TANTALUM 4 CU ATTENUATORS

# BirminghamSim.g4bl - 10-36 MeV proton beam into a W/Ta target

# The "default" physics list is QGSP\_BERT

physics QGSP\_BERT

# the beam is 10-36 MeV kinetic energy, the mass of a proton is 938.272 MeV/c^2

# Momentum calculated from SR and has units of MeV/c

param M=938.272 KE=30.0

param P=sqrt(($M+$KE)\*($M+$KE)-$M\*$M)

# a zero-emittance beam is unrealistic, but simple; it easily fits through

# a 1 mm hole in the backward detector. It emanates from z=0.

beam gaussian meanMomentum=$P nEvents=1000 particle=proton

trackcuts keep=proton killSecondaries keepPrimaries

# the targets are tantalum foils 10x10x0.008 mm

box foil1 height=10 width=10 length=0.008 material=Ta color=1,0,0

place foil1 z=100.004

box foil2 height=10 width=10 length=0.008 material=Ta color=1,0,0

place foil2 z=100.040

box foil3 height=10 width=10 length=0.008 material=Ta color=1,0,0

place foil3 z=100.076

box foil4 height=10 width=10 length=0.008 material=Ta color=1,0,0

place foil4 z=100.112

box foil5 height=10 width=10 length=0.008 material=Ta color=1,0,0

place foil5 z=100.148

box foil6 height=10 width=10 length=0.008 material=Ta color=1,0,0

place foil6 z=100.184

box foil7 height=10 width=10 length=0.008 material=Ta color=1,0,0

place foil7 z=100.220

box foil8 height=10 width=10 length=0.008 material=Ta color=1,0,0

place foil8 z=100.256

box foil9 height=10 width=10 length=0.008 material=Ta color=1,0,0

place foil9 z=100.292

box foil10 height=10 width=10 length=0.008 material=Ta color=1,0,0

place foil10 z=100.328

# The attenuator foils reduce the proton energies to create a more noticeable energy difference between the foils

box atten1 height=10 width=10 length=0.028 material=Cu color=0,0,1

place atten1 z=100.022

box atten2 height=10 width=10 length=0.028 material=Cu color=0,0,1

place atten2 z=100.058

box atten3 height=10 width=10 length=0.028 material=Cu color=0,0,1

place atten3 z=100.094

box atten4 height=10 width=10 length=0.028 material=Cu color=0,0,1

place atten4 z=100.130

box atten5 height=10 width=10 length=0.028 material=Cu color=0,0,1

place atten5 z=100.166

box atten6 height=10 width=10 length=0.028 material=Cu color=0,0,1

place atten6 z=100.202

box atten7 height=10 width=10 length=0.028 material=Cu color=0,0,1

place atten7 z=100.238

box atten8 height=10 width=10 length=0.028 material=Cu color=0,0,1

place atten8 z=100.274

box atten9 height=10 width=10 length=0.028 material=Cu color=0,0,1

place atten9 z=100.310

# The virtualdetectors detect the proton momenta and this can be used to calculate their energies

virtualdetector ta\_Det1 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place ta\_Det1 z=100

virtualdetector ta\_Det2 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place ta\_Det2 z=100.036

virtualdetector ta\_Det3 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place ta\_Det3 z=100.072

virtualdetector ta\_Det4 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place ta\_Det4 z=100.108

virtualdetector ta\_Det5 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place ta\_Det5 z=100.144

virtualdetector ta\_Det6 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place ta\_Det6 z=100.180

virtualdetector ta\_Det7 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place ta\_Det7 z=100.216

virtualdetector ta\_Det8 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place ta\_Det8 z=100.252

virtualdetector ta\_Det9 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place ta\_Det9 z=100.288

virtualdetector ta\_Det10 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place ta\_Det10 z=100.324

TANTALUM 3 CU ATTENUATORS

# BirminghamSim.g4bl - 10-36 MeV proton beam into a W/Ta target

# The "default" physics list is QGSP\_BERT

physics QGSP\_BERT

# the beam is 10-36 MeV kinetic energy, the mass of a proton is 938.272 MeV/c^2

# Momentum calculated from SR and has units of MeV/c

param M=938.272 KE=20.0

param P=sqrt(($M+$KE)\*($M+$KE)-$M\*$M)

# a zero-emittance beam is unrealistic, but simple; it easily fits through

# a 1 mm hole in the backward detector. It emanates from z=0.

beam gaussian meanMomentum=$P nEvents=1000 particle=proton

trackcuts keep=proton killSecondaries keepPrimaries

# the targets are tantalum foils 10x10x0.008 mm

box foil1 height=10 width=10 length=0.008 material=Ta color=1,0,0

place foil1 z=100.004

box foil2 height=10 width=10 length=0.008 material=Ta color=1,0,0

place foil2 z=100.033

box foil3 height=10 width=10 length=0.008 material=Ta color=1,0,0

place foil3 z=100.062

box foil4 height=10 width=10 length=0.008 material=Ta color=1,0,0

place foil4 z=100.091

box foil5 height=10 width=10 length=0.008 material=Ta color=1,0,0

place foil5 z=100.120

box foil6 height=10 width=10 length=0.008 material=Ta color=1,0,0

place foil6 z=100.149

box foil7 height=10 width=10 length=0.008 material=Ta color=1,0,0

place foil7 z=100.178

box foil8 height=10 width=10 length=0.008 material=Ta color=1,0,0

place foil8 z=100.207

box foil9 height=10 width=10 length=0.008 material=Ta color=1,0,0

place foil9 z=100.236

box foil10 height=10 width=10 length=0.008 material=Ta color=1,0,0

place foil10 z=100.265

# The attenuator foils reduce the proton energies to create a more noticeable energy difference between the foils

box atten1 height=10 width=10 length=0.021 material=Cu color=0,0,1

place atten1 z=100.0185

box atten2 height=10 width=10 length=0.021 material=Cu color=0,0,1

place atten2 z=100.0475

box atten3 height=10 width=10 length=0.021 material=Cu color=0,0,1

place atten3 z=100.0765

box atten4 height=10 width=10 length=0.021 material=Cu color=0,0,1

place atten4 z=100.1055

box atten5 height=10 width=10 length=0.021 material=Cu color=0,0,1

place atten5 z=100.1345

box atten6 height=10 width=10 length=0.021 material=Cu color=0,0,1

place atten6 z=100.1635

box atten7 height=10 width=10 length=0.021 material=Cu color=0,0,1

place atten7 z=100.1925

box atten8 height=10 width=10 length=0.021 material=Cu color=0,0,1

place atten8 z=100.2215

box atten9 height=10 width=10 length=0.021 material=Cu color=0,0,1

place atten9 z=100.2505

# The virtualdetectors detect the proton momenta and this can be used to calculate their energies

virtualdetector ta\_Det1 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place ta\_Det1 z=100

virtualdetector ta\_Det2 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place ta\_Det2 z=100.029

virtualdetector ta\_Det3 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place ta\_Det3 z=100.058

virtualdetector ta\_Det4 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place ta\_Det4 z=100.087

virtualdetector ta\_Det5 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place ta\_Det5 z=100.116

virtualdetector ta\_Det6 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place ta\_Det6 z=100.145

virtualdetector ta\_Det7 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place ta\_Det7 z=100.174

virtualdetector ta\_Det8 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place ta\_Det8 z=100.203

virtualdetector ta\_Det9 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place ta\_Det9 z=100.232

virtualdetector ta\_Det10 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place ta\_Det10 z=100.261

TANTALUM 1 CU ATTENUATOR

# BirminghamSim.g4bl - 10-36 MeV proton beam into a W/Ta target

# The "default" physics list is QGSP\_BERT

physics QGSP\_BERT

# the beam is 10-36 MeV kinetic energy, the mass of a proton is 938.272 MeV/c^2

# Momentum calculated from SR and has units of MeV/c

param M=938.272 KE=10.0

param P=sqrt(($M+$KE)\*($M+$KE)-$M\*$M)

# a zero-emittance beam is unrealistic, but simple; it easily fits through

# a 1 mm hole in the backward detector. It emanates from z=0.

beam gaussian meanMomentum=$P nEvents=1000 particle=proton

trackcuts keep=proton killSecondaries keepPrimaries

# the targets are tantalum foils 10x10x0.008 mm

box foil1 height=10 width=10 length=0.008 material=Ta color=1,0,0

place foil1 z=100.004

box foil2 height=10 width=10 length=0.008 material=Ta color=1,0,0

place foil2 z=100.019

box foil3 height=10 width=10 length=0.008 material=Ta color=1,0,0

place foil3 z=100.034

box foil4 height=10 width=10 length=0.008 material=Ta color=1,0,0

place foil4 z=100.049

box foil5 height=10 width=10 length=0.008 material=Ta color=1,0,0

place foil5 z=100.064

box foil6 height=10 width=10 length=0.008 material=Ta color=1,0,0

place foil6 z=100.079

box foil7 height=10 width=10 length=0.008 material=Ta color=1,0,0

place foil7 z=100.094

box foil8 height=10 width=10 length=0.008 material=Ta color=1,0,0

place foil8 z=100.109

box foil9 height=10 width=10 length=0.008 material=Ta color=1,0,0

place foil9 z=100.124

box foil10 height=10 width=10 length=0.008 material=Ta color=1,0,0

place foil10 z=100.139

# The attenuator foils reduce the proton energies to create a more noticeable energy difference between the foils

box atten1 height=10 width=10 length=0.007 material=Cu color=0,0,1

place atten1 z=100.0115

box atten2 height=10 width=10 length=0.007 material=Cu color=0,0,1

place atten2 z=100.0265

box atten3 height=10 width=10 length=0.007 material=Cu color=0,0,1

place atten3 z=100.0415

box atten4 height=10 width=10 length=0.007 material=Cu color=0,0,1

place atten4 z=100.0565

box atten5 height=10 width=10 length=0.007 material=Cu color=0,0,1

place atten5 z=100.0715

box atten6 height=10 width=10 length=0.007 material=Cu color=0,0,1

place atten6 z=100.0865

box atten7 height=10 width=10 length=0.007 material=Cu color=0,0,1

place atten7 z=100.1015

box atten8 height=10 width=10 length=0.007 material=Cu color=0,0,1

place atten8 z=100.1165

box atten9 height=10 width=10 length=0.007 material=Cu color=0,0,1

place atten9 z=100.1315

# The virtualdetectors detect the proton momenta and this can be used to calculate their energies

virtualdetector ta\_Det1 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place ta\_Det1 z=100

virtualdetector ta\_Det2 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place ta\_Det2 z=100.015

virtualdetector ta\_Det3 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place ta\_Det3 z=100.030

virtualdetector ta\_Det4 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place ta\_Det4 z=100.045

virtualdetector ta\_Det5 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place ta\_Det5 z=100.060

virtualdetector ta\_Det6 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place ta\_Det6 z=100.075

virtualdetector ta\_Det7 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place ta\_Det7 z=100.090

virtualdetector ta\_Det8 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place ta\_Det8 z=100.105

virtualdetector ta\_Det9 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place ta\_Det9 z=100.120

virtualdetector ta\_Det10 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place ta\_Det10 z=100.135

