MOLLER Solid Targets

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This document outlines the Solid Target ladder for MOLLER, as constructed by the JLab Targets group. This information is not new, and was documented on several WWW pages, but is intended for posting on the DocDB to allow more general access.

Note: The Target ladder will have only vertical motion.

The target positions ”in beam” are, starting vertically from the top:

1. Downstream 2 mm hole
2. Downstream ^{27}Al 6 mm thick
3. Downstream ^{27}Al 12.5 mm thick
4. Downstream ^{12}C 40 mm thick
5. Upstream ^{12}C 2 mm thick
6. Upstream 2 mm hole
7. Upstream ^{27}Al 1 mm thick
8. Upstream ^{27}Al 2 mm thick
9. empty (no target in beam)
10. Optics 1: Upstream ^{12}C foil, 0.254 mm thick at z = -624.5 mm (center of foil)
11. Optics 2: Downstream ^{12}C foil, 0.254 mm thick at z = +624.5 mm
12. Optics 3: Middle ^{12}C foil, 0.254 mm thick at z = 0.127 mm (center of lH2 target)

Isometric and end-views of the target ladder are attached; see Fig. 1 amd Fig. 2.

The “Hole” targets are for beam/target alignment purposes.

All target thicknesses are in the beam direction.

Additional notes: we will be able to study radiative-tail effects using:

1. ^{12}C - we will be able to take data with targets that have: 1.3% X_0, 10% X_0, and 20% X_0
2. ^{27}Al - we will be able to take data with targets that have: 1.1% X_0, 2.3% X_0, 7% X_0, and 14% X_0

Since we will have solid targets (both ^{12}C and ^{27}Al) at both upstream and downstream locations, will also be able to study Z-dependent edges in our acceptance, and in our optics-map.

The thickest solid targets (4 cm thick ^{12}C and 12.5 mm thick ^{27}Al) are also there for potential A_{PV} and A_T (BNSSA) measurements from those nuclei.

Also, we need to update the remoll GDML to ensure that the positions and thicknesses are correct there. See also an elog with our original request to the targets group: https://dilbert.physics.wm.edu/Tracking/72

