

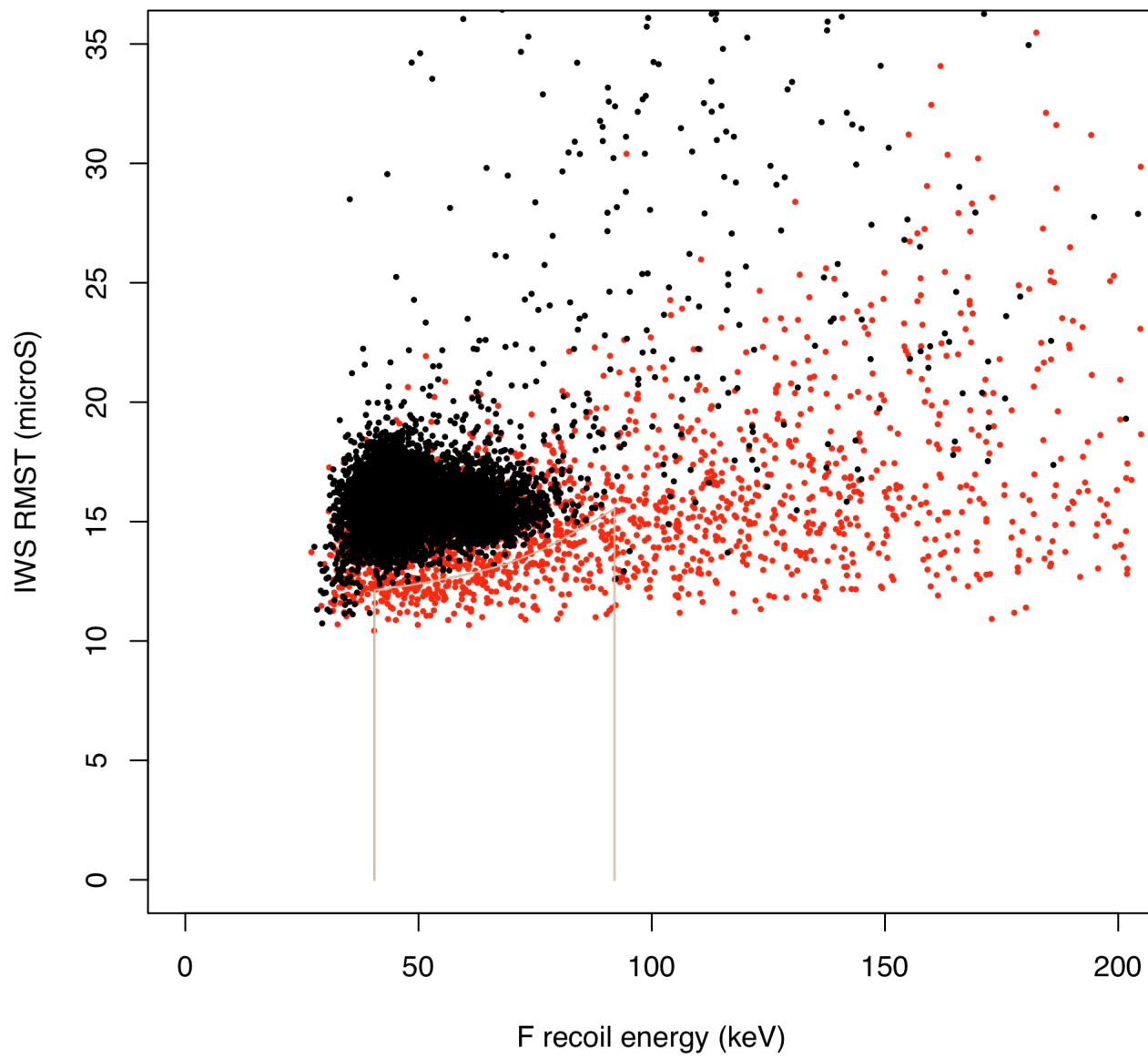
Background Rejection in DRIFT

Eric Miller
University of New Mexico
For the DRIFT Collaboration

July 27 2010
IDM 2010

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IDM 2010

All Background–Neutron Runs
F equivalent energy vs Width



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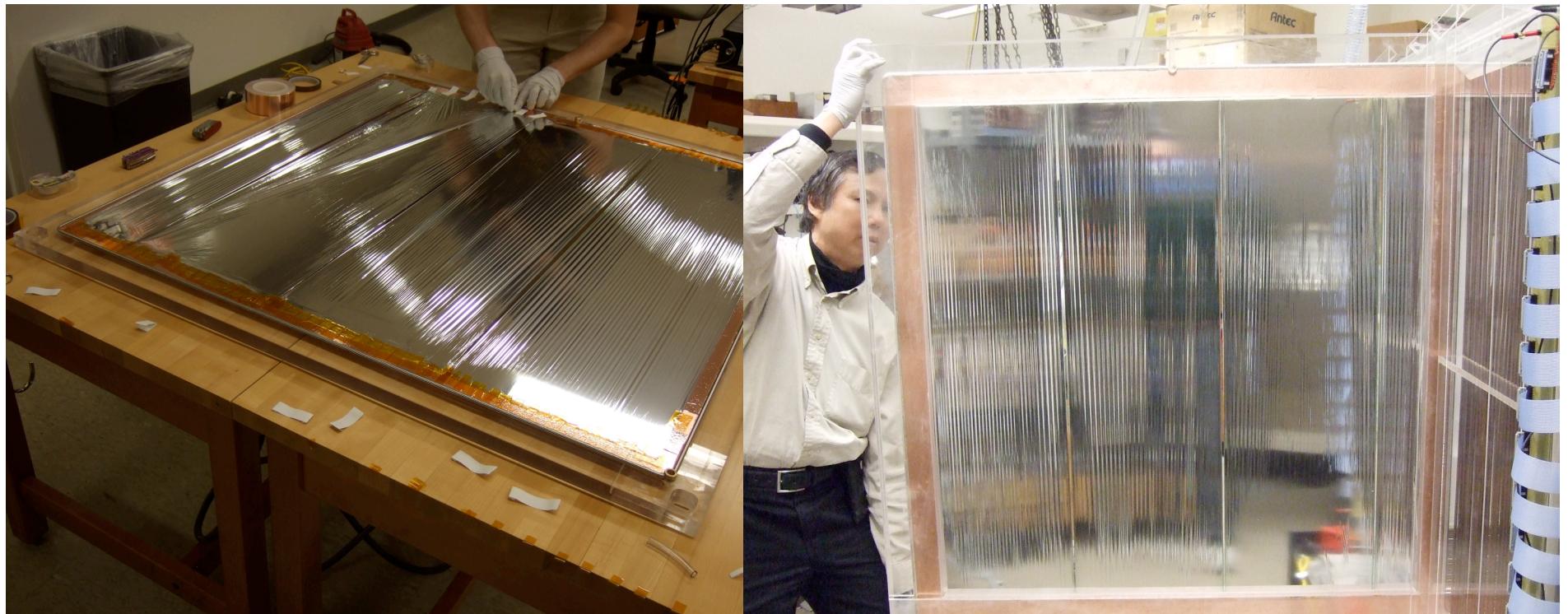
Radiation-Transparent Cathode