W 0.025MM FOILS NO ATTENS

# Foils

box foil1 height=10 width=10 length=0.025 material=W color=1,0,0

place foil1 z=100.0125

box foil2 height=10 width=10 length=0.025 material=W color=1,0,0

place foil2 z=100.0375

box foil3 height=10 width=10 length=0.025 material=W color=1,0,0

place foil3 z=100.0625

box foil4 height=10 width=10 length=0.025 material=W color=1,0,0

place foil4 z=100.0875

box foil5 height=10 width=10 length=0.025 material=W color=1,0,0

place foil5 z=100.1125

box foil6 height=10 width=10 length=0.025 material=W color=1,0,0

place foil6 z=100.1375

box foil7 height=10 width=10 length=0.025 material=W color=1,0,0

place foil7 z=100.1625

box foil8 height=10 width=10 length=0.025 material=W color=1,0,0

place foil8 z=100.1875

box foil9 height=10 width=10 length=0.025 material=W color=1,0,0

place foil9 z=100.2125

box foil10 height=10 width=10 length=0.025 material=W color=1,0,0

place foil10 z=100.2375

# Detectors

virtualdetector w\_Det1 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det1 z=100

virtualdetector w\_Det2 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det2 z=100.025

virtualdetector w\_Det3 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det3 z=100.050

virtualdetector w\_Det4 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det4 z=100.075

virtualdetector w\_Det5 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det5 z=100.100

virtualdetector w\_Det6 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det6 z=100.125

virtualdetector w\_Det7 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det7 z=100.150

virtualdetector w\_Det8 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det8 z=100.175

virtualdetector w\_Det9 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det9 z=100.200

virtualdetector w\_Det10 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det10 z=100.225

W 0.003MM FOILS NO ATTENS

# Foils

box foil1 height=10 width=10 length=0.003 material=W color=1,0,0

place foil1 z=100.0015

box foil2 height=10 width=10 length=0.003 material=W color=1,0,0

place foil2 z=100.0045

box foil3 height=10 width=10 length=0.003 material=W color=1,0,0

place foil3 z=100.0075

box foil4 height=10 width=10 length=0.003 material=W color=1,0,0

place foil4 z=100.0105

box foil5 height=10 width=10 length=0.003 material=W color=1,0,0

place foil5 z=100.0135

box foil6 height=10 width=10 length=0.003 material=W color=1,0,0

place foil6 z=100.0165

box foil7 height=10 width=10 length=0.003 material=W color=1,0,0

place foil7 z=100.0195

box foil8 height=10 width=10 length=0.003 material=W color=1,0,0

place foil8 z=100.0225

box foil9 height=10 width=10 length=0.003 material=W color=1,0,0

place foil9 z=100.0255

box foil10 height=10 width=10 length=0.003 material=W color=1,0,0

place foil10 z=100.0285

# Detectors

virtualdetector w\_Det1 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det1 z=100

virtualdetector w\_Det2 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det2 z=100.003

virtualdetector w\_Det3 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det3 z=100.006

virtualdetector w\_Det4 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det4 z=100.009

virtualdetector w\_Det5 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det5 z=100.012

virtualdetector w\_Det6 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det6 z=100.015

virtualdetector w\_Det7 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det7 z=100.018

virtualdetector w\_Det8 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det8 z=100.021

virtualdetector w\_Det9 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det9 z=100.024

virtualdetector w\_Det10 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det10 z=100.027

W 0.004MM FOILS NO ATTENS

# Foils

box foil1 height=10 width=10 length=0.004 material=W color=1,0,0

place foil1 z=100.002

box foil2 height=10 width=10 length=0.004 material=W color=1,0,0

place foil2 z=100.006

box foil3 height=10 width=10 length=0.004 material=W color=1,0,0

place foil3 z=100.010

box foil4 height=10 width=10 length=0.004 material=W color=1,0,0

place foil4 z=100.014

box foil5 height=10 width=10 length=0.004 material=W color=1,0,0

place foil5 z=100.018

box foil6 height=10 width=10 length=0.004 material=W color=1,0,0

place foil6 z=100.022

box foil7 height=10 width=10 length=0.004 material=W color=1,0,0

place foil7 z=100.026

box foil8 height=10 width=10 length=0.004 material=W color=1,0,0

place foil8 z=100.030

box foil9 height=10 width=10 length=0.004 material=W color=1,0,0

place foil9 z=100.034

box foil10 height=10 width=10 length=0.004 material=W color=1,0,0

place foil10 z=100.038

# Detectors

virtualdetector w\_Det1 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det1 z=100

virtualdetector w\_Det2 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det2 z=100.004

virtualdetector w\_Det3 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det3 z=100.008

virtualdetector w\_Det4 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det4 z=100.012

virtualdetector w\_Det5 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det5 z=100.016

virtualdetector w\_Det6 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det6 z=100.020

virtualdetector w\_Det7 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det7 z=100.024

virtualdetector w\_Det8 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det8 z=100.028

virtualdetector w\_Det9 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det9 z=100.032

virtualdetector w\_Det10 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det10 z=100.036

W 0.005MM FOILS NO ATTENS

# Foils

box foil1 height=10 width=10 length=0.005 material=W color=1,0,0

place foil1 z=100.0025

box foil2 height=10 width=10 length=0.005 material=W color=1,0,0

place foil2 z=100.0075

box foil3 height=10 width=10 length=0.005 material=W color=1,0,0

place foil3 z=100.0125

box foil4 height=10 width=10 length=0.005 material=W color=1,0,0

place foil4 z=100.0175

box foil5 height=10 width=10 length=0.005 material=W color=1,0,0

place foil5 z=100.0225

box foil6 height=10 width=10 length=0.005 material=W color=1,0,0

place foil6 z=100.0275

box foil7 height=10 width=10 length=0.005 material=W color=1,0,0

place foil7 z=100.0325

box foil8 height=10 width=10 length=0.005 material=W color=1,0,0

place foil8 z=100.0375

box foil9 height=10 width=10 length=0.005 material=W color=1,0,0

place foil9 z=100.0425

box foil10 height=10 width=10 length=0.005 material=W color=1,0,0

place foil10 z=100.0475

# Detectors

virtualdetector w\_Det1 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det1 z=100

virtualdetector w\_Det2 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det2 z=100.005

virtualdetector w\_Det3 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det3 z=100.010

virtualdetector w\_Det4 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det4 z=100.015

virtualdetector w\_Det5 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det5 z=100.020

virtualdetector w\_Det6 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det6 z=100.025

virtualdetector w\_Det7 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det7 z=100.030

virtualdetector w\_Det8 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det8 z=100.035

virtualdetector w\_Det9 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det9 z=100.040

virtualdetector w\_Det10 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det10 z=100.045

W 0.006MM FOILS NO ATTENS

# Foils

box foil1 height=10 width=10 length=0.006 material=W color=1,0,0

place foil1 z=100.003

box foil2 height=10 width=10 length=0.006 material=W color=1,0,0

place foil2 z=100.009

box foil3 height=10 width=10 length=0.006 material=W color=1,0,0

place foil3 z=100.015

box foil4 height=10 width=10 length=0.006 material=W color=1,0,0

place foil4 z=100.021

box foil5 height=10 width=10 length=0.006 material=W color=1,0,0

place foil5 z=100.027

box foil6 height=10 width=10 length=0.006 material=W color=1,0,0

place foil6 z=100.033

box foil7 height=10 width=10 length=0.006 material=W color=1,0,0

place foil7 z=100.039

box foil8 height=10 width=10 length=0.006 material=W color=1,0,0

place foil8 z=100.045

box foil9 height=10 width=10 length=0.006 material=W color=1,0,0

place foil9 z=100.051

box foil10 height=10 width=10 length=0.006 material=W color=1,0,0

place foil10 z=100.057

# Detectors

virtualdetector w\_Det1 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det1 z=100

virtualdetector w\_Det2 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det2 z=100.006

virtualdetector w\_Det3 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det3 z=100.012

virtualdetector w\_Det4 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det4 z=100.018

virtualdetector w\_Det5 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det5 z=100.024

virtualdetector w\_Det6 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det6 z=100.030

virtualdetector w\_Det7 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det7 z=100.036

virtualdetector w\_Det8 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det8 z=100.042

virtualdetector w\_Det9 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det9 z=100.048

virtualdetector w\_Det10 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det10 z=100.054

W 0.007MM FOILS NO ATTENS

# Foils

box foil1 height=10 width=10 length=0.007 material=W color=1,0,0

place foil1 z=100.0035

box foil2 height=10 width=10 length=0.007 material=W color=1,0,0

place foil2 z=100.0105

box foil3 height=10 width=10 length=0.007 material=W color=1,0,0

place foil3 z=100.0175

box foil4 height=10 width=10 length=0.007 material=W color=1,0,0

place foil4 z=100.0245

box foil5 height=10 width=10 length=0.007 material=W color=1,0,0

place foil5 z=100.0315

box foil6 height=10 width=10 length=0.007 material=W color=1,0,0

place foil6 z=100.0385

box foil7 height=10 width=10 length=0.007 material=W color=1,0,0

place foil7 z=100.0455

box foil8 height=10 width=10 length=0.007 material=W color=1,0,0

place foil8 z=100.0525

box foil9 height=10 width=10 length=0.007 material=W color=1,0,0

place foil9 z=100.0595

box foil10 height=10 width=10 length=0.007 material=W color=1,0,0

place foil10 z=100.0665

# Detectors

virtualdetector w\_Det1 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det1 z=100

virtualdetector w\_Det2 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det2 z=100.007

virtualdetector w\_Det3 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det3 z=100.014

virtualdetector w\_Det4 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det4 z=100.021

virtualdetector w\_Det5 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det5 z=100.028

virtualdetector w\_Det6 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det6 z=100.035

virtualdetector w\_Det7 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det7 z=100.042

virtualdetector w\_Det8 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det8 z=100.049

virtualdetector w\_Det9 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det9 z=100.056

virtualdetector w\_Det10 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det10 z=100.063

