Update on Aging Studies

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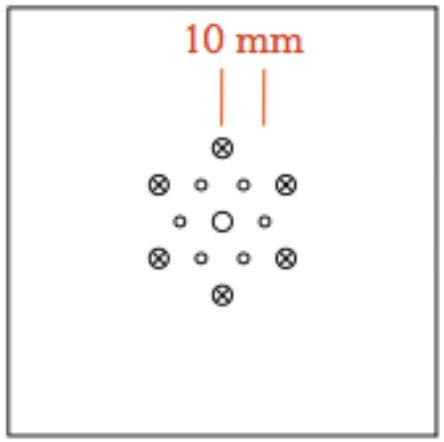
DCH Parallel Session
SuperB Collaboration Meeting
May 29th, 2011

Recap

- Age chamber with a 100 mCi 55Fe source; measure 55Fe spectrum with a low-intensity source
- Monitor current, 55Fe peak location (gain), and ratio of small pulses to 55Fe interactions
  - Number of small pulses increase as Malter effect sets in.

Recap

- He:Isobutane 80:20 (no water)
- Same chamber aged since Dec is still alive



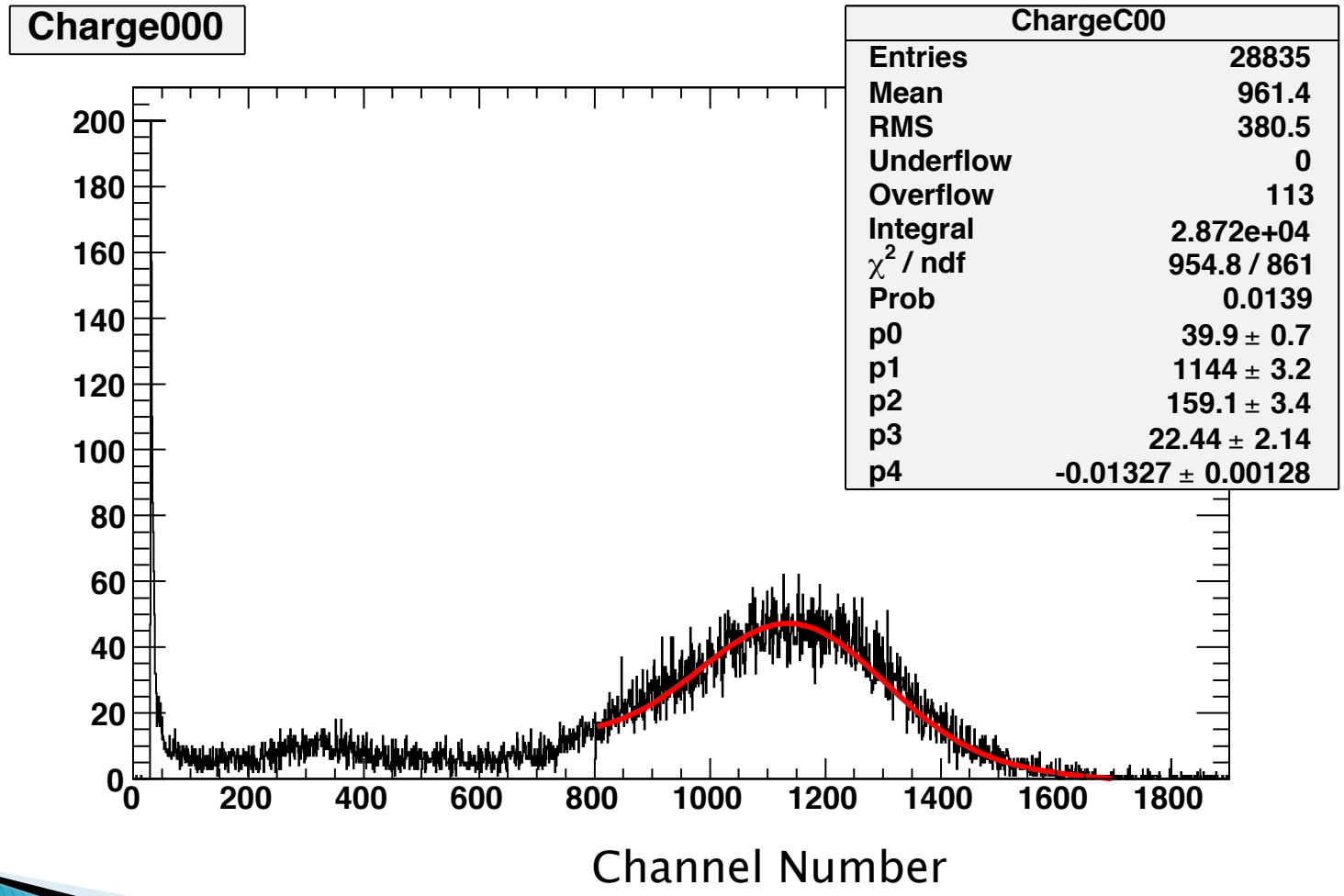
○ Anode Wire 20 μ gold-plated tungsten sense wire 2000V

