

Design progress of CEPC electromagnetic calorimeter

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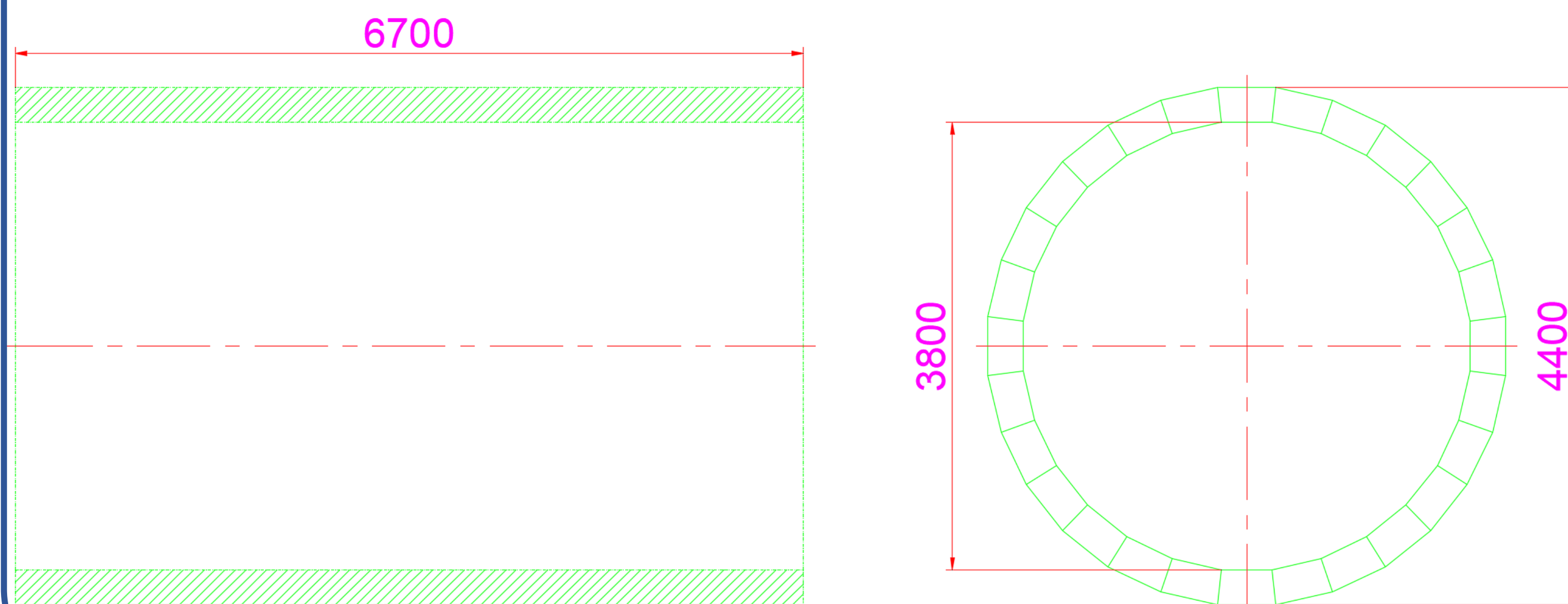
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Abstract

CEPC electromagnetic calorimeter is mainly composed of three parts, including an external honeycomb frame, an internal BGO crystal module and a BGO crystal readout unit. The main update of this design includes the optimization of the size of the honeycomb frame, the optimization of the size and arrangement of the internal crystal bars, and the discussion of different installation methods.