W 0.008MM FOILS NO ATTENS

# Foils

box foil1 height=10 width=10 length=0.008 material=W color=1,0,0

place foil1 z=100.004

box foil2 height=10 width=10 length=0.008 material=W color=1,0,0

place foil2 z=100.012

box foil3 height=10 width=10 length=0.008 material=W color=1,0,0

place foil3 z=100.020

box foil4 height=10 width=10 length=0.008 material=W color=1,0,0

place foil4 z=100.028

box foil5 height=10 width=10 length=0.008 material=W color=1,0,0

place foil5 z=100.036

box foil6 height=10 width=10 length=0.008 material=W color=1,0,0

place foil6 z=100.044

box foil7 height=10 width=10 length=0.008 material=W color=1,0,0

place foil7 z=100.052

box foil8 height=10 width=10 length=0.008 material=W color=1,0,0

place foil8 z=100.060

box foil9 height=10 width=10 length=0.008 material=W color=1,0,0

place foil9 z=100.068

box foil10 height=10 width=10 length=0.008 material=W color=1,0,0

place foil10 z=100.076

# Detectors

virtualdetector w\_Det1 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det1 z=100

virtualdetector w\_Det2 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det2 z=100.008

virtualdetector w\_Det3 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det3 z=100.016

virtualdetector w\_Det4 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det4 z=100.024

virtualdetector w\_Det5 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det5 z=100.032

virtualdetector w\_Det6 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det6 z=100.040

virtualdetector w\_Det7 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det7 z=100.048

virtualdetector w\_Det8 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det8 z=100.056

virtualdetector w\_Det9 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det9 z=100.064

virtualdetector w\_Det10 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det10 z=100.072

W 0.009MM FOILS NO ATTENS

# Foils

box foil1 height=10 width=10 length=0.009 material=W color=1,0,0

place foil1 z=100.0045

box foil2 height=10 width=10 length=0.009 material=W color=1,0,0

place foil2 z=100.0135

box foil3 height=10 width=10 length=0.009 material=W color=1,0,0

place foil3 z=100.0225

box foil4 height=10 width=10 length=0.009 material=W color=1,0,0

place foil4 z=100.0315

box foil5 height=10 width=10 length=0.009 material=W color=1,0,0

place foil5 z=100.0405

box foil6 height=10 width=10 length=0.009 material=W color=1,0,0

place foil6 z=100.0495

box foil7 height=10 width=10 length=0.009 material=W color=1,0,0

place foil7 z=100.0585

box foil8 height=10 width=10 length=0.009 material=W color=1,0,0

place foil8 z=100.0675

box foil9 height=10 width=10 length=0.009 material=W color=1,0,0

place foil9 z=100.0765

box foil10 height=10 width=10 length=0.009 material=W color=1,0,0

place foil10 z=100.0855

# Detectors

virtualdetector w\_Det1 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det1 z=100

virtualdetector w\_Det2 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det2 z=100.009

virtualdetector w\_Det3 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det3 z=100.018

virtualdetector w\_Det4 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det4 z=100.027

virtualdetector w\_Det5 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det5 z=100.036

virtualdetector w\_Det6 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det6 z=100.045

virtualdetector w\_Det7 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det7 z=100.054

virtualdetector w\_Det8 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det8 z=100.063

virtualdetector w\_Det9 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det9 z=100.072

virtualdetector w\_Det10 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det10 z=100.081

W 0.01MM FOILS NO ATTENS

# Foils

box foil1 height=10 width=10 length=0.01 material=W color=1,0,0

place foil1 z=100.005

box foil2 height=10 width=10 length=0.01 material=W color=1,0,0

place foil2 z=100.015

box foil3 height=10 width=10 length=0.01 material=W color=1,0,0

place foil3 z=100.025

box foil4 height=10 width=10 length=0.01 material=W color=1,0,0

place foil4 z=100.035

box foil5 height=10 width=10 length=0.01 material=W color=1,0,0

place foil5 z=100.045

box foil6 height=10 width=10 length=0.01 material=W color=1,0,0

place foil6 z=100.055

box foil7 height=10 width=10 length=0.01 material=W color=1,0,0

place foil7 z=100.065

box foil8 height=10 width=10 length=0.01 material=W color=1,0,0

place foil8 z=100.075

box foil9 height=10 width=10 length=0.01 material=W color=1,0,0

place foil9 z=100.085

box foil10 height=10 width=10 length=0.01 material=W color=1,0,0

place foil10 z=100.095

# Detectors

virtualdetector w\_Det1 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det1 z=100

virtualdetector w\_Det2 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det2 z=100.01

virtualdetector w\_Det3 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det3 z=100.02

virtualdetector w\_Det4 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det4 z=100.03

virtualdetector w\_Det5 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det5 z=100.04

virtualdetector w\_Det6 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det6 z=100.05

virtualdetector w\_Det7 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det7 z=100.06

virtualdetector w\_Det8 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det8 z=100.07

virtualdetector w\_Det9 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det9 z=100.08

virtualdetector w\_Det10 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det10 z=100.09

W 0.025MM FOILS 2 CU ATTENS

# the targets are tungsten foils 10x10x0.025 mm

box foil1 height=10 width=10 length=0.025 material=W color=1,0,0

place foil1 z=100.0125

box foil2 height=10 width=10 length=0.025 material=W color=1,0,0

place foil2 z=100.0515

box foil3 height=10 width=10 length=0.025 material=W color=1,0,0

place foil3 z=100.0905

box foil4 height=10 width=10 length=0.025 material=W color=1,0,0

place foil4 z=100.1295

box foil5 height=10 width=10 length=0.025 material=W color=1,0,0

place foil5 z=100.1685

box foil6 height=10 width=10 length=0.025 material=W color=1,0,0

place foil6 z=100.2075

box foil7 height=10 width=10 length=0.025 material=W color=1,0,0

place foil7 z=100.2465

box foil8 height=10 width=10 length=0.025 material=W color=1,0,0

place foil8 z=100.2855

box foil9 height=10 width=10 length=0.025 material=W color=1,0,0

place foil9 z=100.3245

box foil10 height=10 width=10 length=0.025 material=W color=1,0,0

place foil10 z=100.3635

# The attenuator foils reduce the proton energies to create a more noticeable energy difference between the foils

box atten1 height=10 width=10 length=0.014 material=Cu color=0,0,1

place atten1 z=100.032

box atten2 height=10 width=10 length=0.014 material=Cu color=0,0,1

place atten2 z=100.071

box atten3 height=10 width=10 length=0.014 material=Cu color=0,0,1

place atten3 z=100.110

box atten4 height=10 width=10 length=0.014 material=Cu color=0,0,1

place atten4 z=100.149

box atten5 height=10 width=10 length=0.014 material=Cu color=0,0,1

place atten5 z=100.187

box atten6 height=10 width=10 length=0.014 material=Cu color=0,0,1

place atten6 z=100.226

box atten7 height=10 width=10 length=0.014 material=Cu color=0,0,1

place atten7 z=100.265

box atten8 height=10 width=10 length=0.014 material=Cu color=0,0,1

place atten8 z=100.304

box atten9 height=10 width=10 length=0.014 material=Cu color=0,0,1

place atten9 z=100.343

# The virtualdetectors detect the proton momenta and this can be used to calculate their energies

virtualdetector w\_Det1 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det1 z=100.025

virtualdetector w\_Det2 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det2 z=100.064

virtualdetector w\_Det3 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det3 z=100.103

virtualdetector w\_Det4 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det4 z=100.142

virtualdetector w\_Det5 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det5 z=100.181

virtualdetector w\_Det6 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det6 z=100.220

virtualdetector w\_Det7 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det7 z=100.259

virtualdetector w\_Det8 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det8 z=100.298

virtualdetector w\_Det9 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det9 z=100.337

virtualdetector w\_Det10 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det10 z=100.376

W 0.003MM FOILS 5 CU ATTENS

# W FOILS

box foil1 height=10 width=10 length=0.003 material=W color=1,0,0

place foil1 z=100.0015

box foil2 height=10 width=10 length=0.003 material=W color=1,0,0

place foil2 z=100.0395

box foil3 height=10 width=10 length=0.003 material=W color=1,0,0

place foil3 z=100.0775

box foil4 height=10 width=10 length=0.003 material=W color=1,0,0

place foil4 z=100.1155

box foil5 height=10 width=10 length=0.003 material=W color=1,0,0

place foil5 z=100.1535

box foil6 height=10 width=10 length=0.003 material=W color=1,0,0

place foil6 z=100.1915

box foil7 height=10 width=10 length=0.003 material=W color=1,0,0

place foil7 z=100.2295

box foil8 height=10 width=10 length=0.003 material=W color=1,0,0

place foil8 z=100.2675

box foil9 height=10 width=10 length=0.003 material=W color=1,0,0

place foil9 z=100.3055

box foil10 height=10 width=10 length=0.003 material=W color=1,0,0

place foil10 z=100.3435

# The attenuator foils reduce the proton energies to create a more noticeable energy difference between the foils

box atten1 height=10 width=10 length=0.035 material=Cu color=0,0,1

place atten1 z=100.0205

box atten2 height=10 width=10 length=0.035 material=Cu color=0,0,1

place atten2 z=100.0585

box atten3 height=10 width=10 length=0.035 material=Cu color=0,0,1

place atten3 z=100.0965

box atten4 height=10 width=10 length=0.035 material=Cu color=0,0,1

place atten4 z=100.1345

box atten5 height=10 width=10 length=0.035 material=Cu color=0,0,1

place atten5 z=100.1725

box atten6 height=10 width=10 length=0.035 material=Cu color=0,0,1

place atten6 z=100.2105

box atten7 height=10 width=10 length=0.035 material=Cu color=0,0,1

place atten7 z=100.2485

box atten8 height=10 width=10 length=0.035 material=Cu color=0,0,1

place atten8 z=100.2865

box atten9 height=10 width=10 length=0.035 material=Cu color=0,0,1

place atten9 z=100.3245

# The virtualdetectors detect the proton momenta and this can be used to calculate their energies

virtualdetector w\_Det1 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det1 z=100

virtualdetector w\_Det2 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det2 z=100.038

virtualdetector w\_Det3 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det3 z=100.076

virtualdetector w\_Det4 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det4 z=100.114

virtualdetector w\_Det5 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det5 z=100.152

virtualdetector w\_Det6 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det6 z=100.190

virtualdetector w\_Det7 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det7 z=100.228

virtualdetector w\_Det8 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det8 z=100.266

virtualdetector w\_Det9 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det9 z=100.304

virtualdetector w\_Det10 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det10 z=100.342

