Target Studies with Fluka

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$K^+ \rightarrow \pi^+ \upsilon \bar{\upsilon}$ Workshop
Fermilab

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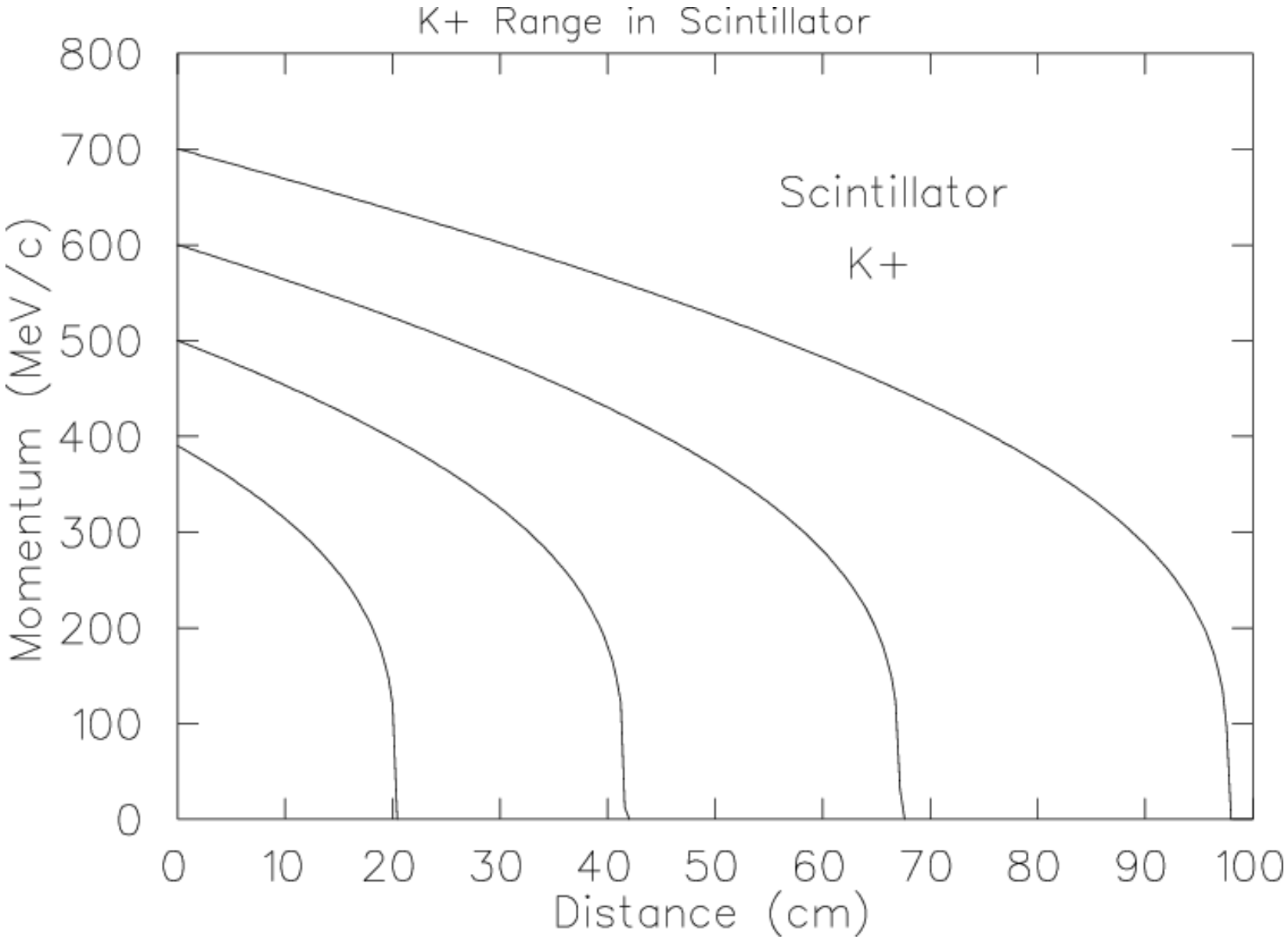
(revised)

K^+ Range in Scintillator



Setup

Beam:

