

CD-4 Requirements

CD-4 Deliverables

Endstations		ABC	D
Energy	(GeV)	>6	>10
Current	(nA)	>2	>2
ϵ_x	(nm-rad)	NA	<20
ϵ_y	(nm-rad)	NA	<20

Beam Requirements for Initial Operations

Hall	Emittance (nm-rad)	Energy Spread σ (%)	Spot Size σ (μm)	Halo
A	$\epsilon_x < 10$ $\epsilon_y < 5$	< 0.05 (12 GeV)	$\sigma_x < 400$ $\sigma_y < 200$ ($\sigma_y < 100$)	$< 1 \times 10^{-4\dagger}$
		< 0.003 (2-4 GeV)	(2-4 GeV)	
B	$\epsilon_x < 10$ $\epsilon_y < 10$	< 0.1	$\sigma_x < 400$ $\sigma_y < 400$	$< 2 \times 10^{-4\dagger}$
C	$\epsilon_x < 10$ $\epsilon_y < 10$	< 0.05	$\sigma_x < 500$ $\sigma_y < 500$	$< 2 \times 10^{-4\dagger}$
D	$\epsilon_x < 50$ $\epsilon_y < 10$	< 0.5	At Radiator: $\sigma_x < 1550, \sigma_y < 550$	$< 1\%‡$
			At Collimator $\sigma_x < 540, \sigma_y < 520$	

\dagger Ratio of the integrated non-Gaussian tail to Gaussian core.

\ddagger Ratio of Halo background event rate to physics event rate.

(GlueX-doc-775-v4, GlueX-doc-646-v5)

Beam Requirements for Out-Year Operations

Hall	Emittance (nm-rad)	Energy Spread σ (%)	Spot Size σ (μm)	Halo
A	$\epsilon_x < 10$ $\epsilon_y < 5$	< 0.05 (12 GeV) < 0.003 (2-4 GeV)	$\sigma_x < 400$ $\sigma_y < 200$ ($\sigma_y < 100$) (2-4 GeV)	$< 1 \times 10^{-4}\dagger$
B	$\epsilon_x < 10$ $\epsilon_y < 10$	< 0.1	$\sigma_x < 400$ $\sigma_y < 400$	$< 1 \times 10^{-4}\dagger$
C	$\epsilon_x < 10$ $\epsilon_y < 5$	< 0.05 < 0.03 (6 GeV)	$\sigma_x < 400$ $\sigma_y < 200$	$< 1 \times 10^{-4}\dagger$
D	$\epsilon_x < 10$ $\epsilon_y < 5$	< 0.5	At Radiator: $\sigma_x < 1550, \sigma_y < 550$ At Collimator $\sigma_x < 540, \sigma_y < 520$	$< 1\%\ddagger$

\dagger Ratio of the integrated non-Gaussian tail to Gaussian core.

\ddagger Ratio of Halo background event rate to physics event rate.

(GlueX-doc-775-v4, GlueX-doc-646-v5)