W 0.003MM FOILS 4 CU ATTENS

# W FOILS

box foil1 height=10 width=10 length=0.003 material=W color=1,0,0

place foil1 z=100.0015

box foil2 height=10 width=10 length=0.003 material=W color=1,0,0

place foil2 z=100.0325

box foil3 height=10 width=10 length=0.003 material=W color=1,0,0

place foil3 z=100.0635

box foil4 height=10 width=10 length=0.003 material=W color=1,0,0

place foil4 z=100.0945

box foil5 height=10 width=10 length=0.003 material=W color=1,0,0

place foil5 z=100.1255

box foil6 height=10 width=10 length=0.003 material=W color=1,0,0

place foil6 z=100.1565

box foil7 height=10 width=10 length=0.003 material=W color=1,0,0

place foil7 z=100.1875

box foil8 height=10 width=10 length=0.003 material=W color=1,0,0

place foil8 z=100.2185

box foil9 height=10 width=10 length=0.003 material=W color=1,0,0

place foil9 z=100.2495

box foil10 height=10 width=10 length=0.003 material=W color=1,0,0

place foil10 z=100.2805

# The attenuator foils reduce the proton energies to create a more noticeable energy difference between the foils

box atten1 height=10 width=10 length=0.028 material=Cu color=0,0,1

place atten1 z=100.017

box atten2 height=10 width=10 length=0.028 material=Cu color=0,0,1

place atten2 z=100.048

box atten3 height=10 width=10 length=0.028 material=Cu color=0,0,1

place atten3 z=100.079

box atten4 height=10 width=10 length=0.028 material=Cu color=0,0,1

place atten4 z=100.110

box atten5 height=10 width=10 length=0.028 material=Cu color=0,0,1

place atten5 z=100.141

box atten6 height=10 width=10 length=0.028 material=Cu color=0,0,1

place atten6 z=100.172

box atten7 height=10 width=10 length=0.028 material=Cu color=0,0,1

place atten7 z=100.203

box atten8 height=10 width=10 length=0.028 material=Cu color=0,0,1

place atten8 z=100.234

box atten9 height=10 width=10 length=0.028 material=Cu color=0,0,1

place atten9 z=100.265

# The virtualdetectors detect the proton momenta and this can be used to calculate their energies

virtualdetector w\_Det1 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det1 z=100

virtualdetector w\_Det2 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det2 z=100.031

virtualdetector w\_Det3 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det3 z=100.062

virtualdetector w\_Det4 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det4 z=100.093

virtualdetector w\_Det5 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det5 z=100.124

virtualdetector w\_Det6 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det6 z=100.155

virtualdetector w\_Det7 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det7 z=100.186

virtualdetector w\_Det8 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det8 z=100.217

virtualdetector w\_Det9 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det9 z=100.248

virtualdetector w\_Det10 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det10 z=100.279

W 0.003MM FOILS 2 CU ATTENS

# W FOILS

box foil1 height=10 width=10 length=0.003 material=W color=1,0,0

place foil1 z=100.0015

box foil2 height=10 width=10 length=0.003 material=W color=1,0,0

place foil2 z=100.0185

box foil3 height=10 width=10 length=0.003 material=W color=1,0,0

place foil3 z=100.0355

box foil4 height=10 width=10 length=0.003 material=W color=1,0,0

place foil4 z=100.0525

box foil5 height=10 width=10 length=0.003 material=W color=1,0,0

place foil5 z=100.0695

box foil6 height=10 width=10 length=0.003 material=W color=1,0,0

place foil6 z=100.0865

box foil7 height=10 width=10 length=0.003 material=W color=1,0,0

place foil7 z=100.1035

box foil8 height=10 width=10 length=0.003 material=W color=1,0,0

place foil8 z=100.1205

box foil9 height=10 width=10 length=0.003 material=W color=1,0,0

place foil9 z=100.1375

box foil10 height=10 width=10 length=0.003 material=W color=1,0,0

place foil10 z=100.1545

# The attenuator foils reduce the proton energies to create a more noticeable energy difference between the foils

box atten1 height=10 width=10 length=0.014 material=Cu color=0,0,1

place atten1 z=100.010

box atten2 height=10 width=10 length=0.014 material=Cu color=0,0,1

place atten2 z=100.027

box atten3 height=10 width=10 length=0.014 material=Cu color=0,0,1

place atten3 z=100.044

box atten4 height=10 width=10 length=0.014 material=Cu color=0,0,1

place atten4 z=100.061

box atten5 height=10 width=10 length=0.014 material=Cu color=0,0,1

place atten5 z=100.078

box atten6 height=10 width=10 length=0.014 material=Cu color=0,0,1

place atten6 z=100.095

box atten7 height=10 width=10 length=0.014 material=Cu color=0,0,1

place atten7 z=100.112

box atten8 height=10 width=10 length=0.014 material=Cu color=0,0,1

place atten8 z=100.129

box atten9 height=10 width=10 length=0.014 material=Cu color=0,0,1

place atten9 z=100.146

# The virtualdetectors detect the proton momenta and this can be used to calculate their energies

virtualdetector w\_Det1 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det1 z=100

virtualdetector w\_Det2 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det2 z=100.017

virtualdetector w\_Det3 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det3 z=100.034

virtualdetector w\_Det4 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det4 z=100.051

virtualdetector w\_Det5 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det5 z=100.068

virtualdetector w\_Det6 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det6 z=100.085

virtualdetector w\_Det7 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det7 z=100.102

virtualdetector w\_Det8 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det8 z=100.119

virtualdetector w\_Det9 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det9 z=100.136

virtualdetector w\_Det10 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det10 z=100.153

W 0.004MM FOILS 2 CU ATTENS

# W FOILS

box foil1 height=10 width=10 length=0.004 material=W color=1,0,0

place foil1 z=100.002

box foil2 height=10 width=10 length=0.004 material=W color=1,0,0

place foil2 z=100.020

box foil3 height=10 width=10 length=0.004 material=W color=1,0,0

place foil3 z=100.038

box foil4 height=10 width=10 length=0.004 material=W color=1,0,0

place foil4 z=100.056

box foil5 height=10 width=10 length=0.004 material=W color=1,0,0

place foil5 z=100.074

box foil6 height=10 width=10 length=0.004 material=W color=1,0,0

place foil6 z=100.092

box foil7 height=10 width=10 length=0.004 material=W color=1,0,0

place foil7 z=100.110

box foil8 height=10 width=10 length=0.004 material=W color=1,0,0

place foil8 z=100.128

box foil9 height=10 width=10 length=0.004 material=W color=1,0,0

place foil9 z=100.146

box foil10 height=10 width=10 length=0.004 material=W color=1,0,0

place foil10 z=100.164

# The attenuator foils reduce the proton energies to create a more noticeable energy difference between the foils

box atten1 height=10 width=10 length=0.014 material=Cu color=0,0,1

place atten1 z=100.011

box atten2 height=10 width=10 length=0.014 material=Cu color=0,0,1

place atten2 z=100.029

box atten3 height=10 width=10 length=0.014 material=Cu color=0,0,1

place atten3 z=100.047

box atten4 height=10 width=10 length=0.014 material=Cu color=0,0,1

place atten4 z=100.065

box atten5 height=10 width=10 length=0.014 material=Cu color=0,0,1

place atten5 z=100.083

box atten6 height=10 width=10 length=0.014 material=Cu color=0,0,1

place atten6 z=100.101

box atten7 height=10 width=10 length=0.014 material=Cu color=0,0,1

place atten7 z=100.119

box atten8 height=10 width=10 length=0.014 material=Cu color=0,0,1

place atten8 z=100.137

box atten9 height=10 width=10 length=0.014 material=Cu color=0,0,1

place atten9 z=100.155

# The virtualdetectors detect the proton momenta and this can be used to calculate their energies

virtualdetector w\_Det1 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det1 z=100

virtualdetector w\_Det2 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det2 z=100.018

virtualdetector w\_Det3 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det3 z=100.036

virtualdetector w\_Det4 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det4 z=100.054

virtualdetector w\_Det5 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det5 z=100.072

virtualdetector w\_Det6 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det6 z=100.090

virtualdetector w\_Det7 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det7 z=100.108

virtualdetector w\_Det8 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det8 z=100.126

virtualdetector w\_Det9 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det9 z=100.144

virtualdetector w\_Det10 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det10 z=100.162

