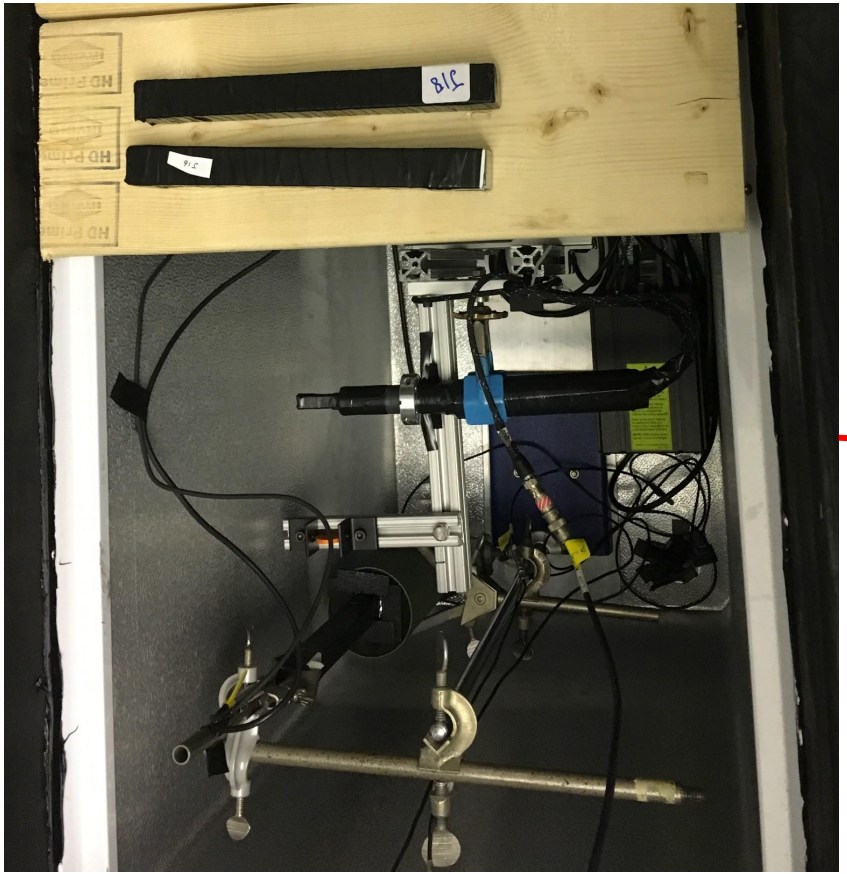
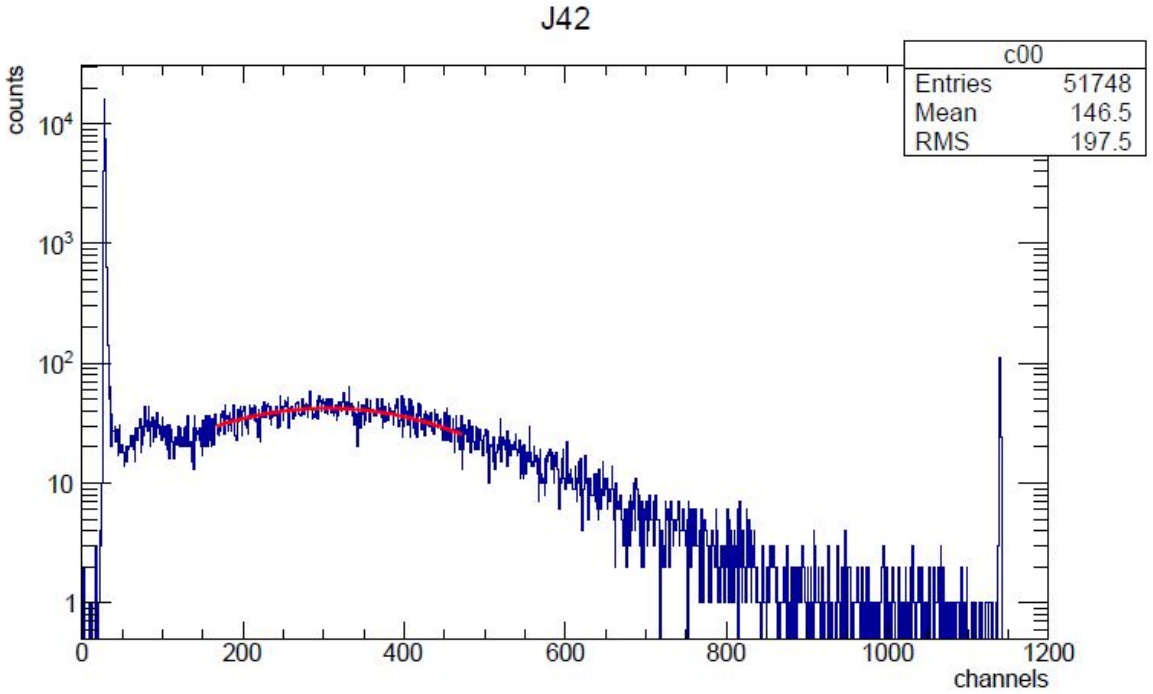
Week 3

