

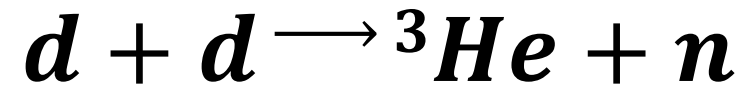


Neutron Detection in DD Reactions with Duoplasmatron Beams

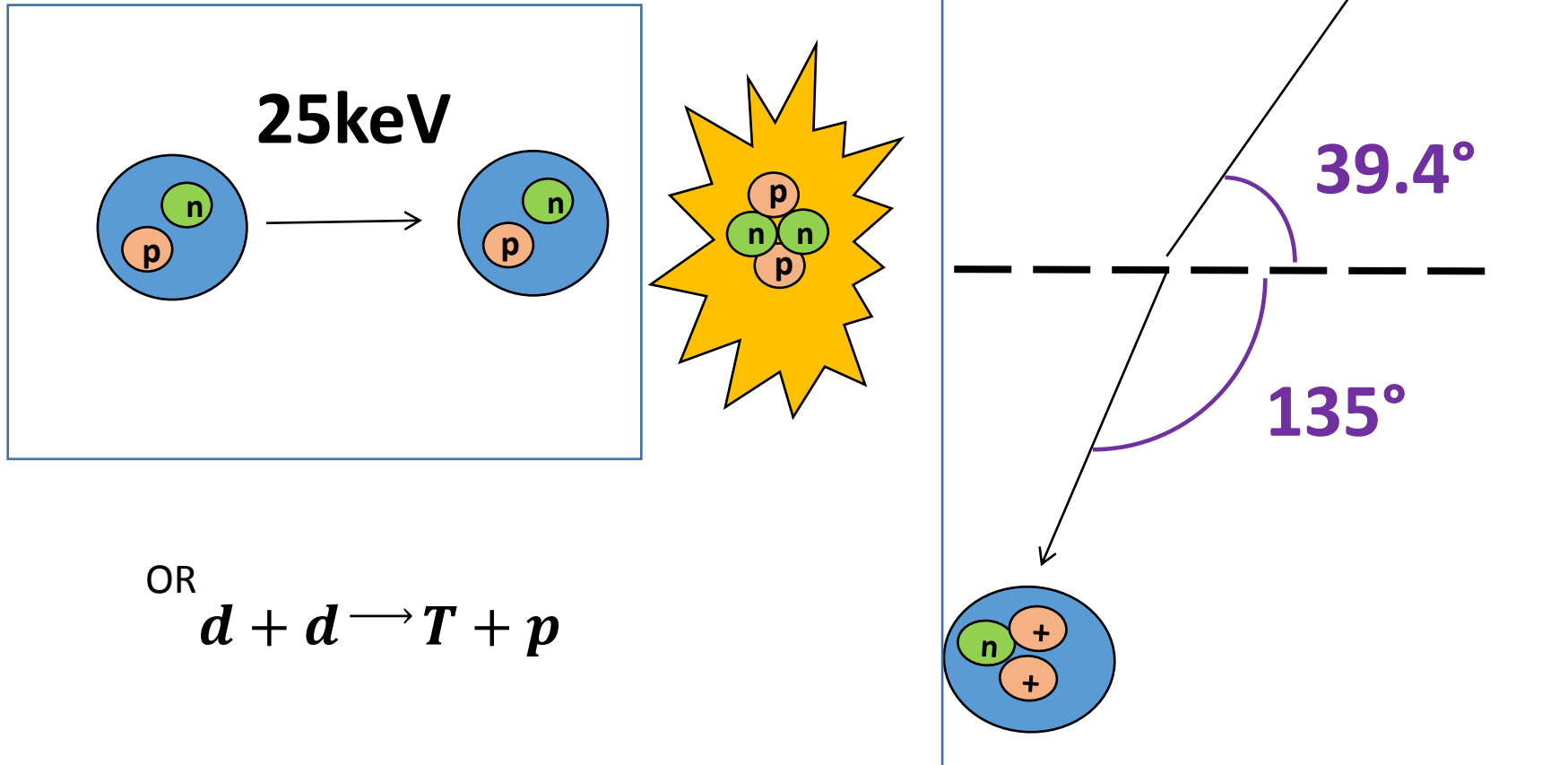