∘ Field Wires, bussed together and grounded
120 μ gold-plated aluminum field wires

⊗ Bias Wires, bussed together and at 1480V

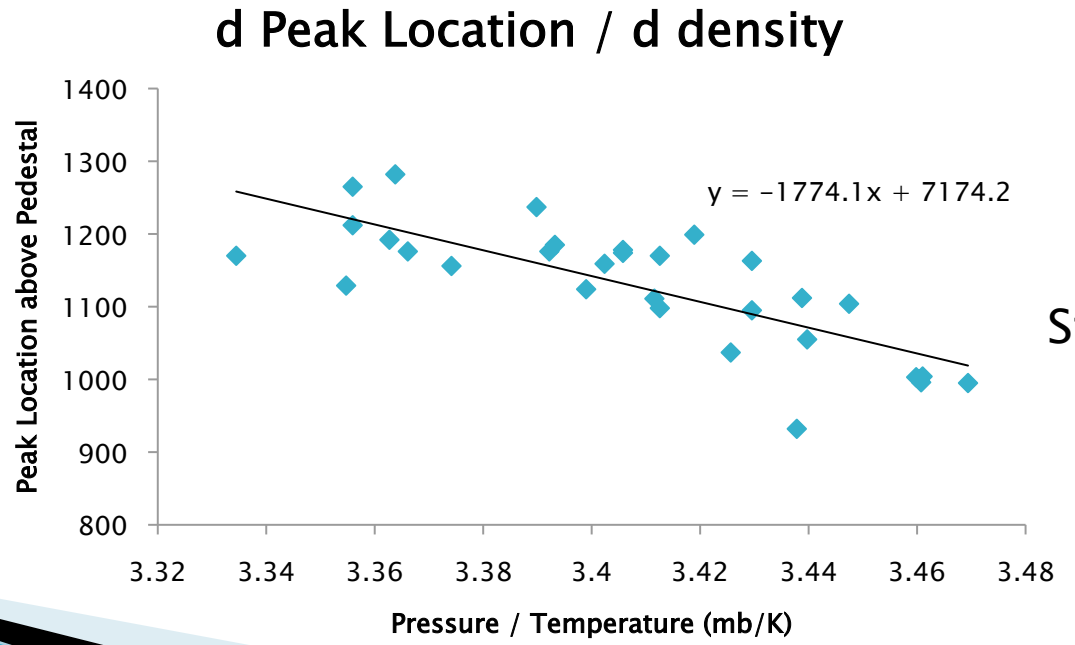
Bias wire 1480V gives same field as an infinite BaBar chamber

Fe55 Spectrum (Low-intensity)