Current: →

Factor ~40
reduction
in RPRs →
expected

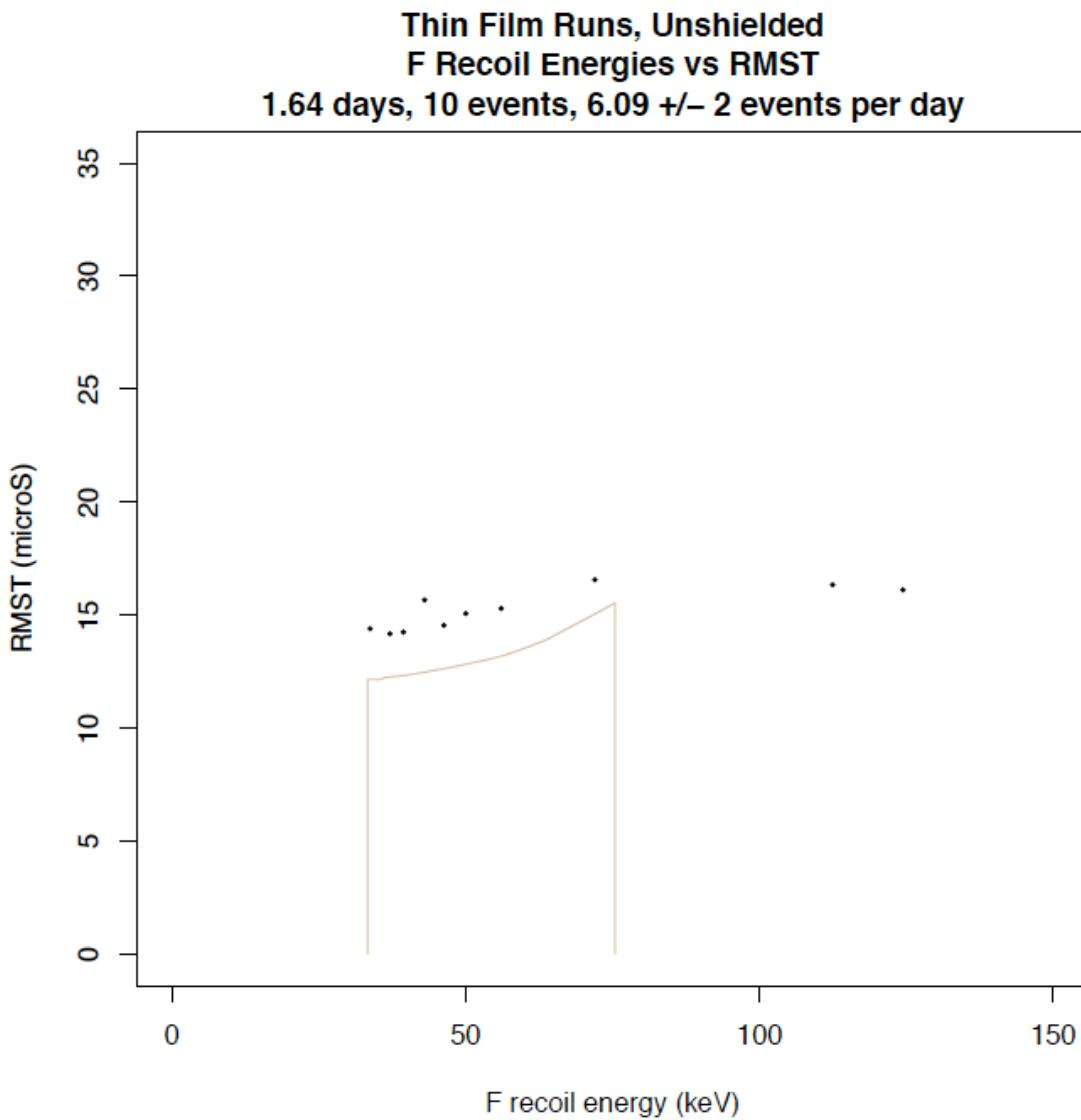
Cathode Type	Fraction Lost (%) Po 214 (7.69 MeV)	Fraction Lost (%) Po 218 (6 MeV)
20 micron steel wire	37	41
20 micron quartz fiber	8.6	14
8.2 micron quartz fiber	3.4	5.1
6.5 micron quartz fiber	2.6	4.1
10 micron mylar sheet	9.1	13
2 micron mylar sheet	1.8 (1.6)	2.7 (2.5)
1.5 micron mylar sheet	1.4	2.0
0.9 micron mylar sheet	0.8	1.2

Thin-Film Installation



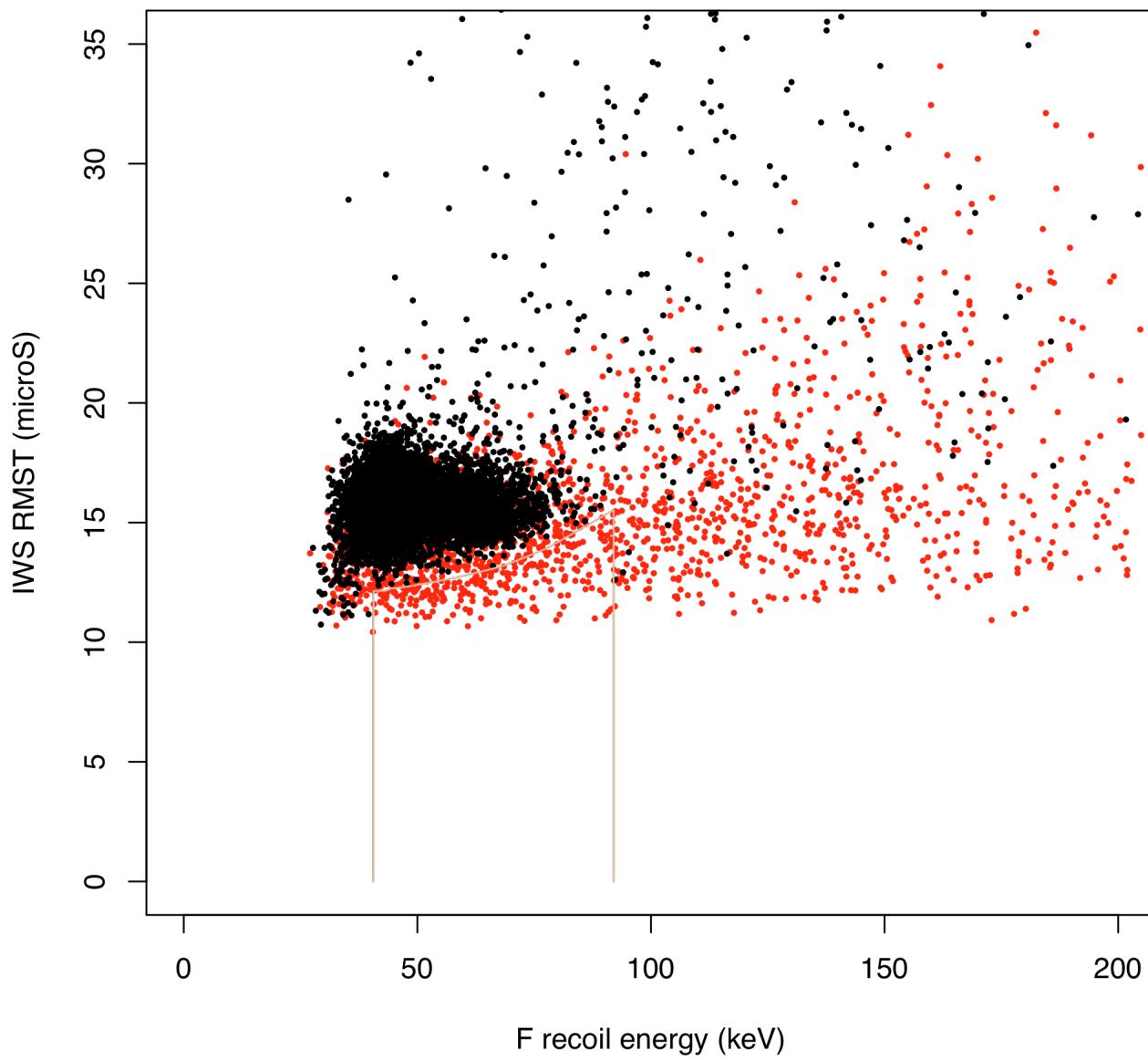
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Thin-Film Results



