



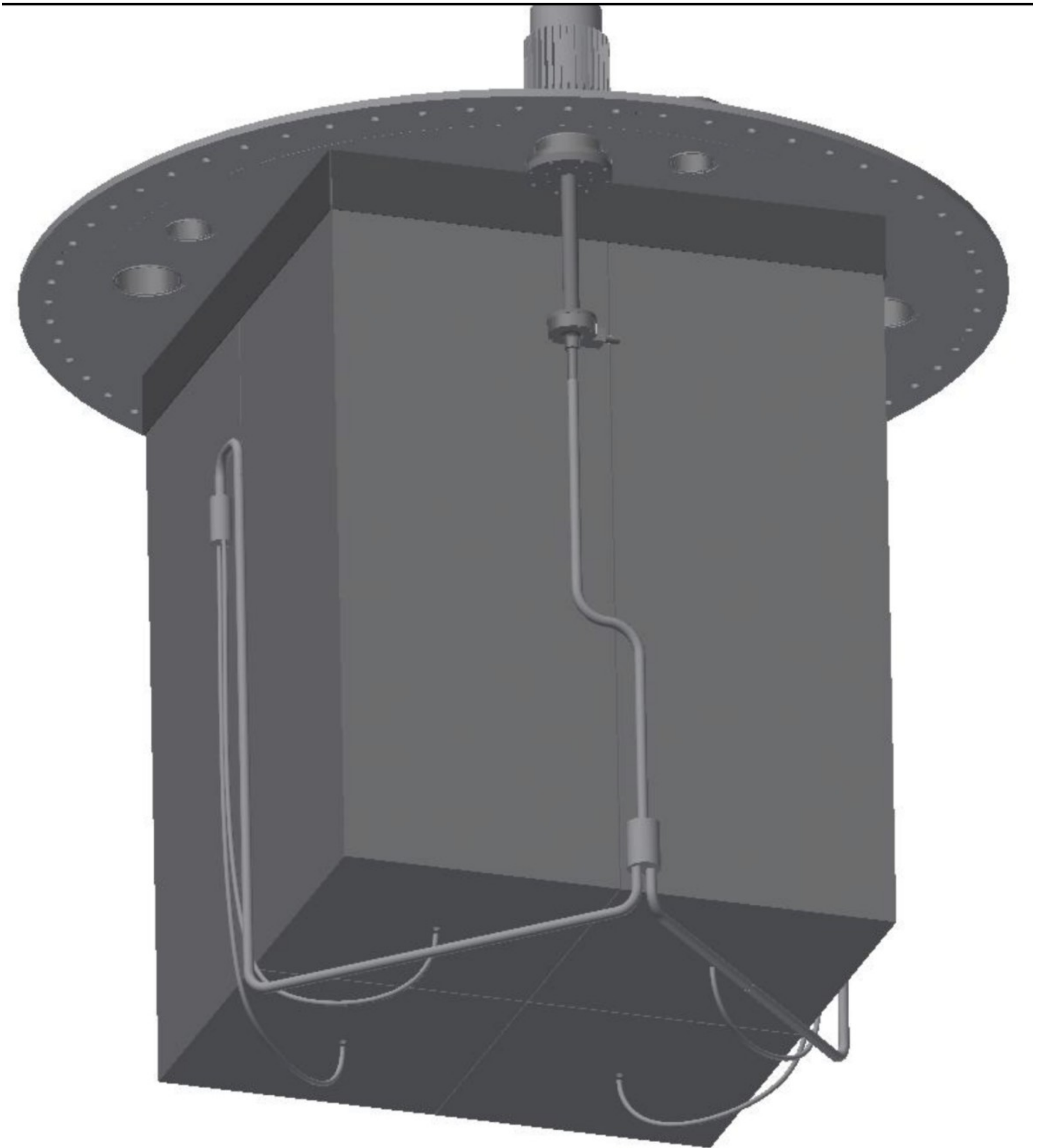
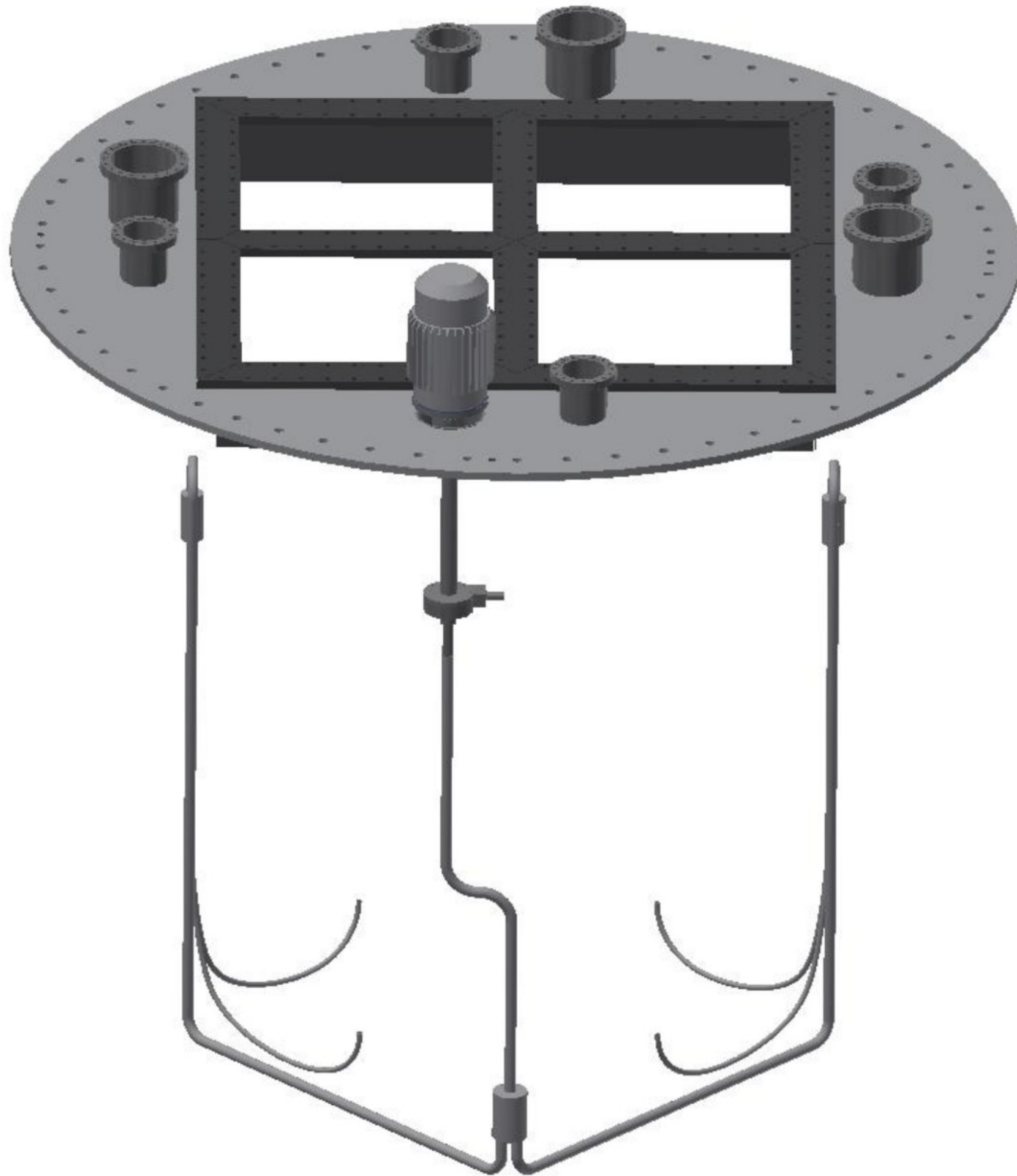
Cubism - Braque's Bottle and Fishes, Paris c.1910-12

