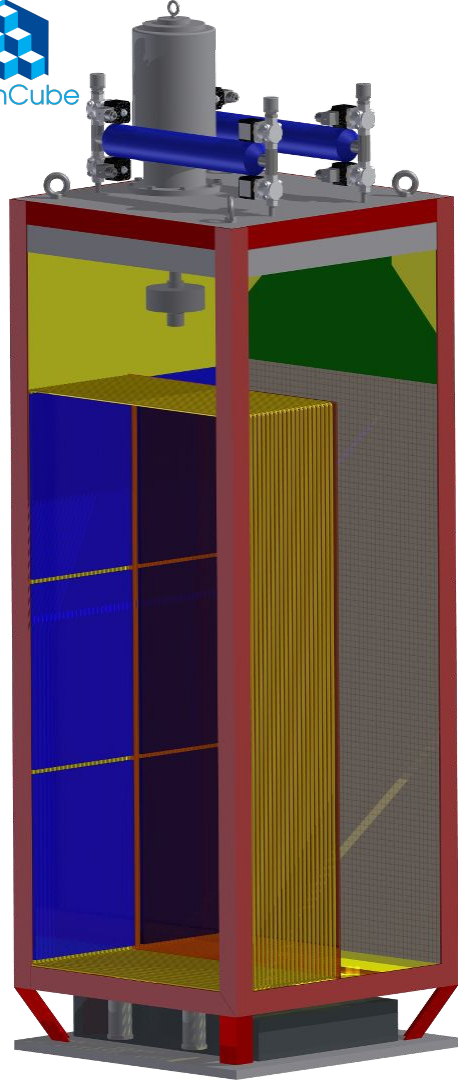


ArgonCube - Initial Module Design and Function

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AEC-LHEP

ArgonCube meeting
October 2017, Bern



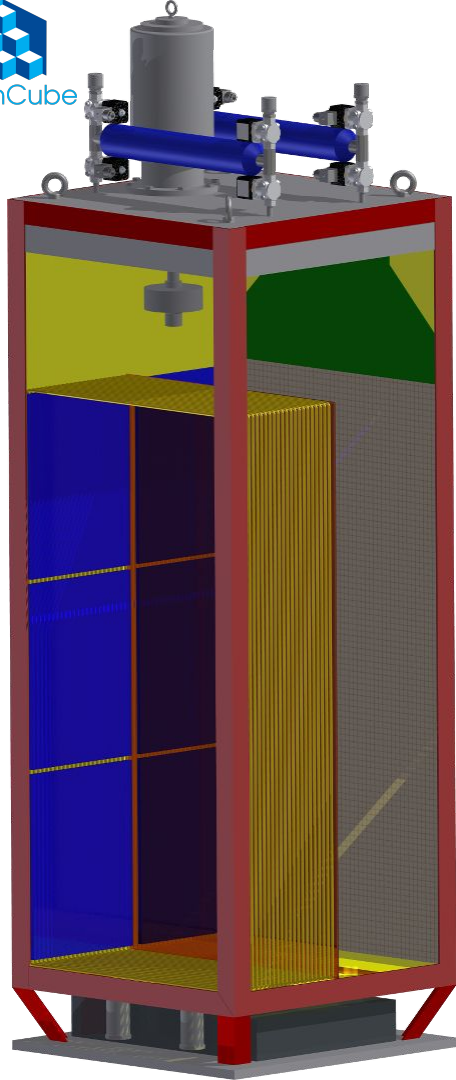
Quick update on the initial module design and ideas:

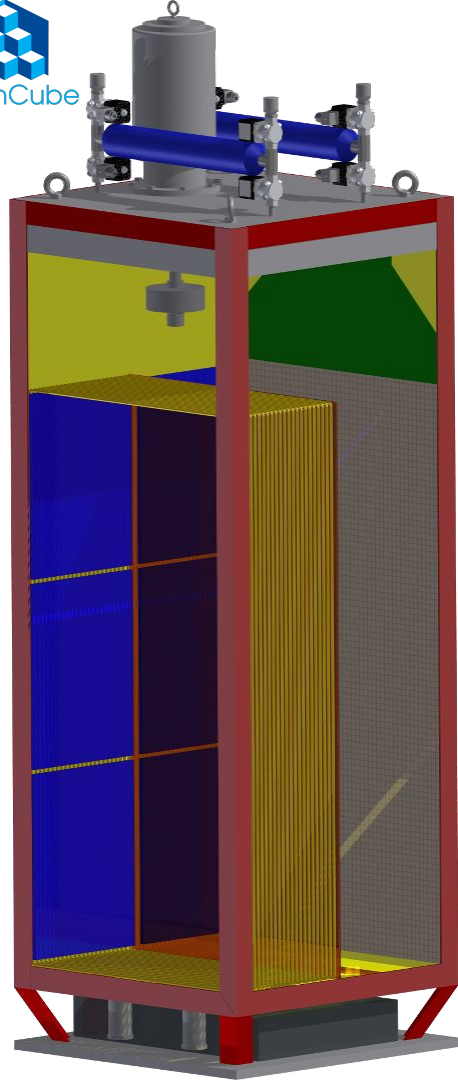
- ‘Services’ relocation
- General operational idea
- Bill of materials

Services: Up is the new down.

Moving 'active' elements to the top:

- More weak points are accessible/replaceable.
- Putting filters on the bottom gives a module a finite lifetime.
- Pump on top is cheaper and serviceable than submerged.

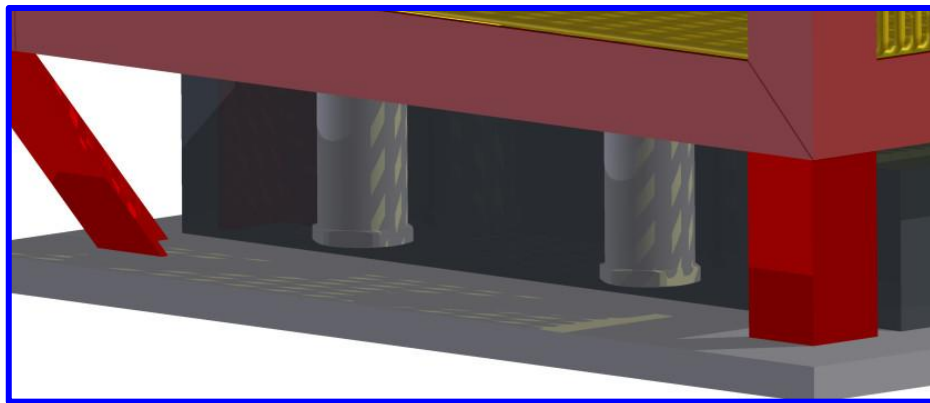
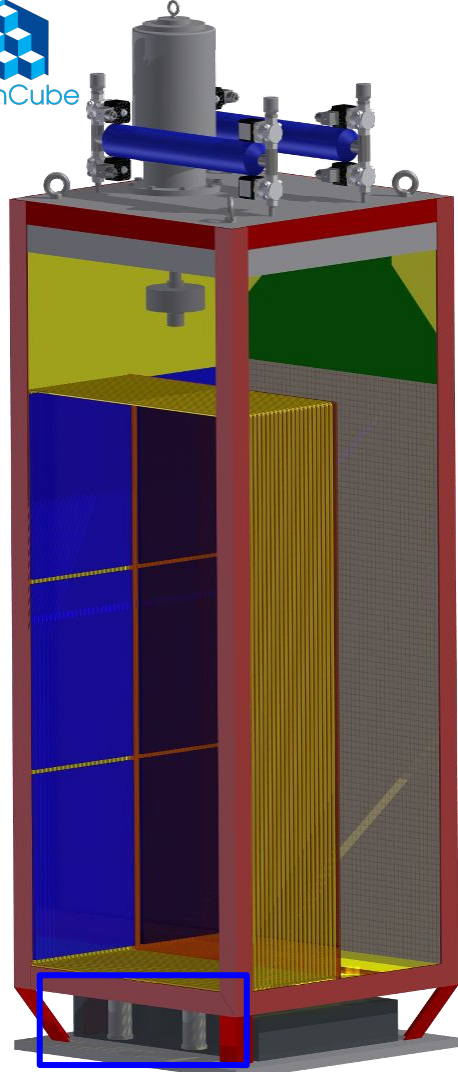




