



# Study of Scintillant Fibers Microdosimeter on Different Radiation Environments using FLUKA Code

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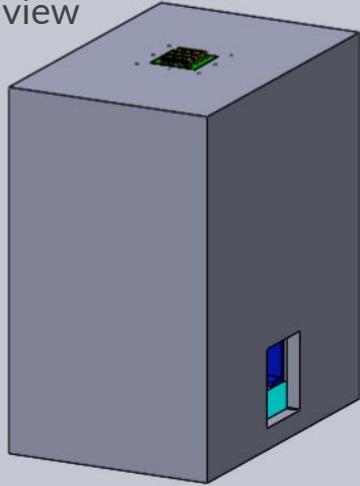
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Fig. 1 Detector  
side view



# The Project

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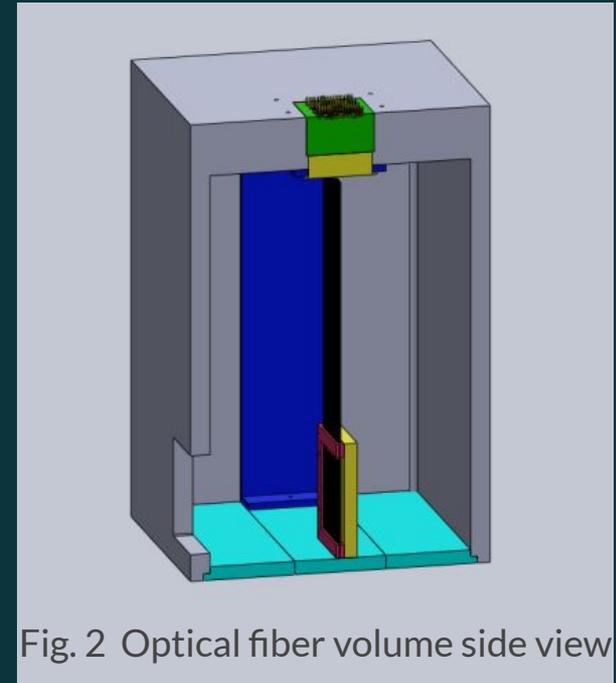