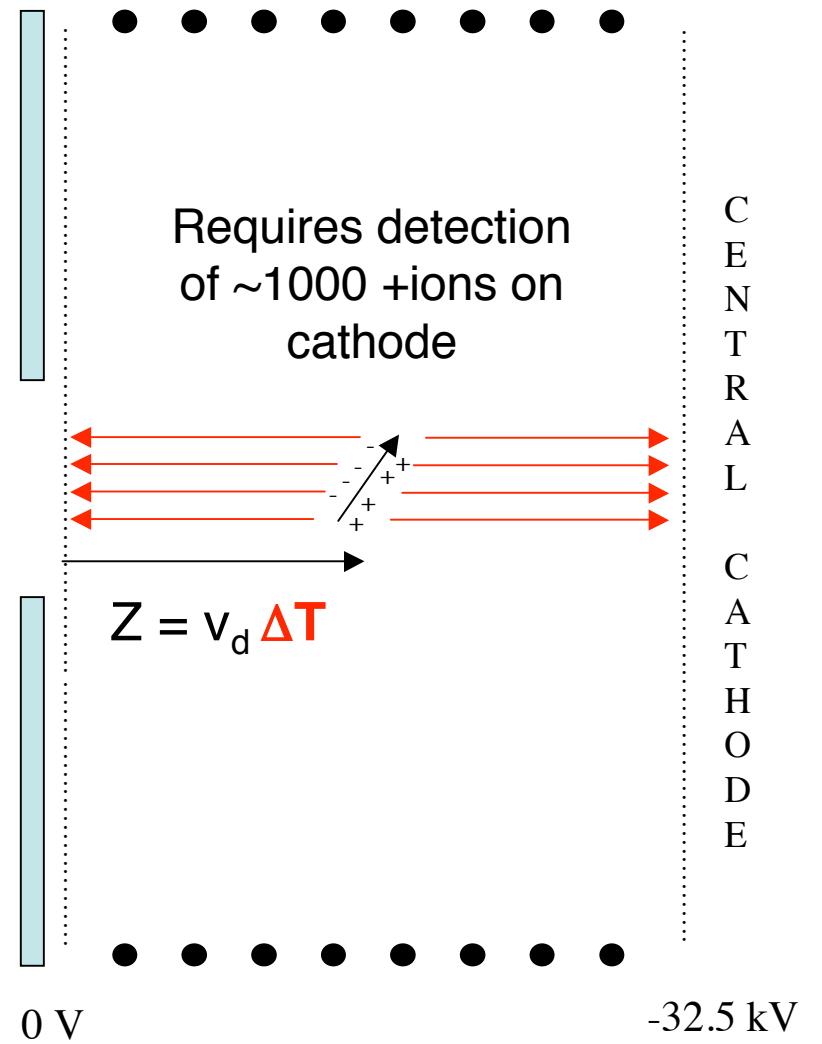
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Full Fiducialization Concept



Eric Lee, UNM
(2009)

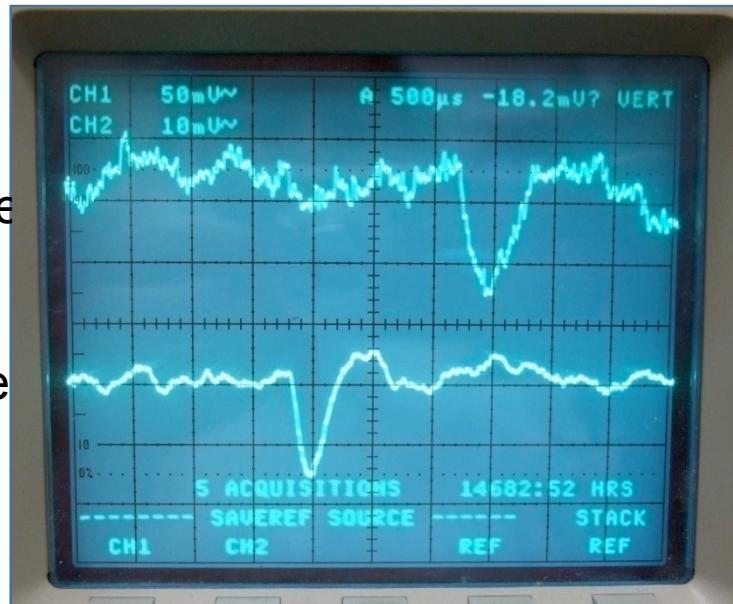
C E N T R A L C A T H O D E

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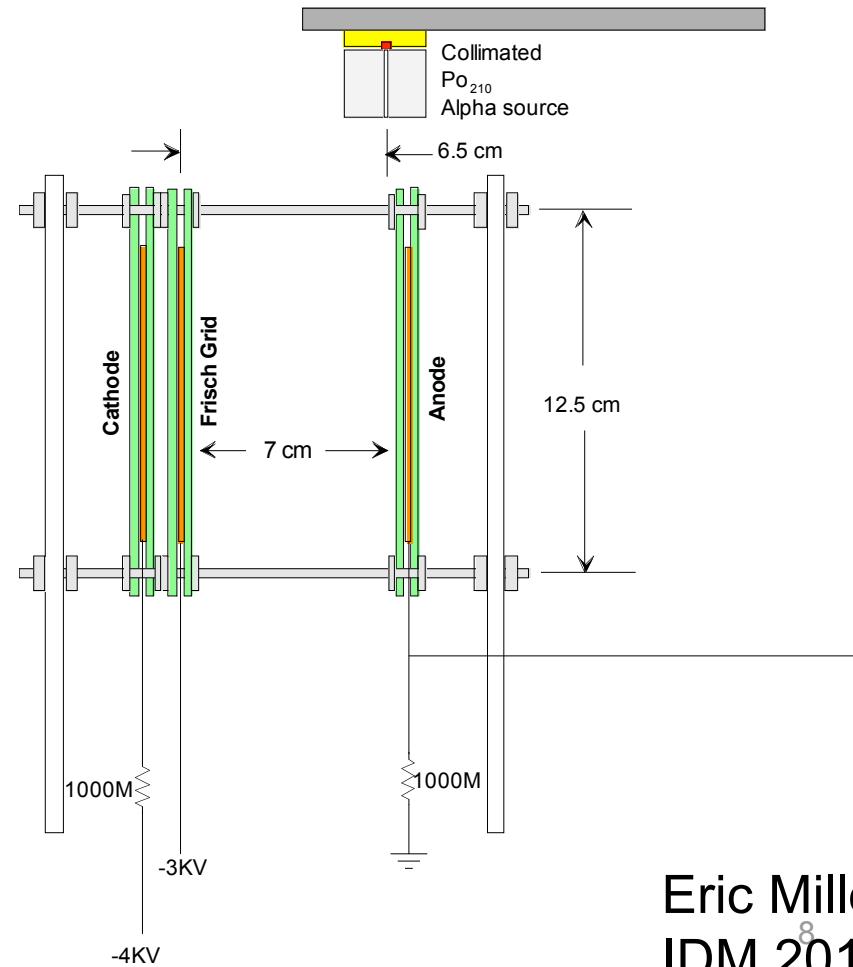
Demonstration of Principle

Cathode

Anode



Expected delay = 1.5 milliseconds



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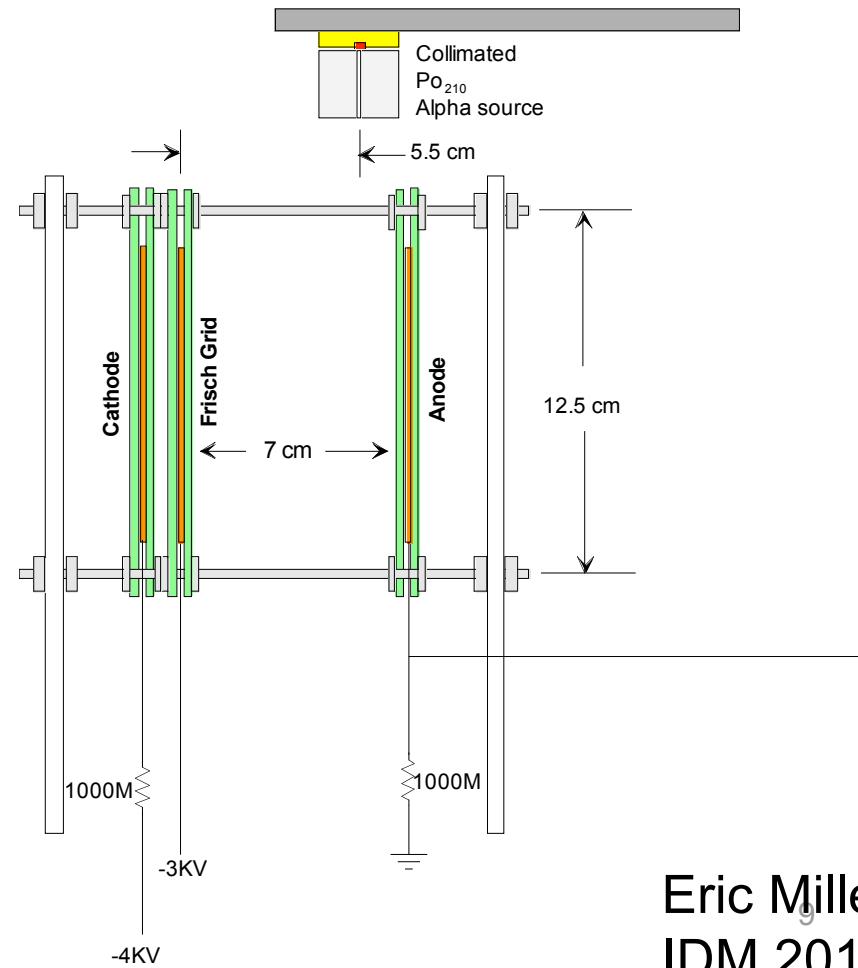
Demonstration of Principle