General operation

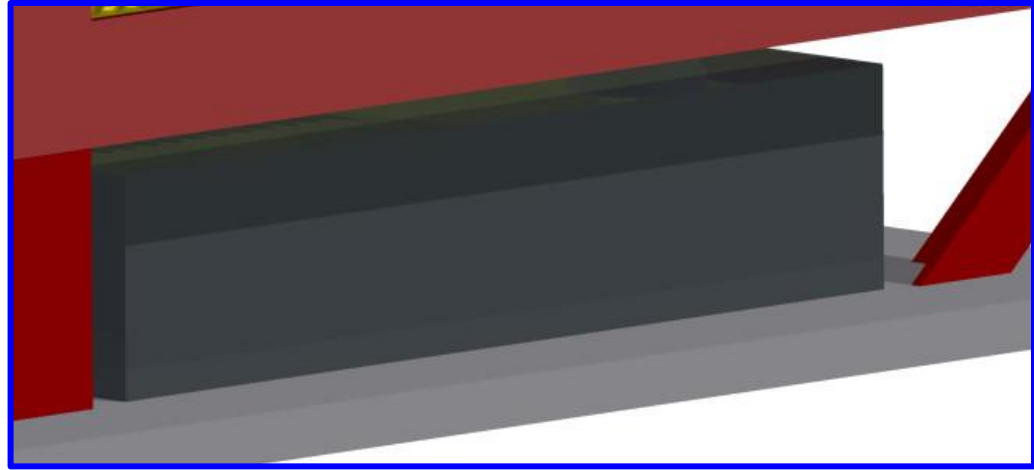
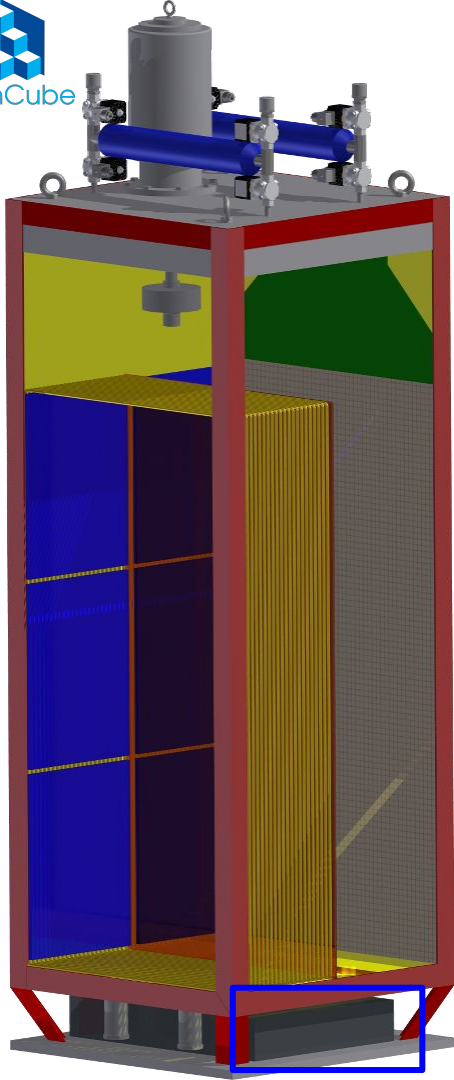
- Poppet valves at the bottom control in/out flow. Essentially self-leveling liquid level amongst modules.
- Extraction from the top, filtration outside, return from underneath after heat exchanger.
- HV feedthrough (not pictured) reaches into liquid.
- Classical field cage, for now.
- ArcLight light detection system

Fill and Empty



- Spring-less cryogenic poppet valve for filling.
- 0.15 PSI poppet for emptying
- No filtering upon filling
- Within 0.15 PSI; self leveling liquid level

