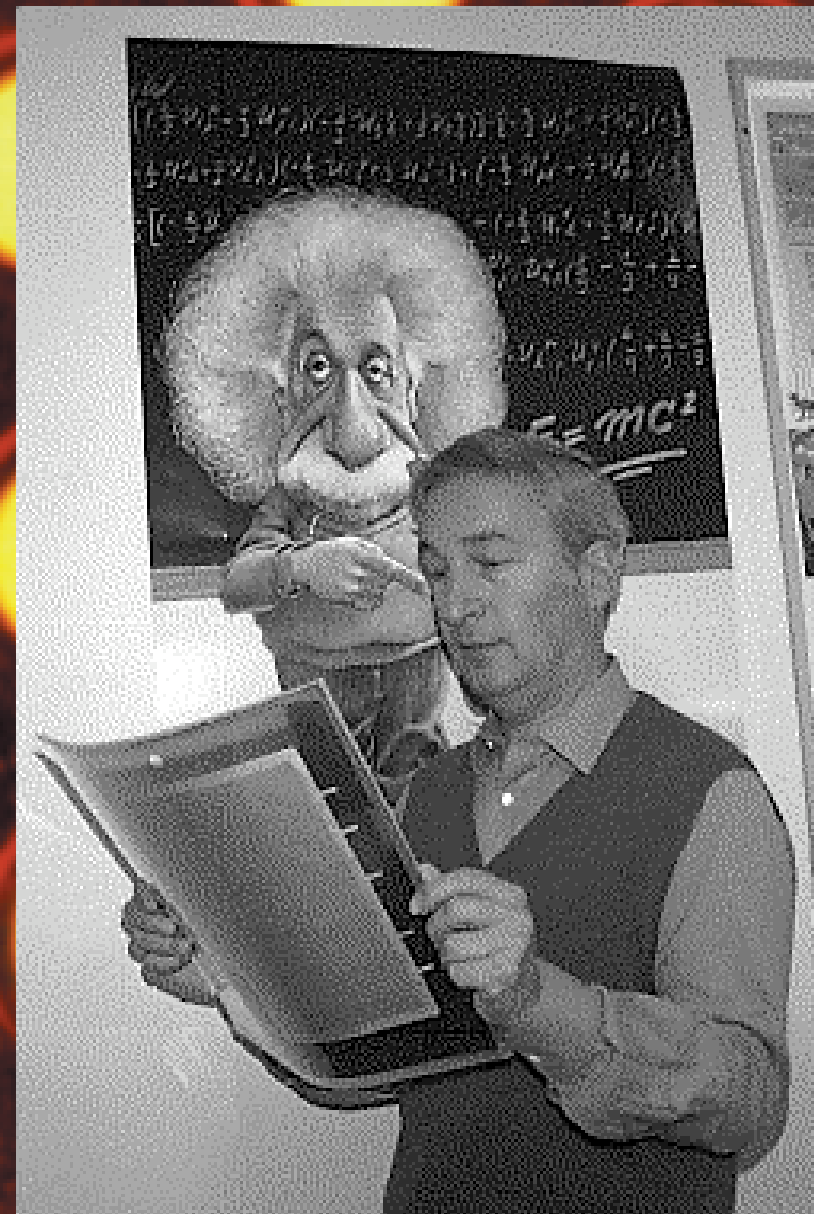
Raw data	Information	Resolution
Anode Strip No	z position	5 mm
Strip segment No	phi	$2\pi / 16$
Drift time	Radius	1 mm
Charge	Energy loss	--

The Gas Electron Multiplier (GEM)