Detailed Structure

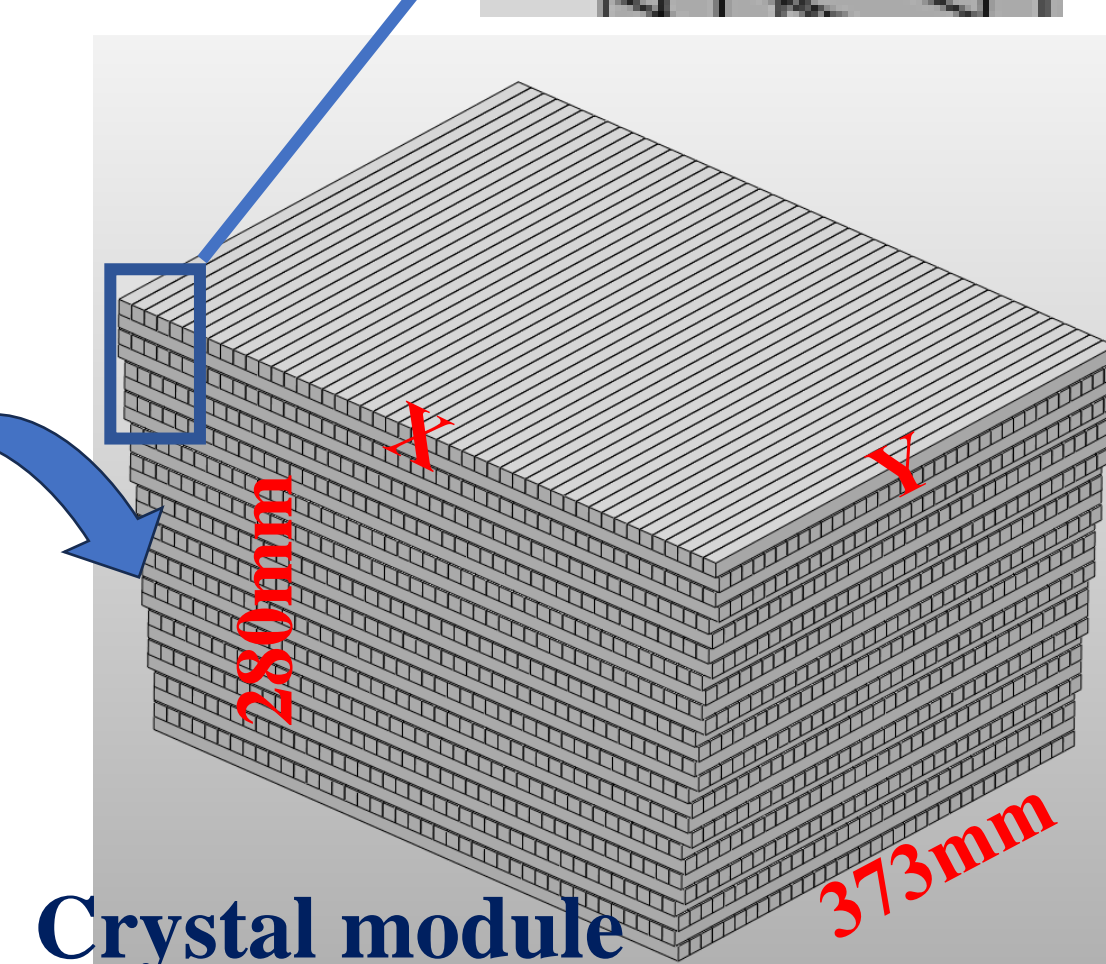
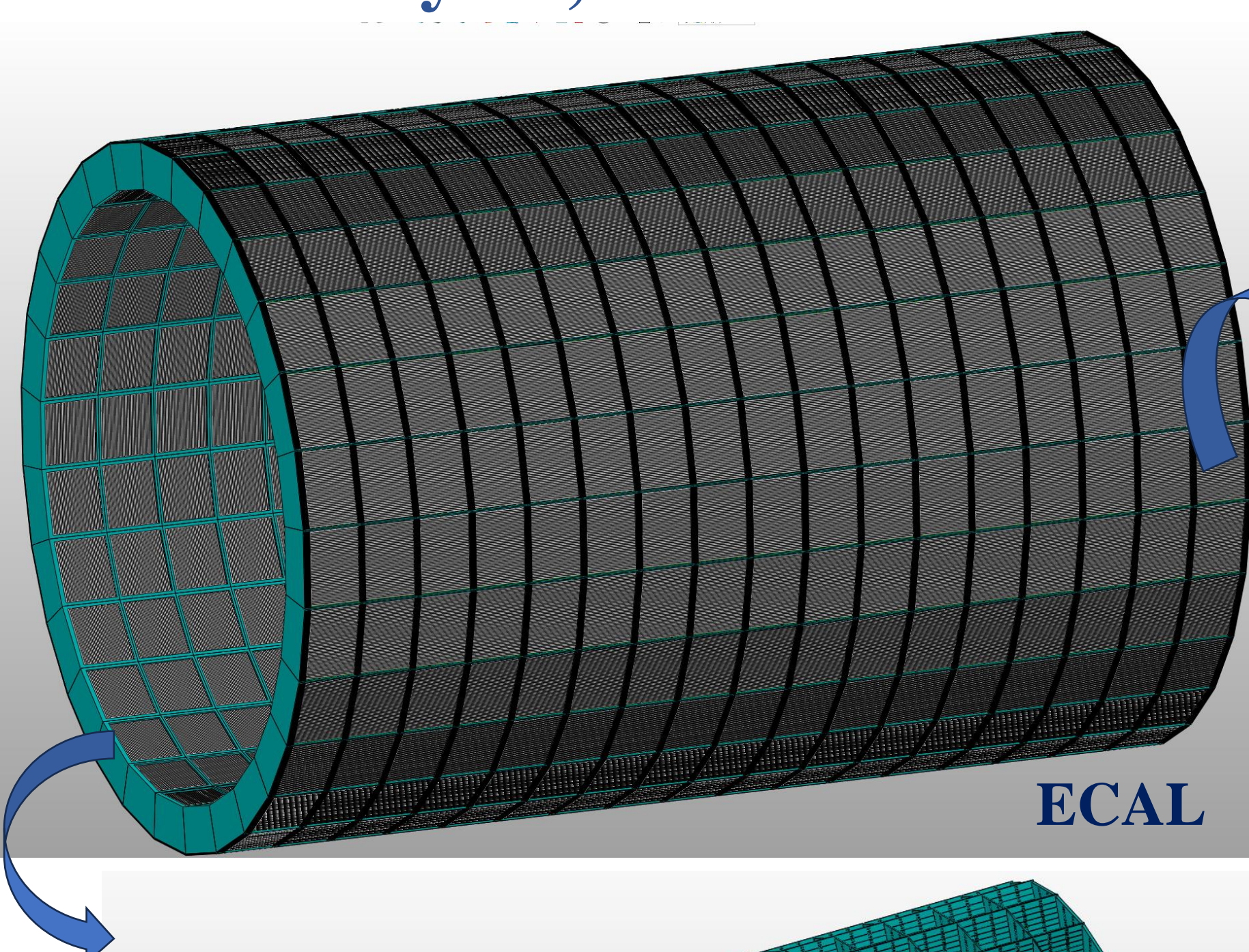
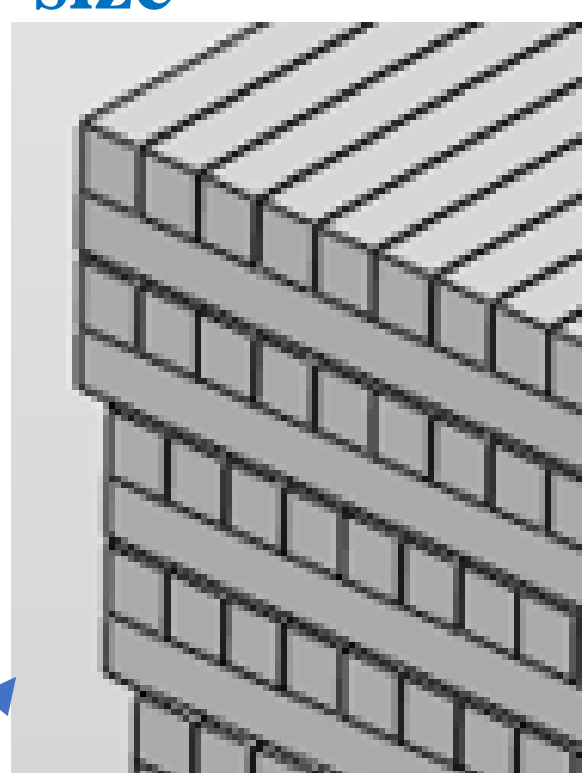
The reference dimensions of ECAL are shown in the following figure. The reference length is 6700mm, the outer diameter is 4400mm, and the inner diameter is 3800mm.