Cathode

Anode



Expected delay = 1.3 milliseconds

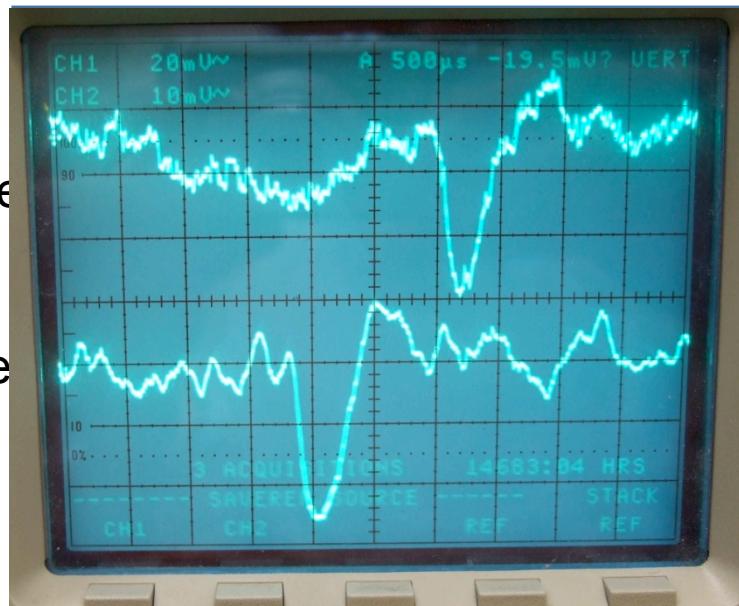


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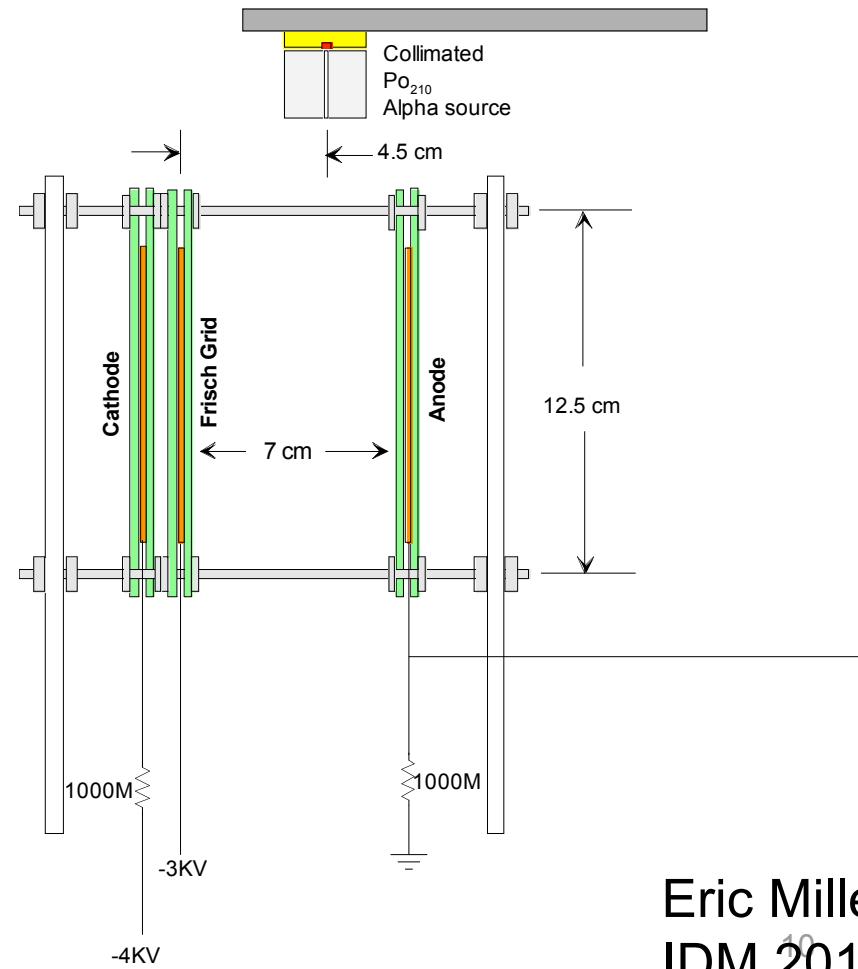
Demonstration of Principle

Cathode

Anode



Expected delay = 1.1 milliseconds

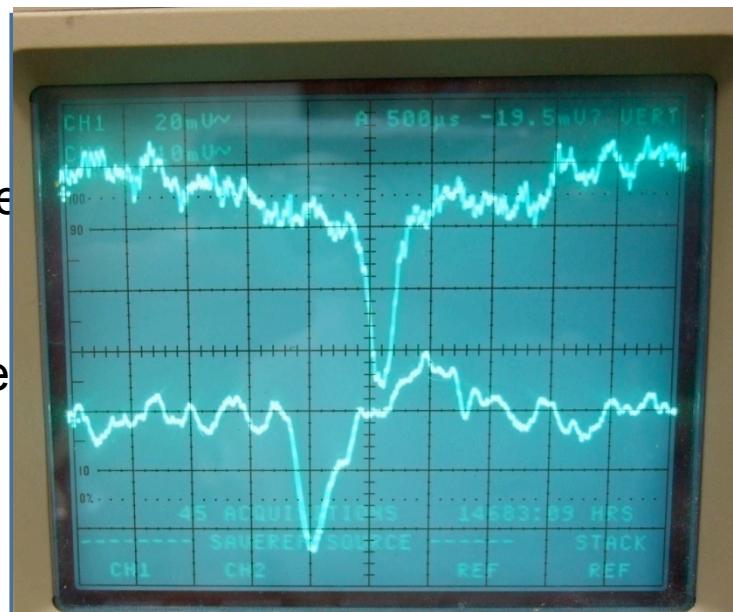


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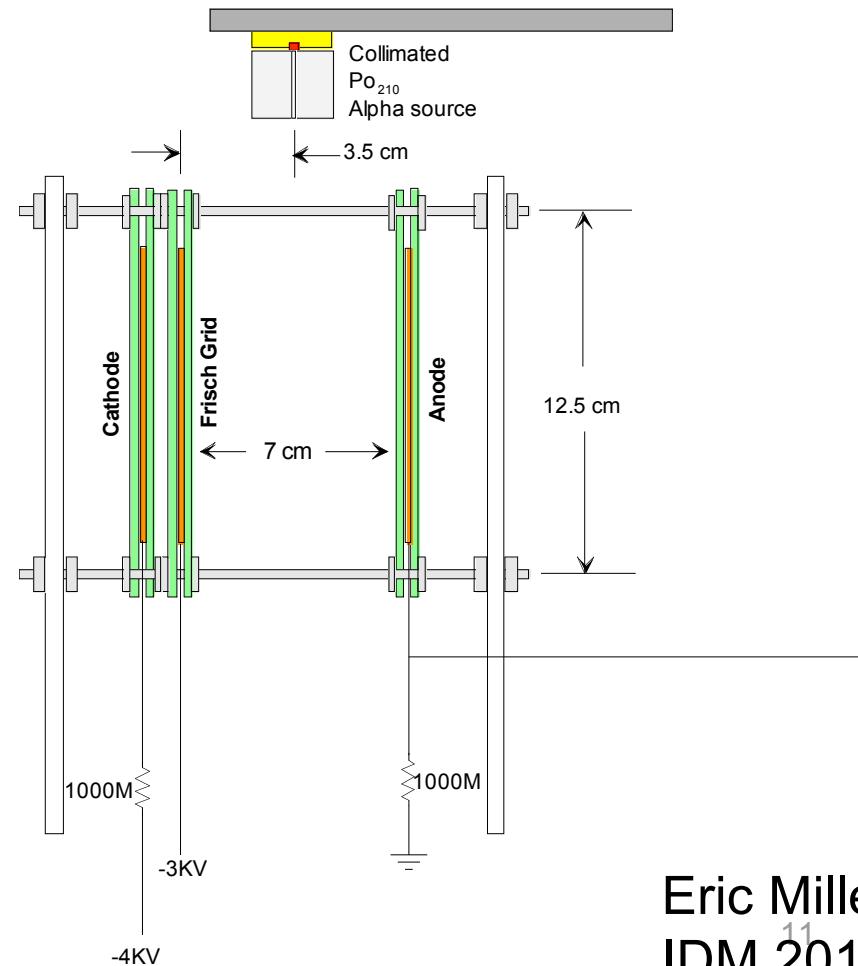
Demonstration of Principle