Abby and Dannie

Task 1: Learn Light Yield Setup

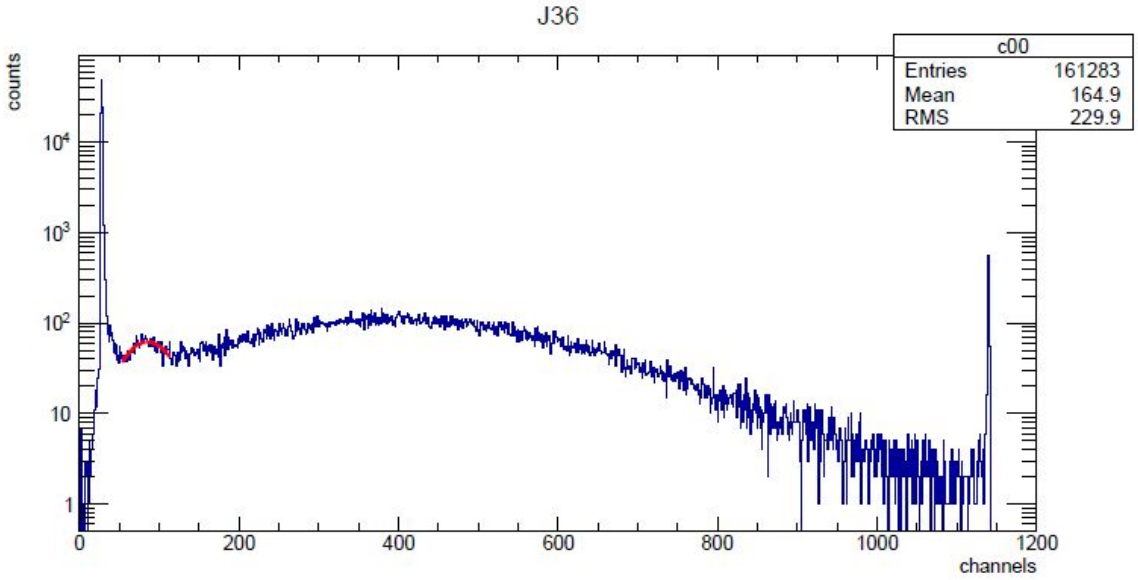


Gaussian Fit: Crystal Peak (using 100ns gw)



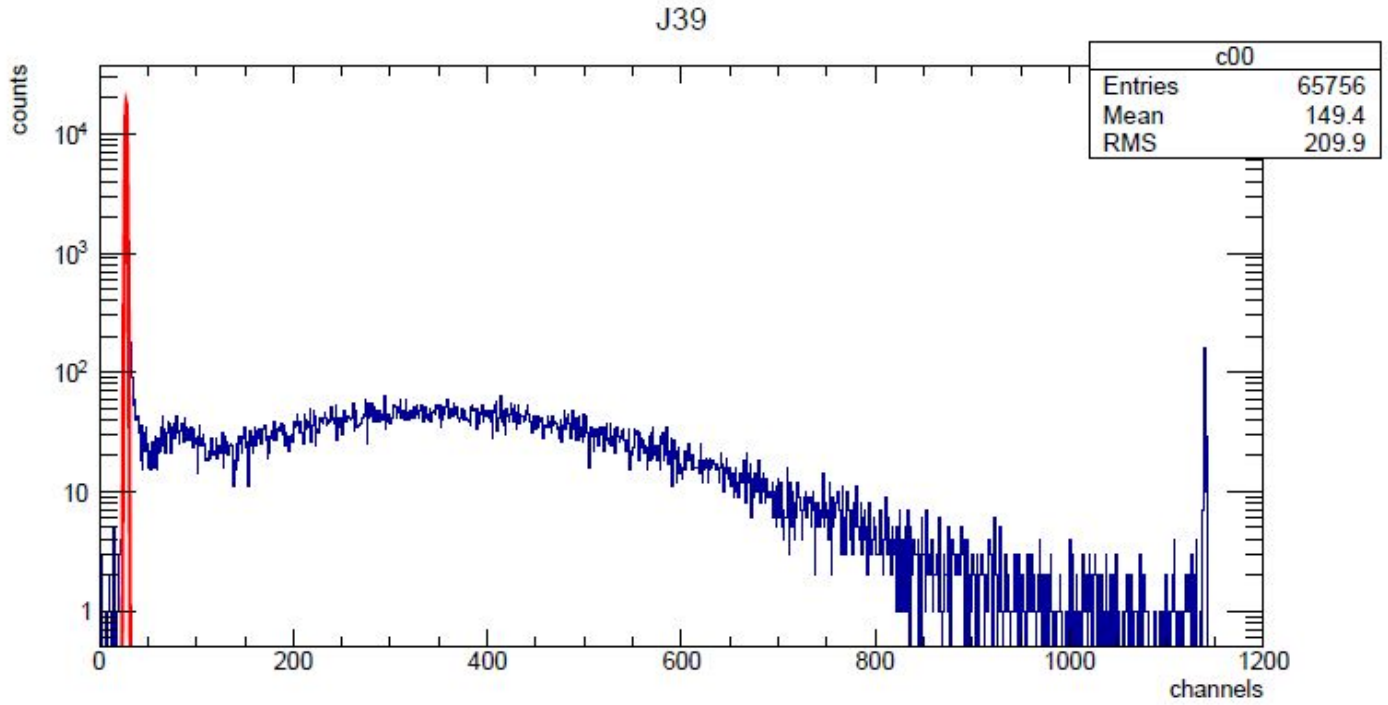
Mean peak: 365 channels

Gaussian Fit: Single Electron Peak



Mean peak: 87 Channels

Pedestal: Gaussian Fit



Mean: 27.6

Calculations (on average)

