

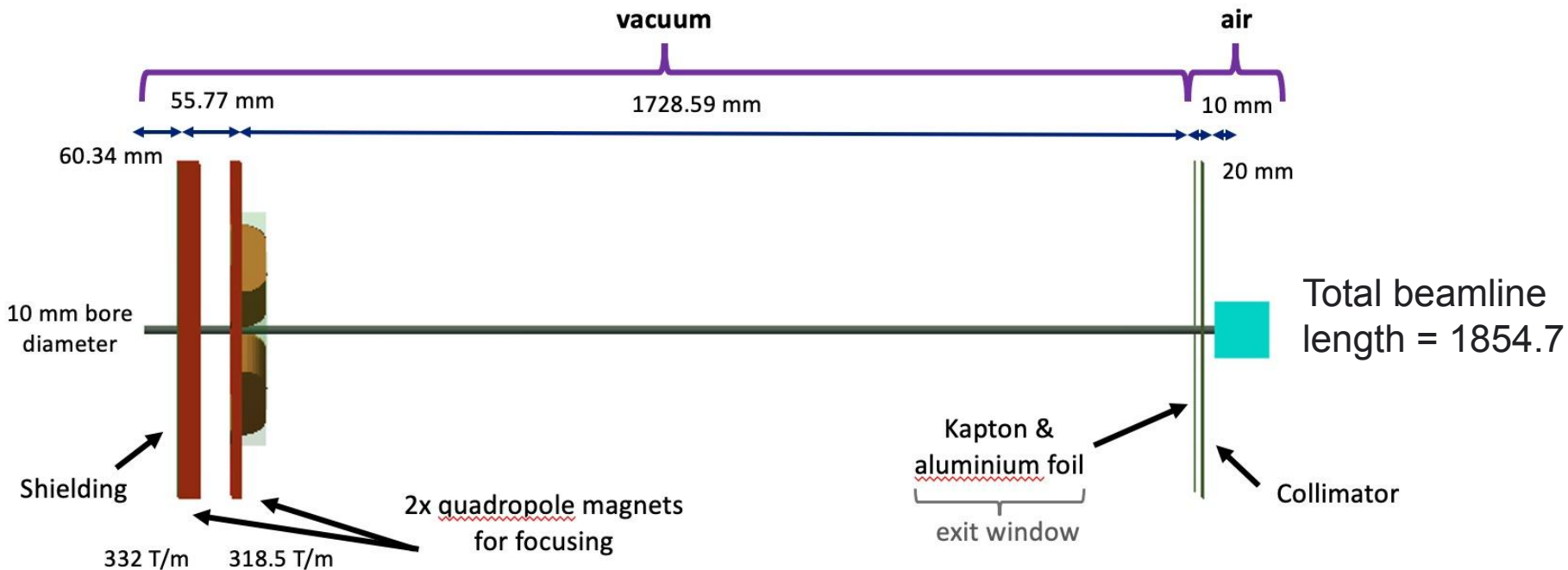
# Linear Optics

Quadrupole energy relations

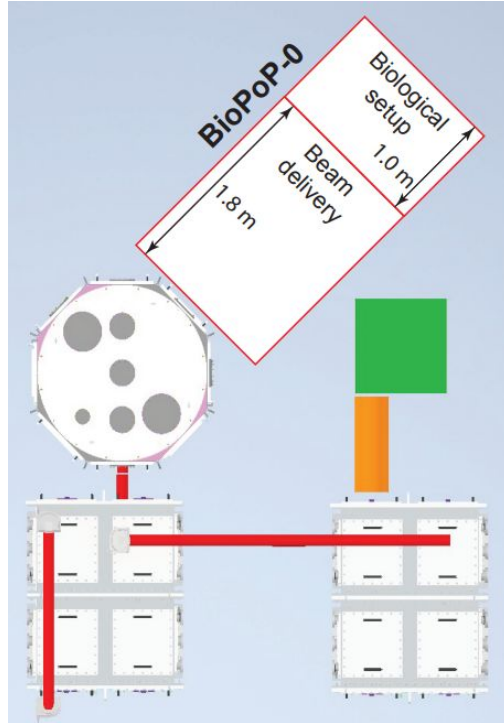




# LION beamline schematic

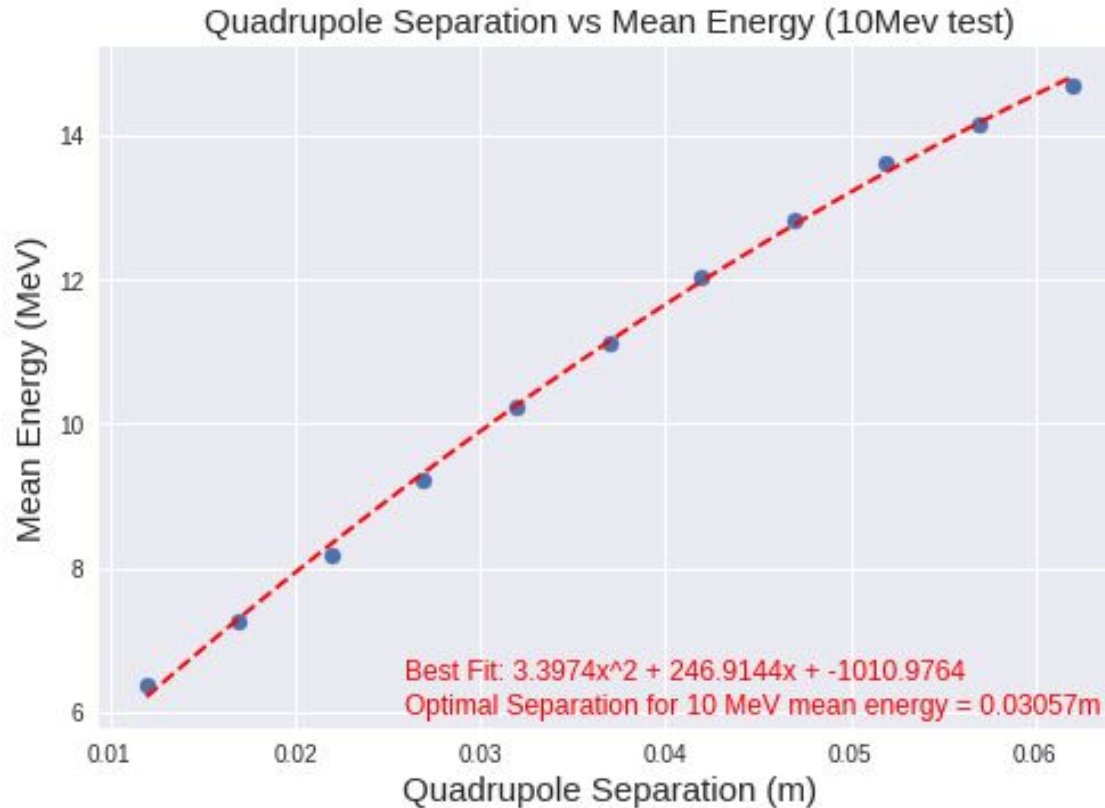


# SCAPA schematic



Stage	Section	Element	Type	Parameter	Value	Unit	Comment
0	Facility	Global	Name	Name	LION		
0	Facility	Global	Reference particle	Kinetic energy		10 MeV	
0	Facility	Global	Vacuum chamber	Mother volume radius		0.5 m	
1	Source	Source	Parameterised TN	SourceMode		0	Gaussian kinetic energy
1	Source	Source	Parameterised TN	SigmaX		0.000004 m	Gaussian width, x
1	Source	Source	Parameterised TN	SigmaY		0.000004 m	Gaussian width, y
1	Source	Source	Parameterised TN	Emin		1 MeV	Minimum of energy distribution
1	Source	Source	Parameterised TN	Emax		25 MeV	Maximum of energy distribution