Cathode

Anode



Expected delay = 0.8 milliseconds

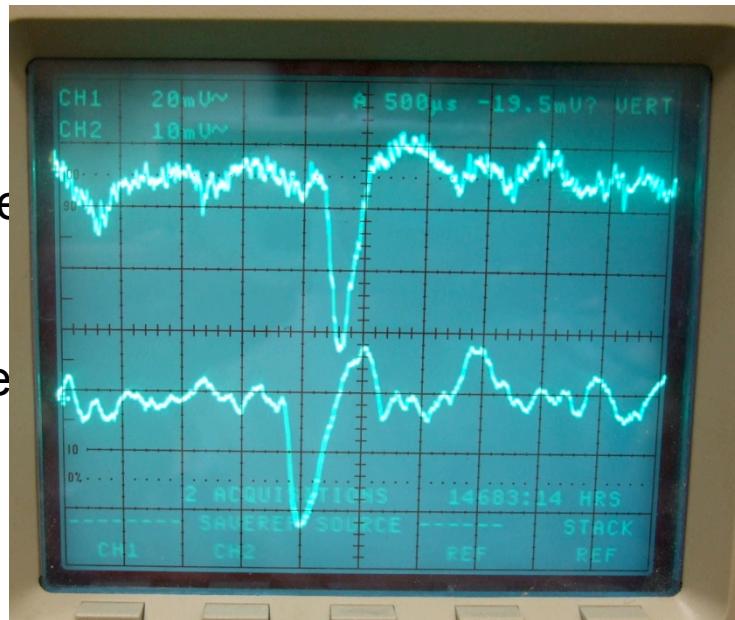


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¹¹

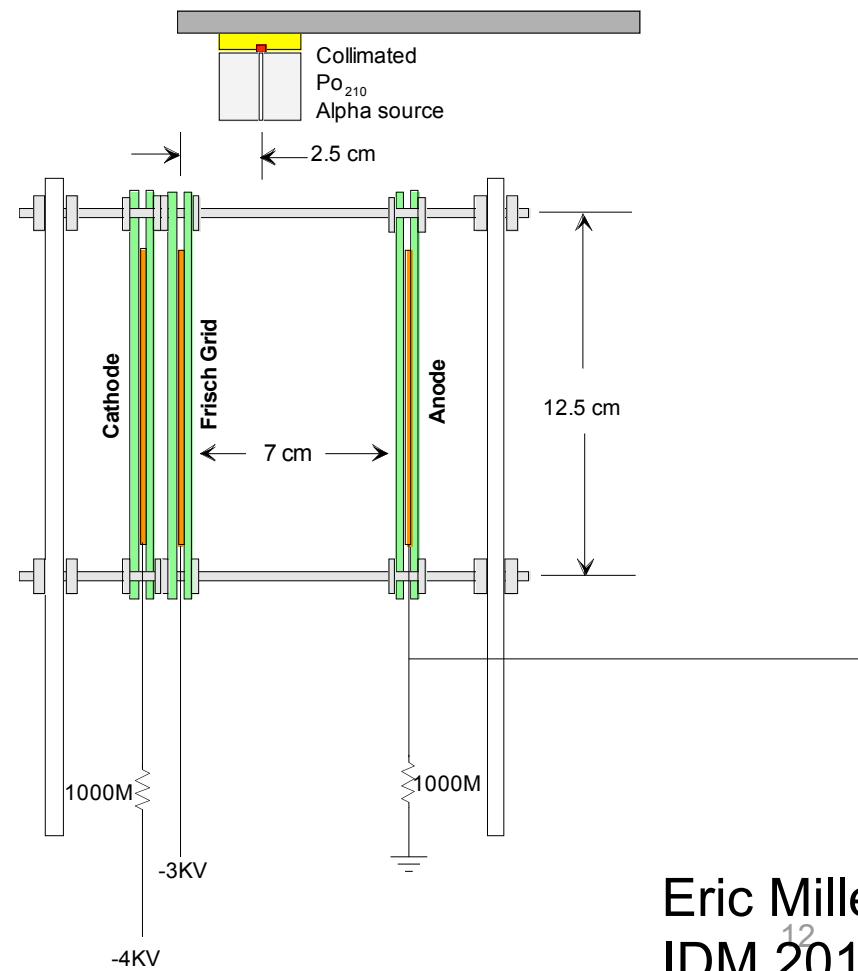
Demonstration of Principle

Cathode

Anode



Expected delay = 0.6 milliseconds

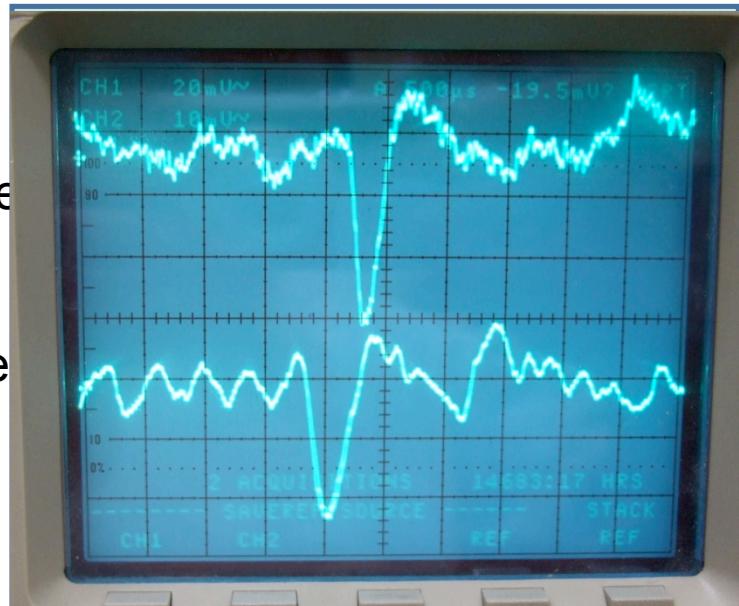


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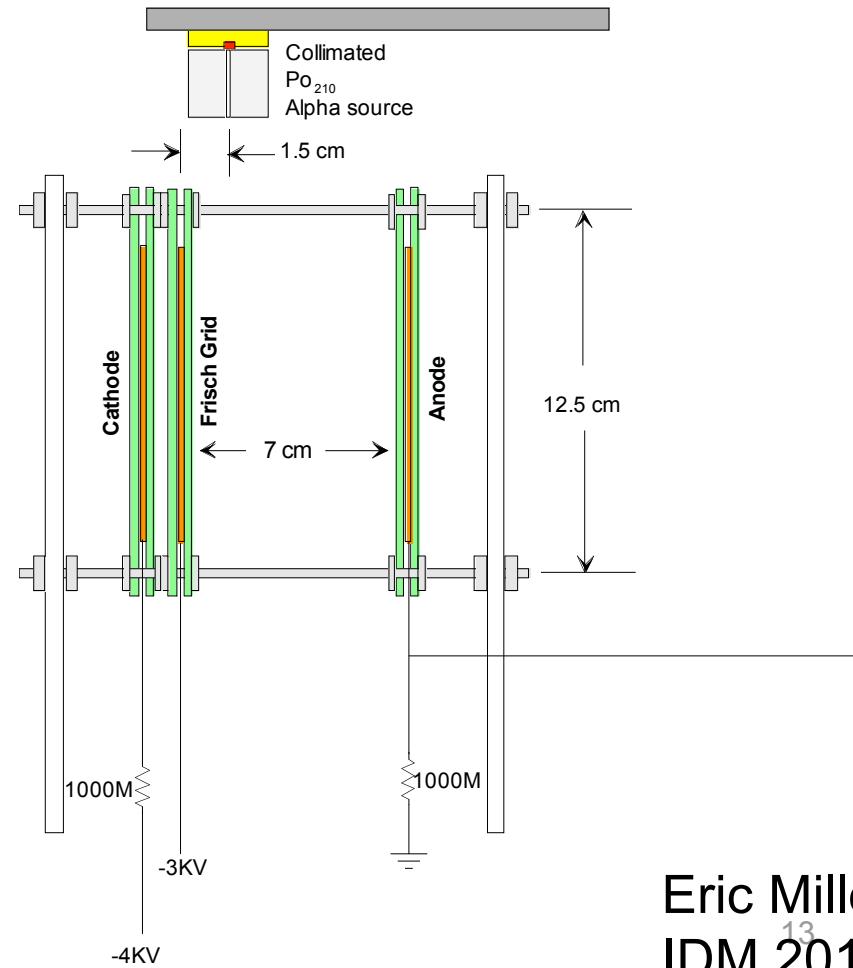
Demonstration of Principle