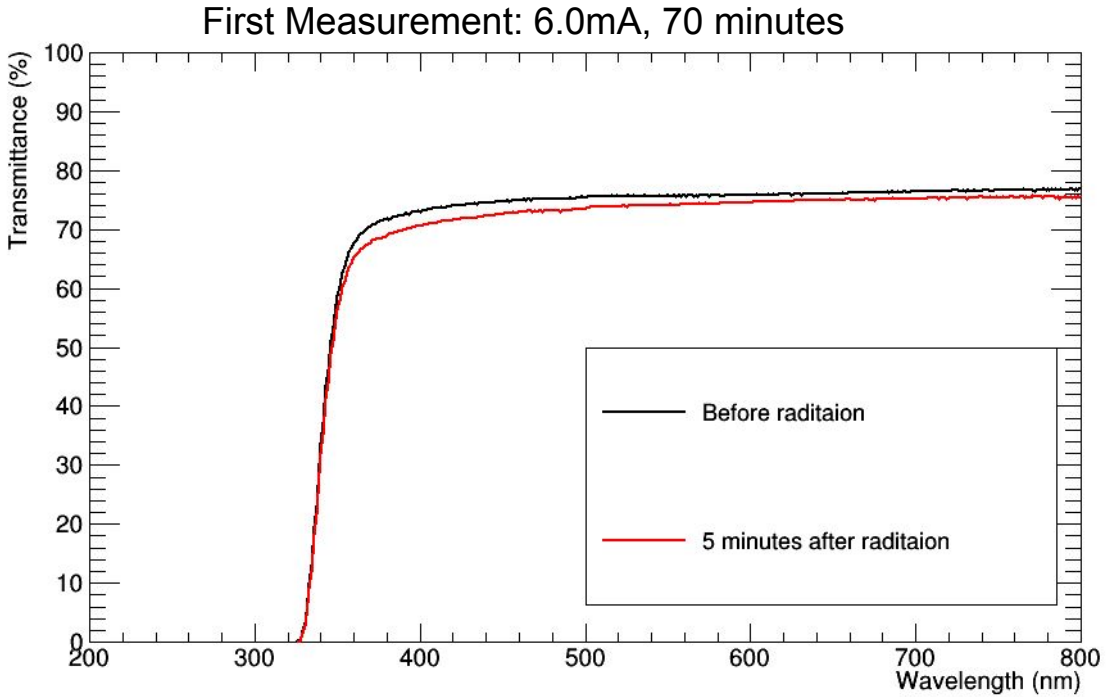
((365-27.6)/(87-27.6))= 6 electrons per photon

(6 electrons)/(.511MeV)=11.3pe/MeV

Task 2: Determine Effects of X-Ray Irradiation

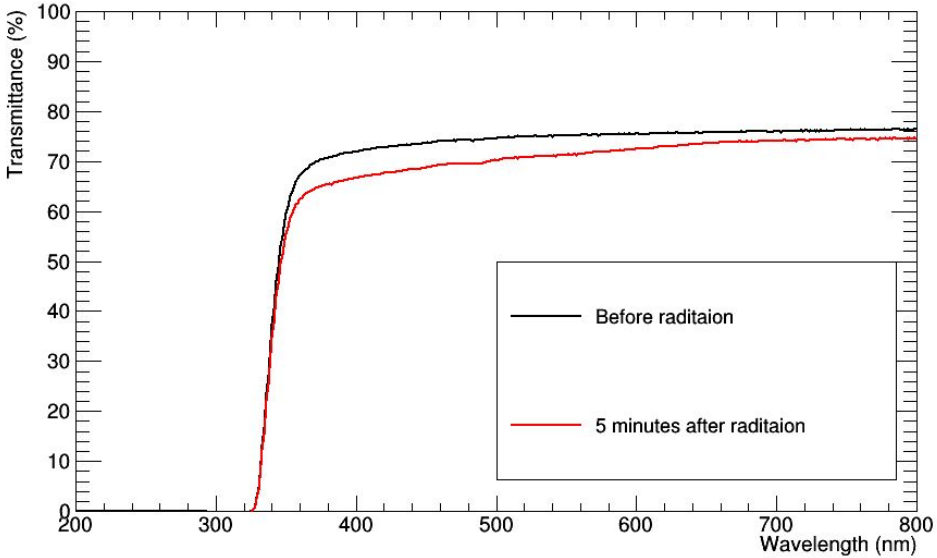
- Faxitron was set at 160mV, 6.0mA, 70 minutes for first measurement
- Set at 160mV, 6.3mA, 99 minutes for rechecked measurements
  - 6.3mA, 99 minutes are maximum capacities
  - Time and current did not affect data significantly