ArgonCube 2x2 Cryo Update



Cryo meeting
Nov 18th 2019
James Sinclair, LHEP ¹

Cryogenic Scheme for Barber Nichols Review

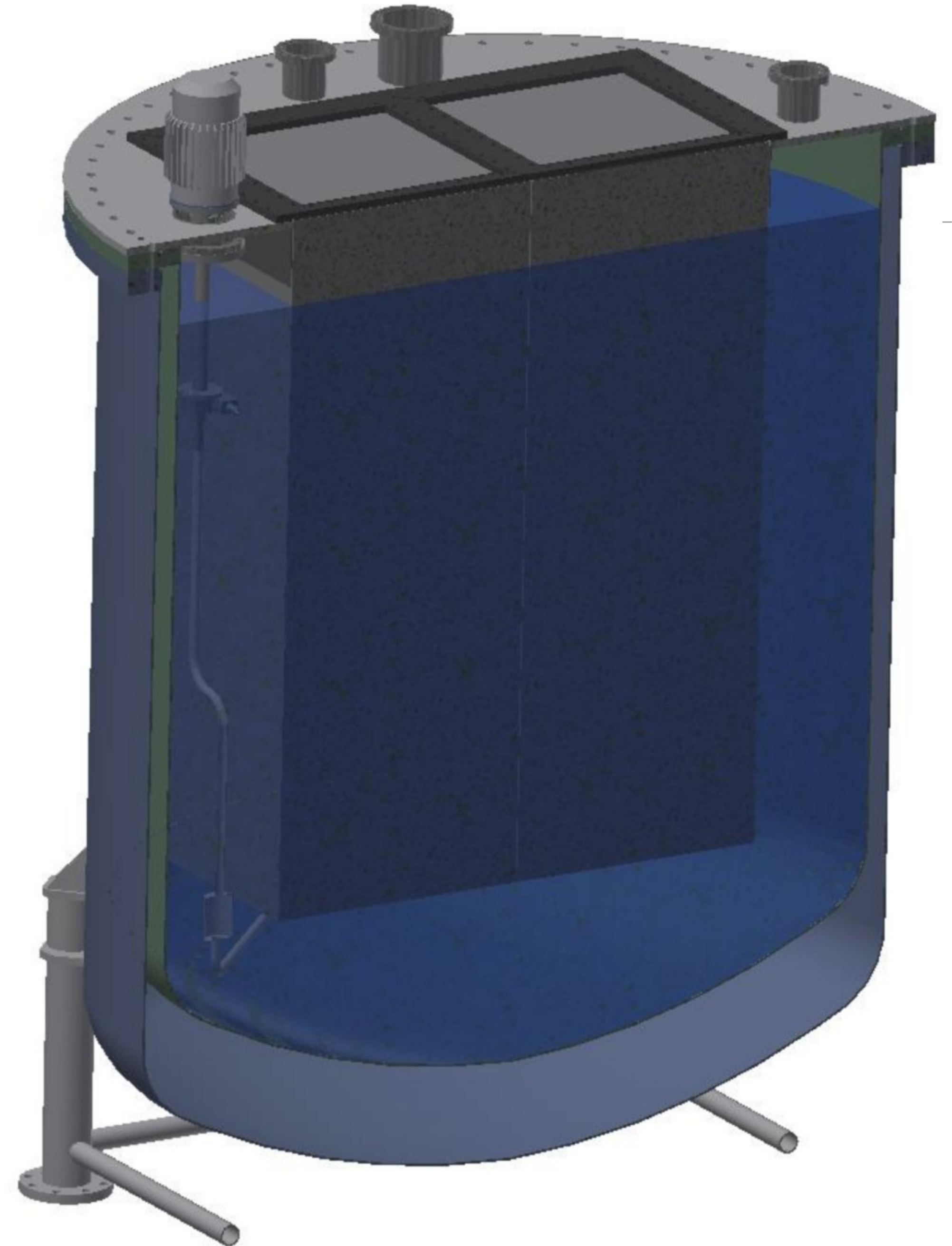


A Comment on Ullage

Total volume of cryostat = 6.4 m^3

To achieve 10% ullage ($5.8 \text{ m}^3 \text{ LAr}$) LAr level is 0.2 m below top flange.

Strong desire to keep it at 0.2 m to maximize pump head. Pump impeller at 0.43 m below flange, 0.23 m below liquid.