Fig. 2 Optical fiber volume side view

# The Project

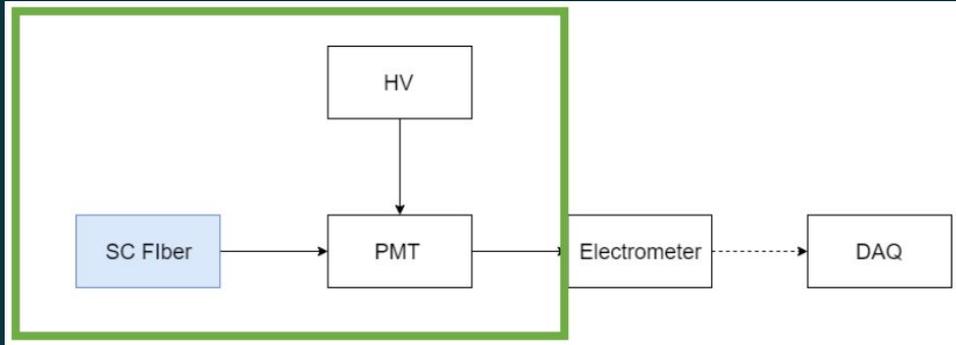


Fig. 3 Scintillation Dosimetry

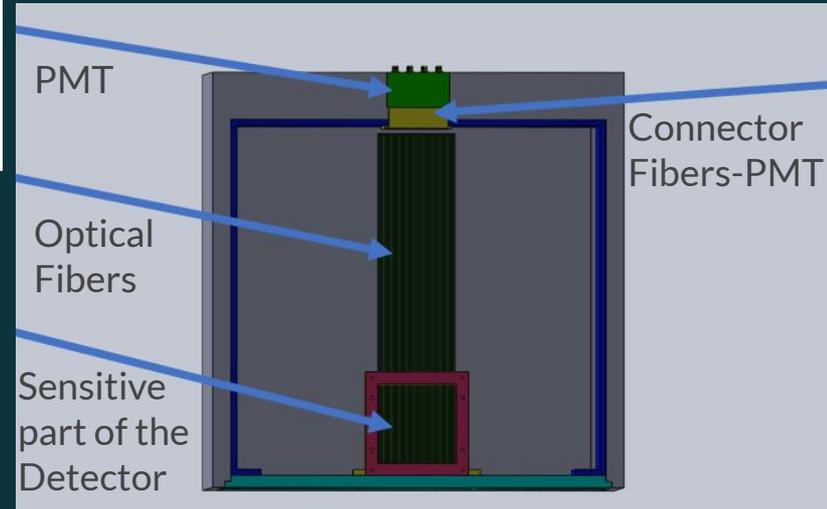


Fig. 4 Frontal view of the Fibers Volume



**FLUKA**



**FLUKA**



# Beam, Scoring and Physics



**T TITLE**  
Set the defaults for precision simulations

**DEFAULTS** : PRECISIO ▼

Define the beam characteristics

**BEAM** Beam: Momentum ▼ p: Part: ISOTOPE ▼  
 $\Delta p$ : Flat ▼  $\Delta p$ :  $\Delta \phi$ : Flat ▼  $\Delta \phi$ :  
Shape(X): Rectangular ▼  $\Delta x$ : Shape(Y): Rectangular ▼  $\Delta y$ :

IsotopeName: Tl-204 - Aqui colocamos o A e o Z do isótopo que nos interessa.

**HI-PROPE** Z: 81. A: 204. Isom: 0.

**PHYSICS** Type: COALESCE ▼ Activate: On ▼

Definimos a posição do beam, neste caso, o local dos decaimentos

**BEAMPOS** x: 0. y: 0.05 z: 5.  
cosx: cosy: Type: POSITIVE ▼

Definimos a geometria da fonte - uma esfera com diâmetro igual a 0.1cm

**BEAMPOS** x: 0.0 y: 0.0 z: 0.0  
cosx: 0.0 cosy: 0.0 Type: POSITIVE ▼

**DETECT** Type: Detector ▼ Regions: 1 ▼ Name: core1  
Emin: 0.0 Emax: 8.0E-4 Ecut: Trigger: ▼  
Reg1: Core1 ▼

# Geometry

<b>GEOBEGIN</b>	Accuracy:	Option: ▼	Paren:
	Geometry: ▼	Out: ▼	Fmt: COMBNAME ▼
Title:			
Black body			
● <b>SPH</b> blkbody	x: 0.0	y: 0.0	z: 0.0
	R: 100000.0		
Void sphere			
● <b>SPH</b> void	x: 0.0	y: 0.0	z: 0.0
	R: 10000.0		
Detector			
● <b>RCC</b> core1	x: 0.	y: 0.	z: -5000.0
	Hx: 0.	Hy: 0.	Hz: 10000.0
	R: 5000.0		
Gold target 60 micrometros (em cm)			
● <b>RCC</b> core2	x: 0.	y: 0.	z: -0.0060
	Hx: 0.	Hy: 0.	Hz: 0.0120
	R: 0.0060		
Plástico que envolve o material radioactivo			
● <b>RCC</b> plastic	x: 0.0	y: 0.05	z: 4.5
	Hx: 0.0	Hy: 0.0	Hz: 2.0
	R: 2.5		