Successful Radiation: J22

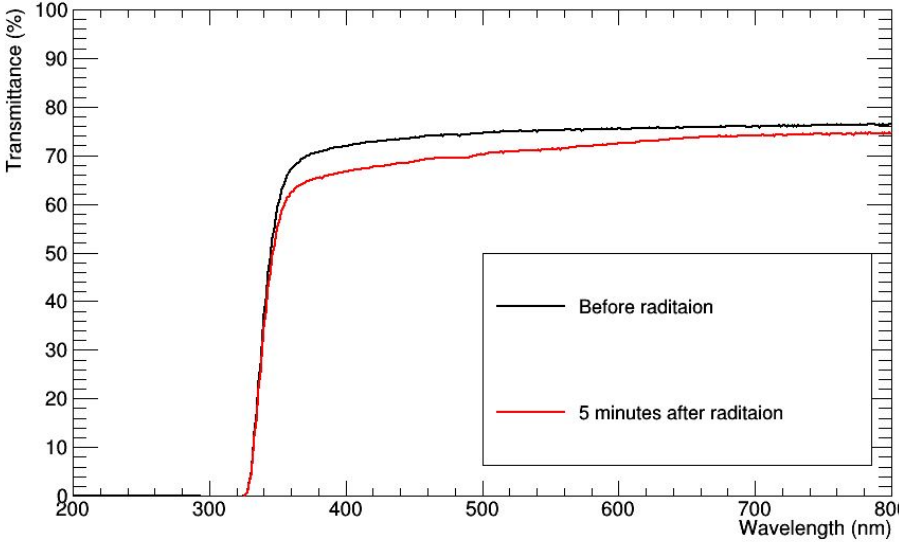


Successful Radiation: J23

First Measurement: 6.0mA, 70 minutes

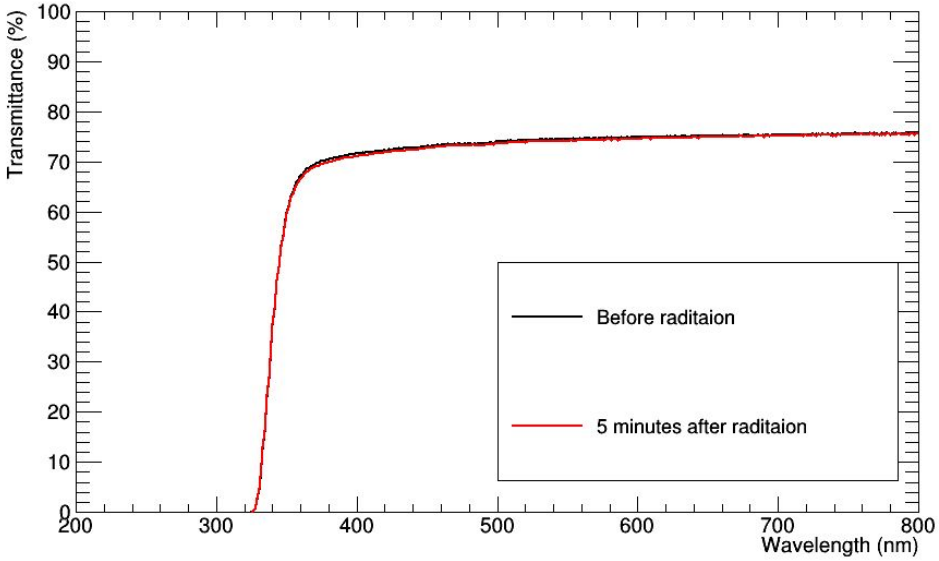


Rechecked Measurement: 6.3mA, 99 minutes

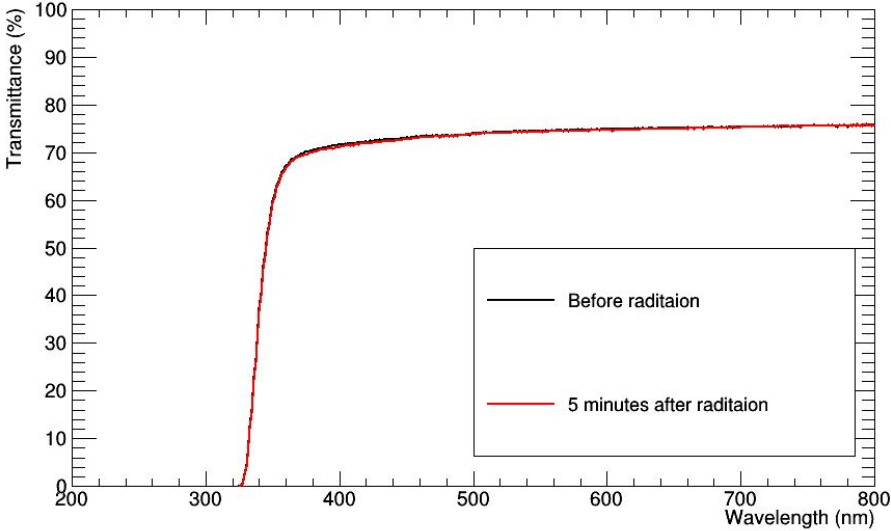