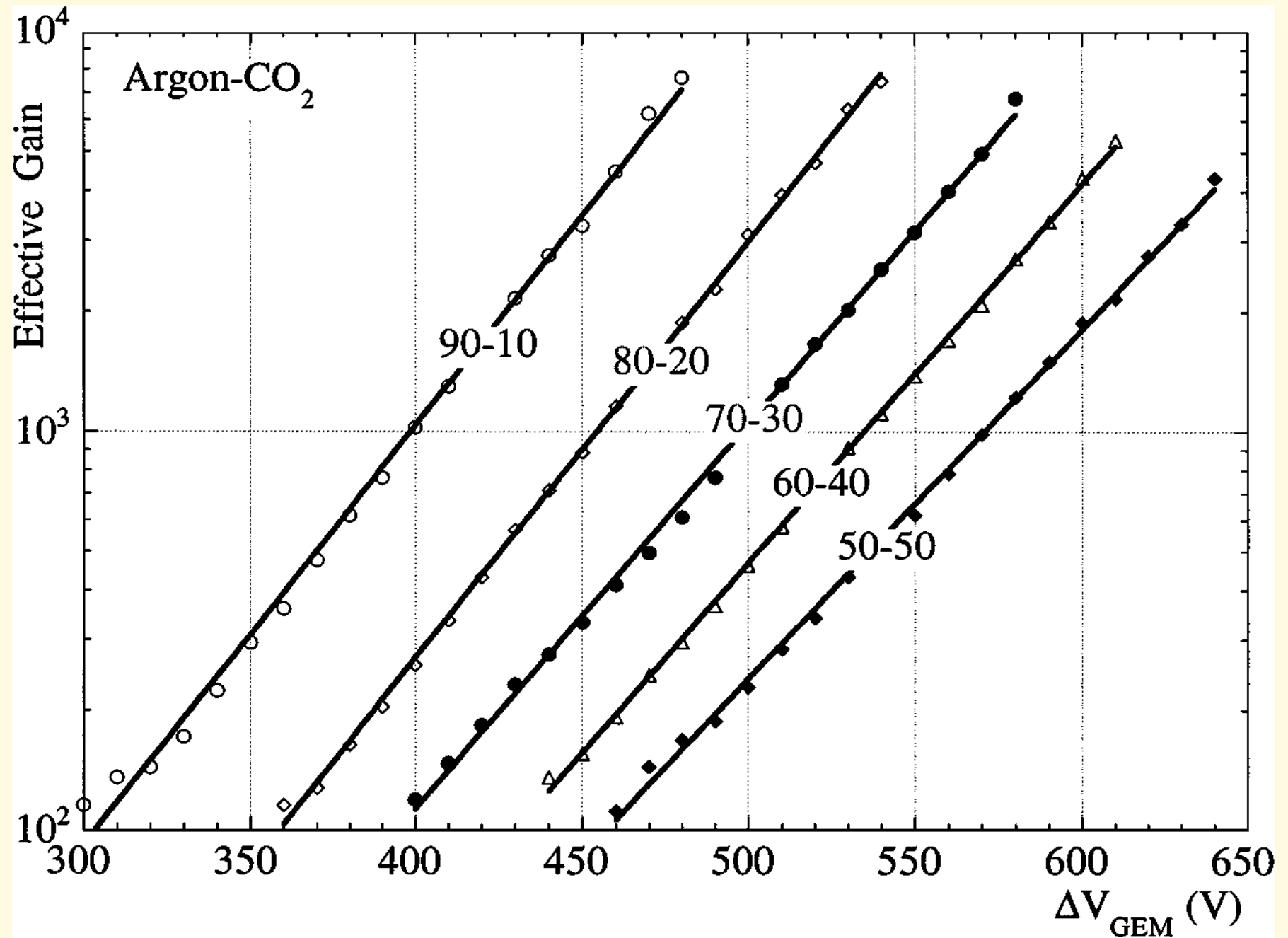


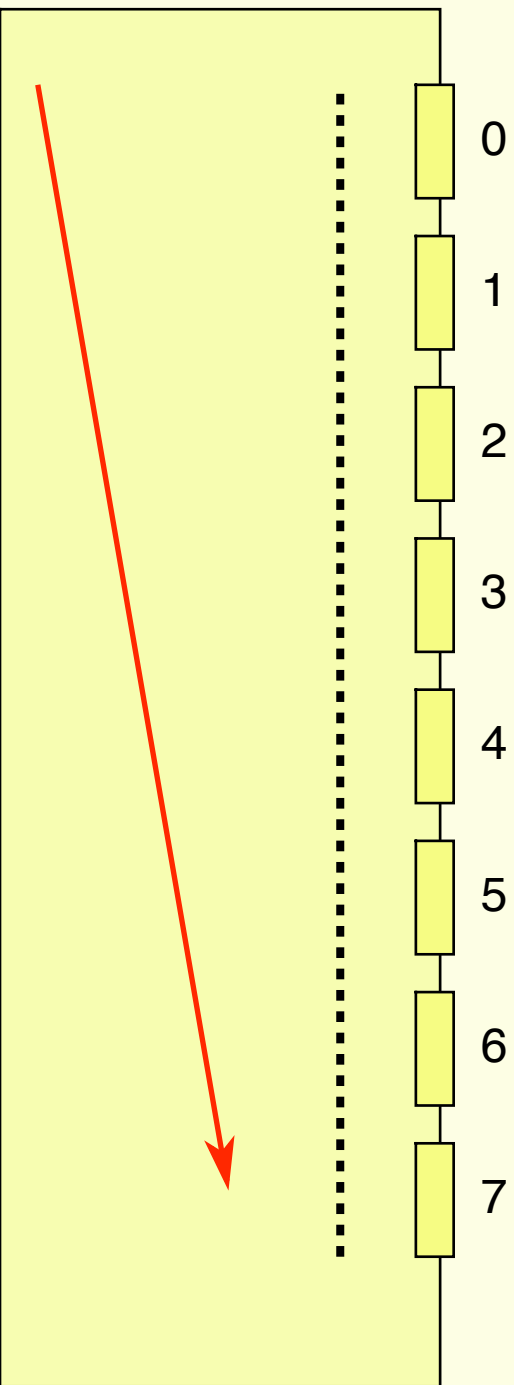
150 μm

- Introduced 1996 by F. Sauli
- 100% transmission
- High gain (up to 10^4)
- Double sided printed circuit technology
- Preserving the ionization pattern to a large extend

