

Heat Shield for the Primex Liquid Helium Target

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A new heat shield surrounding the target cell was installed inside the Hall D cryotarget for Primex experiment, on March 1 2019. The new shield was required in order to condense liquid ^4He into the target cell. A drawing with relevant dimensions is given below.

The shield is comprised of two parts. The first part is located upstream of the target cell and is made of copper C101. This is cooled via thermal contact with the first stage of the cryotarget's pulse tube refrigerator. The second part of the shield surrounds the target cell and is made of high purity, 1100-series aluminum. It is 0.51 mm thick, approximately 57.0 mm in diameter, and 373 mm long. There is a 33 mm hole in the downstream end for the photon beam to pass through. This hole is covered by a 25 μm thick aluminum foil. The distance from the downstream end of the LHe target cell and this foil is approximately 28.5 mm, although the uncertainty in this distance might be as high as 6 mm.

Both the LHe target cell and the aluminum heat shield were surrounded by five layers of aluminized mylar and cerex (also known as "super-insulation"). The areal density of one layer of the super-insulation is about 2.9 mg/cm². There is no super-insulation on the downstream end of either the target cell or heat shield.

