

CDC Design Parameters

GlueX-doc-737 (version 3)

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February 2007

Abstract

A brief abstract of the note that will be placed on the search sites to allow searching the document

1 List of Design Parameters

Table 1: Geometry

Active volume inner radius:	10.16 <i>cm</i>
Active volume outer radius:	57.4 <i>cm</i>
Active length:	175 <i>cm</i>
Chamber assembly outer radius:	60.0 <i>cm</i>
Axial layers (1-4):	10.2 to 15.3 <i>cm</i>
Stereo layers (5-8):	15.9 to 22.5 <i>cm</i>
Axial layers (9,13):	24.4 to 33.2 <i>cm</i>
Stereo layers (14-17):	33.4 to 40.3 <i>cm</i>
Axial layers (18,23):	41.5 to 57.4 <i>cm</i>
Thickness per layer (g/cm ²):	0.051
Thickness per layer (rad. lengths):	0.0014
Thickness per 25 layers (rad. lengths):	0.035

Table 2: Material

Gas (at 1 at.):	<i>Ar/CO₂/CH₄</i> 80/10/10 (possibly)
Number of cables :	3337/24
(50-conductor shielded ribbon cables)	
Positioning accuracy of sense wires (x,y):	10 μ m
Positioning accuracy of package (z):	0.5 <i>mm</i>
Thickness of inner shell (g/cm ²):	0.162
Thickness of inner shell (rad. lengths):	0.0067
Thickness of outer shell (g/cm ²):	1.02 <i>cm</i> of fiberglass
Thickness of outer shell (rad. lengths):	0.031
Strawtube (diameter):	1.6 <i>cm</i>
Strawtube (material):	Aluminized Kapton
Strawtube (thickness):	100(5) μ m Kapton(Al)
Number of sense wires (20 micron gold-plated W):	3337 \pm 1.5%
Upstream Endplate:	0.9 <i>cm</i> Al
Downstream Endplate:	0.6 <i>cm</i> Al
Upstream Feedthrus:	Al
Downstream Feedthrus:	Delrin
Plenums:	Plexiglas

Table 3: Location active area

Upstream gas plenum:	-3 cm
Upstream active volume:	17 cm
Downstream active volume:	192 cm
Downstream gas plenum:	202 cm

Table 4: dE/dX capability

Sense wires:	YES
Momentum Range:	$p \leq 450\text{ MeV}/c$

Table 5: Operation:

Nominal operating voltage (sense):	$+1900\text{ V}$
Nominal gas gain:	5×10^4
Gas flow:	$5/\text{day}$

Table 6: Preamplifier and Readout

Nominal gain:	5^4
Noise level:	
Rise time:	$\sim 50\text{ ns}$
Tail compensation:	YES
Cable length to post-amp:	30 m
Discriminator output:	NO
Sense wires:	100 MHz FADCs

Table 7: Calibration and Resolution

Sense wires (selected charge):	electronic pulser
Perpendicular to wire (σ):	$150\text{ }\mu\text{m}$
z-position from stereo (σ):	2 mm
z-position from charge division:	8 cm