W 0.005MM FOILS 3 CU ATTENS

# W FOILS

box foil1 height=10 width=10 length=0.005 material=W color=1,0,0

place foil1 z=100.0025

box foil2 height=10 width=10 length=0.005 material=W color=1,0,0

place foil2 z=100.0285

box foil3 height=10 width=10 length=0.005 material=W color=1,0,0

place foil3 z=100.0545

box foil4 height=10 width=10 length=0.005 material=W color=1,0,0

place foil4 z=100.0805

box foil5 height=10 width=10 length=0.005 material=W color=1,0,0

place foil5 z=100.1065

box foil6 height=10 width=10 length=0.005 material=W color=1,0,0

place foil6 z=100.1325

box foil7 height=10 width=10 length=0.005 material=W color=1,0,0

place foil7 z=100.1585

box foil8 height=10 width=10 length=0.005 material=W color=1,0,0

place foil8 z=100.1845

box foil9 height=10 width=10 length=0.005 material=W color=1,0,0

place foil9 z=100.2105

box foil10 height=10 width=10 length=0.005 material=W color=1,0,0

place foil10 z=100.2365

# The attenuator foils reduce the proton energies to create a more noticeable energy difference between the foils

box atten1 height=10 width=10 length=0.021 material=Cu color=0,0,1

place atten1 z=100.0155

box atten2 height=10 width=10 length=0.021 material=Cu color=0,0,1

place atten2 z=100.0415

box atten3 height=10 width=10 length=0.021 material=Cu color=0,0,1

place atten3 z=100.0675

box atten4 height=10 width=10 length=0.021 material=Cu color=0,0,1

place atten4 z=100.0935

box atten5 height=10 width=10 length=0.021 material=Cu color=0,0,1

place atten5 z=100.1195

box atten6 height=10 width=10 length=0.021 material=Cu color=0,0,1

place atten6 z=100.1455

box atten7 height=10 width=10 length=0.021 material=Cu color=0,0,1

place atten7 z=100.1715

box atten8 height=10 width=10 length=0.021 material=Cu color=0,0,1

place atten8 z=100.1975

box atten9 height=10 width=10 length=0.021 material=Cu color=0,0,1

place atten9 z=100.2235

# The virtualdetectors detect the proton momenta and this can be used to calculate their energies

virtualdetector w\_Det1 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det1 z=100

virtualdetector w\_Det2 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det2 z=100.026

virtualdetector w\_Det3 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det3 z=100.052

virtualdetector w\_Det4 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det4 z=100.078

virtualdetector w\_Det5 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det5 z=100.104

virtualdetector w\_Det6 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det6 z=100.130

virtualdetector w\_Det7 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det7 z=100.156

virtualdetector w\_Det8 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det8 z=100.182

virtualdetector w\_Det9 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det9 z=100.208

virtualdetector w\_Det10 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det10 z=100.234

W 0.006MM FOILS 5 CU ATTENS

# W FOILS

box foil1 height=10 width=10 length=0.006 material=W color=1,0,0

place foil1 z=100.003

box foil2 height=10 width=10 length=0.006 material=W color=1,0,0

place foil2 z=100.044

box foil3 height=10 width=10 length=0.006 material=W color=1,0,0

place foil3 z=100.085

box foil4 height=10 width=10 length=0.006 material=W color=1,0,0

place foil4 z=100.126

box foil5 height=10 width=10 length=0.006 material=W color=1,0,0

place foil5 z=100.167

box foil6 height=10 width=10 length=0.006 material=W color=1,0,0

place foil6 z=100.208

box foil7 height=10 width=10 length=0.006 material=W color=1,0,0

place foil7 z=100.249

box foil8 height=10 width=10 length=0.006 material=W color=1,0,0

place foil8 z=100.290

box foil9 height=10 width=10 length=0.006 material=W color=1,0,0

place foil9 z=100.331

box foil10 height=10 width=10 length=0.006 material=W color=1,0,0

place foil10 z=100.372

# The attenuator foils reduce the proton energies to create a more noticeable energy difference between the foils

box atten1 height=10 width=10 length=0.035 material=Cu color=0,0,1

place atten1 z=100.0235

box atten2 height=10 width=10 length=0.035 material=Cu color=0,0,1

place atten2 z=100.0645

box atten3 height=10 width=10 length=0.035 material=Cu color=0,0,1

place atten3 z=100.1055

box atten4 height=10 width=10 length=0.035 material=Cu color=0,0,1

place atten4 z=100.1465

box atten5 height=10 width=10 length=0.035 material=Cu color=0,0,1

place atten5 z=100.1875

box atten6 height=10 width=10 length=0.035 material=Cu color=0,0,1

place atten6 z=100.2285

box atten7 height=10 width=10 length=0.035 material=Cu color=0,0,1

place atten7 z=100.2695

box atten8 height=10 width=10 length=0.035 material=Cu color=0,0,1

place atten8 z=100.3105

box atten9 height=10 width=10 length=0.035 material=Cu color=0,0,1

place atten9 z=100.3515

# The virtualdetectors detect the proton momenta and this can be used to calculate their energies

virtualdetector w\_Det1 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det1 z=100

virtualdetector w\_Det2 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det2 z=100.041

virtualdetector w\_Det3 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det3 z=100.082

virtualdetector w\_Det4 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det4 z=100.123

virtualdetector w\_Det5 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det5 z=100.164

virtualdetector w\_Det6 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det6 z=100.205

virtualdetector w\_Det7 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det7 z=100.246

virtualdetector w\_Det8 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det8 z=100.287

virtualdetector w\_Det9 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det9 z=100.328

virtualdetector w\_Det10 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det10 z=100.369

W 0.007MM FOILS 1 CU ATTEN

# W FOILS

box foil1 height=10 width=10 length=0.007 material=W color=1,0,0

place foil1 z=100.0035

box foil2 height=10 width=10 length=0.007 material=W color=1,0,0

place foil2 z=100.0175

box foil3 height=10 width=10 length=0.007 material=W color=1,0,0

place foil3 z=100.0315

box foil4 height=10 width=10 length=0.007 material=W color=1,0,0

place foil4 z=100.0455

box foil5 height=10 width=10 length=0.007 material=W color=1,0,0

place foil5 z=100.0595

box foil6 height=10 width=10 length=0.007 material=W color=1,0,0

place foil6 z=100.0735

box foil7 height=10 width=10 length=0.007 material=W color=1,0,0

place foil7 z=100.0875

box foil8 height=10 width=10 length=0.007 material=W color=1,0,0

place foil8 z=100.1015

box foil9 height=10 width=10 length=0.007 material=W color=1,0,0

place foil9 z=100.1155

box foil10 height=10 width=10 length=0.007 material=W color=1,0,0

place foil10 z=100.1295

# The attenuator foils reduce the proton energies to create a more noticeable energy difference between the foils

box atten1 height=10 width=10 length=0.007 material=Cu color=0,0,1

place atten1 z=100.0105

box atten2 height=10 width=10 length=0.007 material=Cu color=0,0,1

place atten2 z=100.0245

box atten3 height=10 width=10 length=0.007 material=Cu color=0,0,1

place atten3 z=100.0385

box atten4 height=10 width=10 length=0.007 material=Cu color=0,0,1

place atten4 z=100.0525

box atten5 height=10 width=10 length=0.007 material=Cu color=0,0,1

place atten5 z=100.0665

box atten6 height=10 width=10 length=0.007 material=Cu color=0,0,1

place atten6 z=100.0805

box atten7 height=10 width=10 length=0.007 material=Cu color=0,0,1

place atten7 z=100.0945

box atten8 height=10 width=10 length=0.007 material=Cu color=0,0,1

place atten8 z=100.1085

box atten9 height=10 width=10 length=0.007 material=Cu color=0,0,1

place atten9 z=100.1225

# The virtualdetectors detect the proton momenta and this can be used to calculate their energies

virtualdetector w\_Det1 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det1 z=100

virtualdetector w\_Det2 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det2 z=100.014

virtualdetector w\_Det3 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det3 z=100.028

virtualdetector w\_Det4 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det4 z=100.042

virtualdetector w\_Det5 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det5 z=100.056

virtualdetector w\_Det6 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det6 z=100.070

virtualdetector w\_Det7 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det7 z=100.084

virtualdetector w\_Det8 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det8 z=100.098

virtualdetector w\_Det9 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det9 z=100.112

virtualdetector w\_Det10 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det10 z=100.126

W 0.007MM FOILS 3 CU ATTENS

# W FOILS

box foil1 height=10 width=10 length=0.007 material=W color=1,0,0

place foil1 z=100.0035

box foil2 height=10 width=10 length=0.007 material=W color=1,0,0

place foil2 z=100.0315

box foil3 height=10 width=10 length=0.007 material=W color=1,0,0

place foil3 z=100.0595

box foil4 height=10 width=10 length=0.007 material=W color=1,0,0

place foil4 z=100.0875

box foil5 height=10 width=10 length=0.007 material=W color=1,0,0

place foil5 z=100.1155

box foil6 height=10 width=10 length=0.007 material=W color=1,0,0

place foil6 z=100.1435

box foil7 height=10 width=10 length=0.007 material=W color=1,0,0

place foil7 z=100.1715

box foil8 height=10 width=10 length=0.007 material=W color=1,0,0

place foil8 z=100.1995

box foil9 height=10 width=10 length=0.007 material=W color=1,0,0

place foil9 z=100.2275

box foil10 height=10 width=10 length=0.007 material=W color=1,0,0

place foil10 z=100.2555

# The attenuator foils reduce the proton energies to create a more noticeable energy difference between the foils

box atten1 height=10 width=10 length=0.021 material=Cu color=0,0,1

place atten1 z=100.0175

box atten2 height=10 width=10 length=0.021 material=Cu color=0,0,1

place atten2 z=100.0455

box atten3 height=10 width=10 length=0.021 material=Cu color=0,0,1

place atten3 z=100.0735

box atten4 height=10 width=10 length=0.021 material=Cu color=0,0,1

place atten4 z=100.1015

box atten5 height=10 width=10 length=0.021 material=Cu color=0,0,1

place atten5 z=100.1295

box atten6 height=10 width=10 length=0.021 material=Cu color=0,0,1

place atten6 z=100.1575

box atten7 height=10 width=10 length=0.021 material=Cu color=0,0,1

place atten7 z=100.1855

box atten8 height=10 width=10 length=0.021 material=Cu color=0,0,1

place atten8 z=100.2135

box atten9 height=10 width=10 length=0.021 material=Cu color=0,0,1

place atten9 z=100.2415

# The virtualdetectors detect the proton momenta and this can be used to calculate their energies

virtualdetector w\_Det1 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det1 z=100

virtualdetector w\_Det2 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det2 z=100.028

virtualdetector w\_Det3 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det3 z=100.056

virtualdetector w\_Det4 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det4 z=100.084

virtualdetector w\_Det5 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det5 z=100.112

virtualdetector w\_Det6 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det6 z=100.140

virtualdetector w\_Det7 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det7 z=100.168

virtualdetector w\_Det8 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det8 z=100.196

virtualdetector w\_Det9 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det9 z=100.224

virtualdetector w\_Det10 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det10 z=100.252