Dr. Fletcher, Mike Giordano

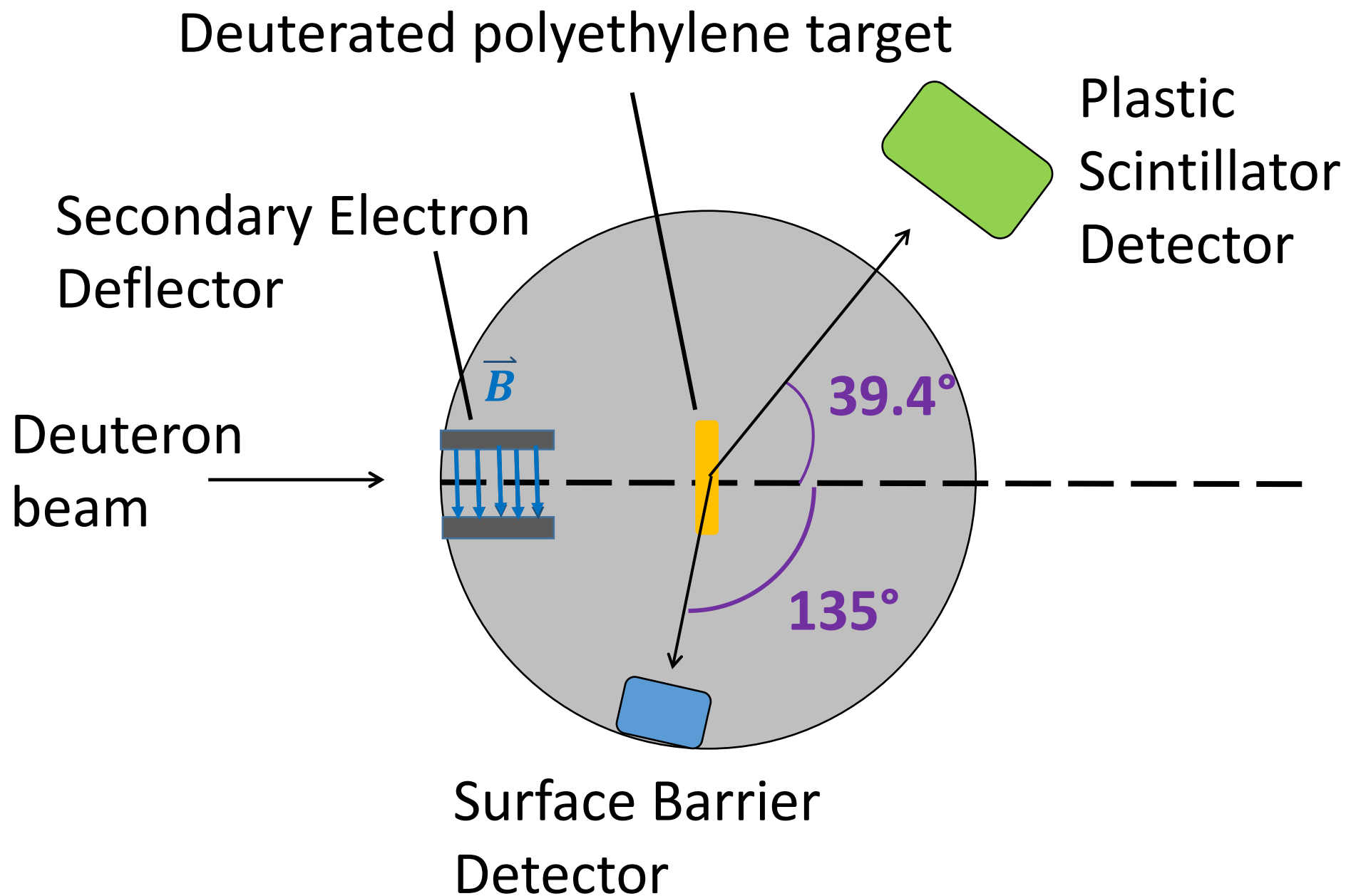
Hannah Harrison, Patrick Lawson-Keister, Hannah Visca