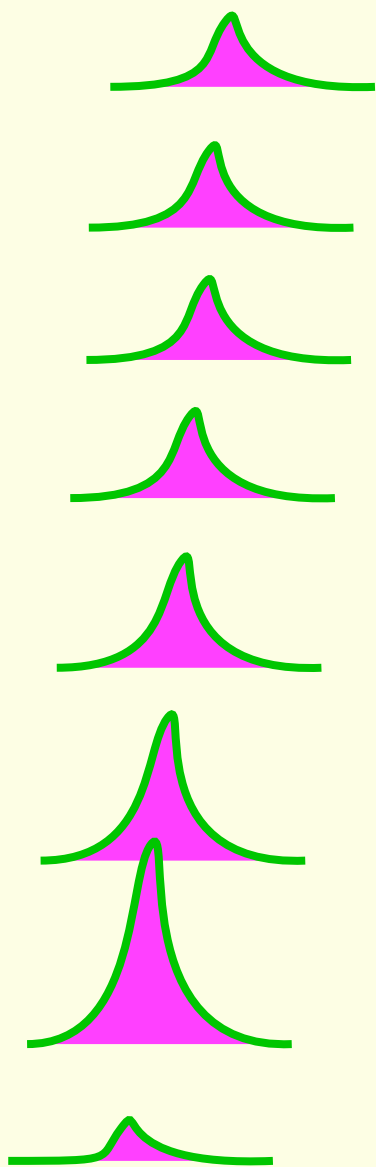


GEM Gain in Different Ar-CO₂ Mixtures

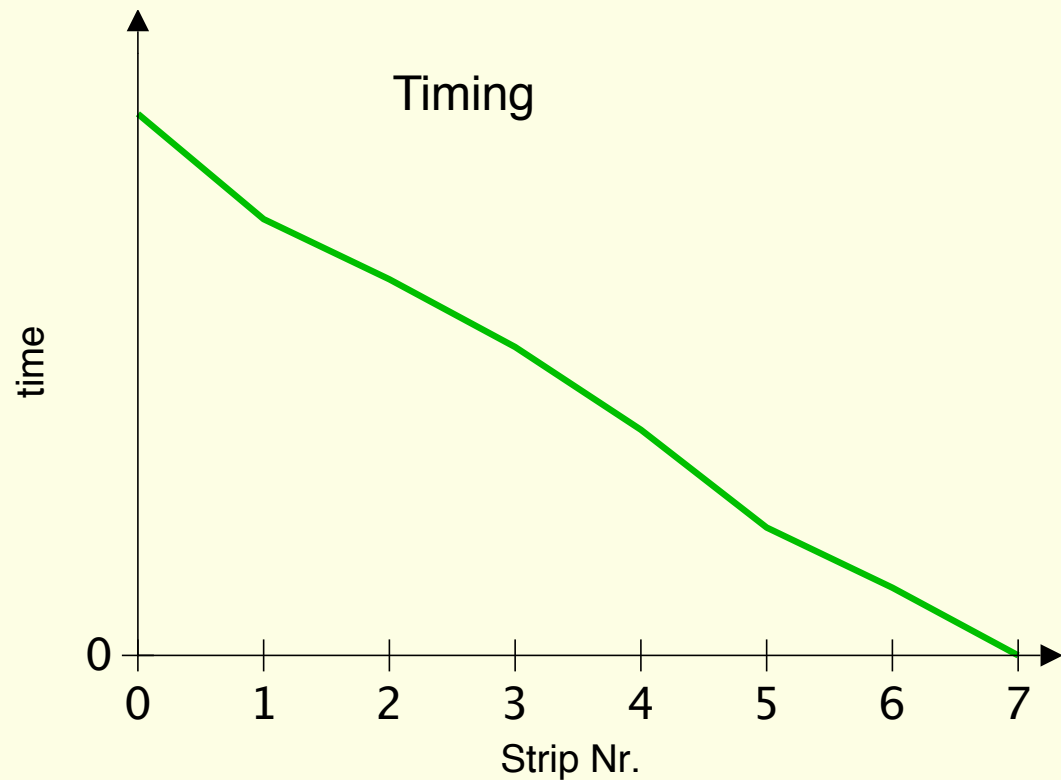




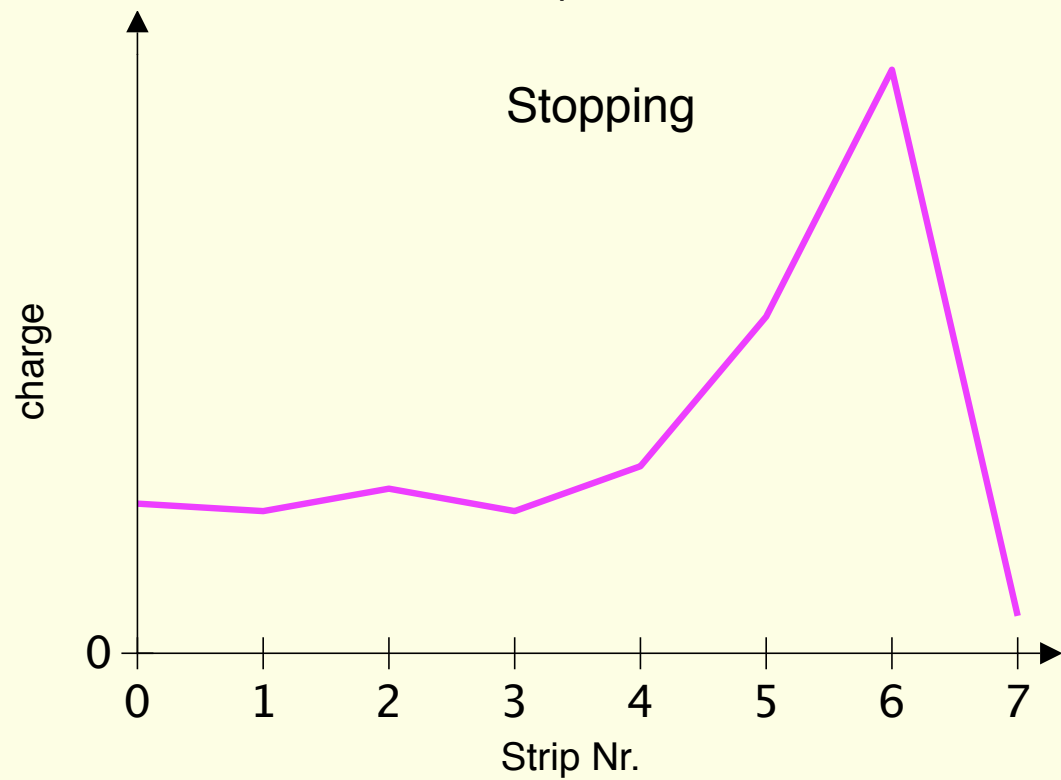
Signal



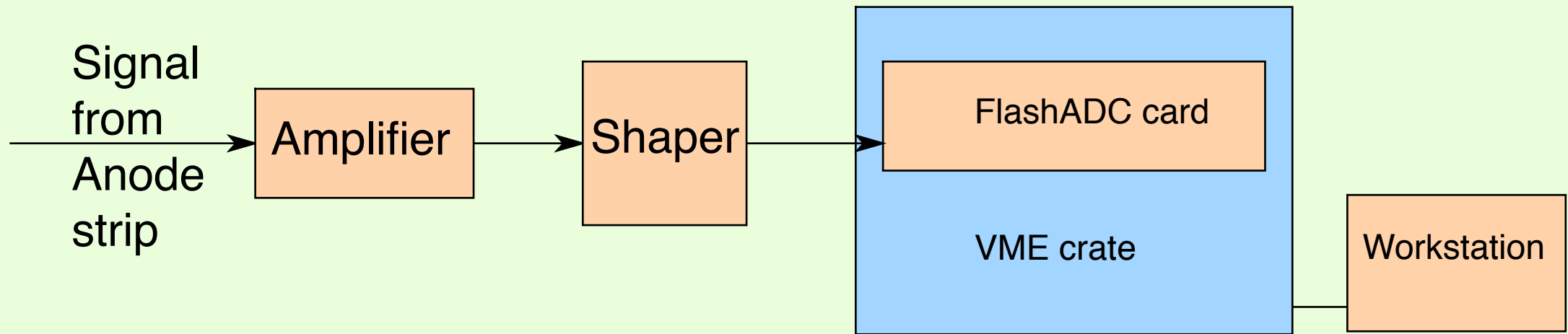
Timing



Stopping