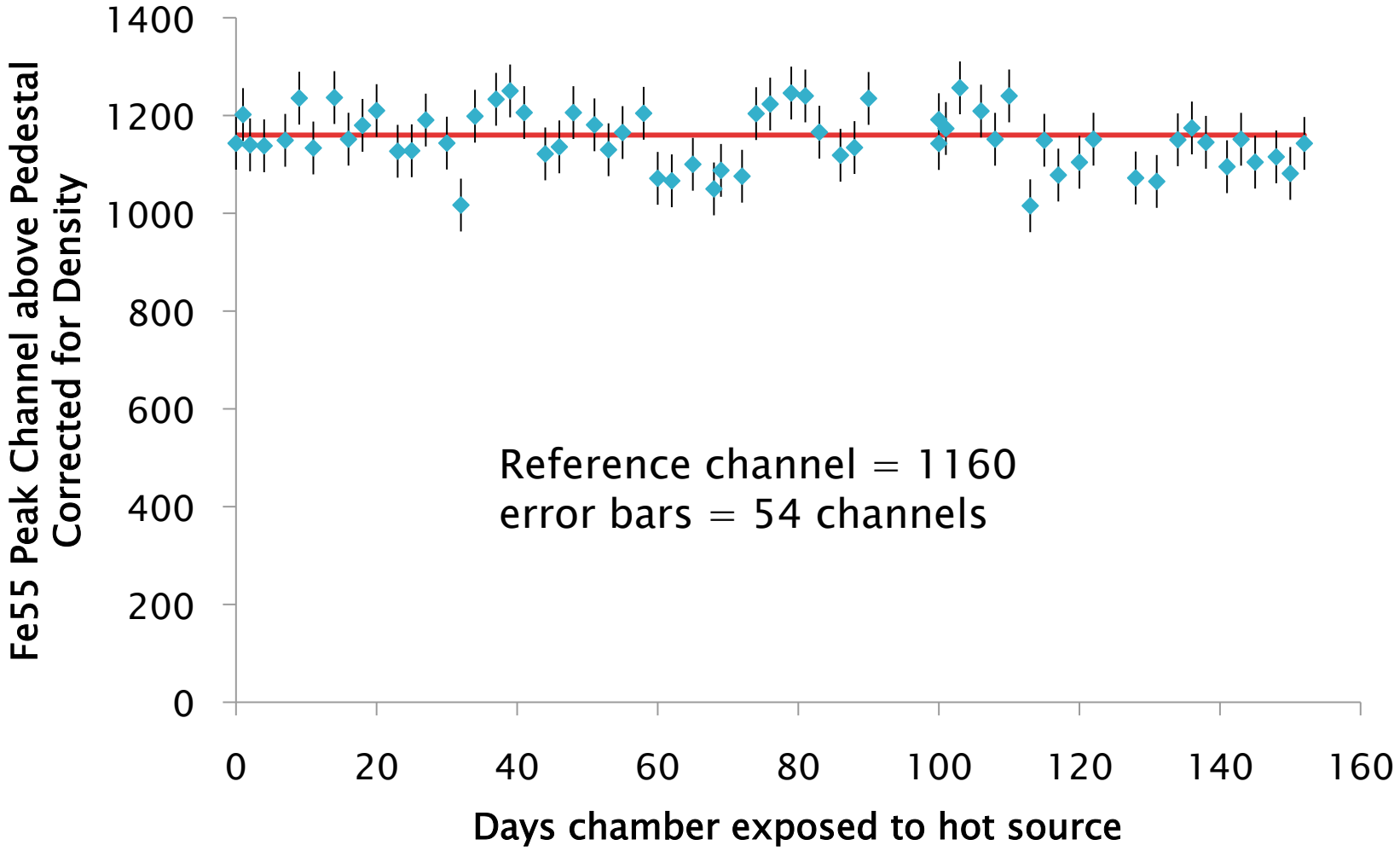


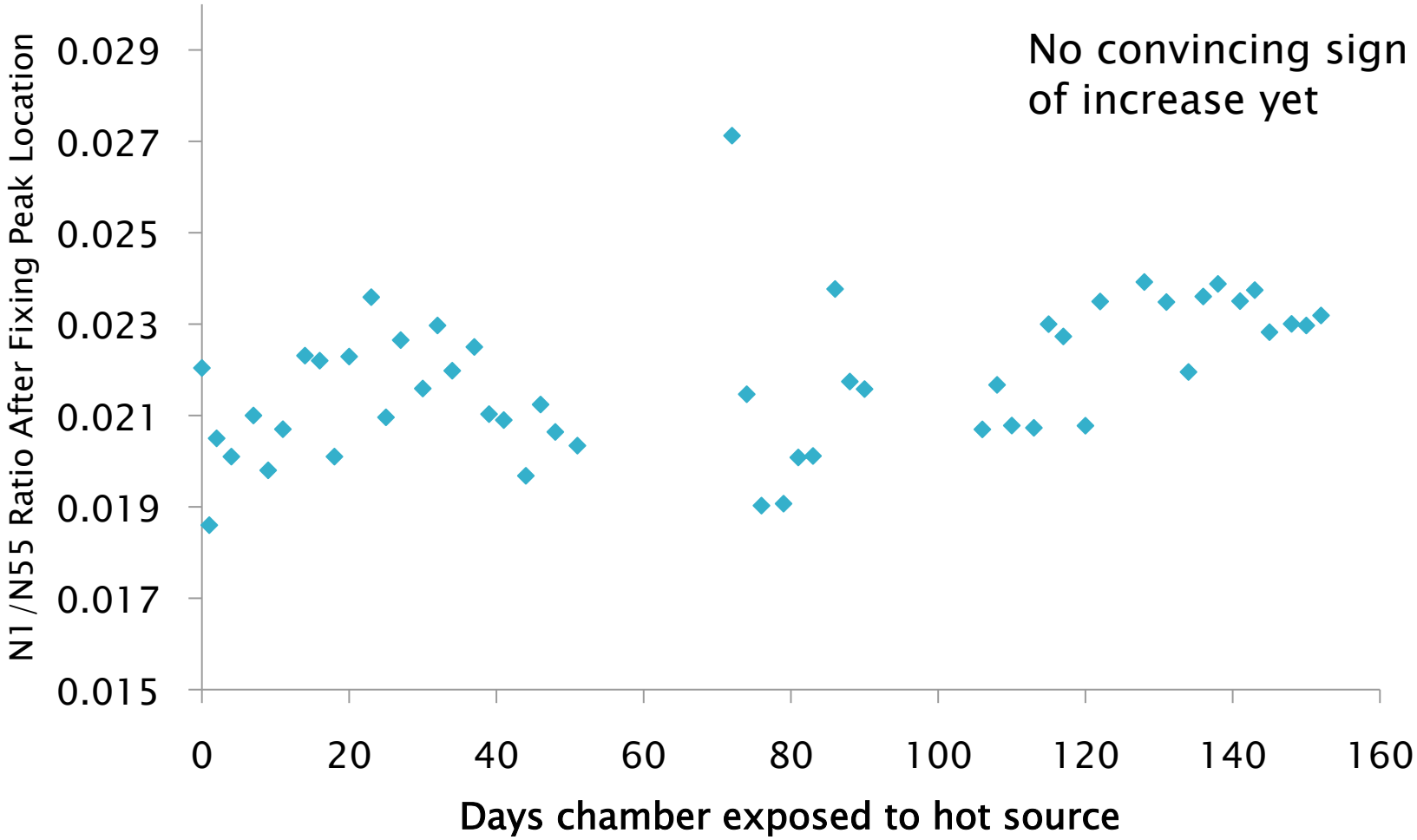
Gain Correction by Density

- Assume that the first 2 months of aging has no effect on Fe55 peak location
- Assume linear relationship
- Assume ideal gas
- rms of pressure(mb)/temperature(K) is 84 channels
- rms after correction is 54 channels (distance from points to line)