W 0.007MM FOILS 5 CU ATTENS

# W FOILS

box foil1 height=10 width=10 length=0.007 material=W color=1,0,0

place foil1 z=100.0035

box foil2 height=10 width=10 length=0.007 material=W color=1,0,0

place foil2 z=100.0455

box foil3 height=10 width=10 length=0.007 material=W color=1,0,0

place foil3 z=100.0875

box foil4 height=10 width=10 length=0.007 material=W color=1,0,0

place foil4 z=100.1295

box foil5 height=10 width=10 length=0.007 material=W color=1,0,0

place foil5 z=100.1715

box foil6 height=10 width=10 length=0.007 material=W color=1,0,0

place foil6 z=100.2135

box foil7 height=10 width=10 length=0.007 material=W color=1,0,0

place foil7 z=100.2555

box foil8 height=10 width=10 length=0.007 material=W color=1,0,0

place foil8 z=100.2975

box foil9 height=10 width=10 length=0.007 material=W color=1,0,0

place foil9 z=100.3395

box foil10 height=10 width=10 length=0.007 material=W color=1,0,0

place foil10 z=100.3815

# The attenuator foils reduce the proton energies to create a more noticeable energy difference between the foils

box atten1 height=10 width=10 length=0.035 material=Cu color=0,0,1

place atten1 z=100.0245

box atten2 height=10 width=10 length=0.035 material=Cu color=0,0,1

place atten2 z=100.0665

box atten3 height=10 width=10 length=0.035 material=Cu color=0,0,1

place atten3 z=100.1085

box atten4 height=10 width=10 length=0.035 material=Cu color=0,0,1

place atten4 z=100.1505

box atten5 height=10 width=10 length=0.035 material=Cu color=0,0,1

place atten5 z=100.1925

box atten6 height=10 width=10 length=0.035 material=Cu color=0,0,1

place atten6 z=100.2345

box atten7 height=10 width=10 length=0.035 material=Cu color=0,0,1

place atten7 z=100.2765

box atten8 height=10 width=10 length=0.035 material=Cu color=0,0,1

place atten8 z=100.3185

box atten9 height=10 width=10 length=0.035 material=Cu color=0,0,1

place atten9 z=100.3605

# The virtualdetectors detect the proton momenta and this can be used to calculate their energies

virtualdetector w\_Det1 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det1 z=100

virtualdetector w\_Det2 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det2 z=100.042

virtualdetector w\_Det3 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det3 z=100.084

virtualdetector w\_Det4 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det4 z=100.126

virtualdetector w\_Det5 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det5 z=100.168

virtualdetector w\_Det6 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det6 z=100.210

virtualdetector w\_Det7 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det7 z=100.252

virtualdetector w\_Det8 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det8 z=100.294

virtualdetector w\_Det9 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det9 z=100.336

virtualdetector w\_Det10 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det10 z=100.378

W 0.008MM FOILS 1 CU ATTEN

# W FOILS

box foil1 height=10 width=10 length=0.008 material=W color=1,0,0

place foil1 z=100.004

box foil2 height=10 width=10 length=0.008 material=W color=1,0,0

place foil2 z=100.019

box foil3 height=10 width=10 length=0.008 material=W color=1,0,0

place foil3 z=100.034

box foil4 height=10 width=10 length=0.008 material=W color=1,0,0

place foil4 z=100.049

box foil5 height=10 width=10 length=0.008 material=W color=1,0,0

place foil5 z=100.064

box foil6 height=10 width=10 length=0.008 material=W color=1,0,0

place foil6 z=100.079

box foil7 height=10 width=10 length=0.008 material=W color=1,0,0

place foil7 z=100.094

box foil8 height=10 width=10 length=0.008 material=W color=1,0,0

place foil8 z=100.109

box foil9 height=10 width=10 length=0.008 material=W color=1,0,0

place foil9 z=100.124

box foil10 height=10 width=10 length=0.008 material=W color=1,0,0

place foil10 z=100.139

# The attenuator foils reduce the proton energies to create a more noticeable energy difference between the foils

box atten1 height=10 width=10 length=0.007 material=Cu color=0,0,1

place atten1 z=100.0115

box atten2 height=10 width=10 length=0.007 material=Cu color=0,0,1

place atten2 z=100.0265

box atten3 height=10 width=10 length=0.007 material=Cu color=0,0,1

place atten3 z=100.0415

box atten4 height=10 width=10 length=0.007 material=Cu color=0,0,1

place atten4 z=100.0565

box atten5 height=10 width=10 length=0.007 material=Cu color=0,0,1

place atten5 z=100.0715

box atten6 height=10 width=10 length=0.007 material=Cu color=0,0,1

place atten6 z=100.0865

box atten7 height=10 width=10 length=0.007 material=Cu color=0,0,1

place atten7 z=100.1015

box atten8 height=10 width=10 length=0.007 material=Cu color=0,0,1

place atten8 z=100.1165

box atten9 height=10 width=10 length=0.007 material=Cu color=0,0,1

place atten9 z=100.1315

# The virtualdetectors detect the proton momenta and this can be used to calculate their energies

virtualdetector w\_Det1 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det1 z=100

virtualdetector w\_Det2 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det2 z=100.015

virtualdetector w\_Det3 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det3 z=100.030

virtualdetector w\_Det4 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det4 z=100.045

virtualdetector w\_Det5 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det5 z=100.060

virtualdetector w\_Det6 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det6 z=100.075

virtualdetector w\_Det7 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det7 z=100.090

virtualdetector w\_Det8 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det8 z=100.105

virtualdetector w\_Det9 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det9 z=100.120

virtualdetector w\_Det10 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det10 z=100.135

W 0.008MM FOILS 3 CU ATTENS

# W FOILS

box foil1 height=10 width=10 length=0.008 material=W color=1,0,0

place foil1 z=100.004

box foil2 height=10 width=10 length=0.008 material=W color=1,0,0

place foil2 z=100.033

box foil3 height=10 width=10 length=0.008 material=W color=1,0,0

place foil3 z=100.062

box foil4 height=10 width=10 length=0.008 material=W color=1,0,0

place foil4 z=100.091

box foil5 height=10 width=10 length=0.008 material=W color=1,0,0

place foil5 z=100.120

box foil6 height=10 width=10 length=0.008 material=W color=1,0,0

place foil6 z=100.149

box foil7 height=10 width=10 length=0.008 material=W color=1,0,0

place foil7 z=100.178

box foil8 height=10 width=10 length=0.008 material=W color=1,0,0

place foil8 z=100.207

box foil9 height=10 width=10 length=0.008 material=W color=1,0,0

place foil9 z=100.236

box foil10 height=10 width=10 length=0.008 material=W color=1,0,0

place foil10 z=100.265

# The attenuator foils reduce the proton energies to create a more noticeable energy difference between the foils

box atten1 height=10 width=10 length=0.021 material=Cu color=0,0,1

place atten1 z=100.0185

box atten2 height=10 width=10 length=0.021 material=Cu color=0,0,1

place atten2 z=100.0475

box atten3 height=10 width=10 length=0.021 material=Cu color=0,0,1

place atten3 z=100.0765

box atten4 height=10 width=10 length=0.021 material=Cu color=0,0,1

place atten4 z=100.1055

box atten5 height=10 width=10 length=0.021 material=Cu color=0,0,1

place atten5 z=100.1345

box atten6 height=10 width=10 length=0.021 material=Cu color=0,0,1

place atten6 z=100.1635

box atten7 height=10 width=10 length=0.021 material=Cu color=0,0,1

place atten7 z=100.1925

box atten8 height=10 width=10 length=0.021 material=Cu color=0,0,1

place atten8 z=100.2215

box atten9 height=10 width=10 length=0.021 material=Cu color=0,0,1

place atten9 z=100.2505

# The virtualdetectors detect the proton momenta and this can be used to calculate their energies

virtualdetector w\_Det1 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det1 z=100

virtualdetector w\_Det2 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det2 z=100.029

virtualdetector w\_Det3 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det3 z=100.058

virtualdetector w\_Det4 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det4 z=100.087

virtualdetector w\_Det5 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det5 z=100.116

virtualdetector w\_Det6 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det6 z=100.145

virtualdetector w\_Det7 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det7 z=100.174

virtualdetector w\_Det8 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det8 z=100.203

virtualdetector w\_Det9 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det9 z=100.232

virtualdetector w\_Det10 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det10 z=100.261

W 0.008MM FOILS 4 CU ATTENS

# W FOILS

box foil1 height=10 width=10 length=0.008 material=W color=1,0,0

place foil1 z=100.004

box foil2 height=10 width=10 length=0.008 material=W color=1,0,0

place foil2 z=100.040

box foil3 height=10 width=10 length=0.008 material=W color=1,0,0

place foil3 z=100.076

box foil4 height=10 width=10 length=0.008 material=W color=1,0,0

place foil4 z=100.112

box foil5 height=10 width=10 length=0.008 material=W color=1,0,0

place foil5 z=100.148

box foil6 height=10 width=10 length=0.008 material=W color=1,0,0

place foil6 z=100.184

box foil7 height=10 width=10 length=0.008 material=W color=1,0,0

place foil7 z=100.220

box foil8 height=10 width=10 length=0.008 material=W color=1,0,0

place foil8 z=100.256

box foil9 height=10 width=10 length=0.008 material=W color=1,0,0

place foil9 z=100.292

box foil10 height=10 width=10 length=0.008 material=W color=1,0,0

place foil10 z=100.328

# The attenuator foils reduce the proton energies to create a more noticeable energy difference between the foils

box atten1 height=10 width=10 length=0.028 material=Cu color=0,0,1

place atten1 z=100.022

box atten2 height=10 width=10 length=0.028 material=Cu color=0,0,1

place atten2 z=100.058

box atten3 height=10 width=10 length=0.028 material=Cu color=0,0,1

place atten3 z=100.094

box atten4 height=10 width=10 length=0.028 material=Cu color=0,0,1

place atten4 z=100.130

box atten5 height=10 width=10 length=0.028 material=Cu color=0,0,1

place atten5 z=100.166

box atten6 height=10 width=10 length=0.028 material=Cu color=0,0,1

place atten6 z=100.202

box atten7 height=10 width=10 length=0.028 material=Cu color=0,0,1

place atten7 z=100.238

box atten8 height=10 width=10 length=0.028 material=Cu color=0,0,1

place atten8 z=100.274

box atten9 height=10 width=10 length=0.028 material=Cu color=0,0,1

place atten9 z=100.310

# The virtualdetectors detect the proton momenta and this can be used to calculate their energies

virtualdetector w\_Det1 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det1 z=100

virtualdetector w\_Det2 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det2 z=100.036

virtualdetector w\_Det3 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det3 z=100.072

virtualdetector w\_Det4 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det4 z=100.108

virtualdetector w\_Det5 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det5 z=100.144

virtualdetector w\_Det6 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det6 z=100.180

virtualdetector w\_Det7 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det7 z=100.216

virtualdetector w\_Det8 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det8 z=100.252

virtualdetector w\_Det9 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det9 z=100.288

virtualdetector w\_Det10 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det10 z=100.324