# Validation

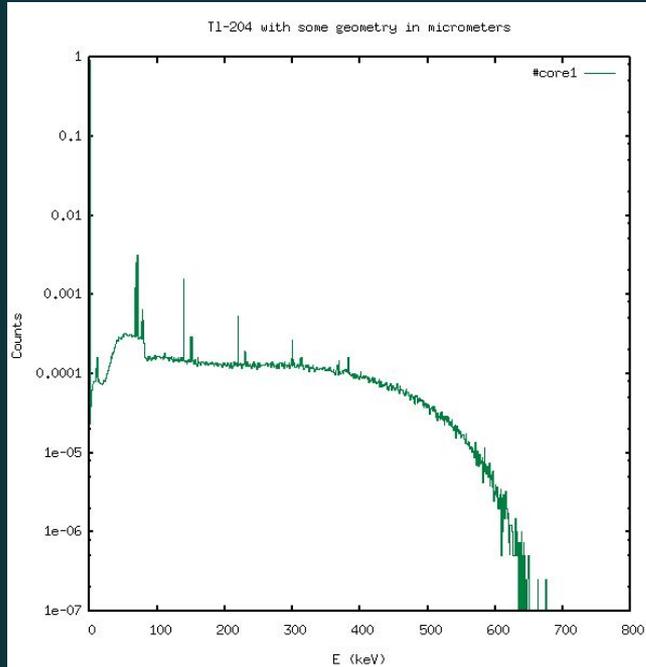


Fig. 5 The TI-204 Spectrum with Gold detector, result of the FLUKA Simulation

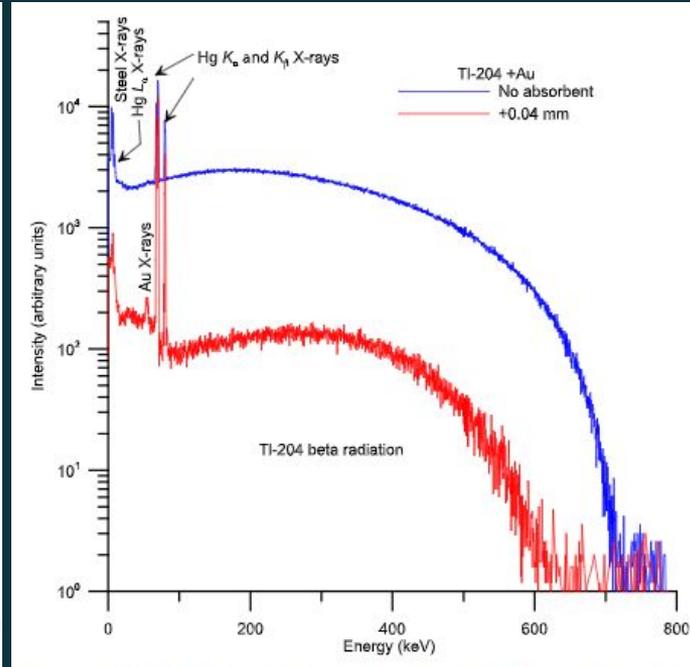


Fig. 6 Emission spectrum of TI-204 source (blue) and experimental spectrum with a 40  $\mu$ m gold absorber (red). Part of the beta radiation intensity has been absorbed by the gold. Au X-rays appear as a consequence of the radiation interaction in the thin gold layer.