Still some scatter


Fe55 Peak Channel above Pedestal
Corrected for Density
1400
1200
1000
800
600
400
200
0
0
20
40
60
80
100
120
140
160
Days chamber exposed to hot source
Reference channel = 1160
error bars = 54 channels


No convincing sign of increase yet
N1/N55 Ratio After Fixing Peak Location
0.029
0.027
0.025
0.023
0.021
0.019
0.017
0.015
0
20
40
60
80
100
120
140
160
Days chamber exposed to hot source

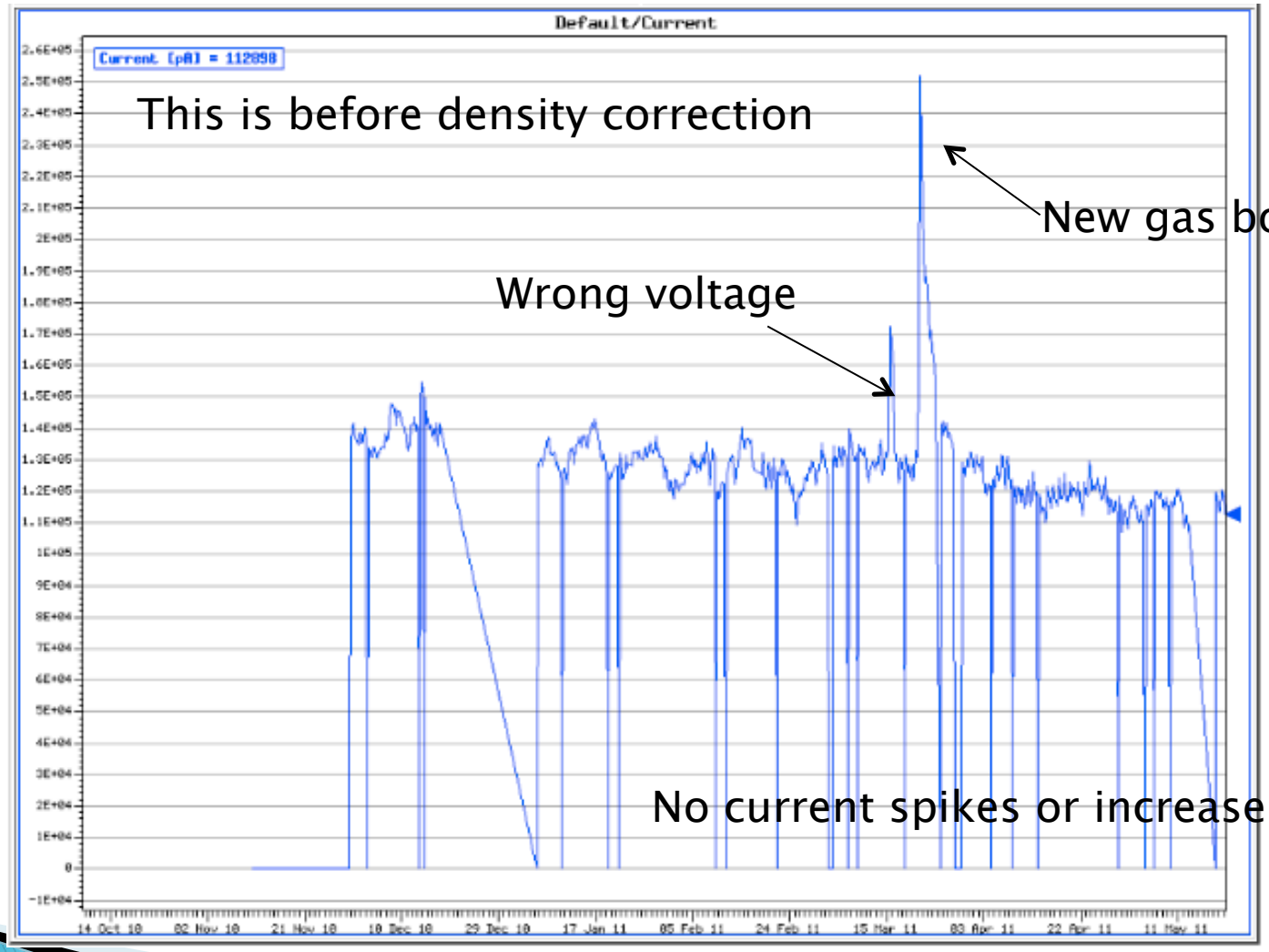
Gain Drop Before Aging

- Babar saw 8% drop in gain
- 54 rms channels/1160 channels = 5% scatter after density correction, possibly due to gas composition variation
- Checked for reproducibility
- Current chamber probably not sensitive enough to see the gain drop