$\Delta P/P$	$\sigma = 2.5\%$	(1.9% in E949)
Div X	$= \pm$ 65 mr, flat	(12 mr in E949)
Div Y	$= \pm$ 6 mr, flat	(12 mr in E949)
ΔX	$\sigma = 0.9$ cm	
ΔY	$\sigma = 0.4$ cm	

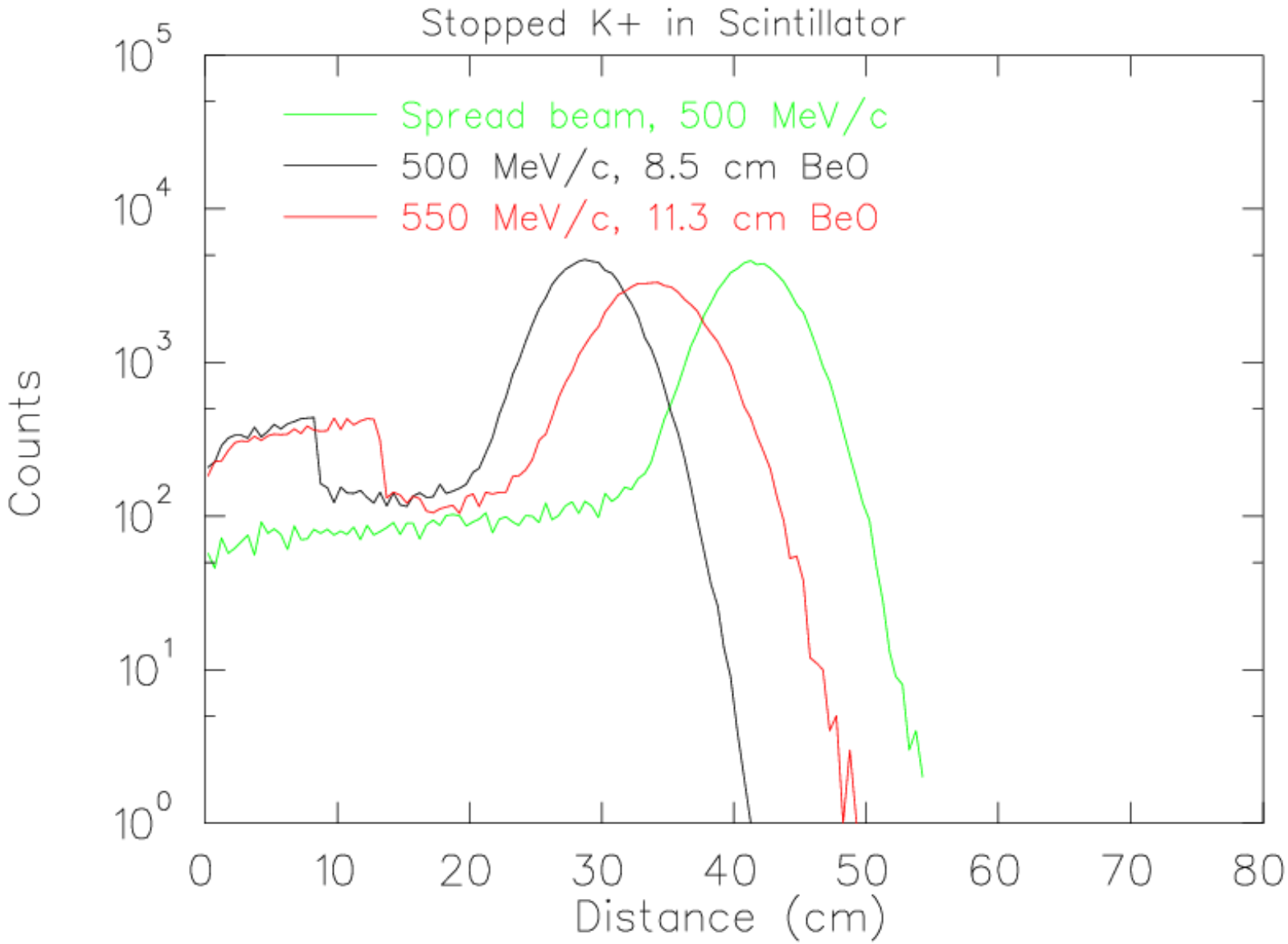
Target:

6.0 cm radius

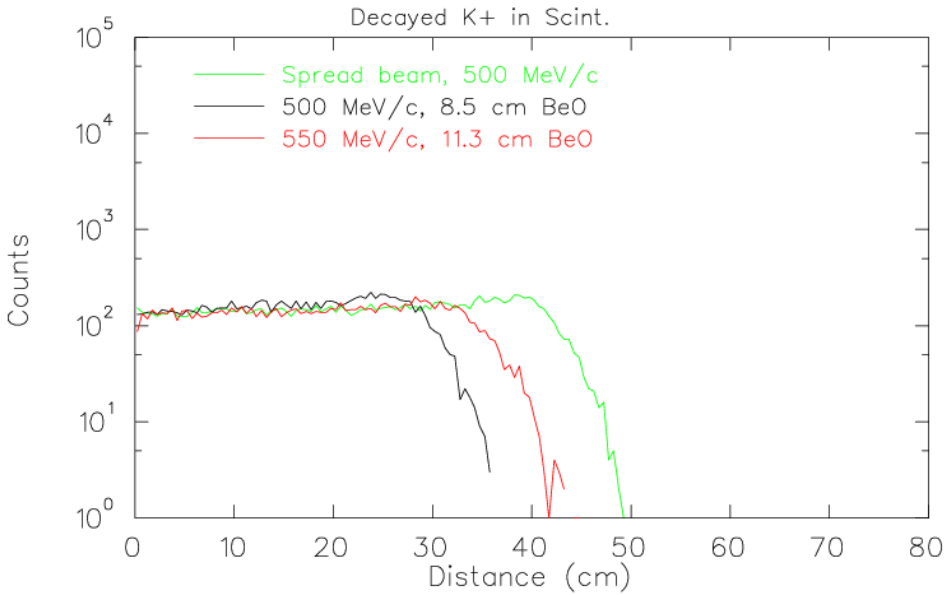
1.0 m long

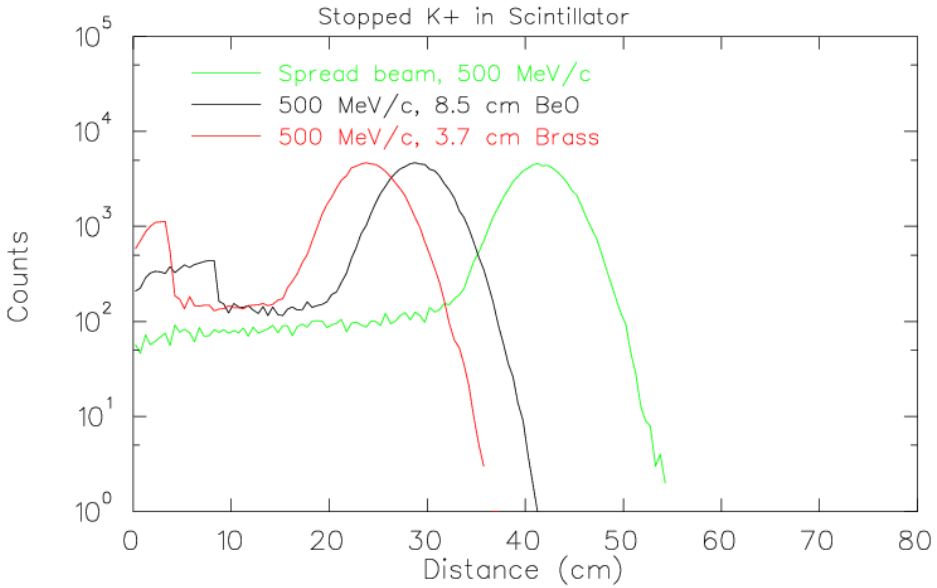
Initial portion can be replaced with degrader