W 0.008MM FOILS 5 CU ATTENS

# W FOILS

box foil1 height=10 width=10 length=0.008 material=W color=1,0,0

place foil1 z=100.004

box foil2 height=10 width=10 length=0.008 material=W color=1,0,0

place foil2 z=100.047

box foil3 height=10 width=10 length=0.008 material=W color=1,0,0

place foil3 z=100.090

box foil4 height=10 width=10 length=0.008 material=W color=1,0,0

place foil4 z=100.133

box foil5 height=10 width=10 length=0.008 material=W color=1,0,0

place foil5 z=100.176

box foil6 height=10 width=10 length=0.008 material=W color=1,0,0

place foil6 z=100.219

box foil7 height=10 width=10 length=0.008 material=W color=1,0,0

place foil7 z=100.262

box foil8 height=10 width=10 length=0.008 material=W color=1,0,0

place foil8 z=100.305

box foil9 height=10 width=10 length=0.008 material=W color=1,0,0

place foil9 z=100.348

box foil10 height=10 width=10 length=0.008 material=W color=1,0,0

place foil10 z=100.391

# The attenuator foils reduce the proton energies to create a more noticeable energy difference between the foils

box atten1 height=10 width=10 length=0.035 material=Cu color=0,0,1

place atten1 z=100.0255

box atten2 height=10 width=10 length=0.035 material=Cu color=0,0,1

place atten2 z=100.0685

box atten3 height=10 width=10 length=0.035 material=Cu color=0,0,1

place atten3 z=100.1115

box atten4 height=10 width=10 length=0.035 material=Cu color=0,0,1

place atten4 z=100.1545

box atten5 height=10 width=10 length=0.035 material=Cu color=0,0,1

place atten5 z=100.1975

box atten6 height=10 width=10 length=0.035 material=Cu color=0,0,1

place atten6 z=100.2405

box atten7 height=10 width=10 length=0.035 material=Cu color=0,0,1

place atten7 z=100.2835

box atten8 height=10 width=10 length=0.035 material=Cu color=0,0,1

place atten8 z=100.3265

box atten9 height=10 width=10 length=0.035 material=Cu color=0,0,1

place atten9 z=100.3695

# The virtualdetectors detect the proton momenta and this can be used to calculate their energies

virtualdetector w\_Det1 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det1 z=100

virtualdetector w\_Det2 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det2 z=100.043

virtualdetector w\_Det3 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det3 z=100.086

virtualdetector w\_Det4 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det4 z=100.129

virtualdetector w\_Det5 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det5 z=100.172

virtualdetector w\_Det6 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det6 z=100.215

virtualdetector w\_Det7 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det7 z=100.258

virtualdetector w\_Det8 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det8 z=100.301

virtualdetector w\_Det9 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det9 z=100.344

virtualdetector w\_Det10 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det10 z=100.387

W 0.009MM FOILS 5 CU ATTENS

# W FOILS

box foil1 height=10 width=10 length=0.009 material=W color=1,0,0

place foil1 z=100.0045

box foil2 height=10 width=10 length=0.009 material=W color=1,0,0

place foil2 z=100.0485

box foil3 height=10 width=10 length=0.009 material=W color=1,0,0

place foil3 z=100.0925

box foil4 height=10 width=10 length=0.009 material=W color=1,0,0

place foil4 z=100.1365

box foil5 height=10 width=10 length=0.009 material=W color=1,0,0

place foil5 z=100.1805

box foil6 height=10 width=10 length=0.009 material=W color=1,0,0

place foil6 z=100.2245

box foil7 height=10 width=10 length=0.009 material=W color=1,0,0

place foil7 z=100.2685

box foil8 height=10 width=10 length=0.009 material=W color=1,0,0

place foil8 z=100.3125

box foil9 height=10 width=10 length=0.009 material=W color=1,0,0

place foil9 z=100.3565

box foil10 height=10 width=10 length=0.009 material=W color=1,0,0

place foil10 z=100.4005

# The attenuator foils reduce the proton energies to create a more noticeable energy difference between the foils

box atten1 height=10 width=10 length=0.035 material=Cu color=0,0,1

place atten1 z=100.0265

box atten2 height=10 width=10 length=0.035 material=Cu color=0,0,1

place atten2 z=100.0705

box atten3 height=10 width=10 length=0.035 material=Cu color=0,0,1

place atten3 z=100.1145

box atten4 height=10 width=10 length=0.035 material=Cu color=0,0,1

place atten4 z=100.1585

box atten5 height=10 width=10 length=0.035 material=Cu color=0,0,1

place atten5 z=100.2025

box atten6 height=10 width=10 length=0.035 material=Cu color=0,0,1

place atten6 z=100.2465

box atten7 height=10 width=10 length=0.035 material=Cu color=0,0,1

place atten7 z=100.2905

box atten8 height=10 width=10 length=0.035 material=Cu color=0,0,1

place atten8 z=100.3345

box atten9 height=10 width=10 length=0.035 material=Cu color=0,0,1

place atten9 z=100.3785

# The virtualdetectors detect the proton momenta and this can be used to calculate their energies

virtualdetector w\_Det1 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det1 z=100

virtualdetector w\_Det2 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det2 z=100.044

virtualdetector w\_Det3 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det3 z=100.088

virtualdetector w\_Det4 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det4 z=100.132

virtualdetector w\_Det5 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det5 z=100.176

virtualdetector w\_Det6 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det6 z=100.220

virtualdetector w\_Det7 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det7 z=100.264

virtualdetector w\_Det8 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det8 z=100.308

virtualdetector w\_Det9 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det9 z=100.352

virtualdetector w\_Det10 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det10 z=100.396

W 0.009MM FOILS 4 CU ATTENS

# W FOILS

box foil1 height=10 width=10 length=0.009 material=W color=1,0,0

place foil1 z=100.0045

box foil2 height=10 width=10 length=0.009 material=W color=1,0,0

place foil2 z=100.0415

box foil3 height=10 width=10 length=0.009 material=W color=1,0,0

place foil3 z=100.0785

box foil4 height=10 width=10 length=0.009 material=W color=1,0,0

place foil4 z=100.1155

box foil5 height=10 width=10 length=0.009 material=W color=1,0,0

place foil5 z=100.1525

box foil6 height=10 width=10 length=0.009 material=W color=1,0,0

place foil6 z=100.1895

box foil7 height=10 width=10 length=0.009 material=W color=1,0,0

place foil7 z=100.2265

box foil8 height=10 width=10 length=0.009 material=W color=1,0,0

place foil8 z=100.2635

box foil9 height=10 width=10 length=0.009 material=W color=1,0,0

place foil9 z=100.3005

box foil10 height=10 width=10 length=0.009 material=W color=1,0,0

place foil10 z=100.3375

# The attenuator foils reduce the proton energies to create a more noticeable energy difference between the foils

box atten1 height=10 width=10 length=0.028 material=Cu color=0,0,1

place atten1 z=100.023

box atten2 height=10 width=10 length=0.028 material=Cu color=0,0,1

place atten2 z=100.060

box atten3 height=10 width=10 length=0.028 material=Cu color=0,0,1

place atten3 z=100.097

box atten4 height=10 width=10 length=0.028 material=Cu color=0,0,1

place atten4 z=100.134

box atten5 height=10 width=10 length=0.028 material=Cu color=0,0,1

place atten5 z=100.171

box atten6 height=10 width=10 length=0.028 material=Cu color=0,0,1

place atten6 z=100.208

box atten7 height=10 width=10 length=0.028 material=Cu color=0,0,1

place atten7 z=100.245

box atten8 height=10 width=10 length=0.028 material=Cu color=0,0,1

place atten8 z=100.282

box atten9 height=10 width=10 length=0.028 material=Cu color=0,0,1

place atten9 z=100.319

# The virtualdetectors detect the proton momenta and this can be used to calculate their energies

virtualdetector w\_Det1 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det1 z=100

virtualdetector w\_Det2 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det2 z=100.037

virtualdetector w\_Det3 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det3 z=100.074

virtualdetector w\_Det4 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det4 z=100.111

virtualdetector w\_Det5 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det5 z=100.148

virtualdetector w\_Det6 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det6 z=100.185

virtualdetector w\_Det7 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det7 z=100.222

virtualdetector w\_Det8 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det8 z=100.259

virtualdetector w\_Det9 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det9 z=100.296

virtualdetector w\_Det10 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det10 z=100.333

