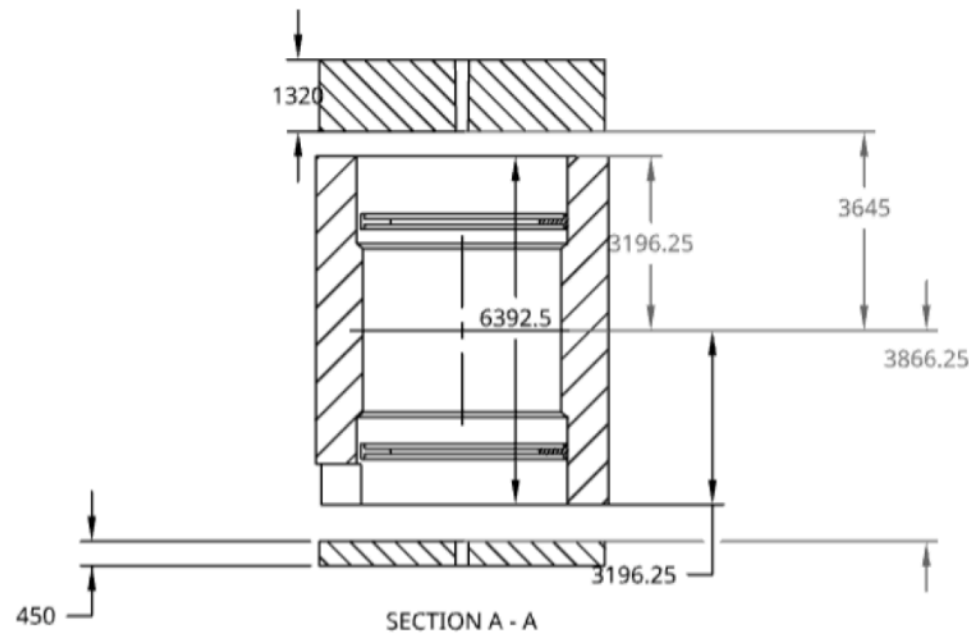


LFHCAL Geometry: Simulation vs. Project

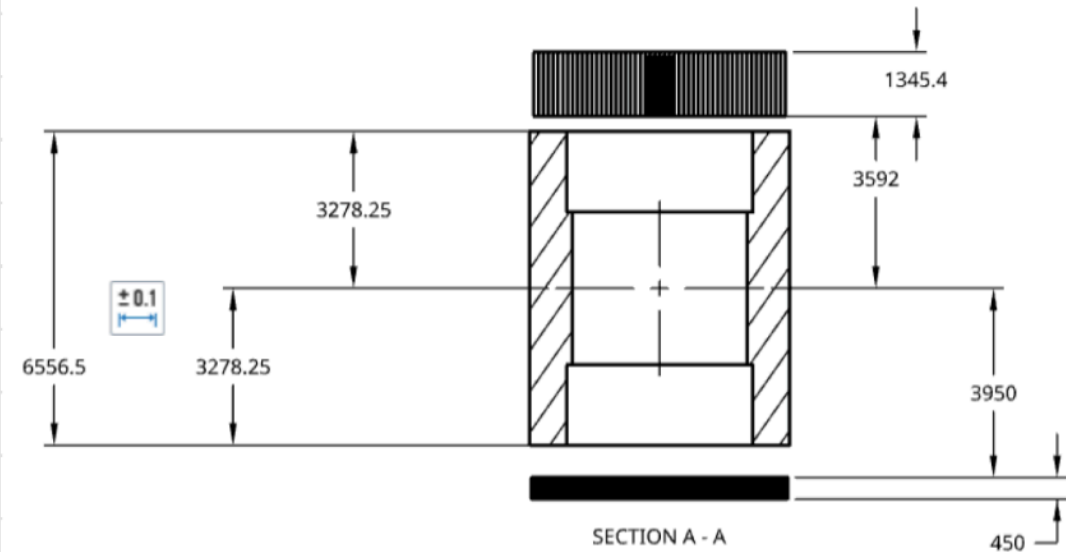
Peter Steinberg / 16 September 2025 / ePIC simulations