DAQ electronics



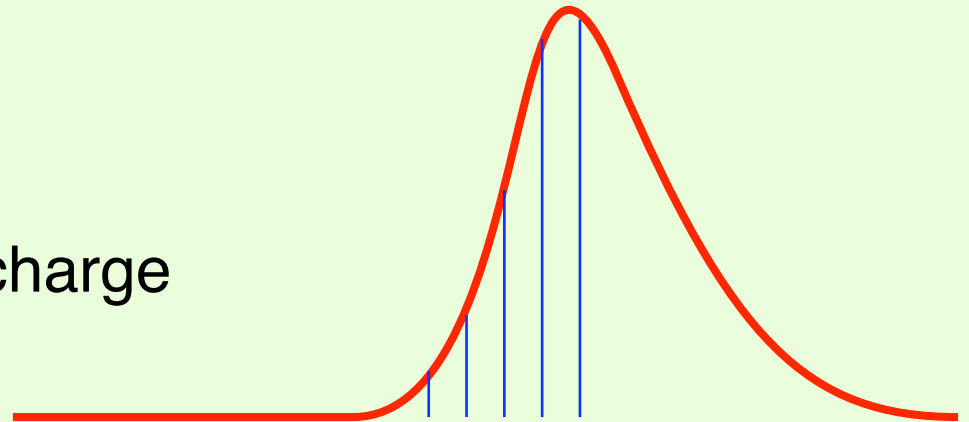
Flash ADC

Sampling rate 50-70 Ms/s

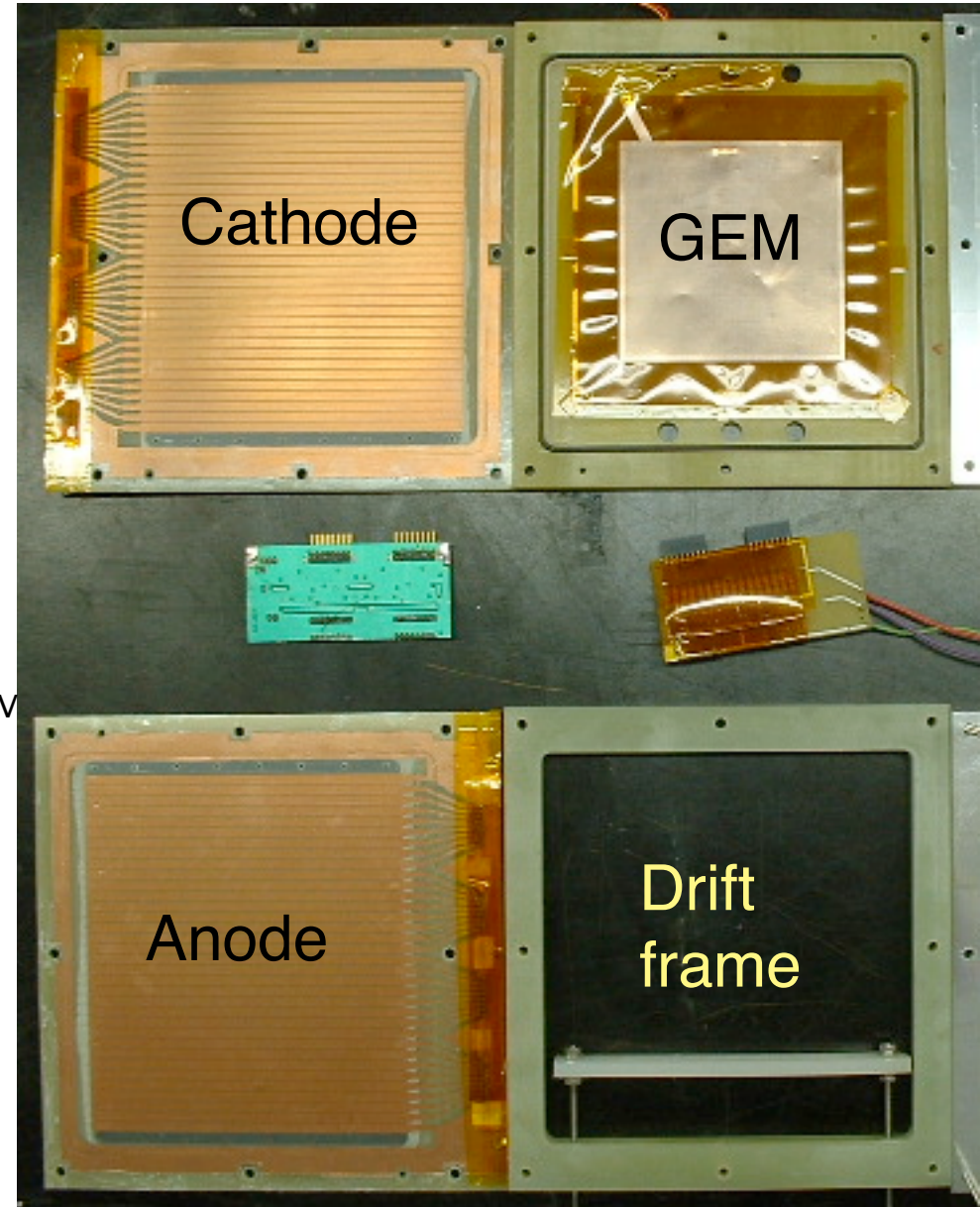
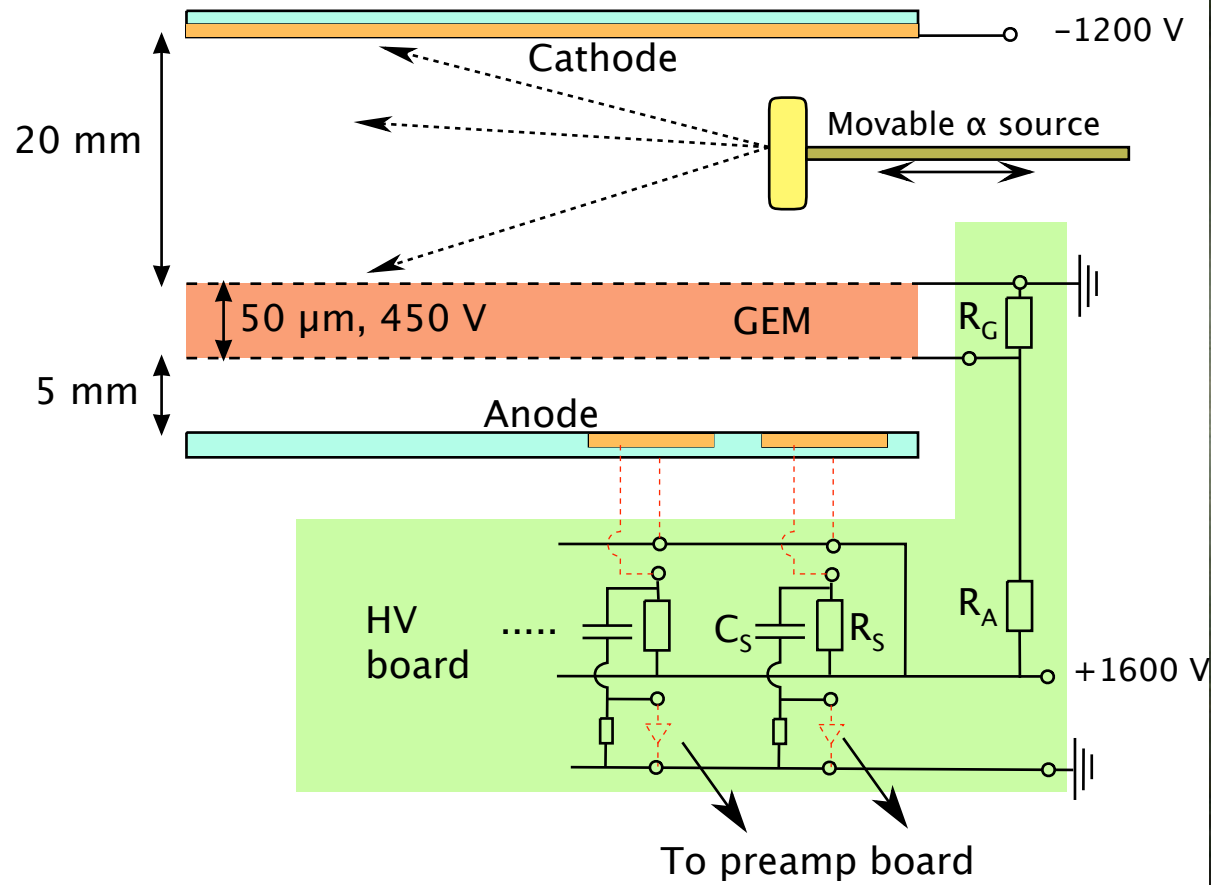
FPGA algorithm to extract time and charge

Needs good S/N ratio (at least 10)