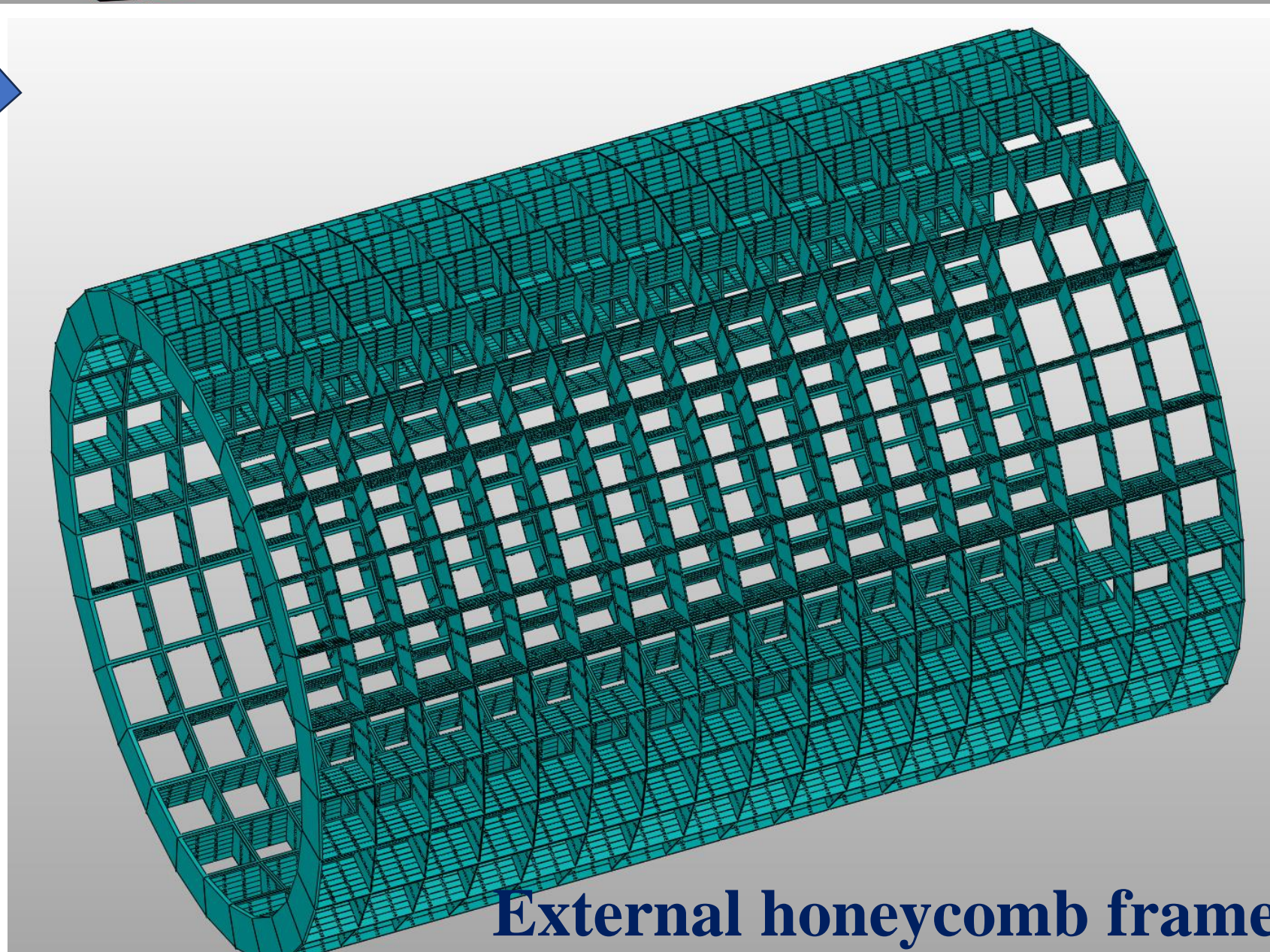
Barrel ECAL geometry design

Barrel ECAL is composed of 17 rings along the beam direction, with each ring containing 28 crystal modules weighing about 344kg; Each crystal module is divided into 7 groups, with different sizes of crystal bars in the X direction. The size decreases from the center to the outer edge. Each module contains 1134 crystal bars, which are arranged orthogonally between layers, readout from two ends.