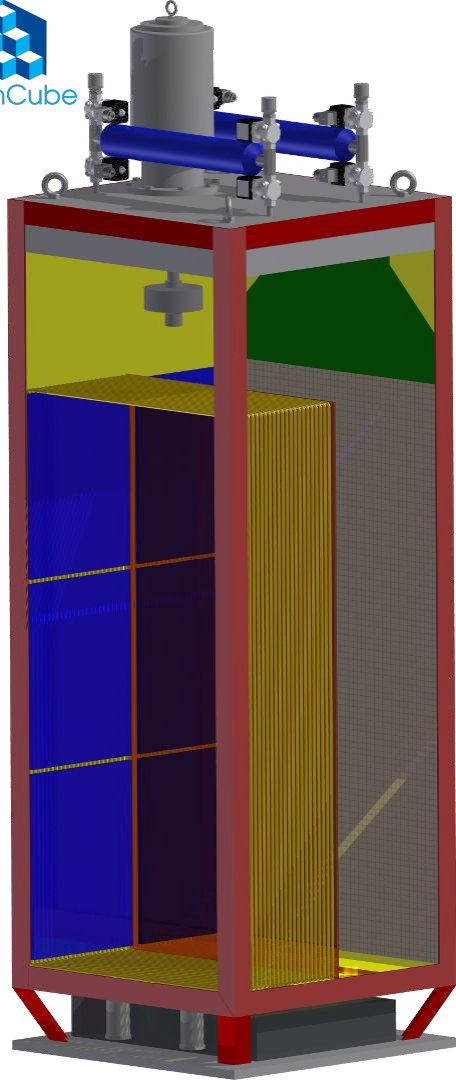
Heat Exchanger



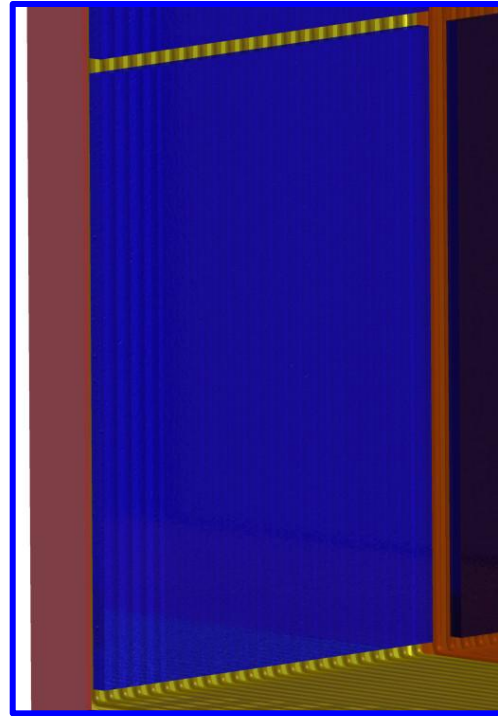
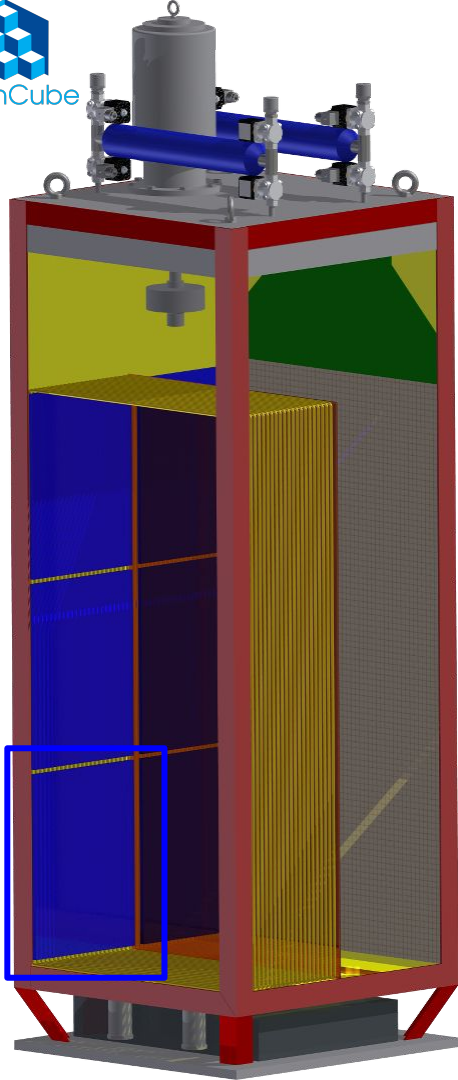
- After filters, before return to module.
- Classical finned, coil, machined block.
- No active per module cooling