Longitudinal sizes

March, 2025 Envelopes



ePIC-25.08.0 simulation geometry

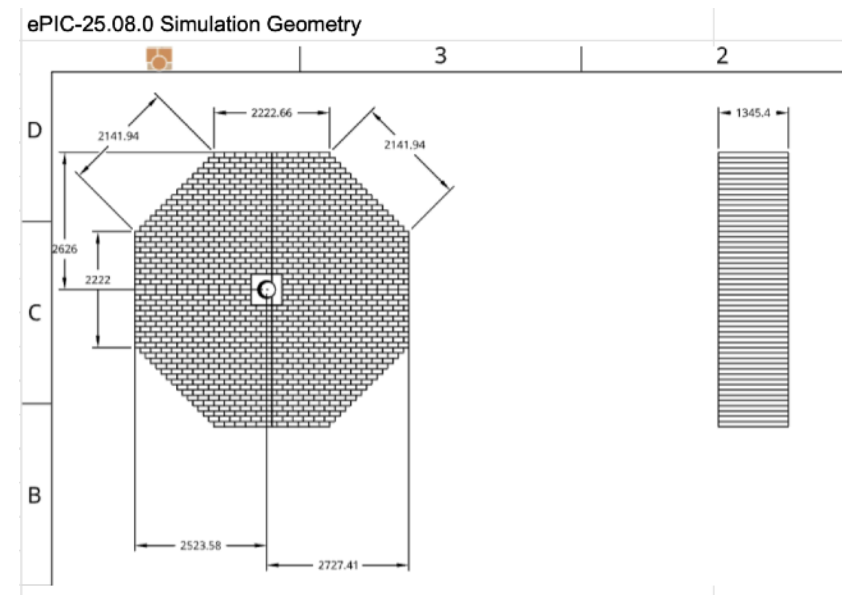
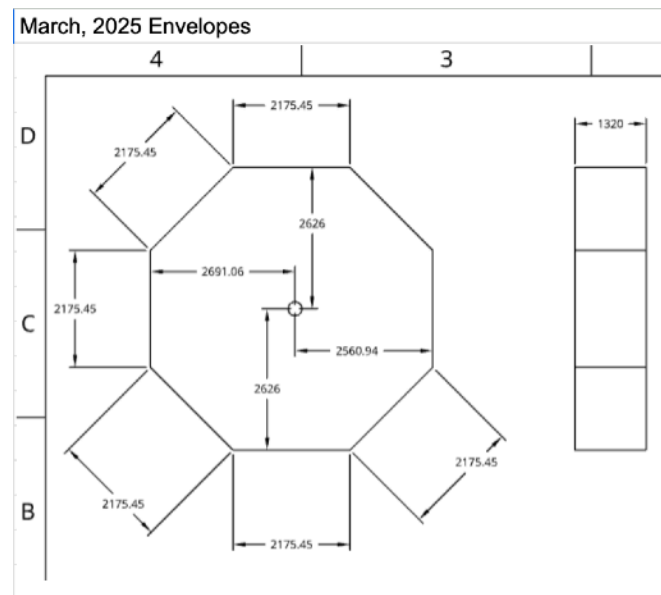


	Project envelopes	25.08.0 simulation	Delta	Comments
Total 1/2 length	3645+1320=4,965	3592+1345=4,937	28	Project “longer” overall
LFHCal length	1320	1345	25	Geometry includes mounting plate
BHCal 1/2 length	3196.25	3278.25	82	Project missing dogbones?
LFHCal front	3645	3592	53	25.08 is “closer”
fEMCal gap	448.75	313.75	135	Envelope has larger gap

Project should keep overall longitudinal envelope, but 1) extend LFHCAL by 25.4 mm, accounting for mounting plate, 2) extend BHCal (after checking w/ DSC) to 3278.25, leaving 340mm gap for fEMCal

Simulation should move LFHCAL back by 28mm to agree with project envelope, leaving 341mm gap for fEMCal

Transverse sizes



Total horizontal and vertical extent is $2626 \times 2 = 5,252$ mm (25.08 is shorter by 1mm horizontally in simulation)

Serious issue #1: based on position of hole, envelope perspective starts at interaction point ($z=0$):
+x is in negative direction!

Conversely: Simulation geometry is looking back at IP from positive z,
so positive x is in the positive direction

Serious issue #2: simulation geometry is made of 8M “bricks” which are 20x10cm+margin:

In vertical: $2222/22$ blocks = 101 mm, i.e. 10cm + 1mm margin (100+1 actual)

In horizontal direction: $2222.66/11 = 202.06$, i.e. 20cm + 2mm margin (reflecting original design & request for 2mm gap from project)

Conversely: March 25 envelope vertical distance is 2175.45, which is 46.55mm too short.

Horizontal distance is a similar issue. In both cases, module dimensions < actual

**NB: Discussions w/ LFHCAL management reveal that modules are 199mm wide, which needs to be fixed in sim,
But this is also not consistent with 2175.45 for 11 modules (198mm/module including gaps)**

**Proposal: simulation geometry is correct, up to 1mm reduction/module, and envelope should be
Revised to reflect the number of modules and the module width**

One non-issue: Envelope distance of beam hole to closer edge is 2560.94 which looks 37.4mm “longer” than 2523.58

This is looking from opposite sides, so explained by 0.025 rad crossing angle over 1345.4mm = 33.6mm