A Comment on Ullage

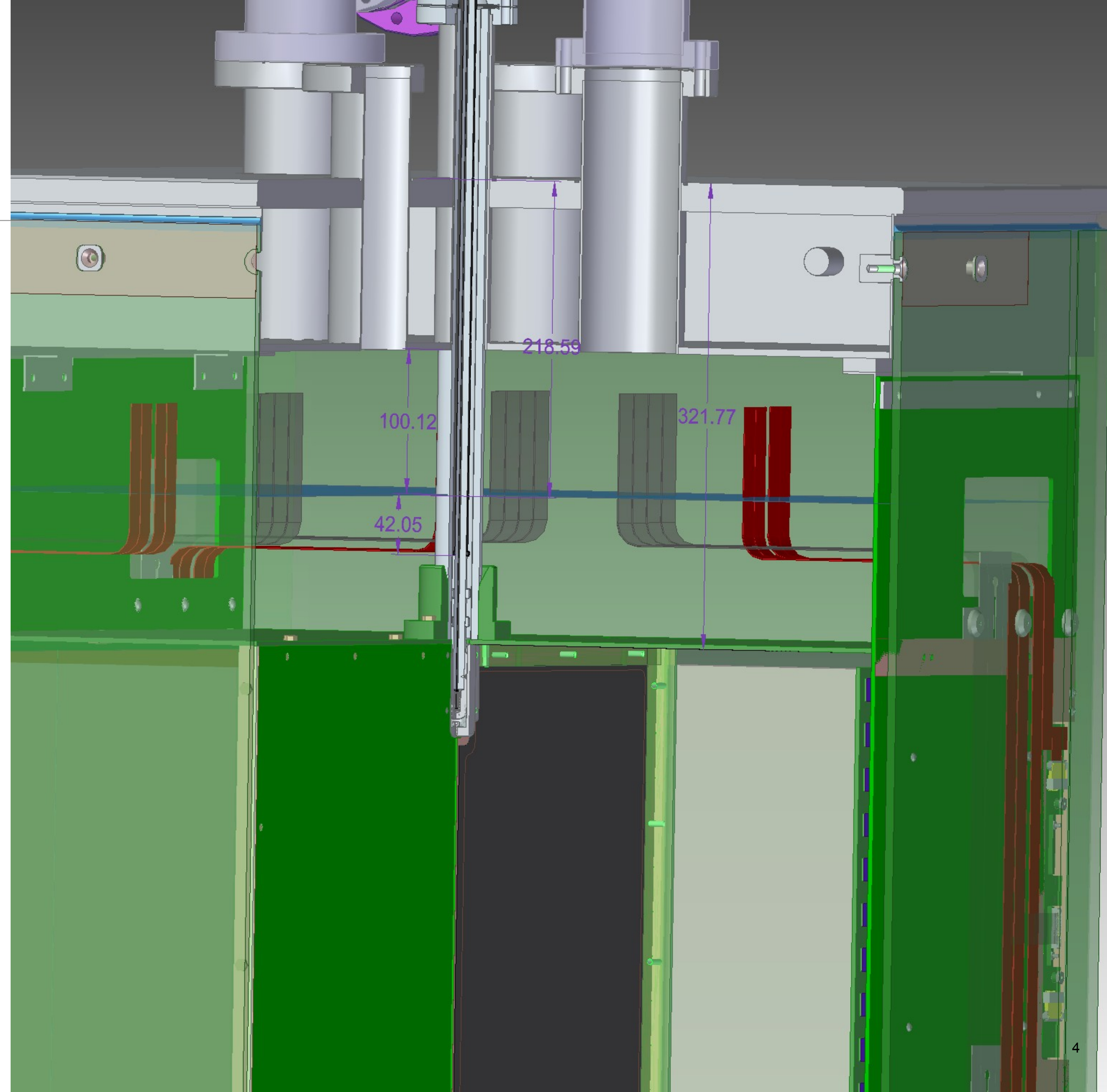
0.2 m LAr level corresponds to 0.1 m below vacuum pocket in module.

Conservatively 7% ullage.

Volume of submerged material and gas volume in feedthroughs will increase ullage

If 7% is a real safety concern, we can add a gas volume above each module.

N.B. industrial standard for natural gas is 5%. ICARUS operated at 2%.



Filter Cooling

We are adapting a LHe cryostat to cool the LAr filters with LN2 at 2.25 bar.

Manufacturer (Cryogenic Ltd) says the cryostat will be ok at 2.25 bar.

We will not test at 400% (9 bar). Instead, we will purchase a rated cryostat for use at FNAL.