Cage and cathode

- Classical field cage, for now. Aluminium, chromium coated tubes.
- Bottom and side rails with grooves to give rigidity.
- Tube sizing and spacing being worked out.
- Solid cathode.
- Investigating mesh cathode within solid frame; weight advantage but not light tight.

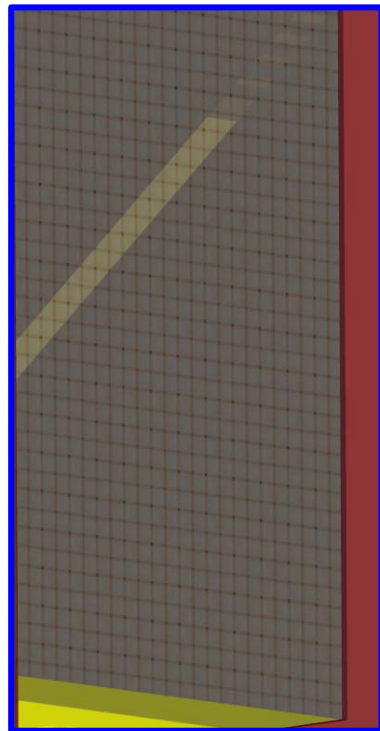
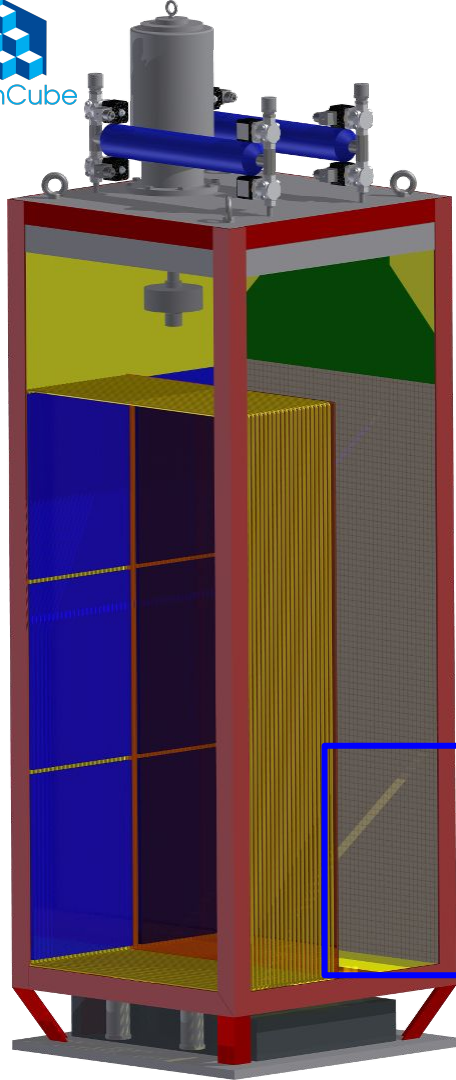