- 77/23 He:Iso causes 38% increase in pulse height
- Gas fluctuated up to 79.6/20.4

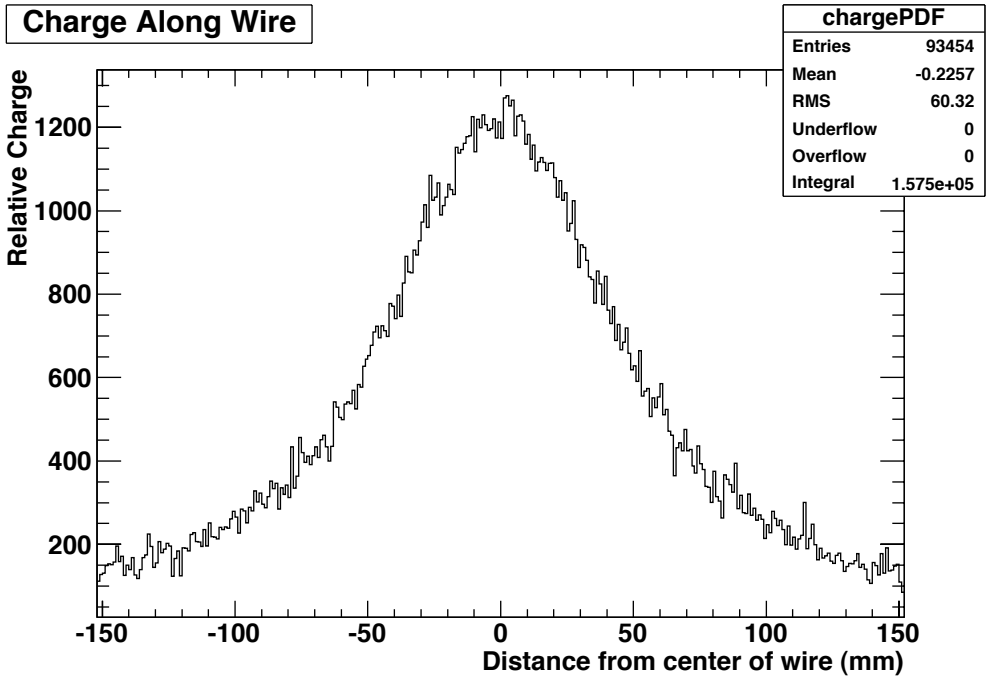
- Build 2 new chambers using aluminum field wires
- Age one but not the other to correct for gas variation and composition uncertainty

Sense Wire Current with Hot Fe55



Charge Distribution along Wire

- Simulated charge by throwing random photons from source to hexagonal cell
- Probability of interaction inside cell is assumed to be proportional to length it traverses
- Central centimeter of wire receives 7.8% of total charge (effective length = 1cm/7.8% = 13cm)
  - Agrees with Boyarski



$$\frac{1.6C}{13cm} \cong 120mC/cm$$

Outlook

- New chamber almost complete
- Continue to age chamber
- String dead chamber with new wires