# Am-241 and Cs-137 with NaI detector

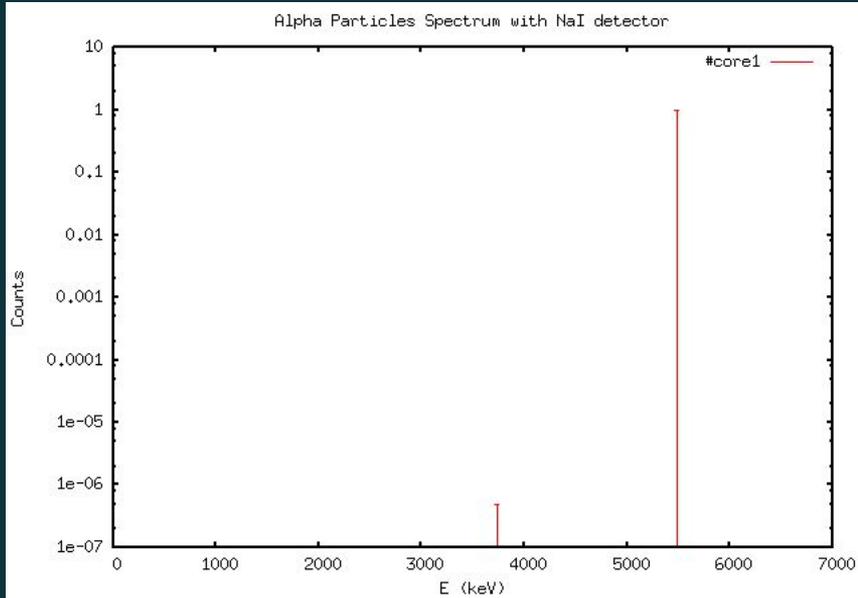


Fig. 7 The Alpha Particles from Am-241 Decay Spectrum with NaI detector

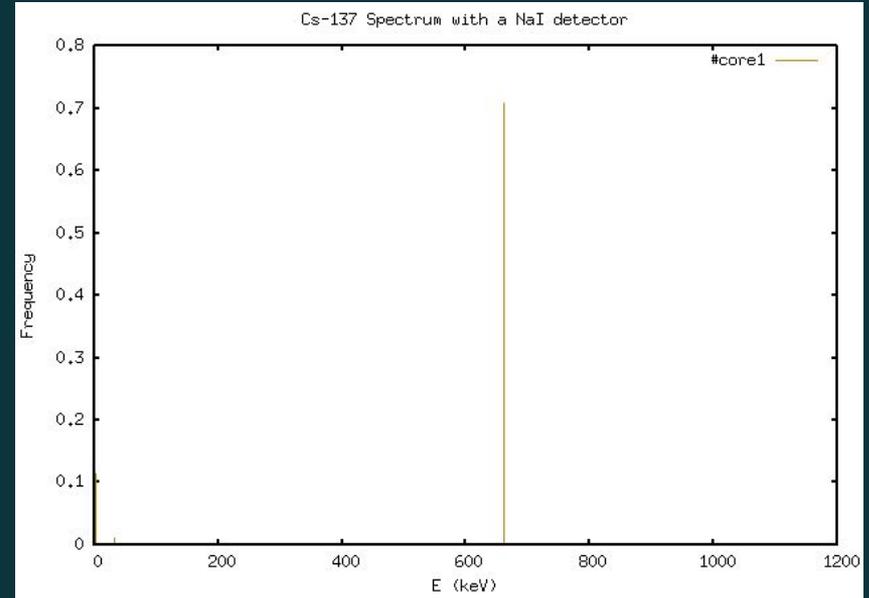


Fig. 8 The Cs-137 Spectrum with NaI detector