ArcLight



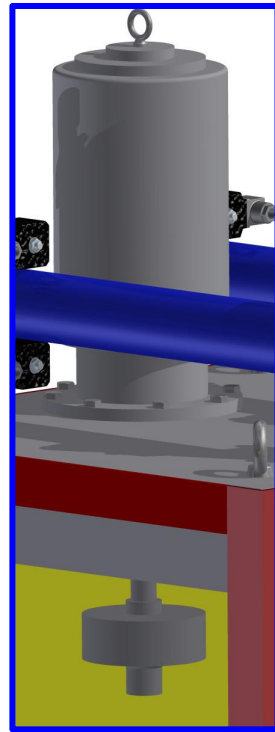
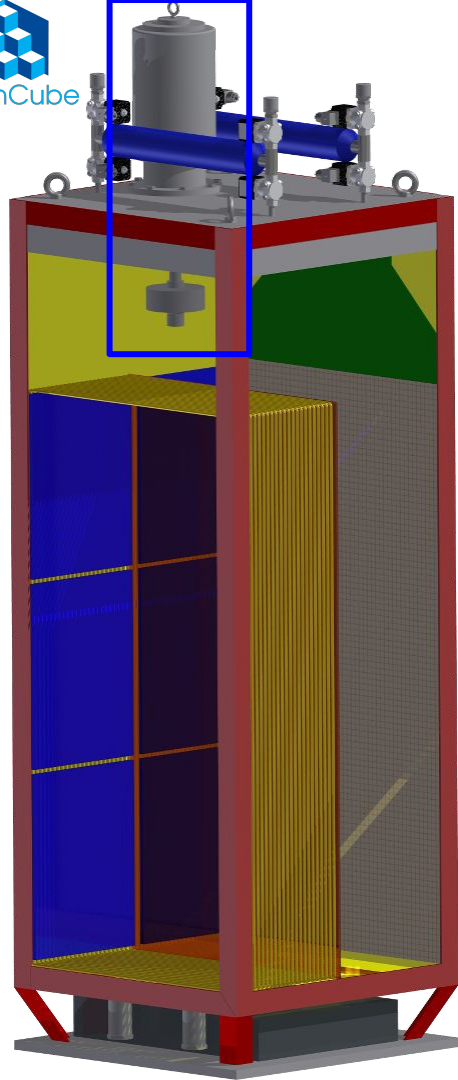
- More on this later.
- Fixed directly into the readout PCB.
- Supported on the field cage with custom hooks

Readout



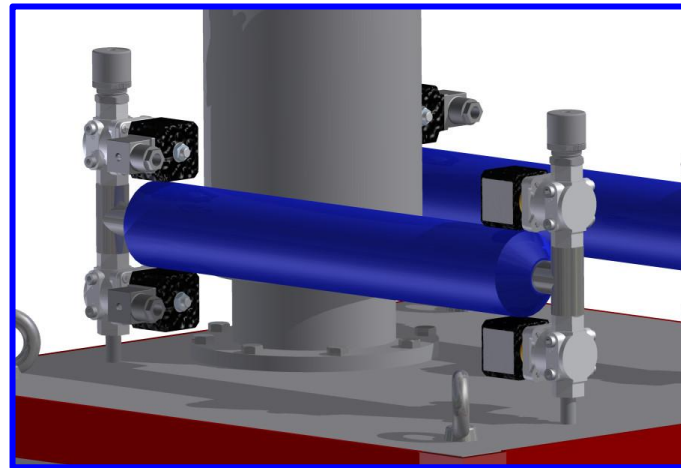
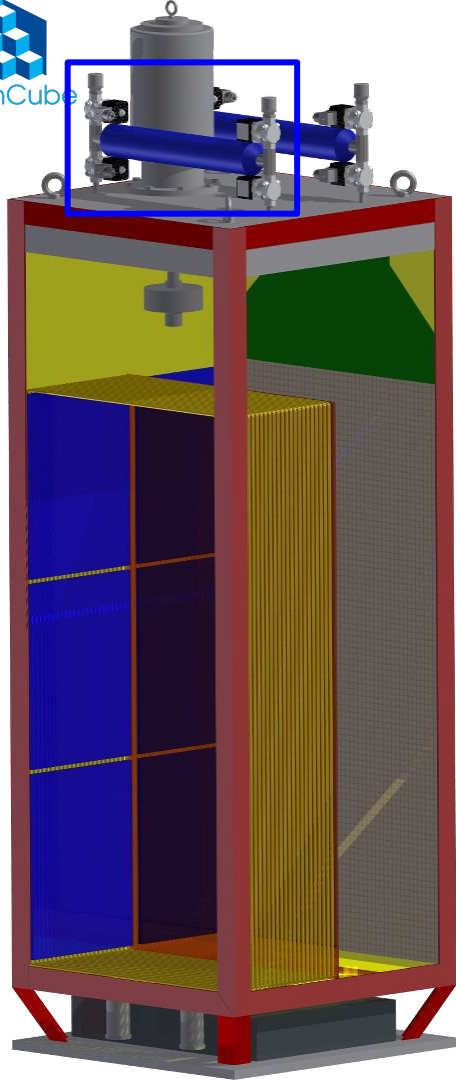
- This is where the differences will be most glaring amongst participants.
- Working out a ‘universal’ attachment system.
- Custom attachment still possible but not favored.
- PCB based also favored but wires will be needed to proof the system.