Unsuccessful Radiation: J24

First Measurement: 6.0mA, 70 minutes

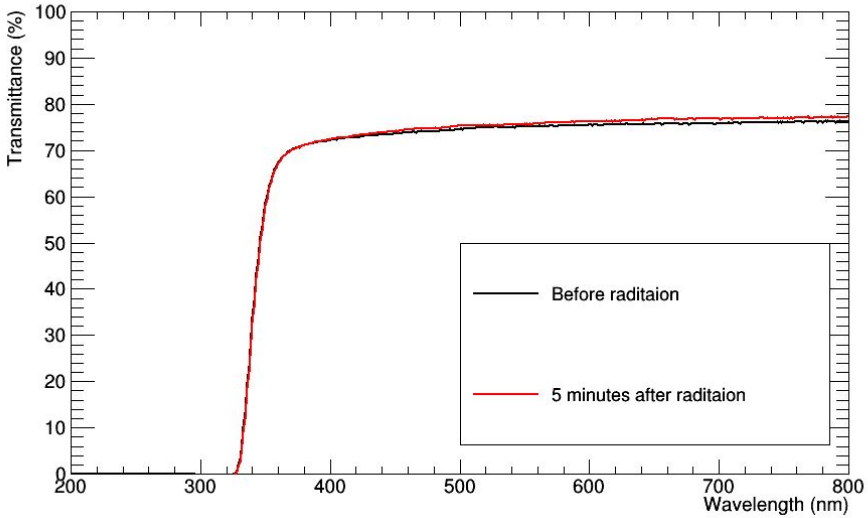


Rechecked Measurement: 6.3mA, 99 minutes

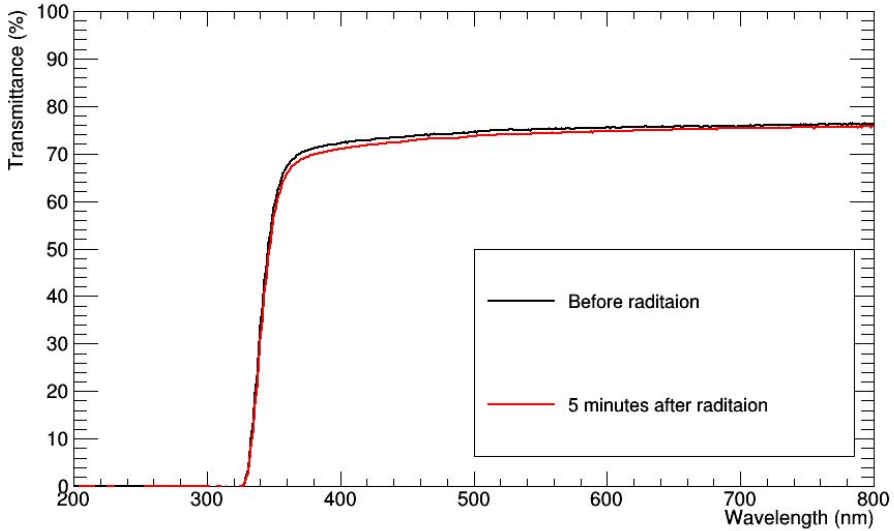


Unsuccessful Radiation: J25

First Measurement: 6.0mA, 70 minutes

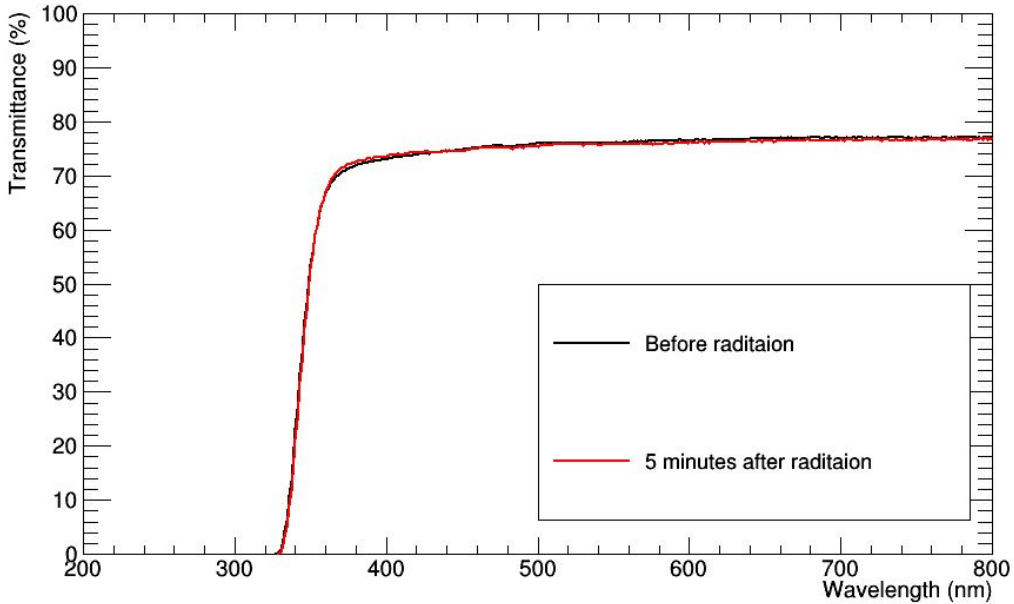