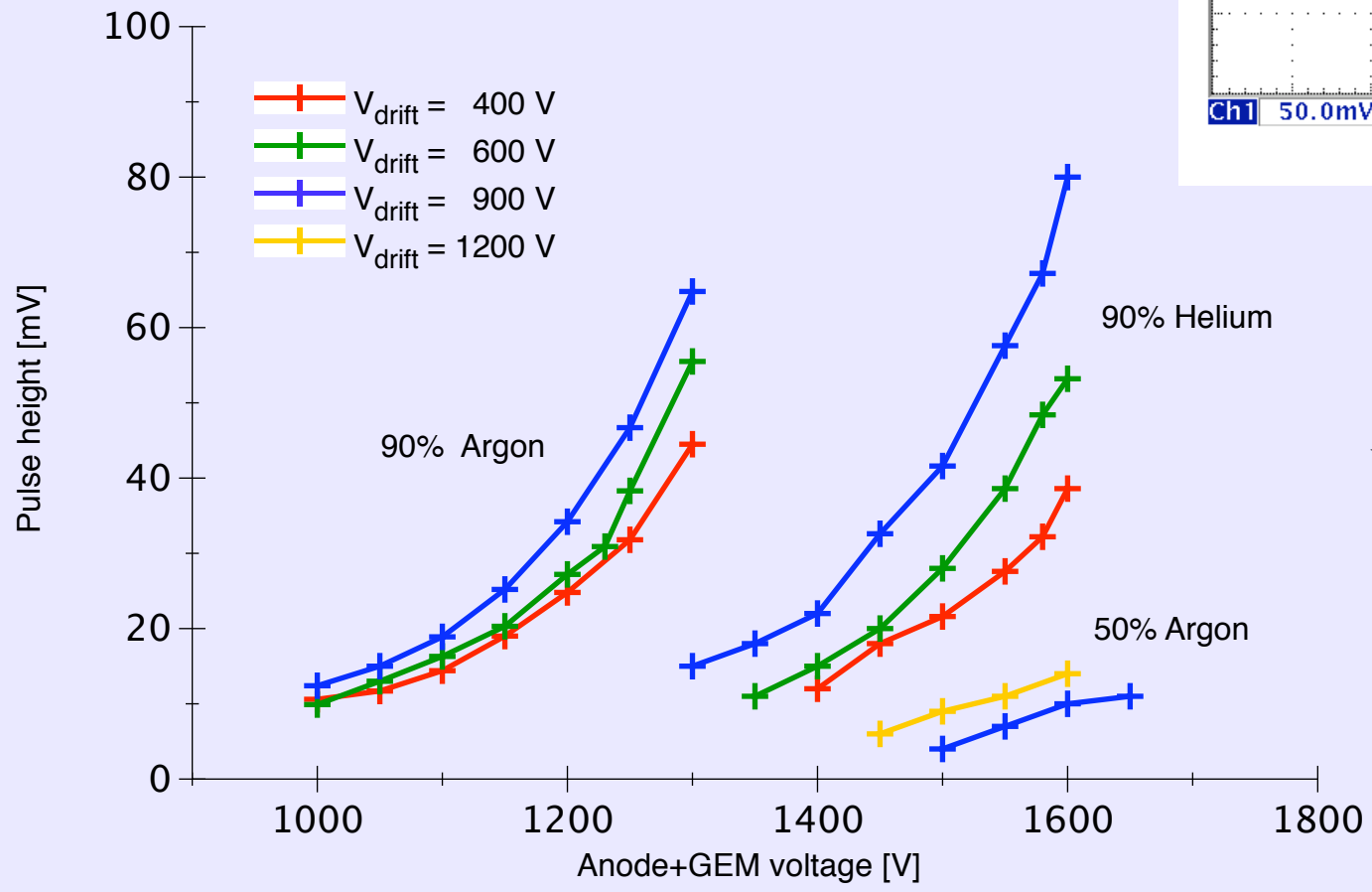
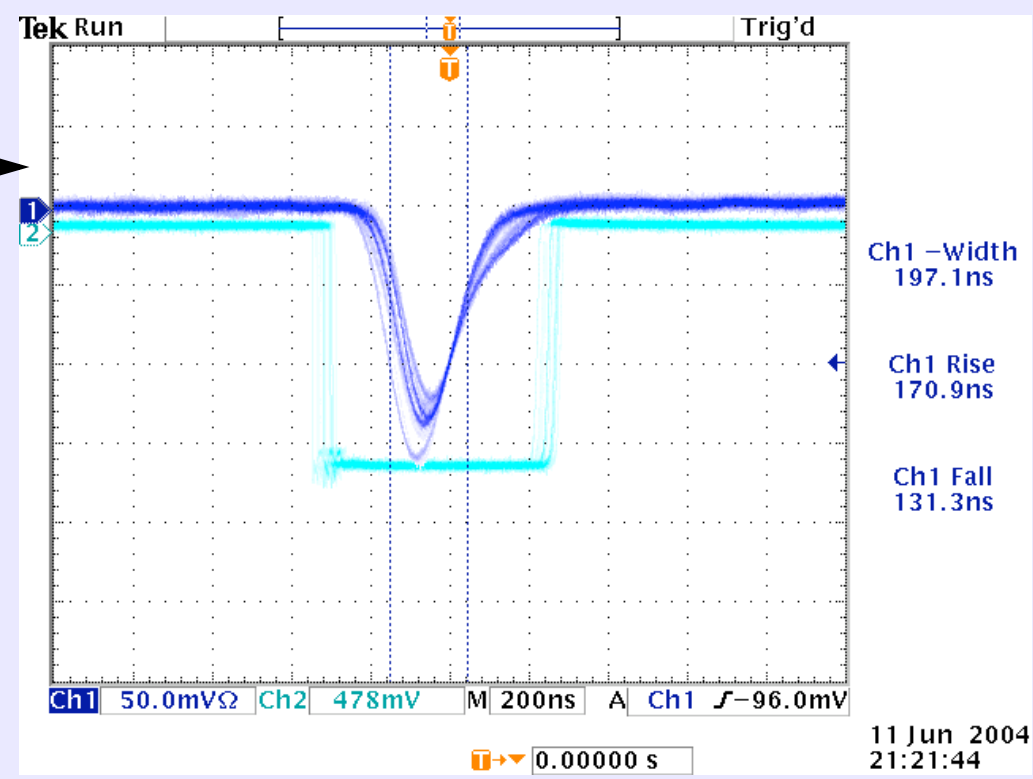
Raise time should be large enough