1	Source	Source	Parameterised TN	nPts		1000	Number of points to sample for integration of PDF
1	Source	Source	Parameterised TN	MinTheta		0.999691155	Maximum theta for flat cos theta
1	Source	Source	Parameterised TN	Power		2500000000000000 W	Laser power
1	Source	Source	Parameterised TN	Energy		70 J	Laser energy
1	Source	Source	Parameterised TN	Wavelength		0.8 um	Laser wavelength
1	Source	Source	Parameterised TN	Duration		2.8E-14 s	Laser pulse duration
1	Source	Source	Parameterised TN	Thickness		0.0000004 m	Target thickness
1	Source	Source	Parameterised TN	Intensity		4E+020 W/cm2	Laser intensity
1	Source	Source	Parameterised TN	DivAngle		25 degrees	Electron divergence angle
1	Capture	Drift		Length		0.04118 m	Length of first drift
1	Capture	Aperture	Elliptical	RadiusX		0.003 m	Half aperture in x of elliptical colimator
1	Capture	Aperture	Elliptical	RadiusY		0.0015 m	Half aperture in y of ellipse of elliptical colimator
1	Capture	Drift		Length		0 m	Gap between colimator and first quad
1	Capture	Fquad		Length		0.04 m	Length of focusing quad
1	Capture	Fquad		Strength		332 T/m	Strength of focusing quad
1	Capture	Aperture	Circular	Radius		0.005 m	Aperture of quad
1	Capture	Drift		Length		0.036953 m	Gap between colimator first (F)quad and second (D)quad
1	Capture	Dquad		Length		0.02 m	Length of defocusing quad
1	Capture	Dquad		Strength		318.5 T/m	Strength of defocusing quad
1	Capture	Aperture	Circular	Radius		0.005 m	Aperture of quad
1	Delivery	Drift		Length		1.6 m	Main drift from last quad to kapton/aluminium foils
1	Delivery	Drift		Length		0.015 m	Drift from kapton/aluminium foils to collimator
1	Delivery	Aperture	Circular	Radius		0.0015 m	Collimator before "end station"
1	Delivery	Drift		Length		0.02 m	Final drift