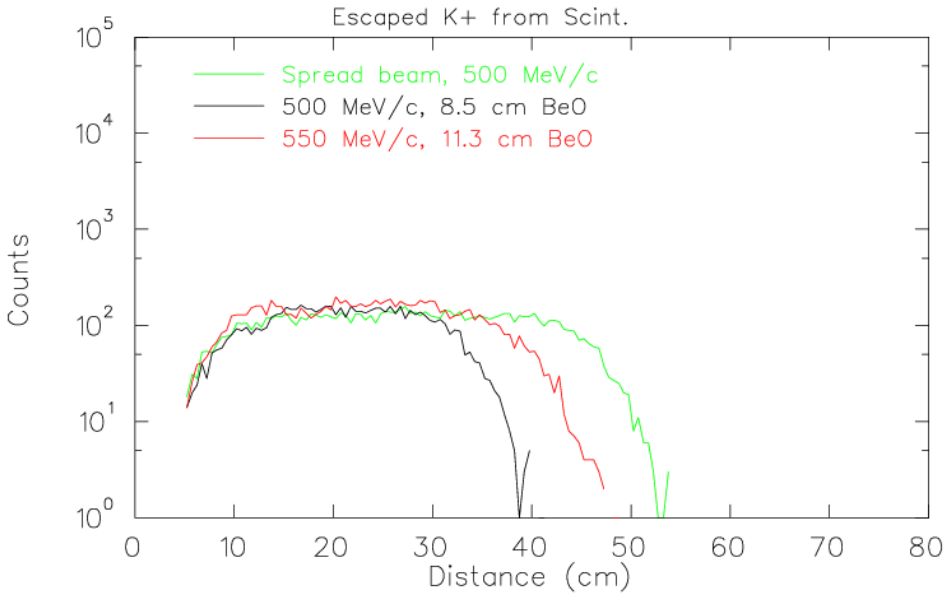
Distribution of Stopped K^+

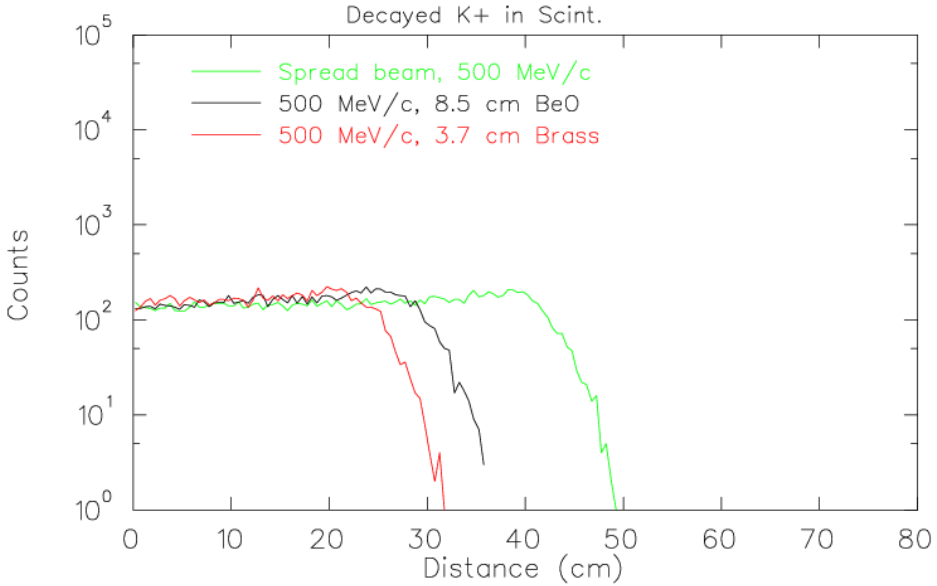


Additional Results









Events per 100,000 K^+

Mom.	Absorber	Stopped	In Range ( )	Decayed	Escaped
500 (pt)	Scint	74,222	66,563 (38-44)	13,373	8,685
500	Scint	73,552	66,878 (34-50)	13,436	9,431
550	Scint	65,282	58,902 (42-66)	15,091	14,770
500	BeO, 7.5	78,783	68,949 (21-37)	10,168	6,651
550	BeO, 13.3	73,744	61,388 (24-43)	10,504	9,324
500	Brass, 3.7	79,567	68,108 (17-33)	8,871	6,899
710	BeO, 32.4	44,236	28,659 (35-65)	9,738	33,399

Escaped Particles

Particle	500/BeO	500/Brass
p	1,137	984
e+	14,219	14,982
e-	16,409	17,856
gamma	126,145	168,566
n	24,408	29,287
mu+	51,329	55,640
pi+	17,747	18,410
pi-	2,215	1,631
K0	1,520	839

Concluding Remarks

1. Can achieve high stopping efficiency.

2. Use low momentum, but balance against flux.

3. An absorber is very helpful.
   a) Reduces the total length of materials
   b) Use high density
   c) Favor low Z (N)

4. Moving the absorber upstream will reduce efficiency.

5. Smaller beam divergence would be helpful.