# Am-241 and Cs-137 with Optical Fiber

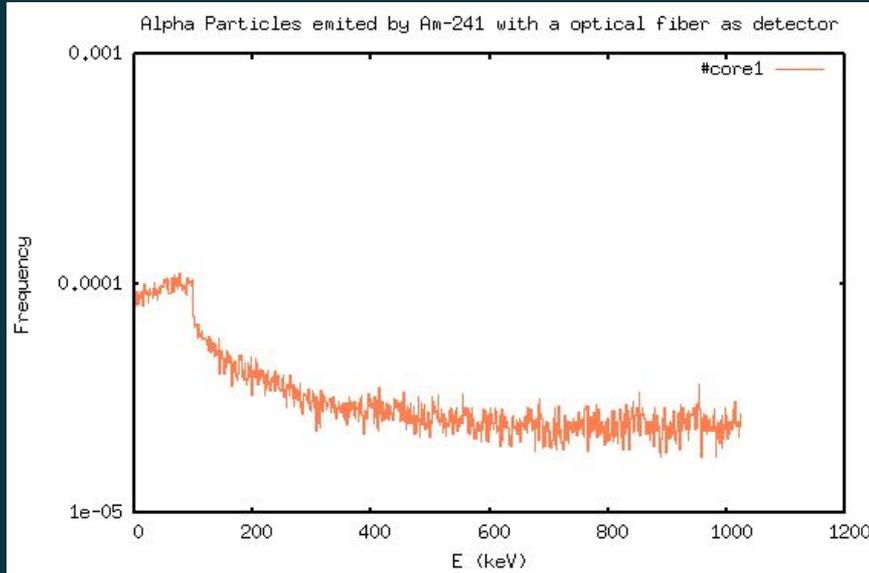


Fig. 9 The Alpha Particles from Am-241 Decay Spectrum with the optical fiber detector

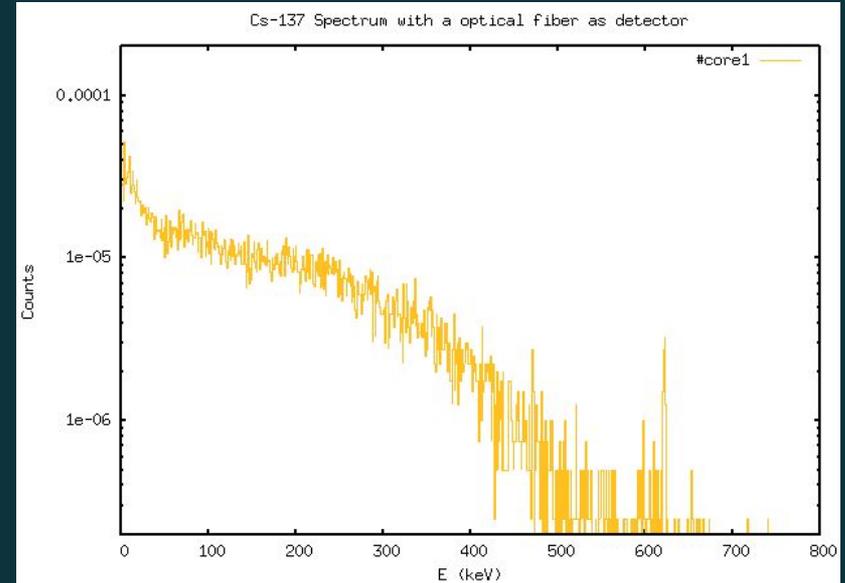


Fig. 10 The Alpha Particles from Am-241 Decay Spectrum with the optical fiber detector