Rechecked Measurement: 6.3mA, 99 minutes

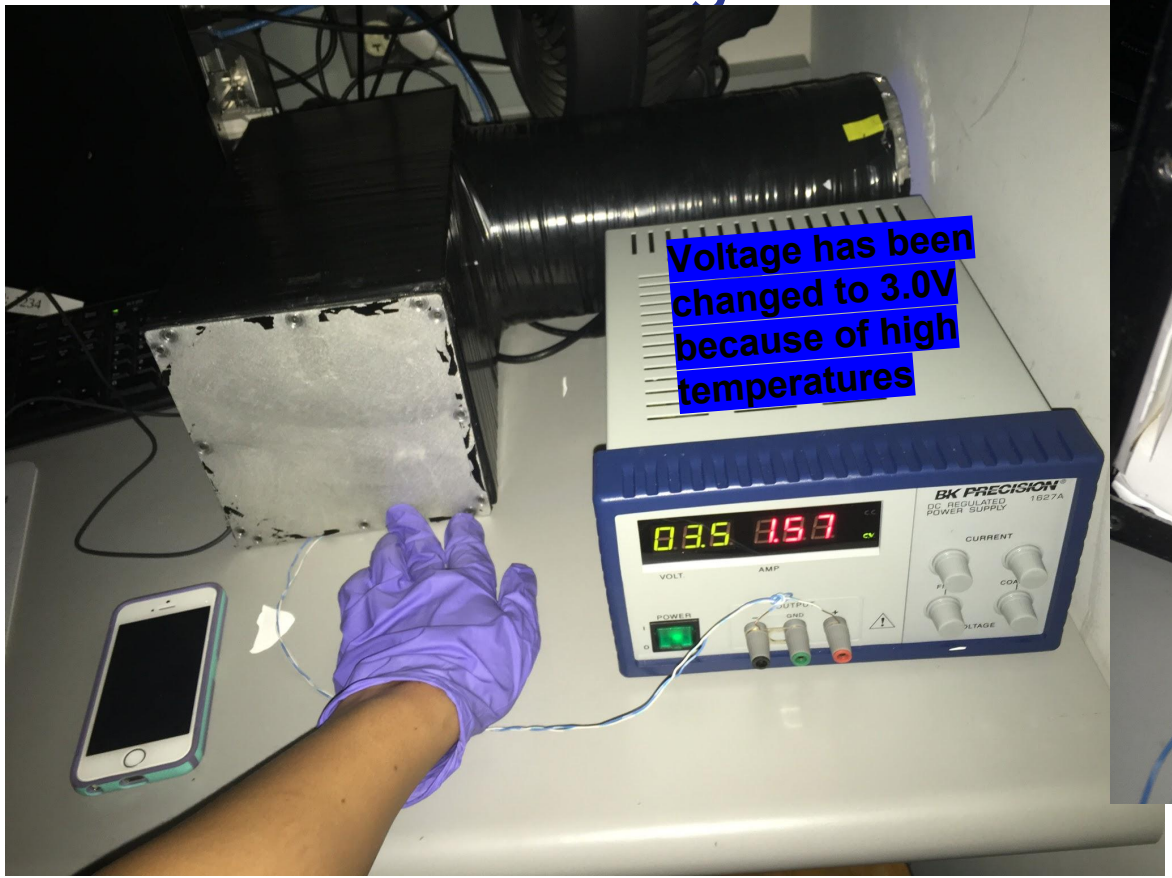


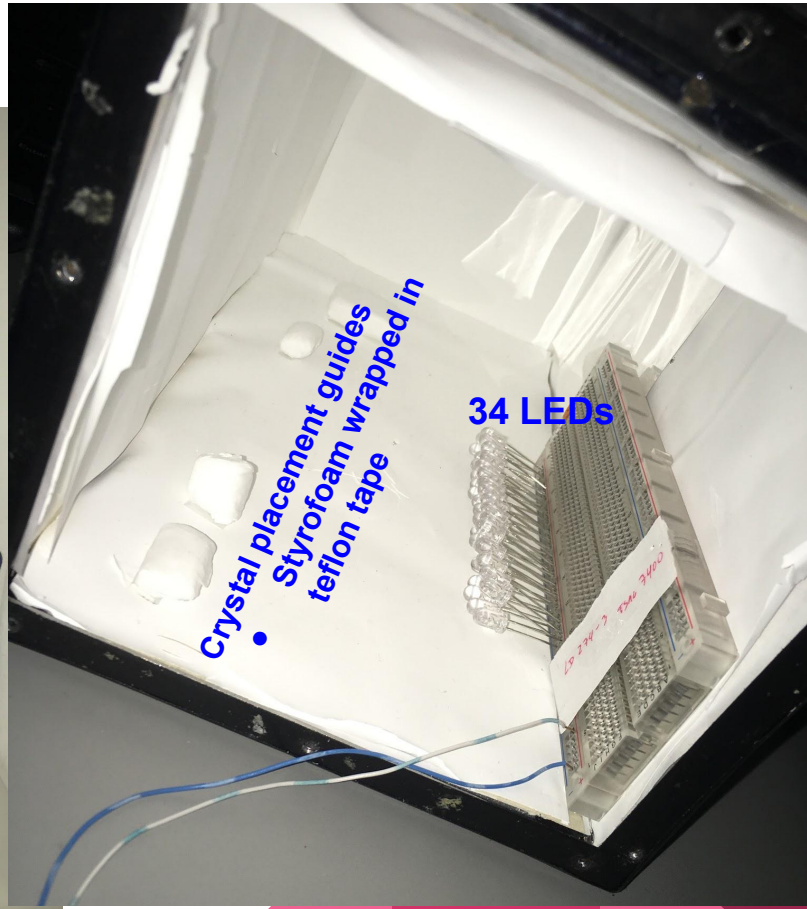
Unsuccessful Radiation: J26

First Measurement: 6.0mA, 70 minutes

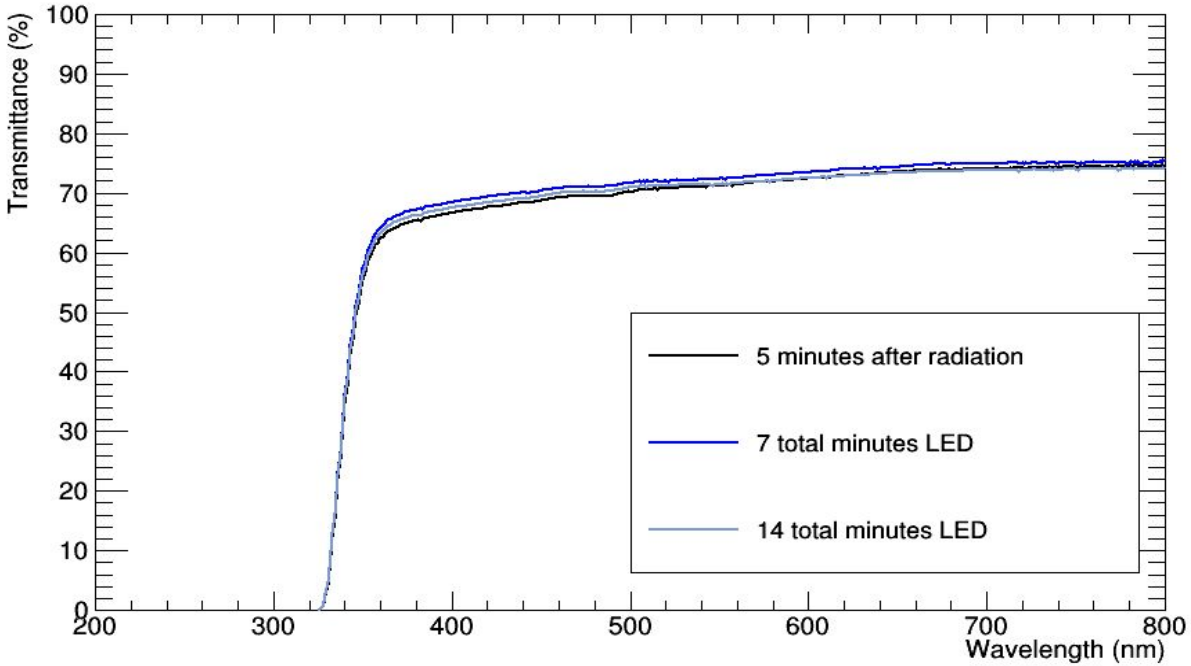


Task 3: LED curing