Cathode

Anode



Expected delay = 0.4 milliseconds

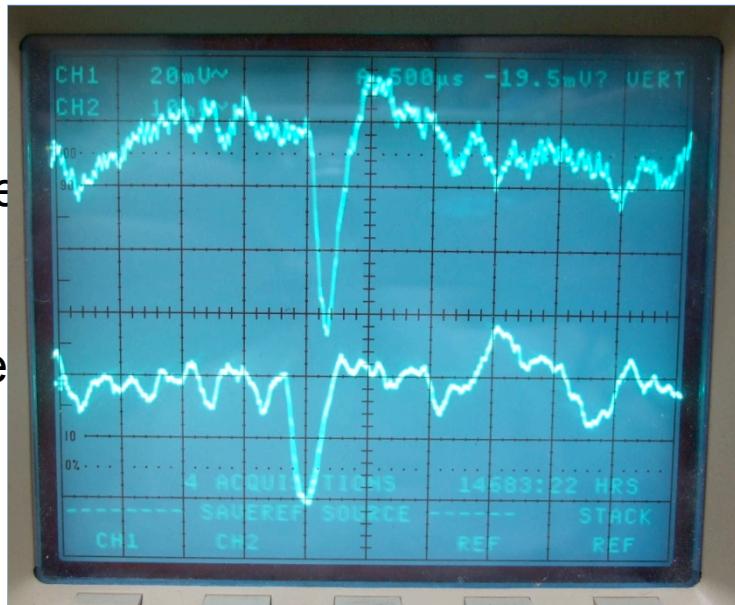


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¹³

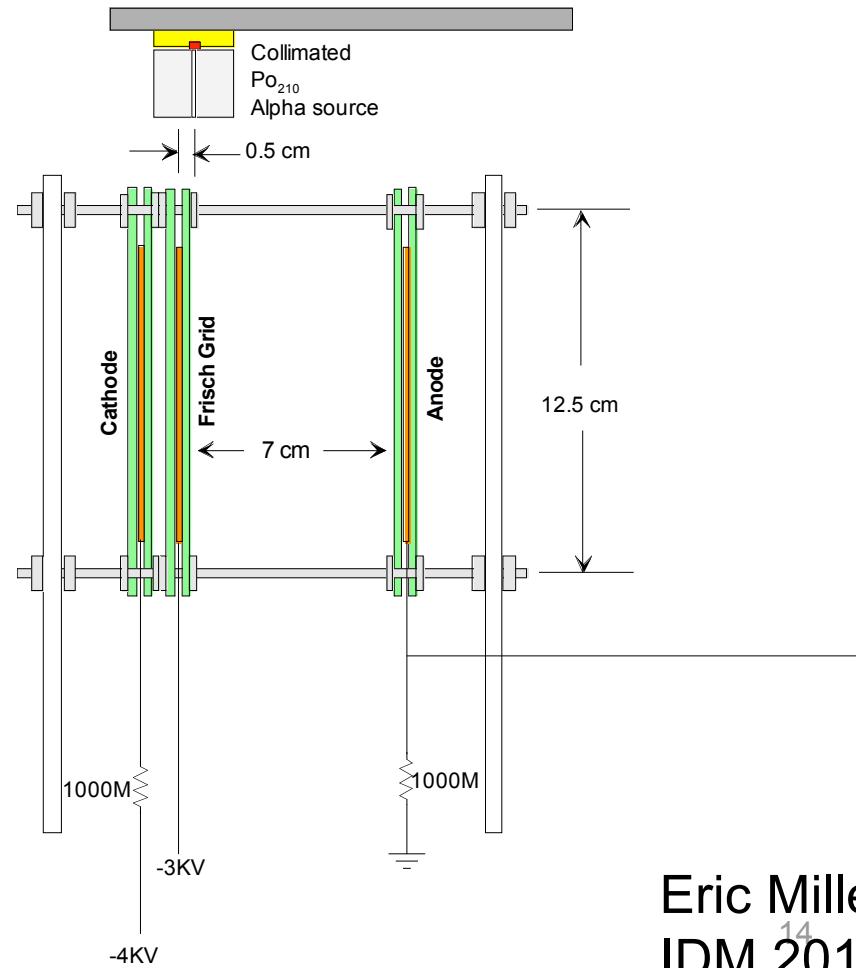
Demonstration of Principle

Cathode

Anode

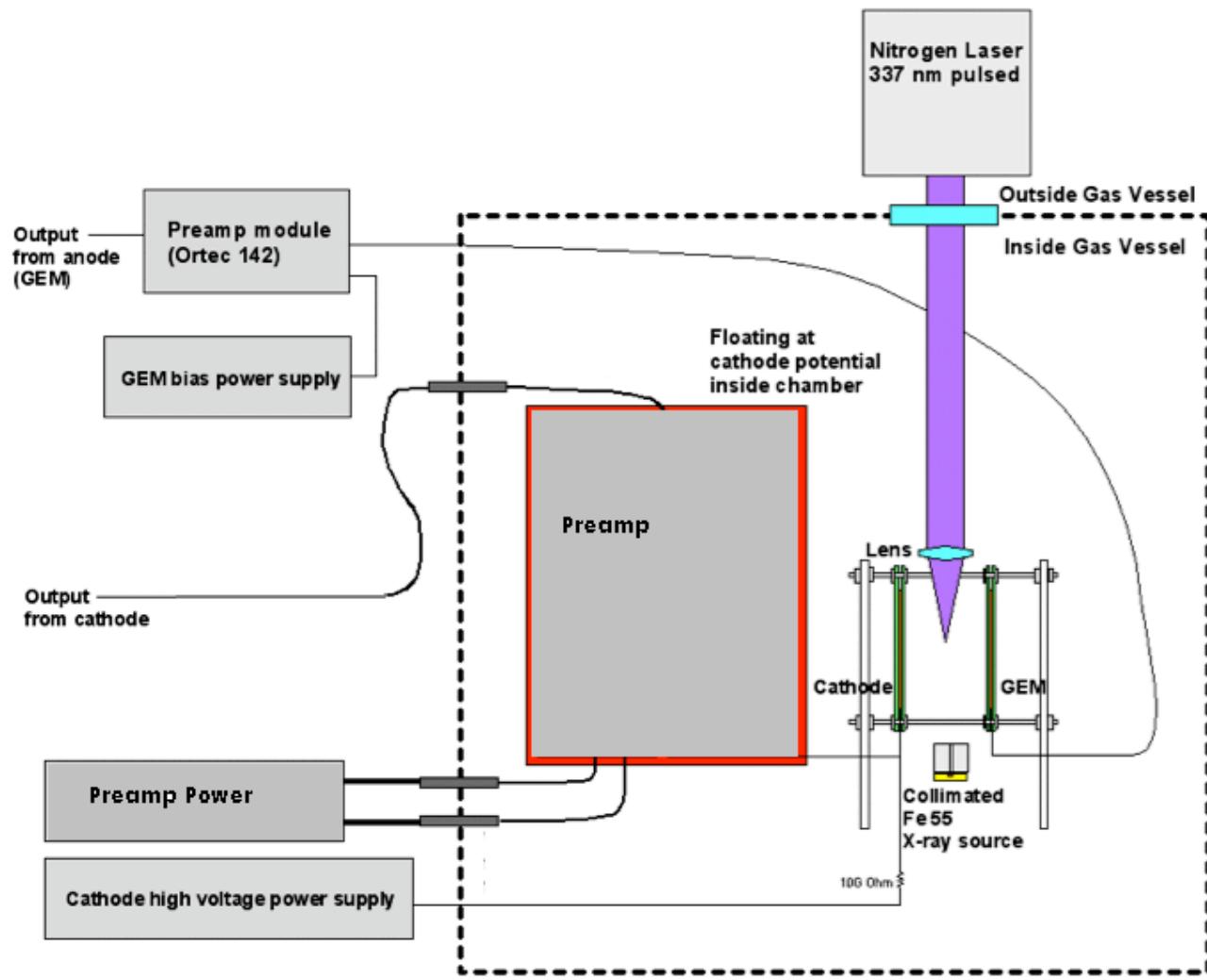


Expected delay = 0.1 milliseconds



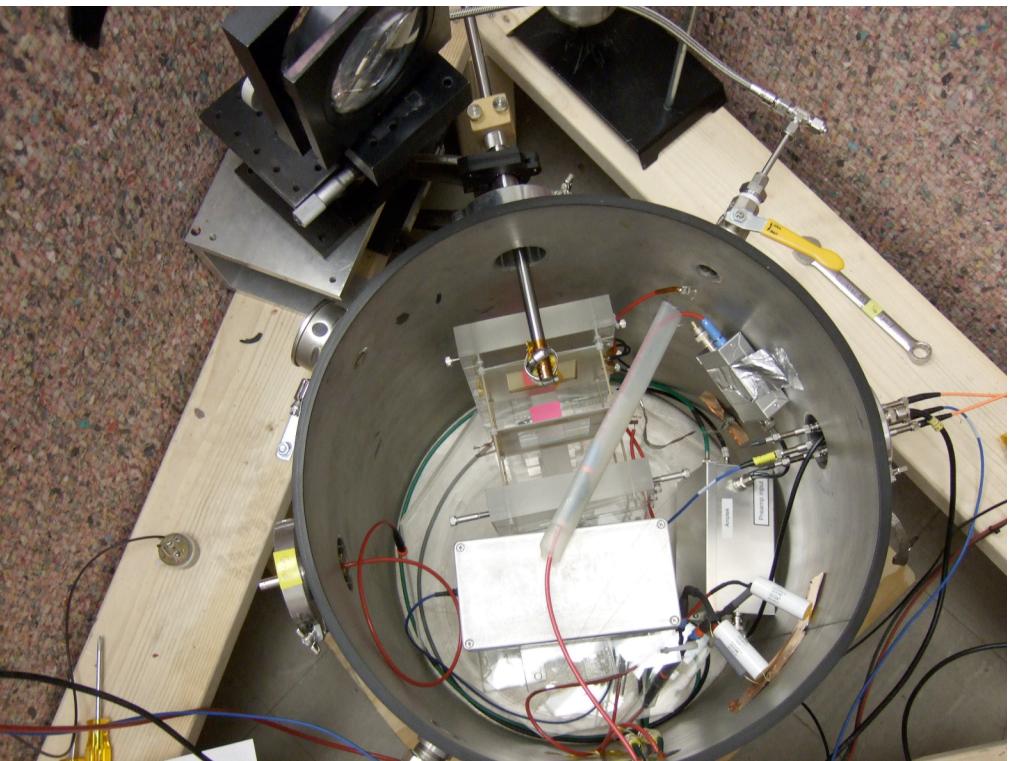