We have demonstrated the ability to produce a
D-D neutron spectrum using n - ^3He coincidence
techniques



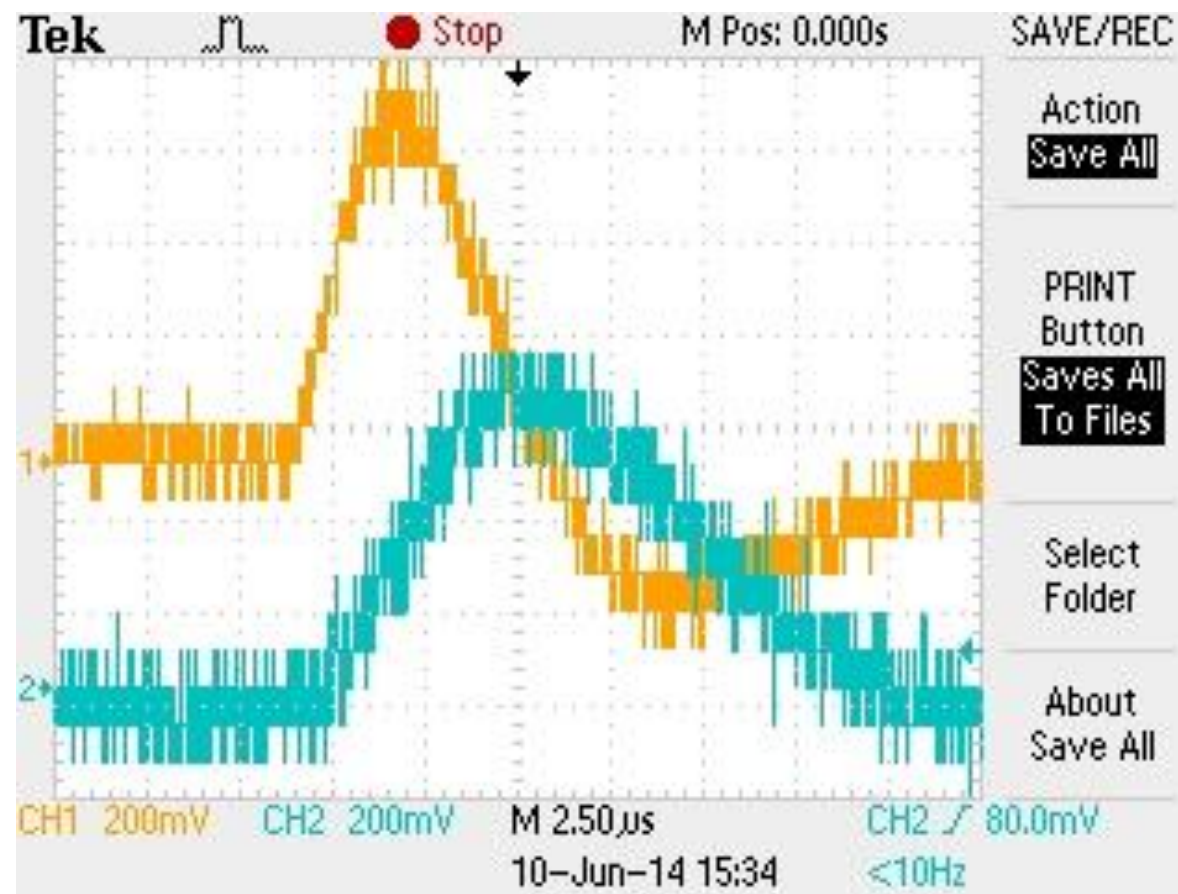
$$Q = 3.27\text{MeV}$$





	Angle	Mass (kg)	Energy (MeV)	Distance (m)	Time (ns)
He-3	135	5.01E-27	0.70	0.084	12.6
Neutron	39.4	1.67E-27	2.60	0.211	9.5

Channel 1: Plastic Scintillator Detector
Channel 2: Surface Barrier Detector
Measured Time Difference:
1.62 μ s



Duoplasmatron Settings:

Magnet: 1 A

Filament: 26 A

Arc Current : 1.85 A

Arc Voltage: 104.6 V

Pressure $\sim 11 \mu\text{Torr}$

Beam Energy

Current 30 mA, Voltage **25 keV**

Focus

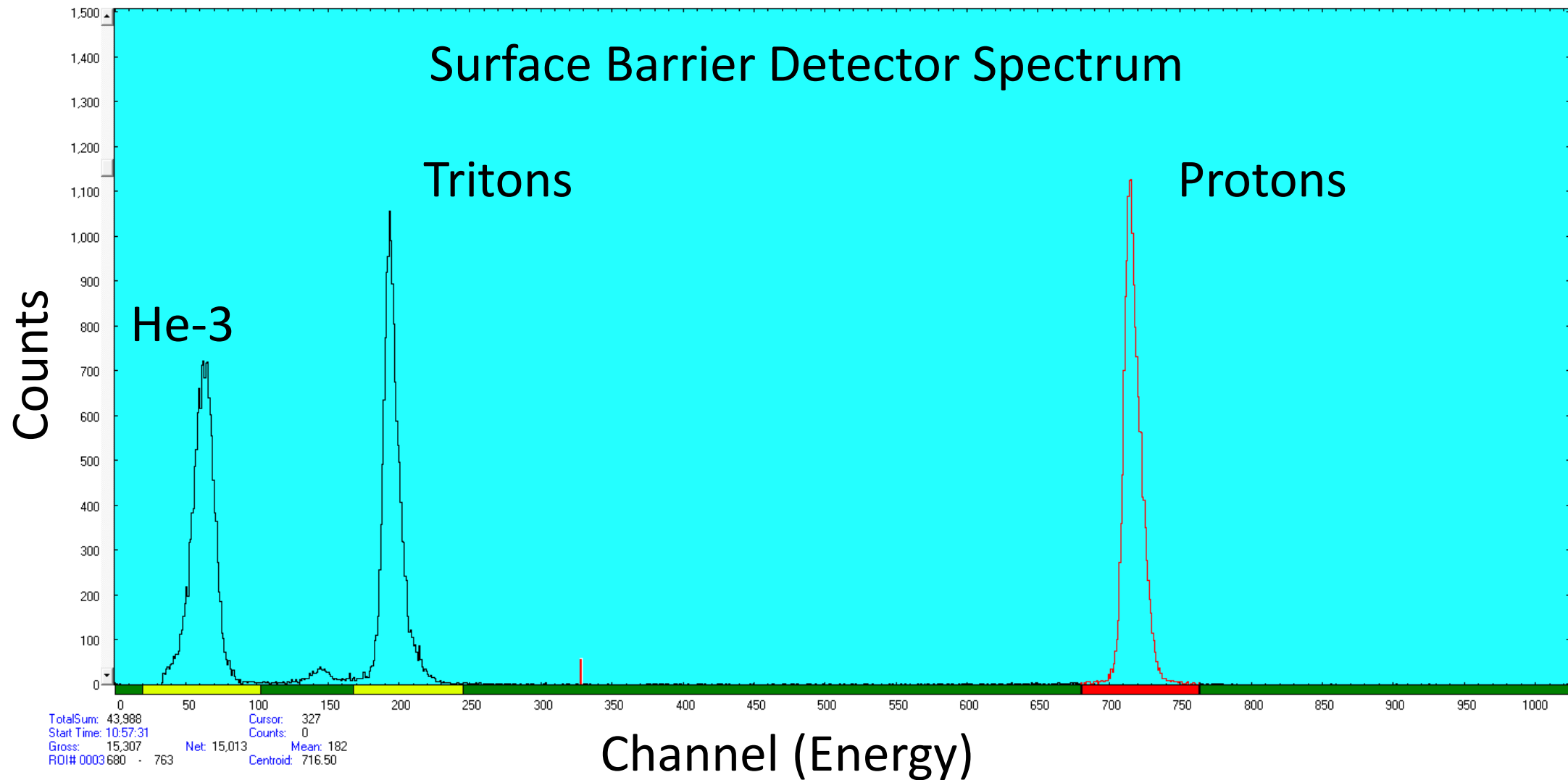
Voltage 20 keV, Current 0.3 mA

Beam Current: **17 μA**



Protons: 15,307
Helium-3: 13,736