# Co-60 and Na-22 with Optical Fiber

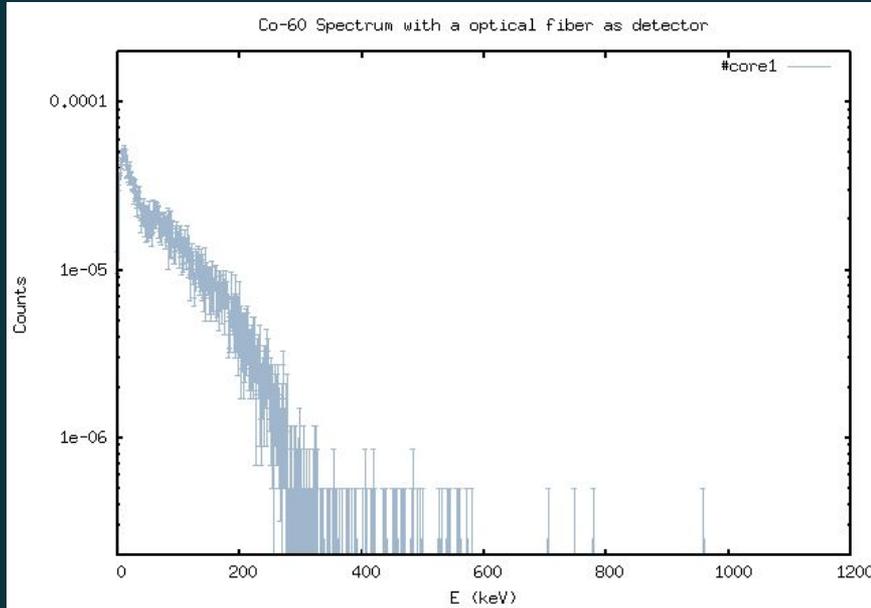


Fig. 11 Co-60 Spectrum with the optical fiber detector

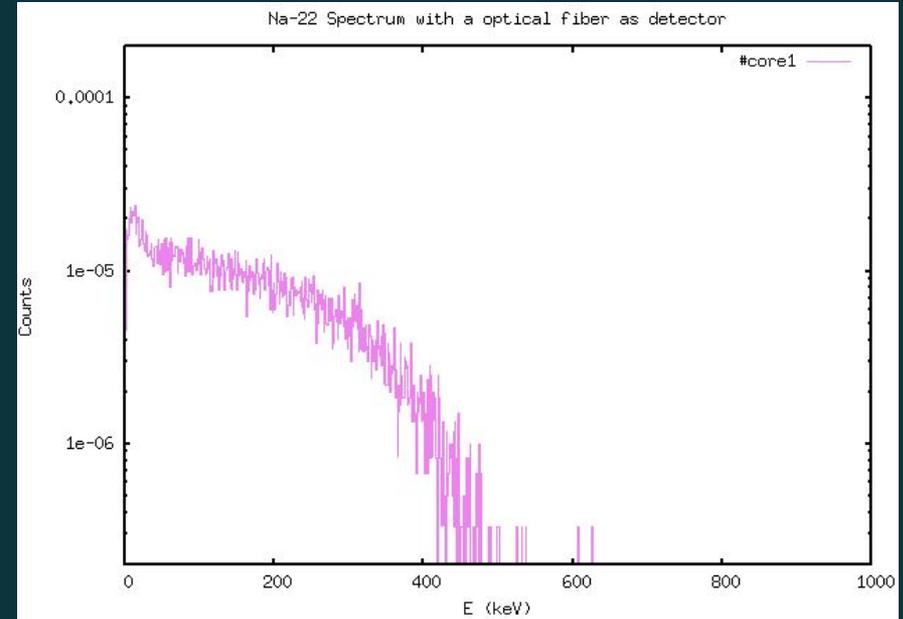


Fig. 12 Na-22 Spectrum with the optical fiber detector

# Tl-204 with Optical Fiber

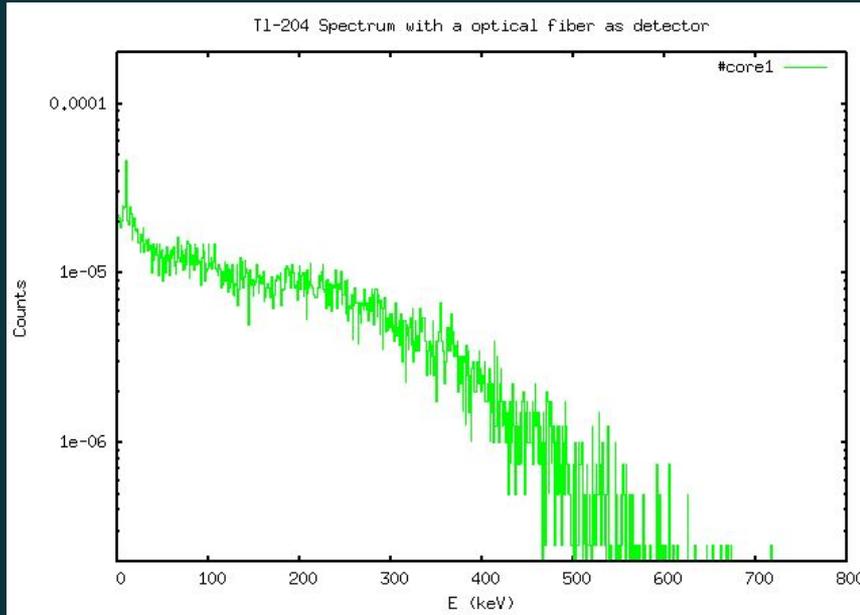


Fig. 13 TI-204 Spectrum with the optical fiber detector

# Comparison with experimental data

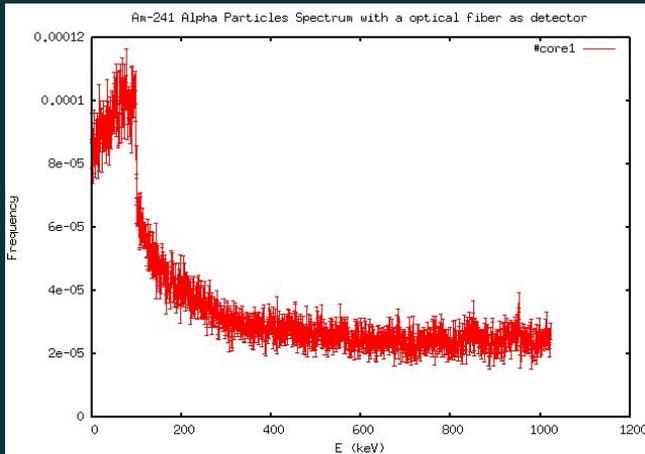


Fig. 14 Simulated Am-241 Alpha particles Spectrum with the optical fiber detector