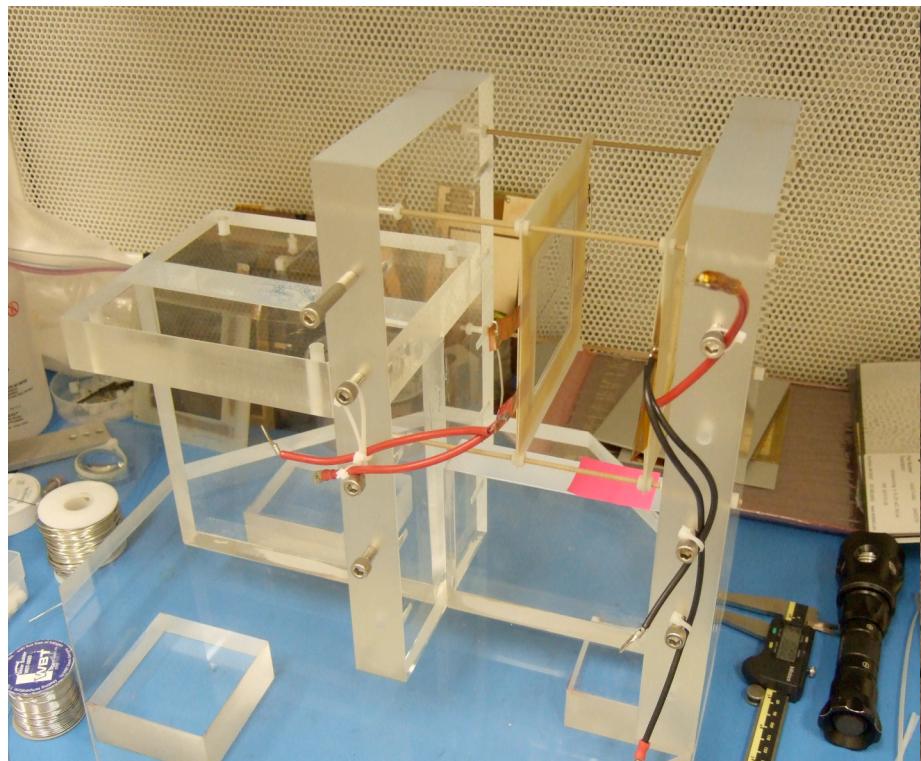
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¹⁴

Test Chamber Schematic



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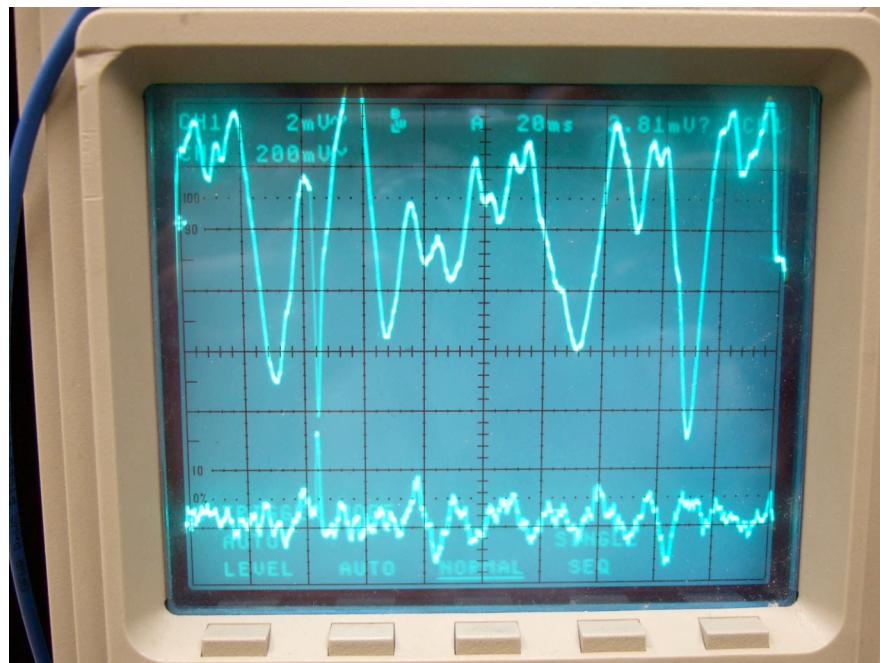
Fiducialization Test Chamber



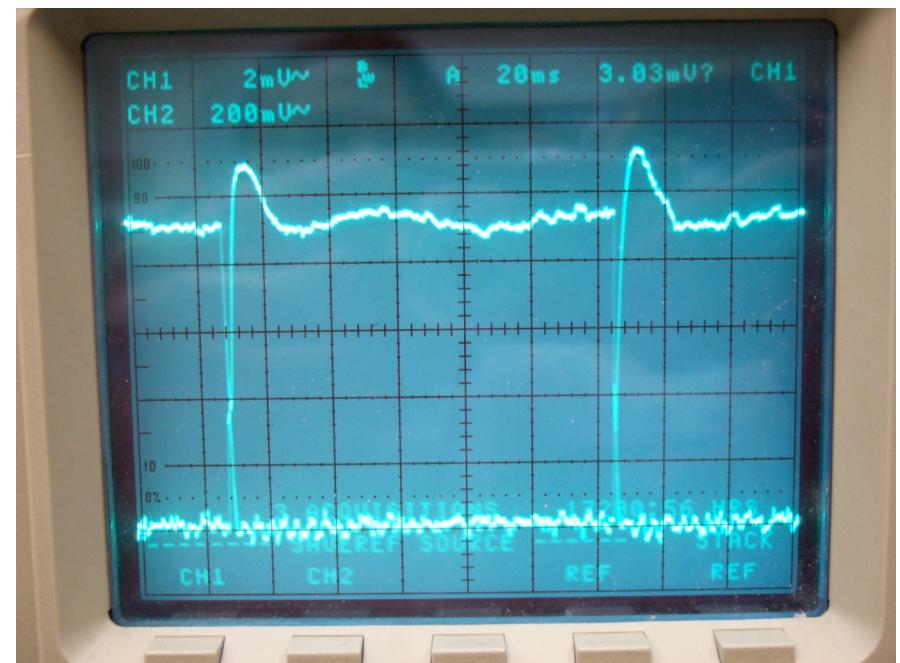
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Effect of Isolation

