

# Hall C Target Configuration

For Gep March 2008

David Meekins

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## Target Positions

The following table gives a list of target positions and materials. (Listed BDS positions are pre corrections for cryo and vacuum motion). The home position will NOT remove the entire target stack from the beam. The configuration is valid from 3/20/08 to 6/1/08.

| Target              | Material    | BDS Position |
|---------------------|-------------|--------------|
| Loop 1 Top 20 cm    | H2          | 325132       |
| Loop 1 Bottom 4 cm  | H2          | 289470       |
| Loop 2 Top 15 cm    | He          | 253706       |
| Loop 2 Bottom 4 cm  | He          | 218013       |
| Loop 3 Top 4 cm     | vacuum      | 182180       |
| Loop 3 Bottom 15 cm | vacuum      | 146506       |
| Optics 3 foil       | Al 6061-T6  | 118326       |
| Optics 2 foil       | Carbon      | 114312       |
| 4 cm Dummy          | Al 6061-T6  | 109837       |
| 15 cm Dummy         | Al 60601-T6 | 93187        |
| 20 cm Dummy         | Al 60601-T6 | 84995        |
| Empty               | n/a         | 61385        |
| BeO                 | BeO         | 45129        |
| Copper              | Copper      | 28873        |
| Carbon              | Carbon      | 12617        |
| Thick Carbon        | Carbon      | -3638        |

## Vacuum and Cryo Motion

The vacuum and cryo motion for the target was not measured. The instruments to measure the motion were damaged by radiation.

## Solid Target Ladder

The following table gives the target foil position, thicknesses and chemical purities.

| Target Position | Target    | Purity | Thickness g/cm <sup>2</sup> |
|-----------------|-----------|--------|-----------------------------|
| Empty           | n/a       | n/a    | n/a                         |
| Carbon Hole     | 2 mm hole | n/a    | n/a                         |
| Copper          | Copper    | 99.95% | 0.17775 ± 0.00015           |
| Thin Carbon     | Carbon    | 99.95% | 0.8879 ± 0.0010             |
| Thick Carbon    | Carbon    | 99.95% | 2.6547 ± 0.0017             |

Error in thickness is from measurement of area and mass only. Outside thickness (measured with micrometers) variations in the foils are less than the reported error. Error also does not include possible voids in materials.

## Fluid Targets

There are three loops, each with two cells, on the current cryotarget stack. The loop 1 is configured with 20 and 4 cm conflat style cells. Loops 2 and 3 are configured with 4 and 15 cm conflat style cells. The 20 cm cell is offset 38.39 mm downstream to accommodate large angle scattering. The following table gives the cell thicknesses for each position on the stack. All cells are made of Al 7075-T6 aluminum alloy.

| Target Position     | Entrance window thickness (mm) | Exit window thickness (mm) | Wall thickness (mm) |
|---------------------|--------------------------------|----------------------------|---------------------|
| Loop 1 top 20 cm    | 0.122 ± 0.005                  | 0.163 ± 0.012              | 0.157 ± 0.017       |
| Loop 1 bottom 4 cm  | 0.107 ± 0.008                  | 0.147 ± 0.008              | 0.142 ± 0.004       |
| Loop 2 top 15 cm    | No Data                        | 0.207 ± 0.055              | No data             |
| Loop 2 bottom 4 cm  | 0.145 ± 0.004                  | 0.149 ± 0.008              | 0.141 ± 0.014       |
| Loop 3 top 4 cm     | 0.110 ± 0.004                  | 0.147 ± 0.008              | 0.142 ± 0.021       |
| Loop 3 bottom 15 cm | 0.128 ± 0.002                  | 0.194 ± 0.009              | No data             |

## Optics Targets

The optics target has 3 positions. The first position has 3 foils on each at  $z = \pm 7.5$  cm and 0; the second has positions at  $z = \pm 2$  cm; the third has positions at  $z = \pm 3.8$  cm. The following table gives the foil thickness and positions. Carbon foils are 99.95% carbon. Positions less than 0 are upstream from the nominal target center.

| Position | Z position | Material | Thickness (g/cm <sup>2</sup> ) |
|----------|------------|----------|--------------------------------|
|----------|------------|----------|--------------------------------|

|                  |             |            |                 |
|------------------|-------------|------------|-----------------|
| 3 foil           | Z = -7.5 cm | Al 6061-T6 | 0.2651 ± 0.0020 |
| 3 foil           | Z=0         | Al 6061-T6 | 0.2658 ± 0.0020 |
| 3 foil           | Z = 7.5 cm  | Al 6061-T6 | 0.2672 ± 0.0020 |
| 2 foil z = ± 3.8 | z = + 2     | Carbon     | 0.1659 ± 0.0012 |
| 2 foil z = ± 3.8 | z = +-2     | Carbon     | 0.1654 ± 0.0012 |
| 2 foil z = ± 2   | z = +-3.8   | Al 6061-T6 | 0.2663 ± 0.0020 |
| 2 foil z = ± 2   | z = +-3.8   | Al 6061-T6 | 0.2600 ± 0.0019 |

Each of these targets is 25 mm wide at the beam interaction point. Please see picture to get a better view of the configuration.

### Dummy Targets

The dummy targets consists of 2 aluminum alloy foils aligned with the end caps of a given cell (i.e. the 15 cm dummy has two foils placed at  $z = \pm 7.5$  cm). The foils are 0.8 cm wide (beam transport  $x$  direction). The following table gives the positions and thicknesses of these foils. The alloy is Al6061-T6.

| Target      | Foil Number | Position        | Thickness (g/cm <sup>2</sup> ) |
|-------------|-------------|-----------------|--------------------------------|
| 15 cm Dummy | Foil 1      | Upstream foil   | 0.2658 ± 0.0035                |
|             | Foil 2      | Downstream foil | 0.2549 ± 0.0034                |
| 20 cm Dummy | Foil 3      | Upstream foil   | 0.2628 ± 0.0035                |
|             | Foil 4      | Downstream Foil | 0.2650 ± 0.0035                |