Testchamber

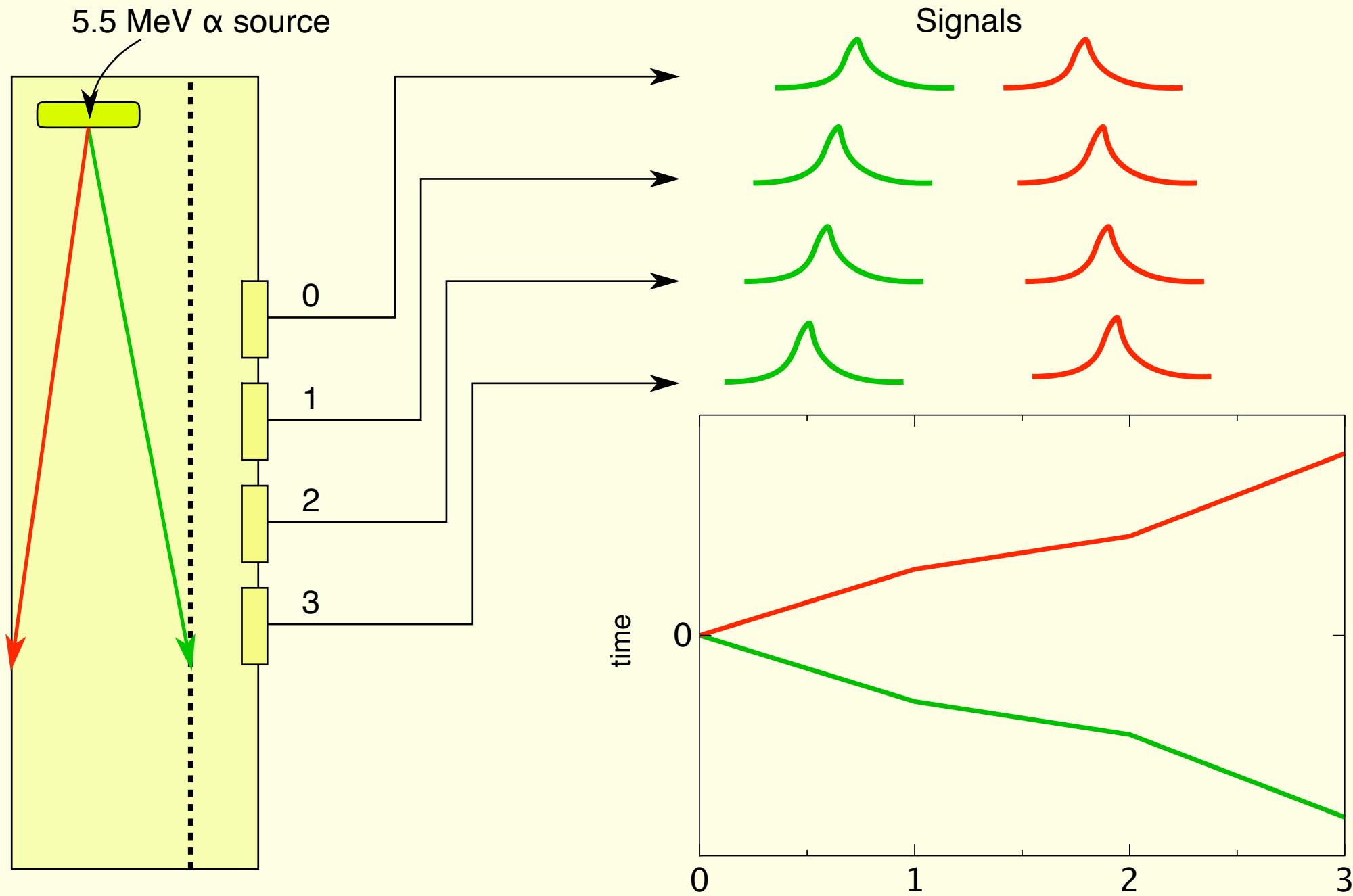


Pulse form

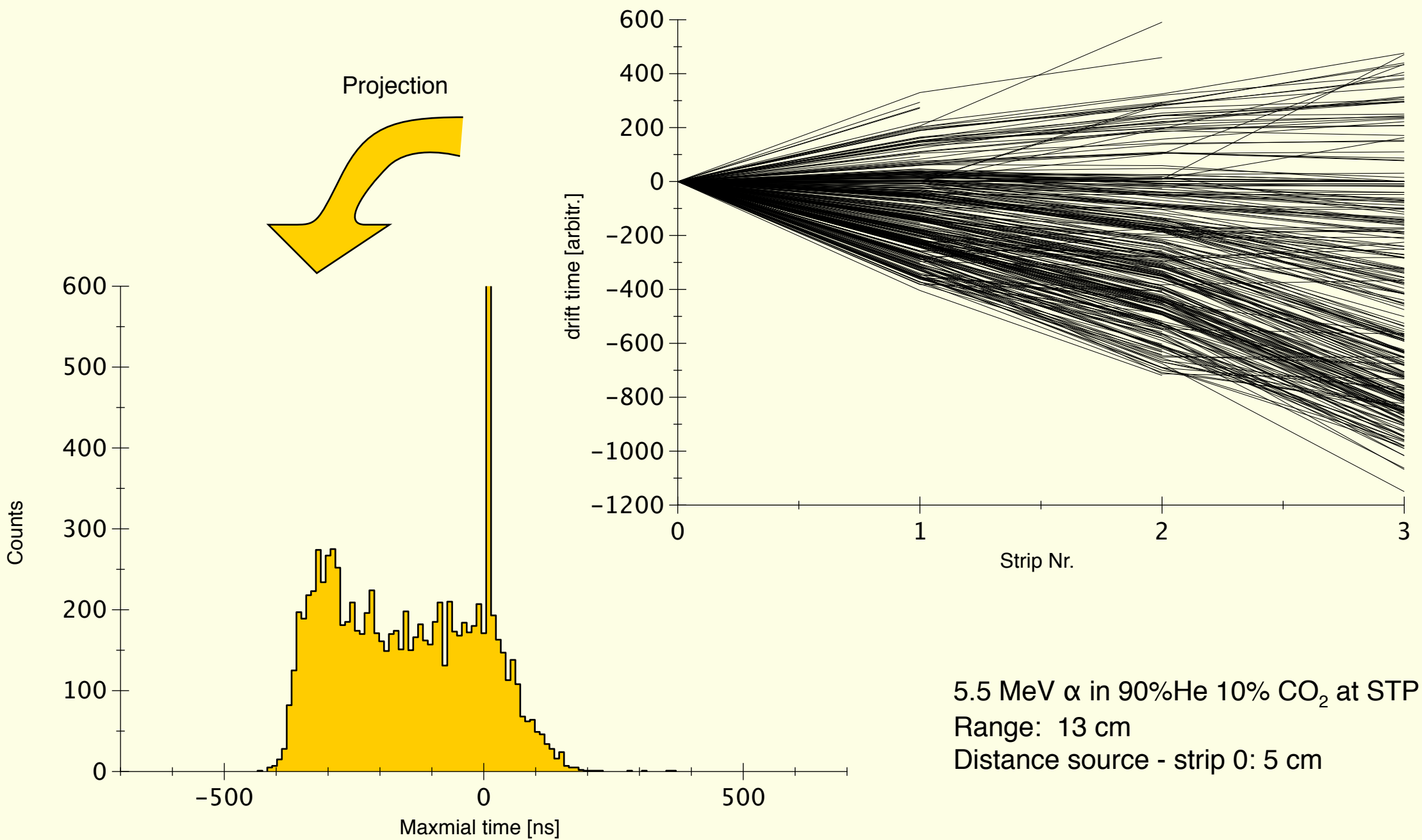


Pulse height
vs.
GEM voltage

Test chamber track reconstruction

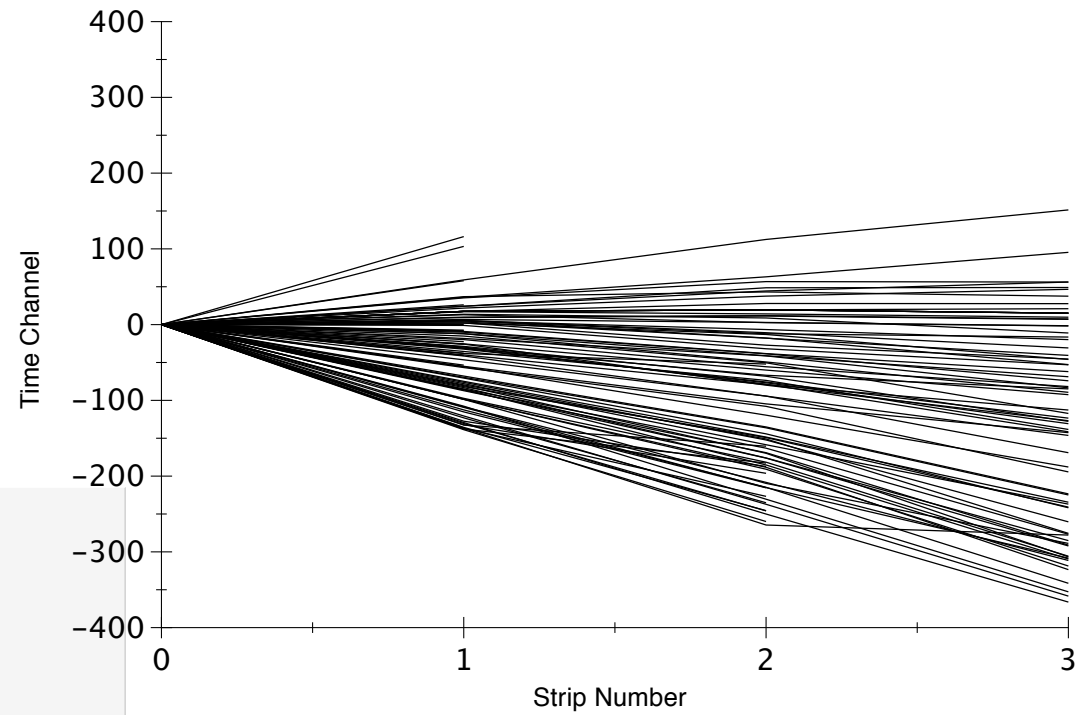


Test chamber track reconstruction

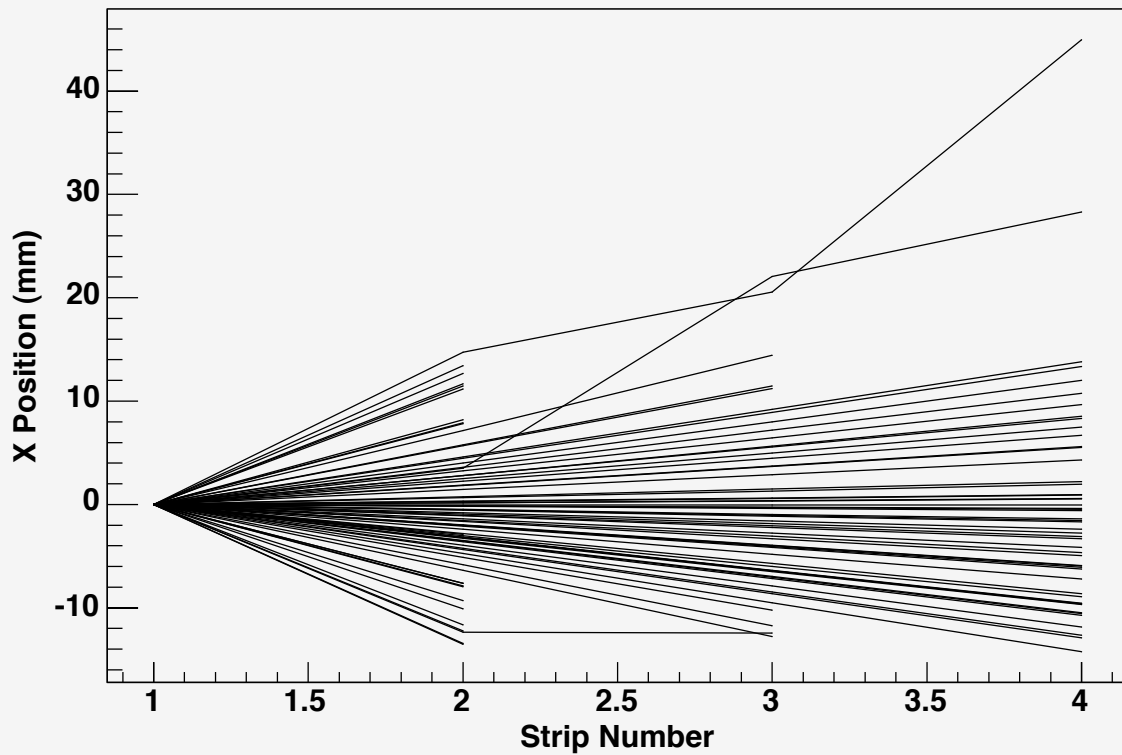


Alpha tracks: Measured and simulated

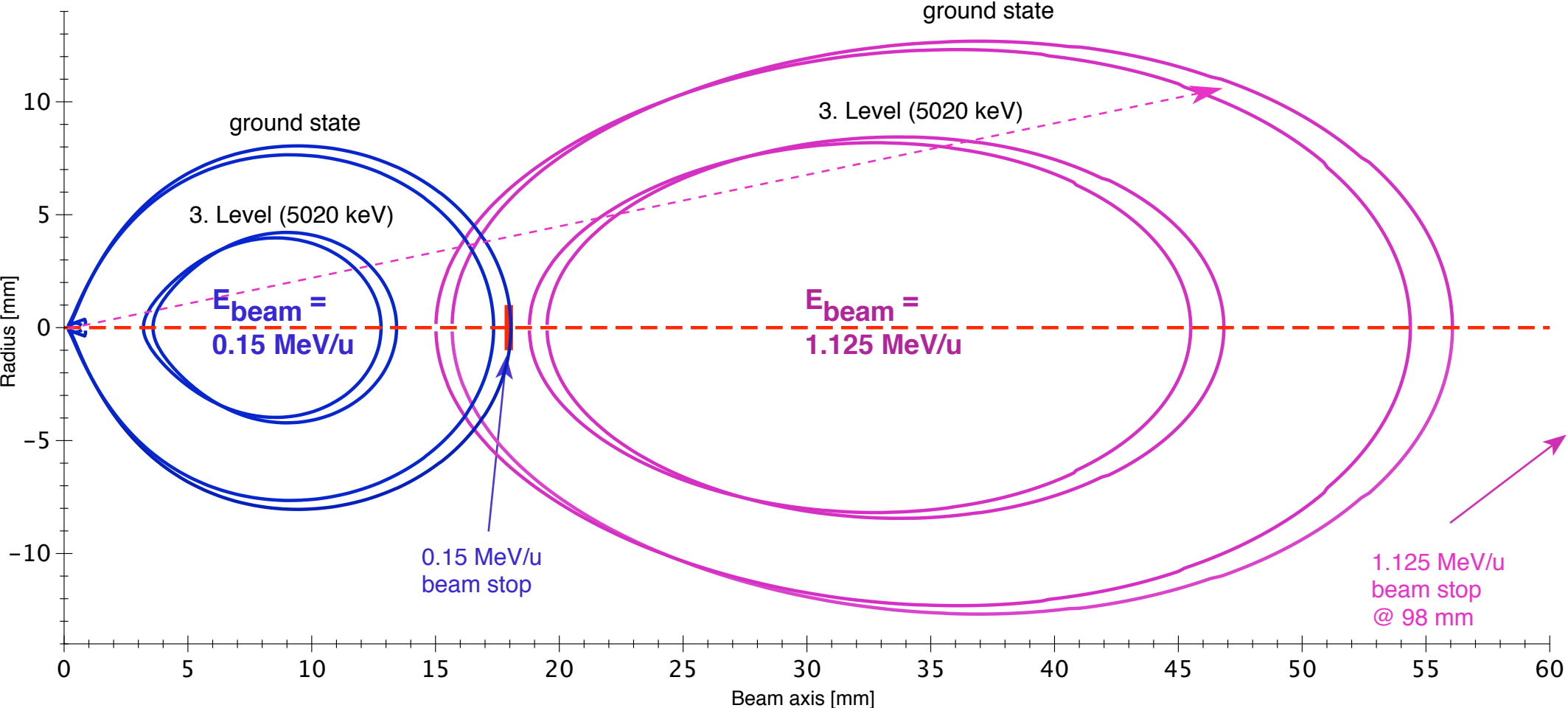
Mock chamber
measured
100 events



Mock chamber,
GEANT4 simulation
100 events

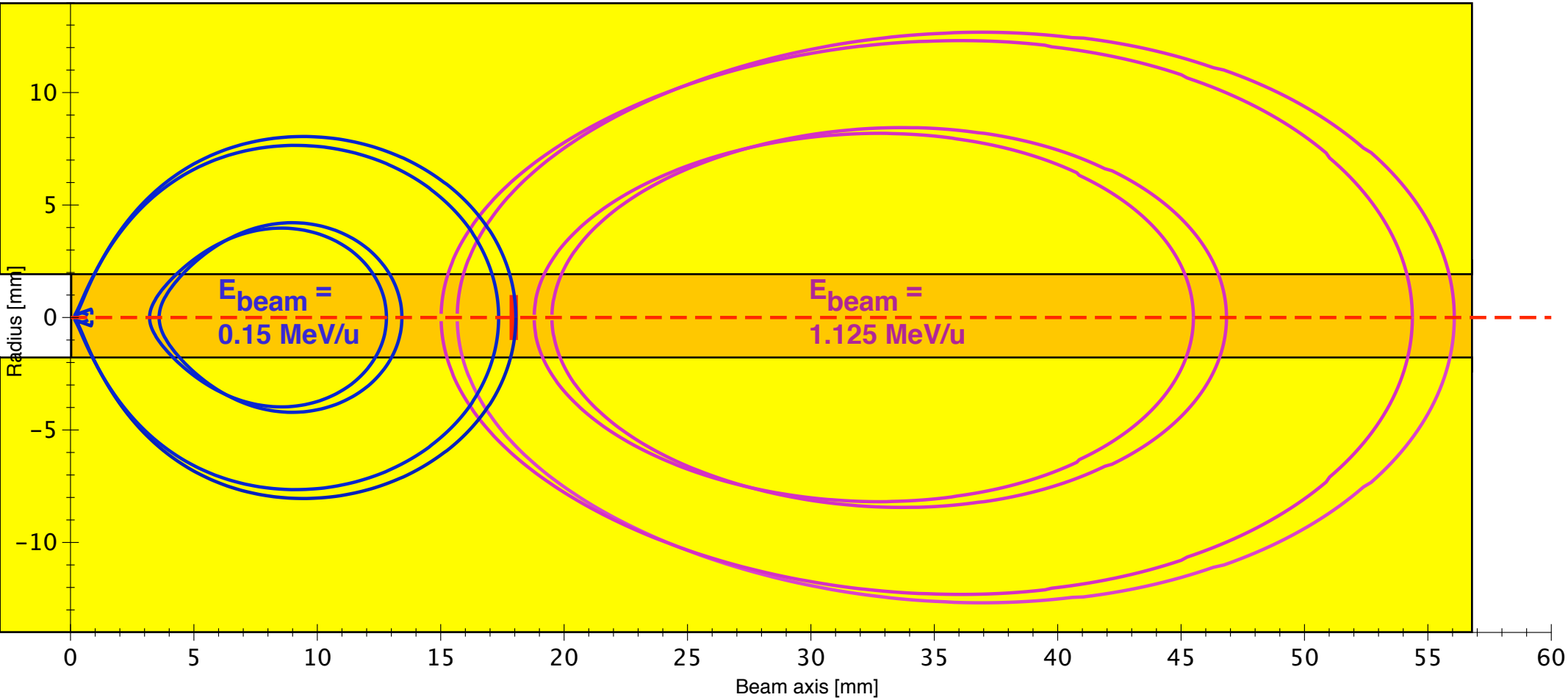