Before Isolation:

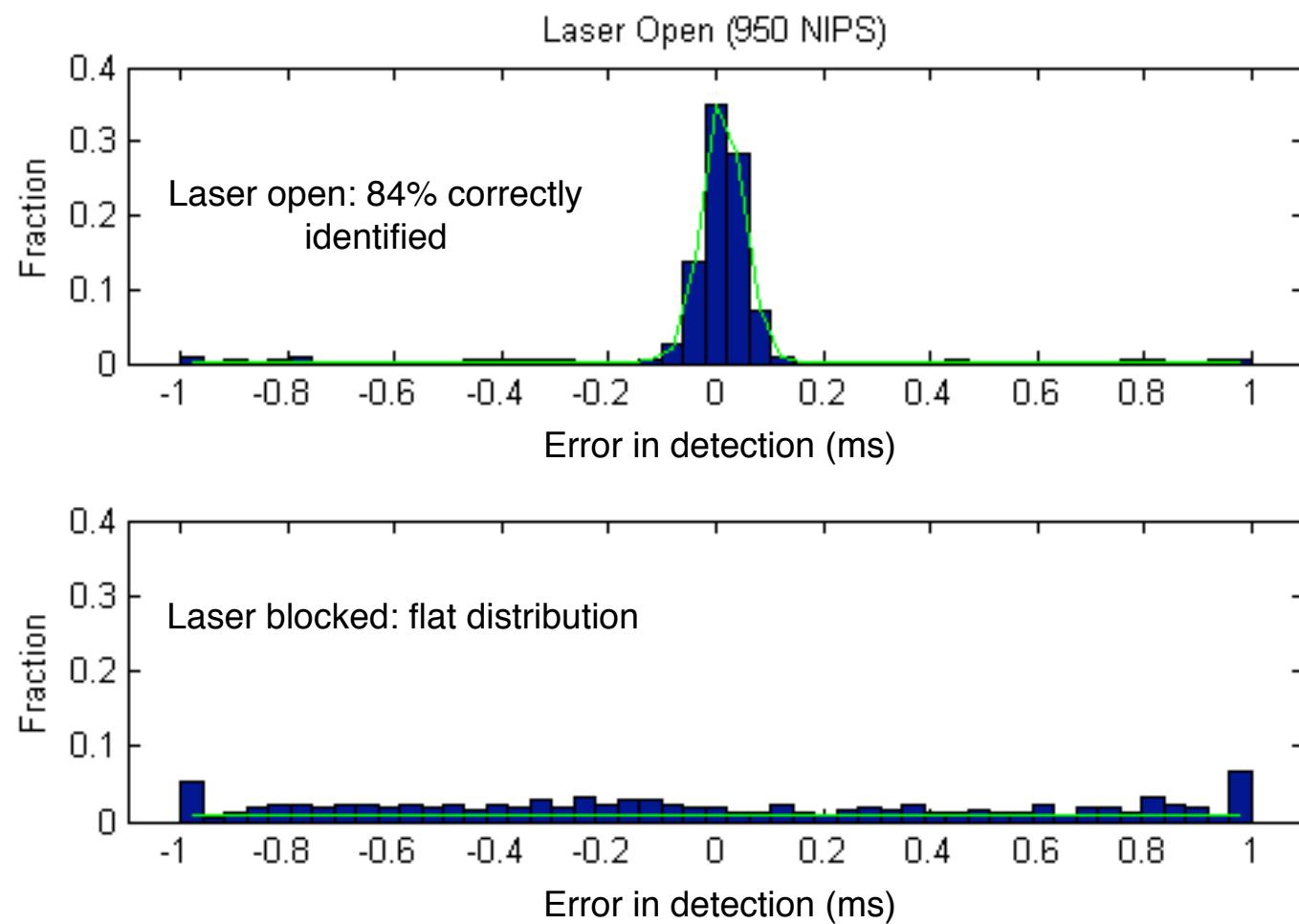


After Isolation:



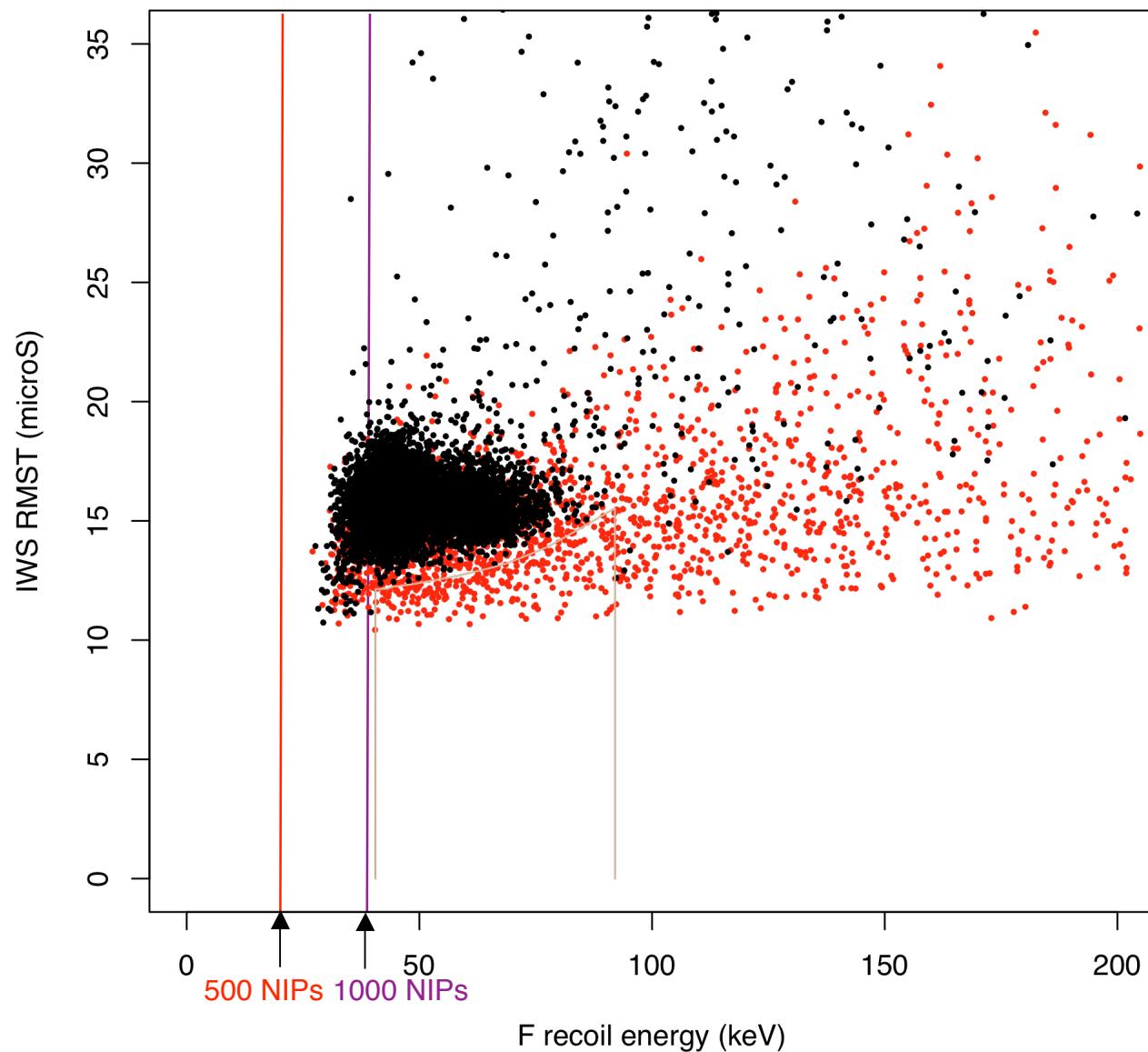
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Fiducialization Results



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Current Fiducialization Work

- Electronics installed in DRIFT sister detector at Occidental College
- Cathode Electronics survived -30kV
- Clean noise spectrum measured
- Need to isolate from seismic noise
- Need to develop signal extraction algorithm

End

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