LED Curing: J23

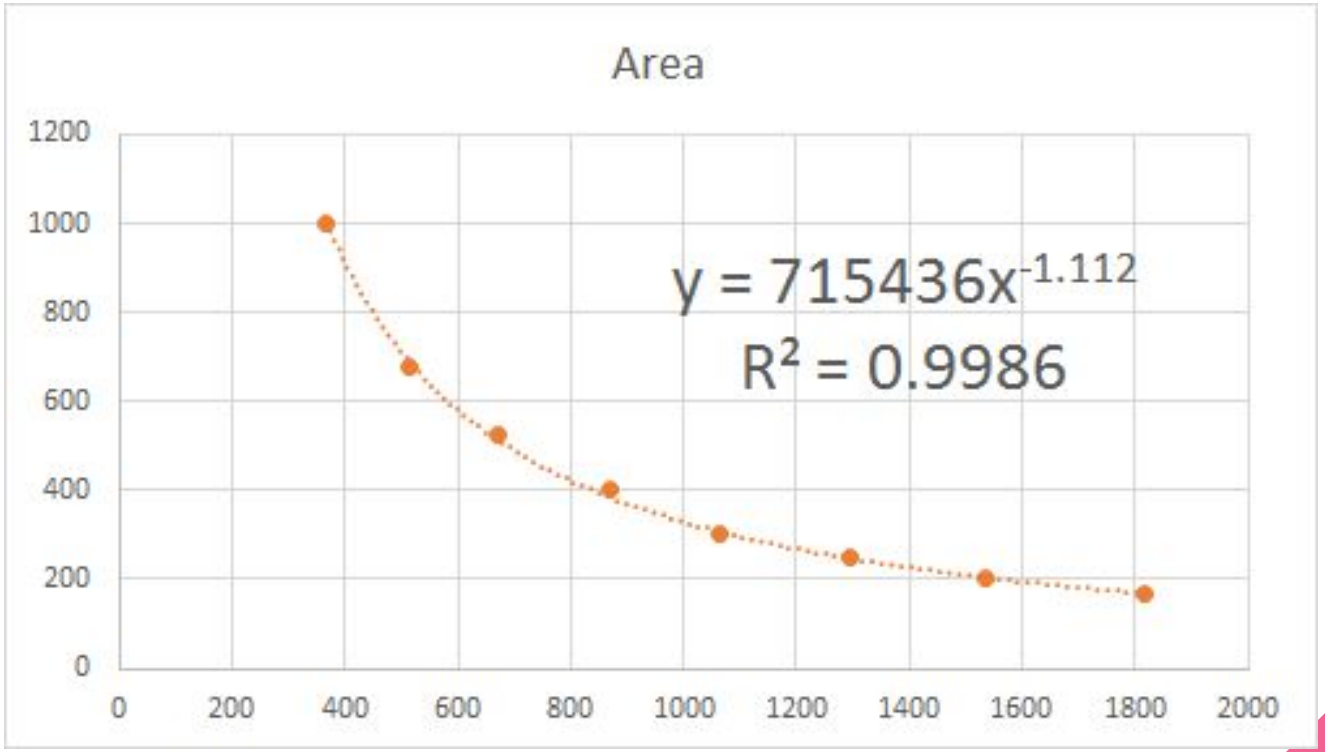


Task 3: Figure Out Dose Rate

Data found online for a faxitron x-ray machine using 130kV, 5mA

Area of Beam	R/min
366.4354	1000
514.7185	675
669.6619	525
870.9202	400
1063.618	300
1294.619	250
1534.385	200
1817.105	170