# Quadrupole Separation for 10MeV Optimising

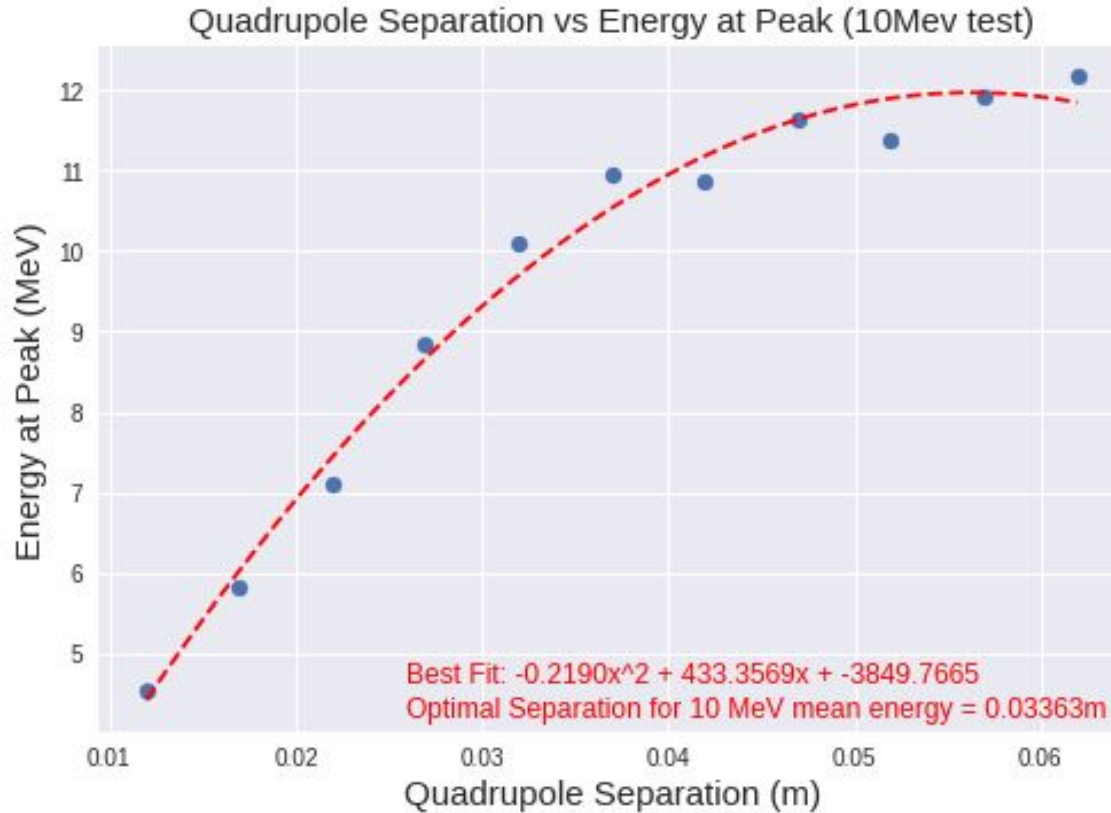


$$Q_1(E) = (0.211E + 2.008) \times 10^{-2}$$

$$Q_2 \text{ from } 1(E) = (-0.008E^2 + 4.139E - 3.637) \times 10^{-3}$$

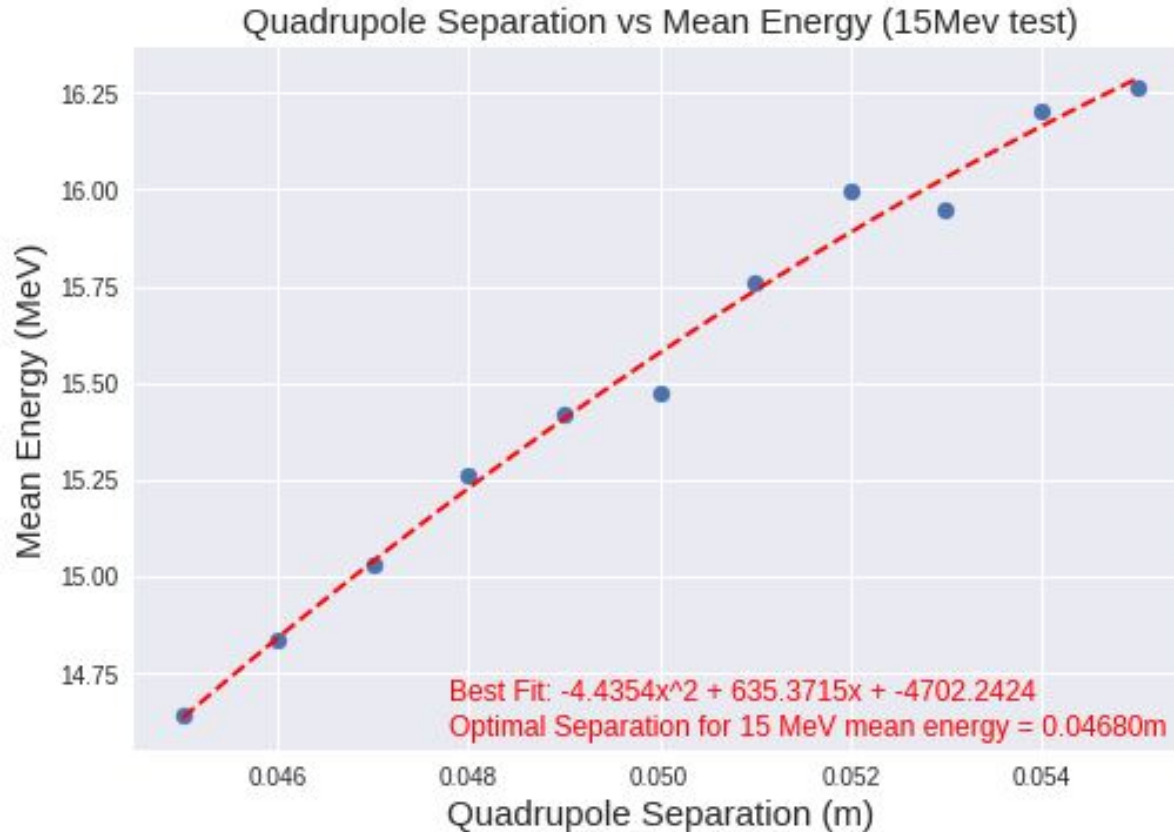
Quadrupole 1 Position  
= 0.04118m