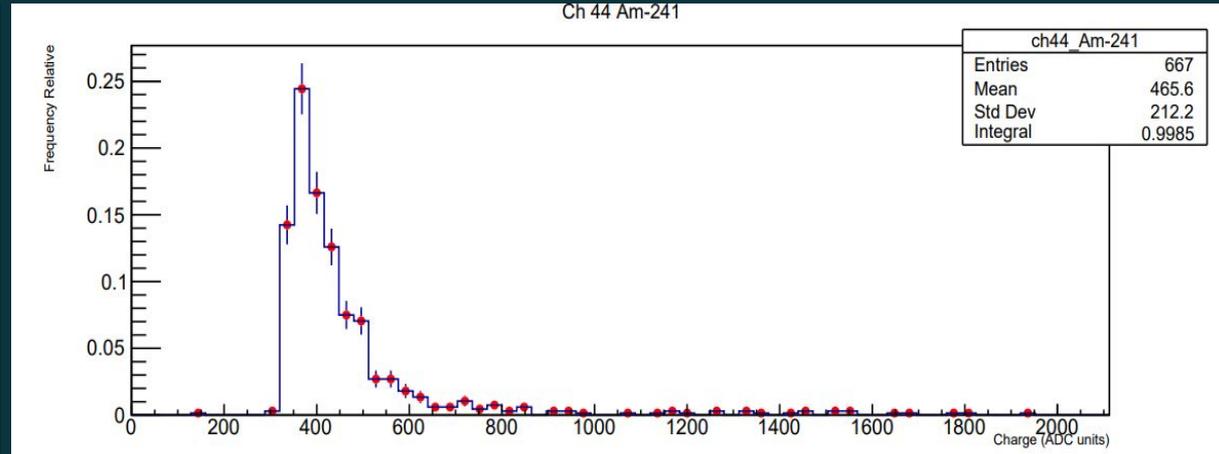


Fig. 15 Experimental Am-241 Spectrum with the optical fiber detector

A green L-shaped line is positioned in the top left corner of the slide, consisting of a vertical line segment on the left and a horizontal line segment on the top.

# The Future

A short, horizontal blue line is centered below the title 'The Future'.

# References

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- <https://fluka.cern/about>
- <https://www.sciencedirect.com/science/article/abs/pii/S0168900219302748>