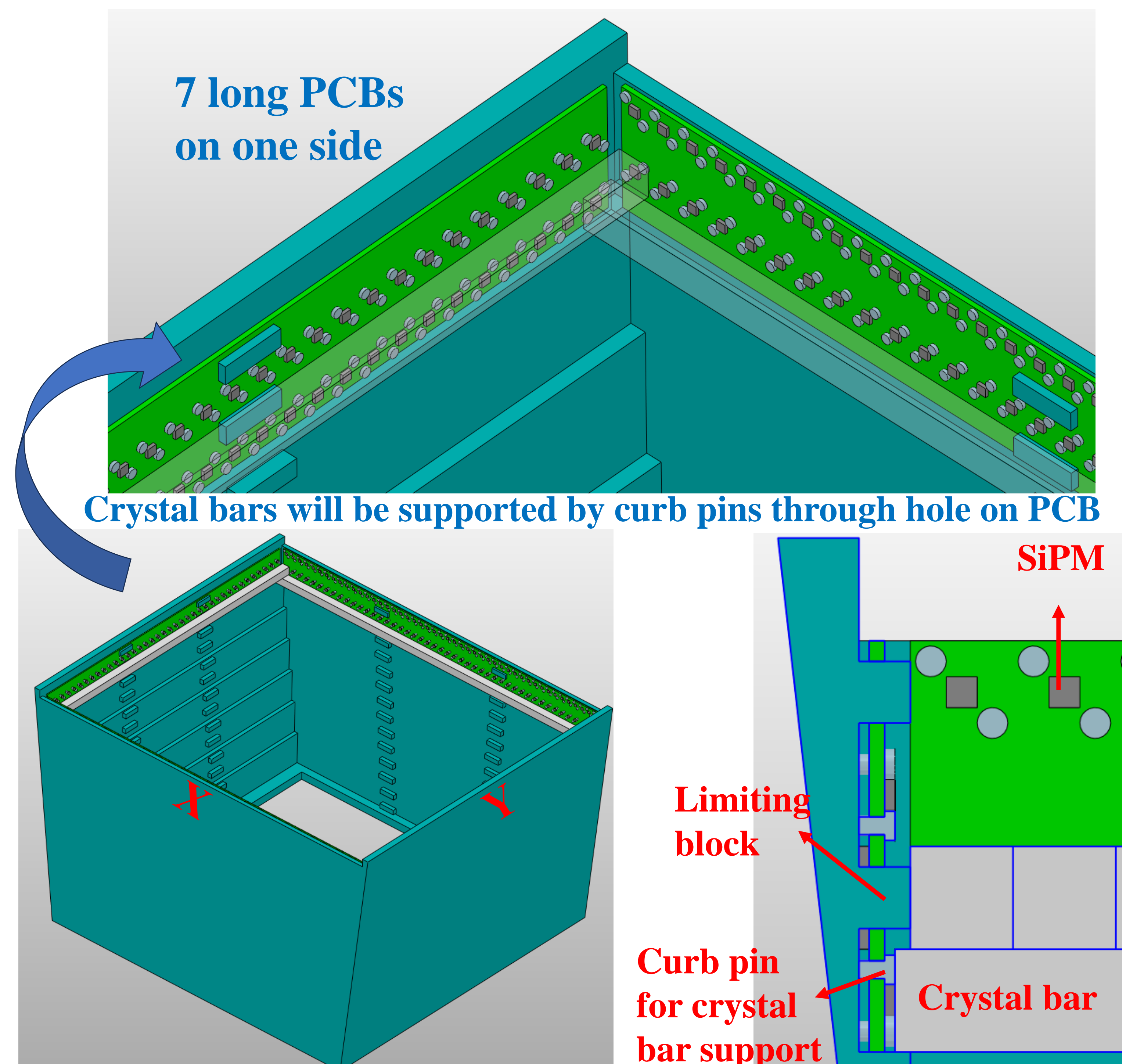
4 layers per group with the same Y direction size



The length of the external honeycomb frame is 6660mm, The weight is approximately 2.8 tons with carbon fiber material, and approximately 4.1 tons with aluminum material.