# Quadrupole Separation for 10MeV Optimising



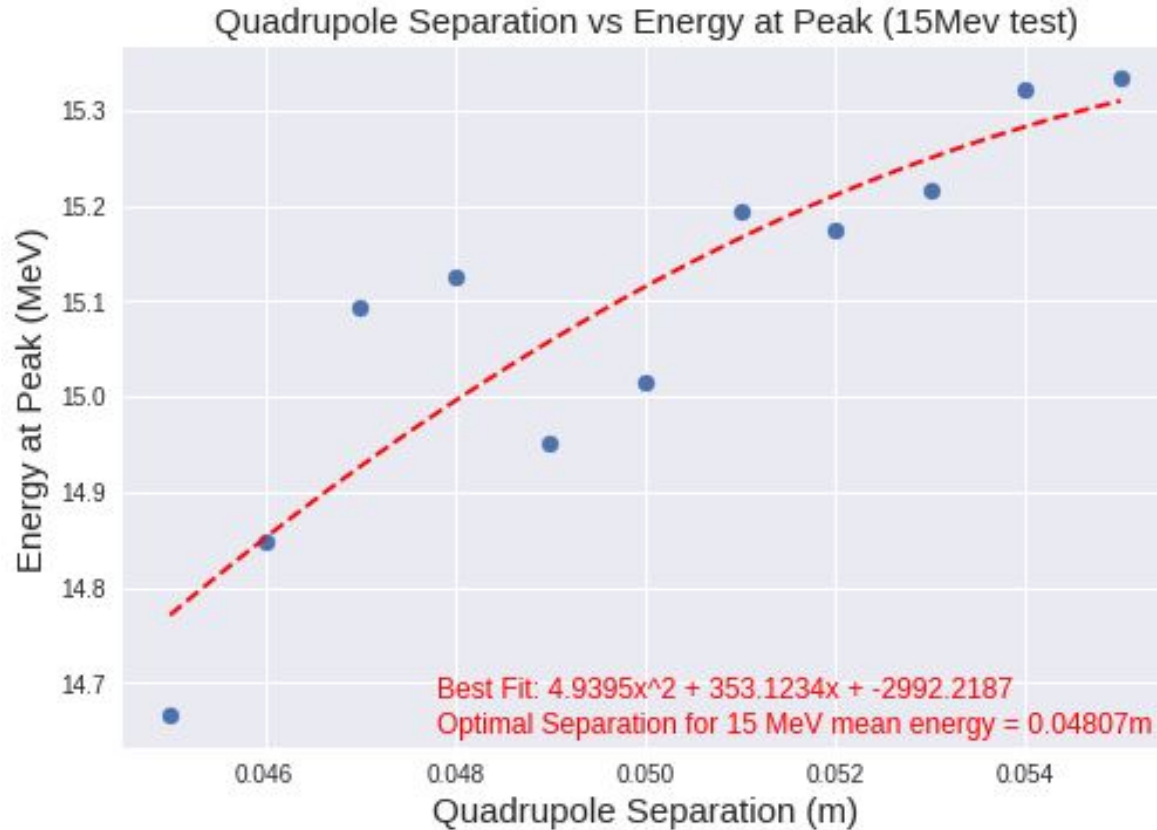
Quadrupole 1 Position  
= 0.04118m

# Quadrupole Separation for 15MeV Optimising



Quadrupole 1 Position  
= 0.05m

# Quadrupole Separation for 15MeV Optimising



Quadrupole 1 Position  
= 0.05m