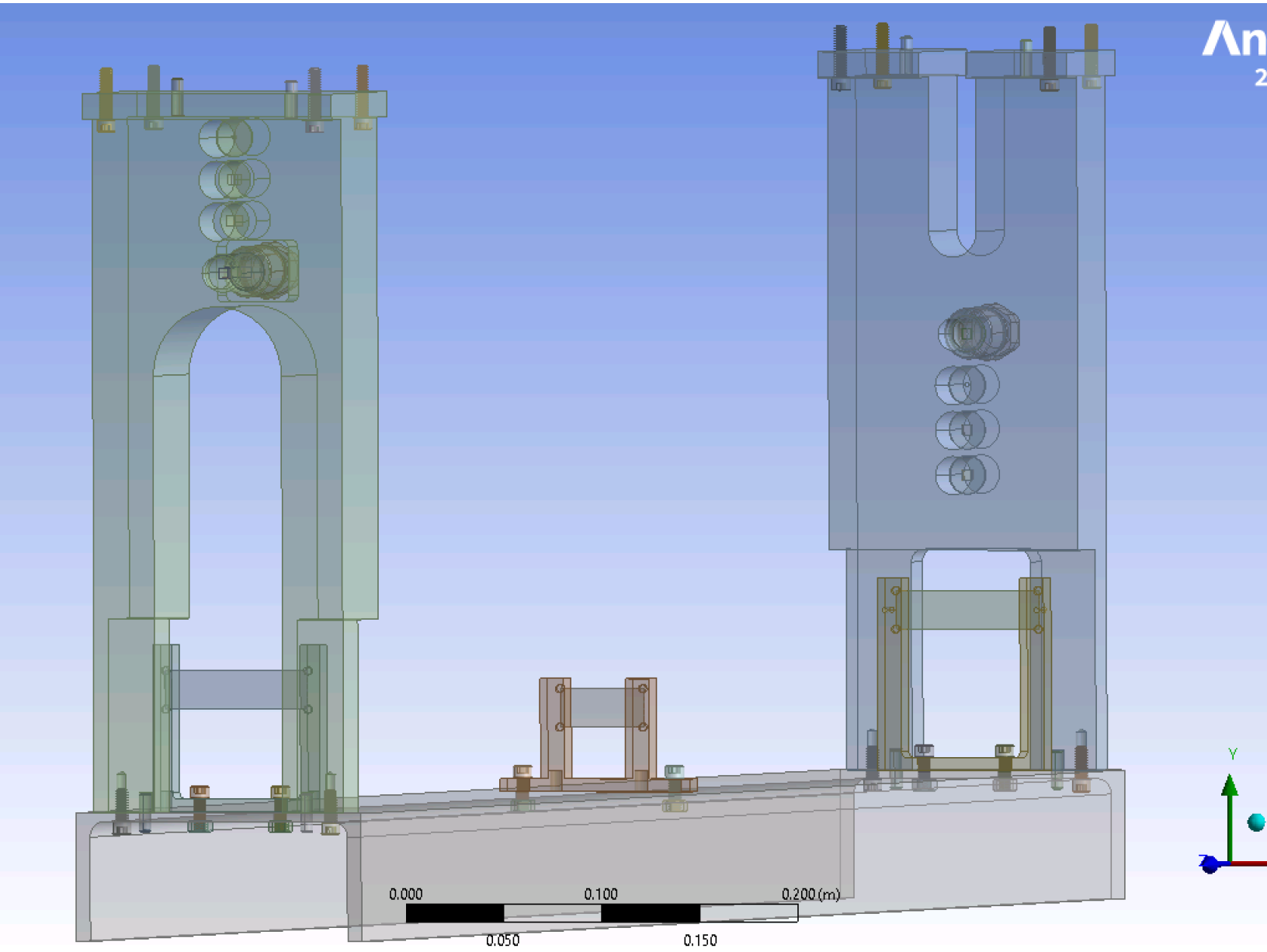

Figure 1: Isometric CAD view of the MOLER solid target ladder. Upstream is on the right (beam goes right to left)

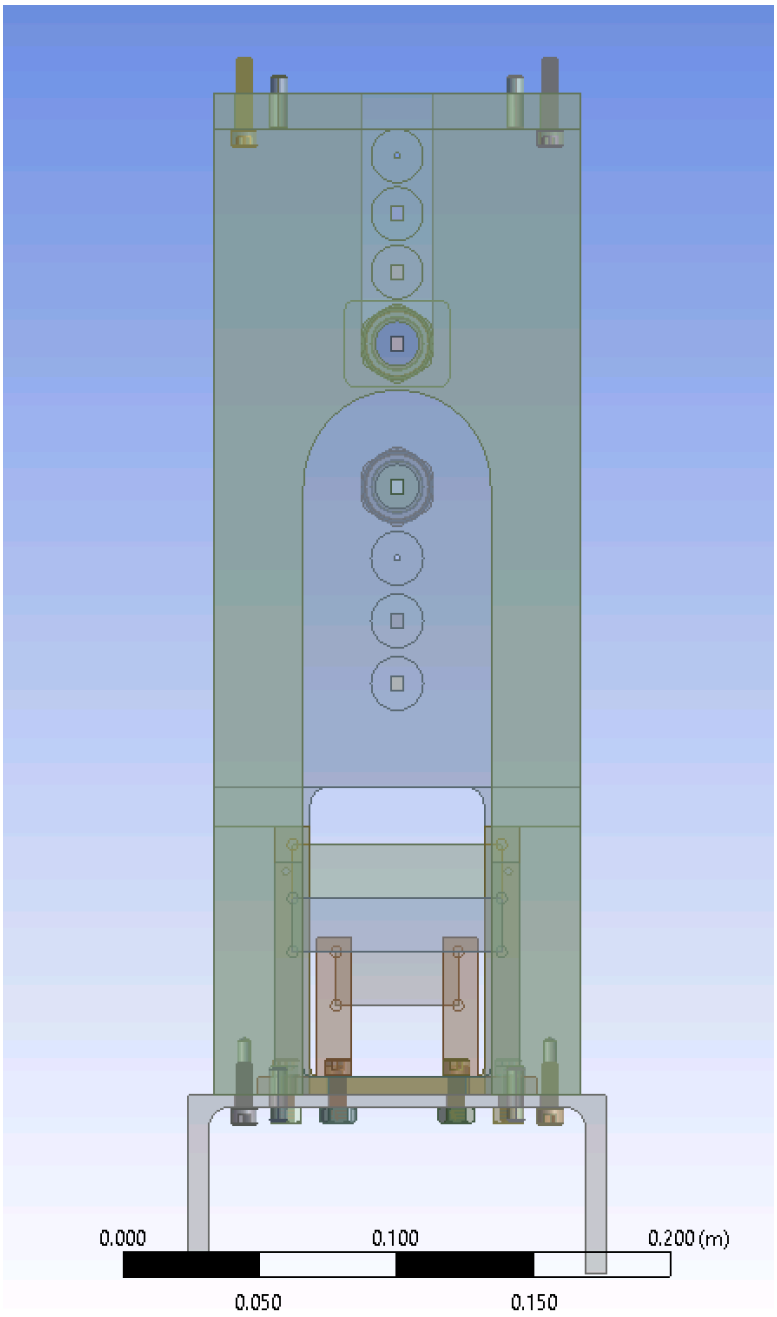

Figure 2: Endview CAD of the MOLLER solid target ladder.