Detailed assembly of PCB and crystal bars

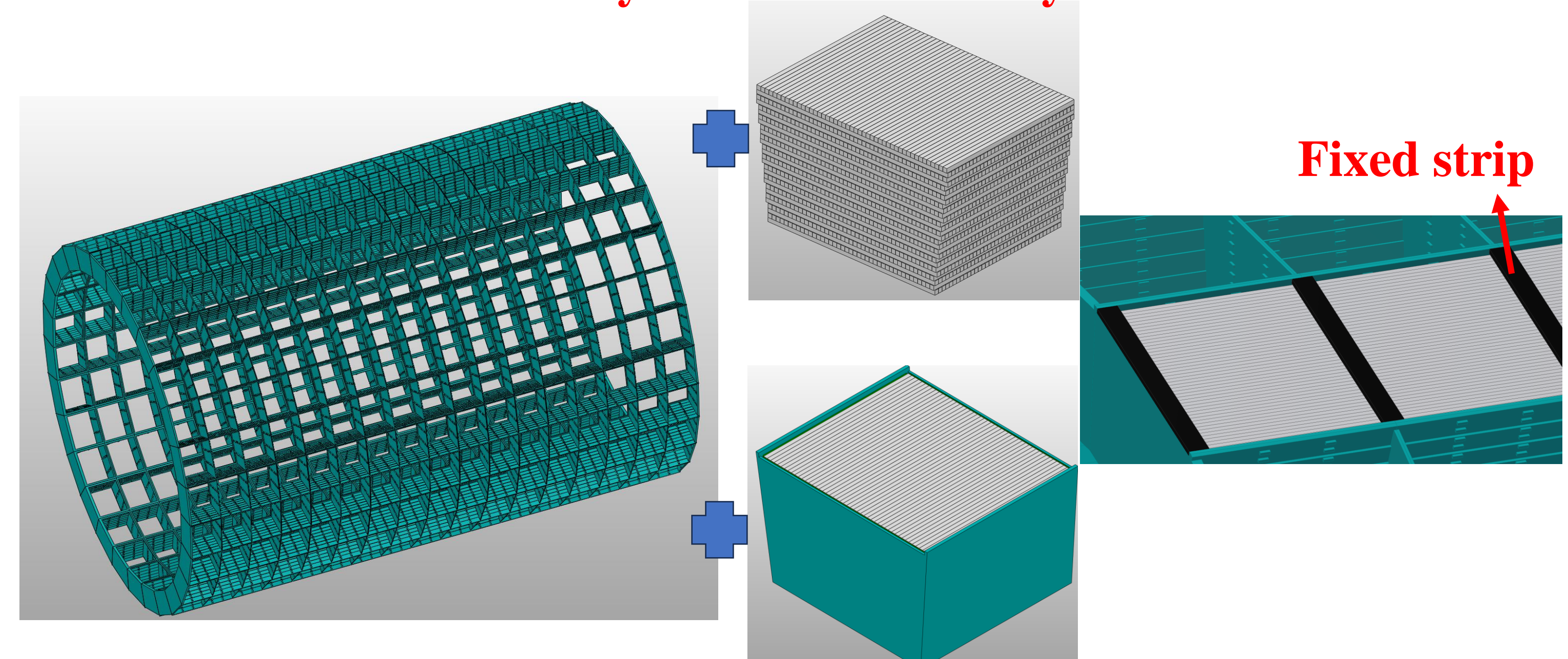


The crystal bars in the X direction are supported by steps every four layers, while the crystal bars in the Y direction are supported by the crystal bars in the X direction; The two ends of the crystal bars are fixed by two curb pins, while the sides are fixed by two limiting blocks.

Question : Assembly under honeycomb structure

- Assembly of a single crystal bar

Key issue: Inefficiency



- Assembly of unit module

Key issue: Large amount of substance