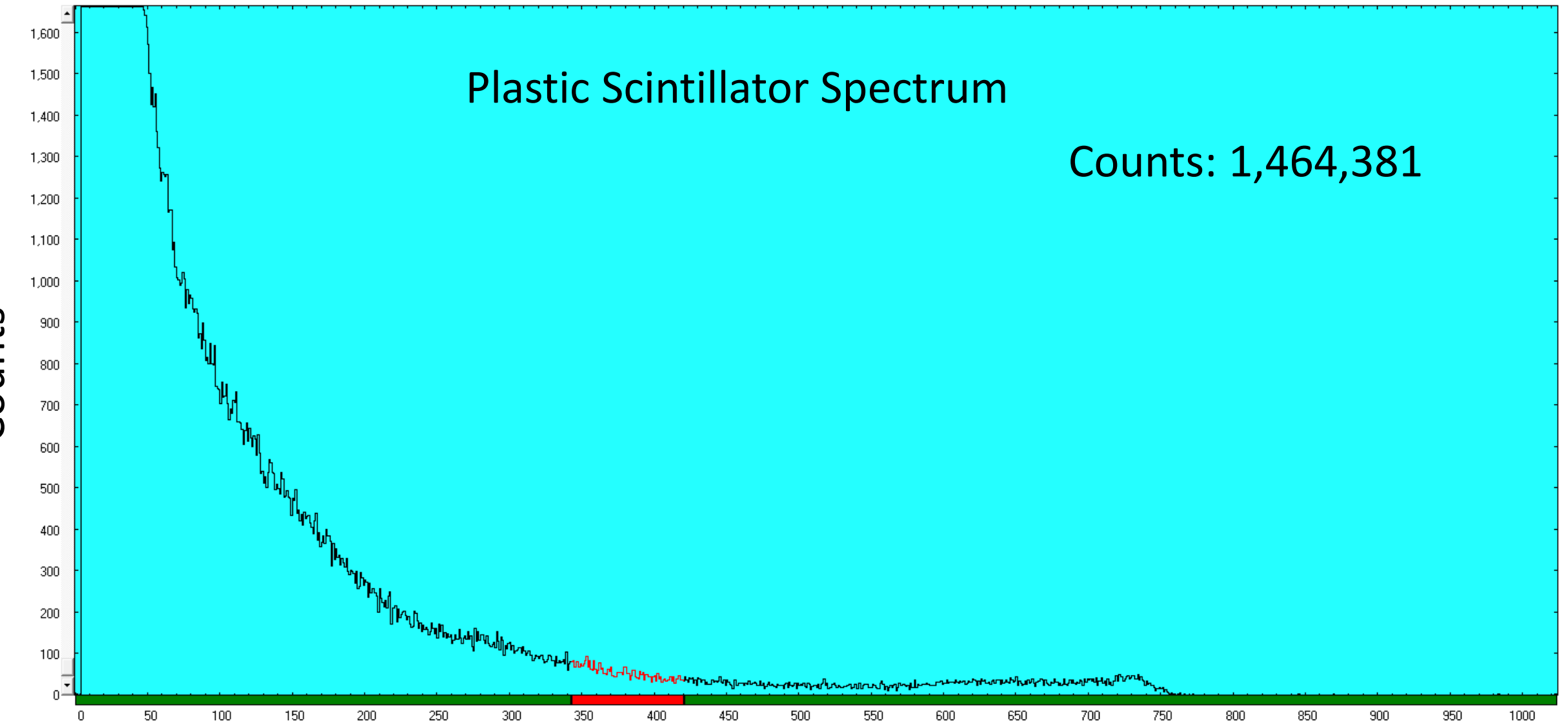
Tritons: 13,873
Elapsed Time: 9000s



Plastic Scintillator Spectrum

Counts: 1,464,381

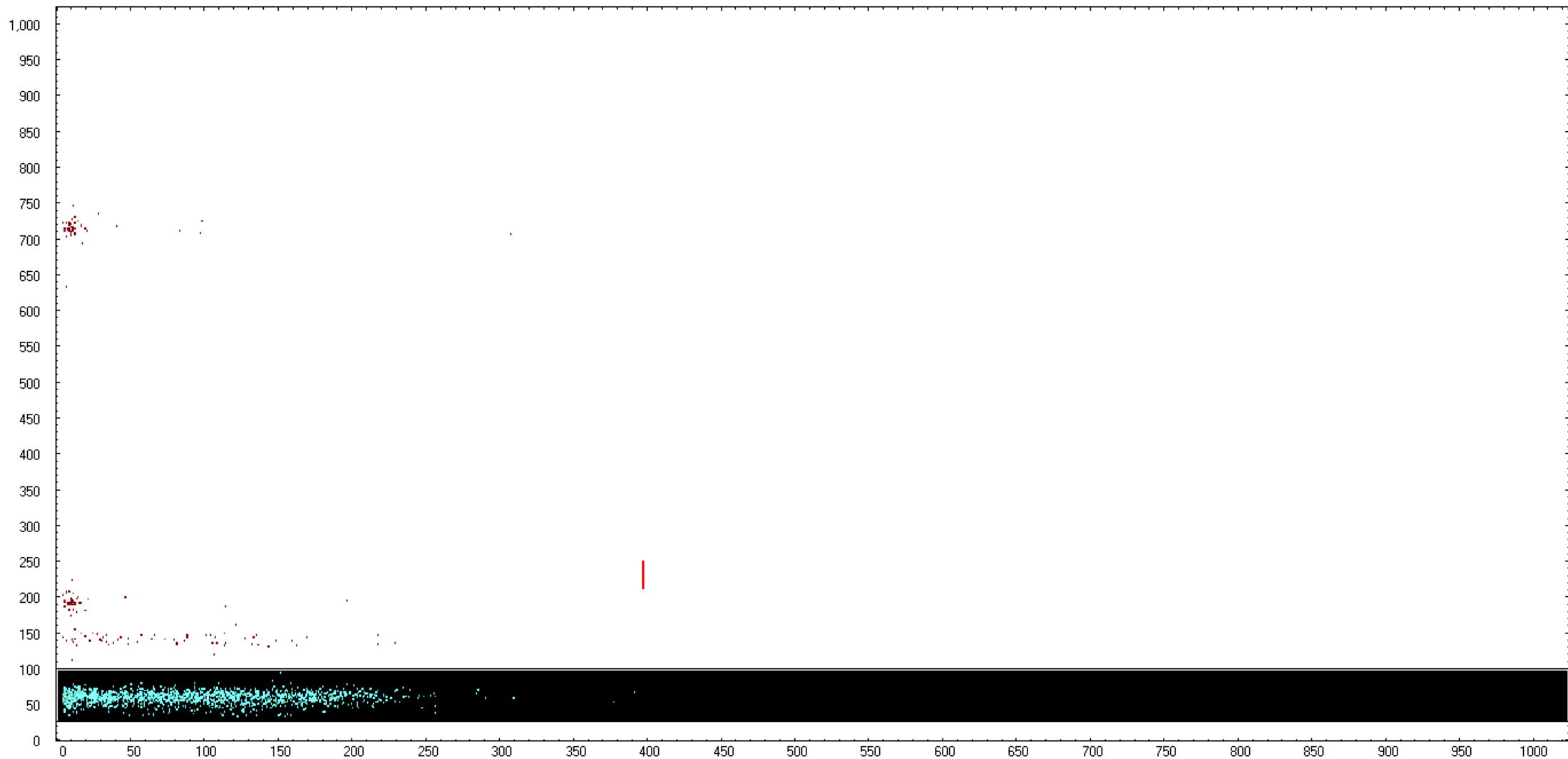
Counts



TotalSum: 1,464,381
Start Time: 10:57:31
Gross: 4.067
ROI# 0001 343 - 420
Cursor: Counts:
Net: -,340
Mean: 52
Centroid: 375.94

Channel (Energy)

Surface Barrier Detector



Neutron – He-3 Counts: 1,623

Background Coincidences: 125

Elapsed Time: 9000s

Plastic Scintillator

Estimated Efficiency: 11%

X-projection of 2-D Spectrum
-1,623 D-D Neutrons

We have demonstrated the
ability to produce a D-D neutron
spectrum using n - ^3He
coincidence techniques