W 0.009MM FOILS 2 AL ATTENS

# W FOILS

box foil1 height=10 width=10 length=0.009 material=W color=1,0,0

place foil1 z=100.0045

box foil2 height=10 width=10 length=0.009 material=W color=1,0,0

place foil2 z=100.0335

box foil3 height=10 width=10 length=0.009 material=W color=1,0,0

place foil3 z=100.0625

box foil4 height=10 width=10 length=0.009 material=W color=1,0,0

place foil4 z=100.0915

box foil5 height=10 width=10 length=0.009 material=W color=1,0,0

place foil5 z=100.1205

box foil6 height=10 width=10 length=0.009 material=W color=1,0,0

place foil6 z=100.1495

box foil7 height=10 width=10 length=0.009 material=W color=1,0,0

place foil7 z=100.1785

box foil8 height=10 width=10 length=0.009 material=W color=1,0,0

place foil8 z=100.2075

box foil9 height=10 width=10 length=0.009 material=W color=1,0,0

place foil9 z=100.2365

box foil10 height=10 width=10 length=0.009 material=W color=1,0,0

place foil10 z=100.2655

# The attenuator foils reduce the proton energies to create a more noticeable energy difference between the foils

box atten1 height=10 width=10 length=0.02 material=Al color=0,0,1

place atten1 z=100.019

box atten2 height=10 width=10 length=0.02 material=Al color=0,0,1

place atten2 z=100.048

box atten3 height=10 width=10 length=0.02 material=Al color=0,0,1

place atten3 z=100.077

box atten4 height=10 width=10 length=0.02 material=Al color=0,0,1

place atten4 z=100.106

box atten5 height=10 width=10 length=0.02 material=Al color=0,0,1

place atten5 z=100.135

box atten6 height=10 width=10 length=0.02 material=Al color=0,0,1

place atten6 z=100.164

box atten7 height=10 width=10 length=0.02 material=Al color=0,0,1

place atten7 z=100.193

box atten8 height=10 width=10 length=0.02 material=Al color=0,0,1

place atten8 z=100.222

box atten9 height=10 width=10 length=0.02 material=Al color=0,0,1

place atten9 z=100.251

# The virtualdetectors detect the proton momenta and this can be used to calculate their energies

virtualdetector w\_Det1 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det1 z=100

virtualdetector w\_Det2 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det2 z=100.029

virtualdetector w\_Det3 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det3 z=100.058

virtualdetector w\_Det4 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det4 z=100.087

virtualdetector w\_Det5 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det5 z=100.116

virtualdetector w\_Det6 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det6 z=100.145

virtualdetector w\_Det7 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det7 z=100.174

virtualdetector w\_Det8 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det8 z=100.203

virtualdetector w\_Det9 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det9 z=100.232

virtualdetector w\_Det10 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det10 z=100.261

W 0.009MM FOILS 1 AL ATTEN

# W FOILS

box foil1 height=10 width=10 length=0.009 material=W color=1,0,0

place foil1 z=100.0045

box foil2 height=10 width=10 length=0.009 material=W color=1,0,0

place foil2 z=100.0235

box foil3 height=10 width=10 length=0.009 material=W color=1,0,0

place foil3 z=100.0425

box foil4 height=10 width=10 length=0.009 material=W color=1,0,0

place foil4 z=100.0615

box foil5 height=10 width=10 length=0.009 material=W color=1,0,0

place foil5 z=100.0805

box foil6 height=10 width=10 length=0.009 material=W color=1,0,0

place foil6 z=100.0995

box foil7 height=10 width=10 length=0.009 material=W color=1,0,0

place foil7 z=100.1185

box foil8 height=10 width=10 length=0.009 material=W color=1,0,0

place foil8 z=100.1375

box foil9 height=10 width=10 length=0.009 material=W color=1,0,0

place foil9 z=100.1565

box foil10 height=10 width=10 length=0.009 material=W color=1,0,0

place foil10 z=100.1755

# The attenuator foils reduce the proton energies to create a more noticeable energy difference between the foils

box atten1 height=10 width=10 length=0.01 material=Al color=0,0,1

place atten1 z=100.014

box atten2 height=10 width=10 length=0.01 material=Al color=0,0,1

place atten2 z=100.033

box atten3 height=10 width=10 length=0.01 material=Al color=0,0,1

place atten3 z=100.052

box atten4 height=10 width=10 length=0.01 material=Al color=0,0,1

place atten4 z=100.071

box atten5 height=10 width=10 length=0.01 material=Al color=0,0,1

place atten5 z=100.090

box atten6 height=10 width=10 length=0.01 material=Al color=0,0,1

place atten6 z=100.109

box atten7 height=10 width=10 length=0.01 material=Al color=0,0,1

place atten7 z=100.128

box atten8 height=10 width=10 length=0.01 material=Al color=0,0,1

place atten8 z=100.147

box atten9 height=10 width=10 length=0.01 material=Al color=0,0,1

place atten9 z=100.166

# The virtualdetectors detect the proton momenta and this can be used to calculate their energies

virtualdetector w\_Det1 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det1 z=100

virtualdetector w\_Det2 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det2 z=100.019

virtualdetector w\_Det3 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det3 z=100.038

virtualdetector w\_Det4 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det4 z=100.057

virtualdetector w\_Det5 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det5 z=100.076

virtualdetector w\_Det6 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det6 z=100.095

virtualdetector w\_Det7 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det7 z=100.114

virtualdetector w\_Det8 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det8 z=100.133

virtualdetector w\_Det9 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det9 z=100.152

virtualdetector w\_Det10 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det10 z=100.171

W 0.01MM FOILS 5 CU ATTENS

# W FOILS

box foil1 height=10 width=10 length=0.01 material=W color=1,0,0

place foil1 z=100.005

box foil2 height=10 width=10 length=0.01 material=W color=1,0,0

place foil2 z=100.050

box foil3 height=10 width=10 length=0.01 material=W color=1,0,0

place foil3 z=100.095

box foil4 height=10 width=10 length=0.01 material=W color=1,0,0

place foil4 z=100.140

box foil5 height=10 width=10 length=0.01 material=W color=1,0,0

place foil5 z=100.185

box foil6 height=10 width=10 length=0.01 material=W color=1,0,0

place foil6 z=100.230

box foil7 height=10 width=10 length=0.01 material=W color=1,0,0

place foil7 z=100.275

box foil8 height=10 width=10 length=0.01 material=W color=1,0,0

place foil8 z=100.320

box foil9 height=10 width=10 length=0.01 material=W color=1,0,0

place foil9 z=100.365

box foil10 height=10 width=10 length=0.01 material=W color=1,0,0

place foil10 z=100.410

# The attenuator foils reduce the proton energies to create a more noticeable energy difference between the foils

box atten1 height=10 width=10 length=0.035 material=Cu color=0,0,1

place atten1 z=100.0275

box atten2 height=10 width=10 length=0.035 material=Cu color=0,0,1

place atten2 z=100.0725

box atten3 height=10 width=10 length=0.035 material=Cu color=0,0,1

place atten3 z=100.1175

box atten4 height=10 width=10 length=0.035 material=Cu color=0,0,1

place atten4 z=100.1625

box atten5 height=10 width=10 length=0.035 material=Cu color=0,0,1

place atten5 z=100.2075

box atten6 height=10 width=10 length=0.035 material=Cu color=0,0,1

place atten6 z=100.2525

box atten7 height=10 width=10 length=0.035 material=Cu color=0,0,1

place atten7 z=100.2975

box atten8 height=10 width=10 length=0.035 material=Cu color=0,0,1

place atten8 z=100.3425

box atten9 height=10 width=10 length=0.035 material=Cu color=0,0,1

place atten9 z=100.3875

# The virtualdetectors detect the proton momenta and this can be used to calculate their energies

virtualdetector w\_Det1 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det1 z=100

virtualdetector w\_Det2 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det2 z=100.045

virtualdetector w\_Det3 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det3 z=100.090

virtualdetector w\_Det4 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det4 z=100.135

virtualdetector w\_Det5 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det5 z=100.180

virtualdetector w\_Det6 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det6 z=100.225

virtualdetector w\_Det7 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det7 z=100.270

virtualdetector w\_Det8 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det8 z=100.315

virtualdetector w\_Det9 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det9 z=100.360

virtualdetector w\_Det10 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det10 z=100.405

W 0.01MM FOILS 4 CU ATTENS

# W FOILS

box foil1 height=10 width=10 length=0.01 material=W color=1,0,0

place foil1 z=100.005

box foil2 height=10 width=10 length=0.01 material=W color=1,0,0

place foil2 z=100.043

box foil3 height=10 width=10 length=0.01 material=W color=1,0,0

place foil3 z=100.081

box foil4 height=10 width=10 length=0.01 material=W color=1,0,0

place foil4 z=100.119

box foil5 height=10 width=10 length=0.01 material=W color=1,0,0

place foil5 z=100.157

box foil6 height=10 width=10 length=0.01 material=W color=1,0,0

place foil6 z=100.195

box foil7 height=10 width=10 length=0.01 material=W color=1,0,0

place foil7 z=100.233

box foil8 height=10 width=10 length=0.01 material=W color=1,0,0

place foil8 z=100.271

box foil9 height=10 width=10 length=0.01 material=W color=1,0,0

place foil9 z=100.309

box foil10 height=10 width=10 length=0.01 material=W color=1,0,0

place foil10 z=100.347

# The attenuator foils reduce the proton energies to create a more noticeable energy difference between the foils

box atten1 height=10 width=10 length=0.028 material=Cu color=0,0,1

place atten1 z=100.024

box atten2 height=10 width=10 length=0.028 material=Cu color=0,0,1

place atten2 z=100.062

box atten3 height=10 width=10 length=0.028 material=Cu color=0,0,1

place atten3 z=100.100

box atten4 height=10 width=10 length=0.028 material=Cu color=0,0,1

place atten4 z=100.138

box atten5 height=10 width=10 length=0.028 material=Cu color=0,0,1

place atten5 z=100.176

box atten6 height=10 width=10 length=0.028 material=Cu color=0,0,1

place atten6 z=100.214

box atten7 height=10 width=10 length=0.028 material=Cu color=0,0,1

place atten7 z=100.252

box atten8 height=10 width=10 length=0.028 material=Cu color=0,0,1

place atten8 z=100.290

box atten9 height=10 width=10 length=0.028 material=Cu color=0,0,1

place atten9 z=100.328

# The virtualdetectors detect the proton momenta and this can be used to calculate their energies

virtualdetector w\_Det1 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det1 z=100

virtualdetector w\_Det2 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det2 z=100.038

virtualdetector w\_Det3 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det3 z=100.076

virtualdetector w\_Det4 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det4 z=100.114

virtualdetector w\_Det5 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det5 z=100.152

virtualdetector w\_Det6 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det6 z=100.190

virtualdetector w\_Det7 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det7 z=100.228

virtualdetector w\_Det8 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det8 z=100.266

virtualdetector w\_Det9 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det9 z=100.304

virtualdetector w\_Det10 height=10 width=10 length=0.0001 color=1,1,0 format=ASCII

place w\_Det10 z=100.342