Range of ^{11}B from $\alpha(^8\text{Li}, ^{11}\text{B})\text{n}$ in 90% He 10% CO_2 gas mixture at STP



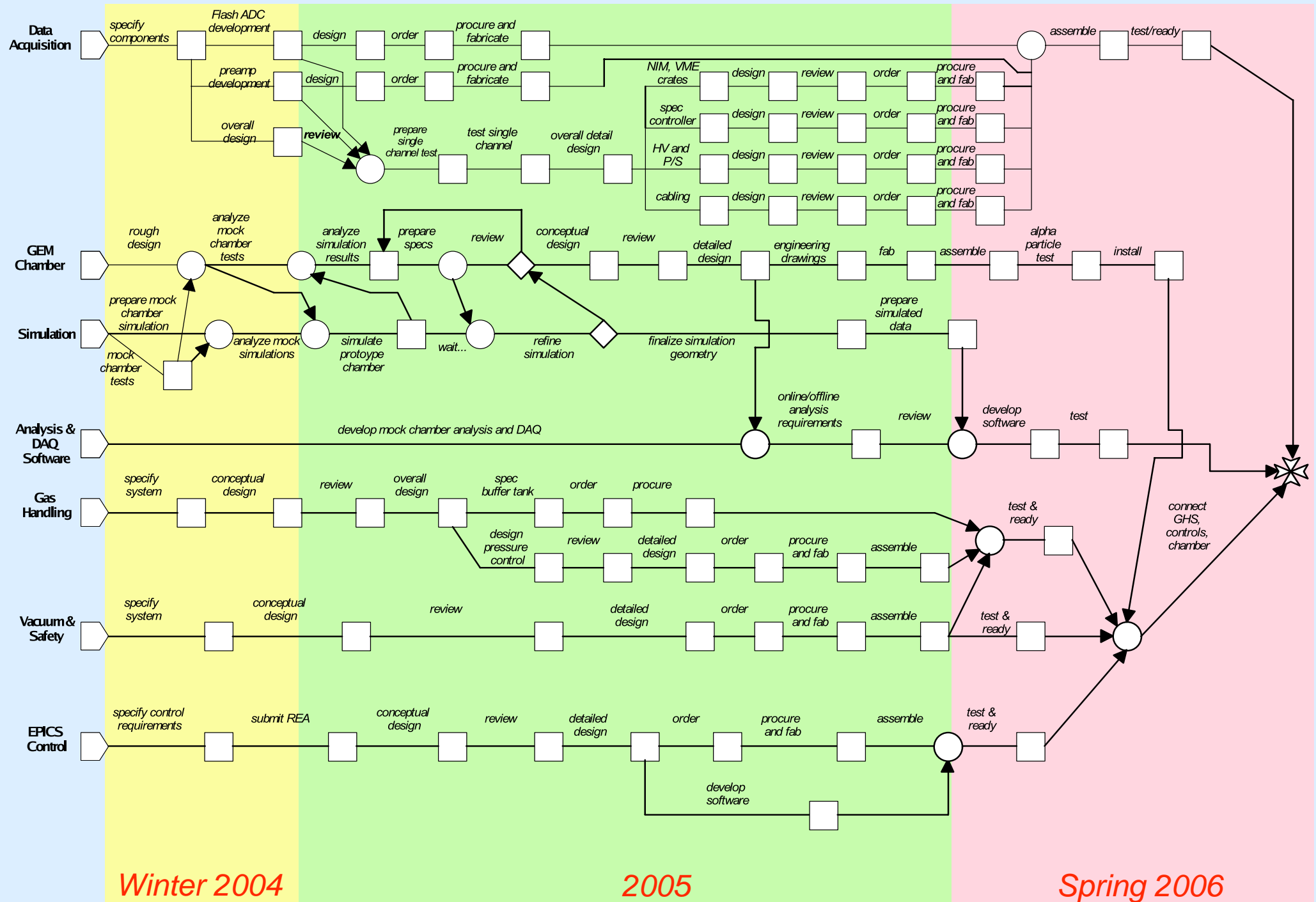
Range of ^{11}B from $\alpha(^8\text{Li}, ^{11}\text{B})\text{n}$ in 90% He
10% CO_2 gas mixture at STP

Find the optimal geometry



TACTIC Project Network Diagram

V.1 November 3, 2004



The Budget

Data acquisition comprising VME crate, 5 48-channel FlashADC cards, amplifiers, workstation, HV supply and more	60,000 CAD
Vacuum system (Turbo, backing, gauges, valves, etc...)	30,000 CAD
Chamber construction	25,000 CAD
Gas handling system / safety	25,000 CAD
EPICS control including small VME crate and PLC	20,000 CAD
<hr/>	
Total w/o tax	160,000 CAD

Next steps

- Reduced pressure: How low can we go?
- DAQ: Display tracks online using MIDAS
- Extend to more channels
- Test FlashADCs
- Test thin entrance foils
- Design prototype (already in progress)

TACTIC

tactic.triumf.ca

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