Trying to find the form of the equation

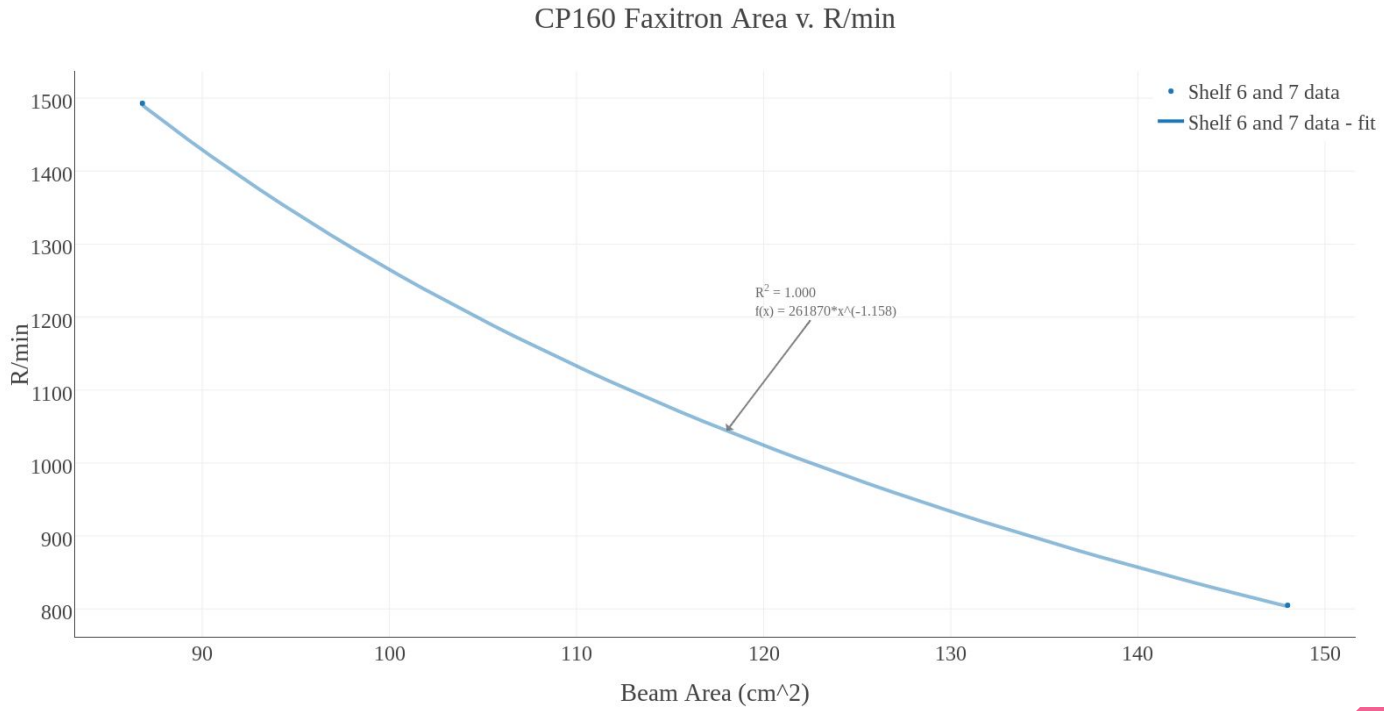


Seems to fit best with equation in the form in the form y=kx^z

Fitting an equation to 160kV, 6.3mA

- From the technical manual, we knew the R/min at shelf 6 and shelf 7
- Also knew circle diameter → could find area
- Shelf 6: 805 R/min, 148.3cm^2 area
- Shelf 7: 1493 R/min, 86.8cm^2 area
- System of equations
  - 1493=k(86.8)^z
  - 805=k(148.3)^z
- Solutions
  - k=261870, z=-1.158
- Therefore y (in R/min) = 261870(x in cm^2)^-1.158

Graph


CP160 Faxitron Area v. R/min
Shelf 6 and 7 data
Shelf 6 and 7 data - fit
R2 = 1.000
f(x) = 261870*x^(-1.158)
R/min
1500
1400
1300
1200
1100
1000
900
800
90
100
110
120
130
140
150
Beam Area (cm^2)

Next Step

Roentgens per min → Dose Rate

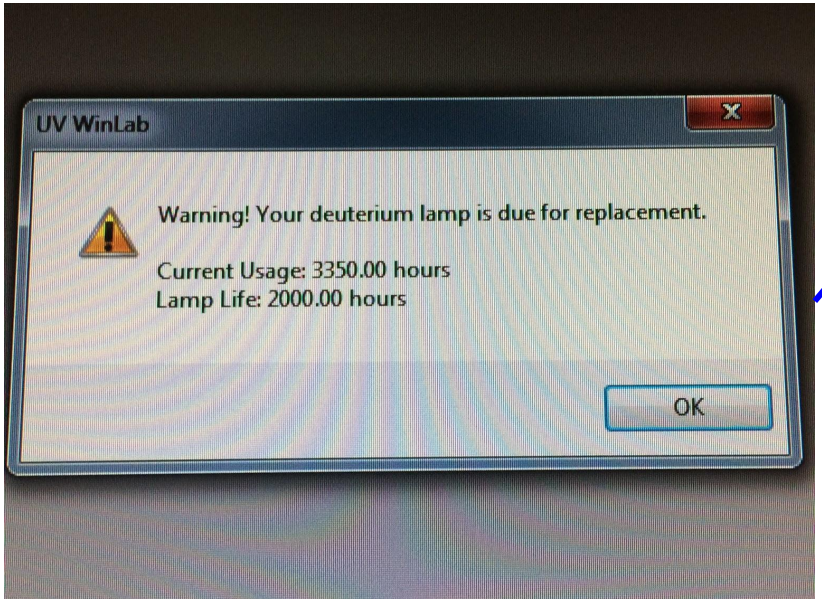
Roentgens per min = charge of 2.58×10^{-4} C/kg(of ionizied air)

Multiply by a voltage (energy supplied per coulomb of charge)??

Task 5: LY as a function of gate width

	J36-100nsgw	J36-200nsgw	J36-300nsgw	J36-400ns-gw	J36-500ns-gw	J36 -600 ns-gw	J36 -700 ns gw	J36 - 800ns gw	J36-900ns gw	J36-1microseconds gw
zero	28	39	51	62	76	96	109	122	134	147
SEP	93	103	115	129	135	157	169	182	197	210
mean	414	447	455	479	489	511	527	540	558	566

Task 15- Spectrometer!!!!!!!



Temperature?