Pump

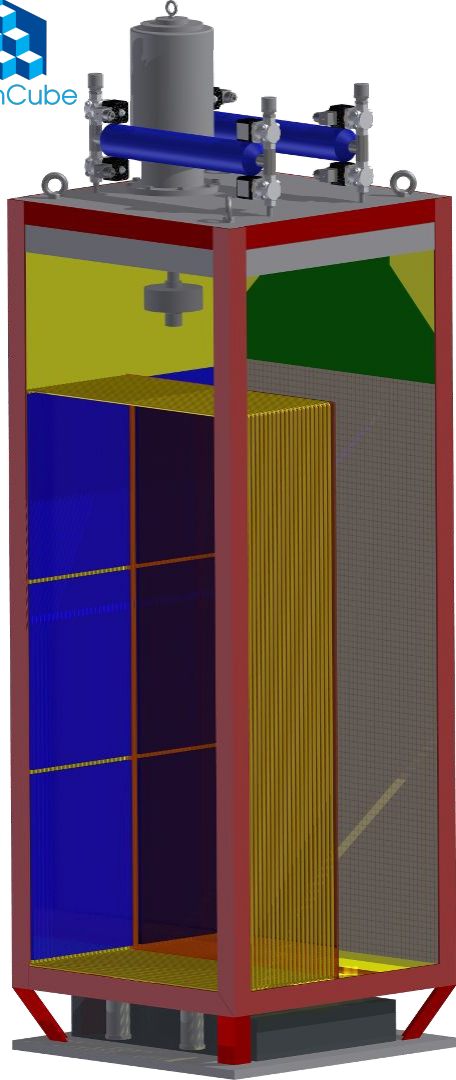


- Moved to the outside from previous submerged idea.
- In talks with manufacturers to provide specifics and prices.
- Most expensive single part of a module.
- Highly necessary since doing away with filtering on filling.

Filters



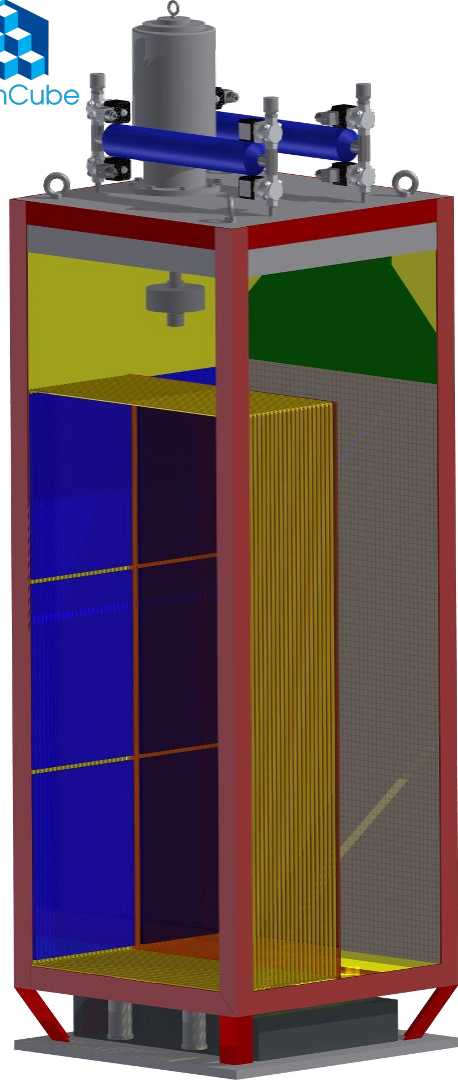
- Initial idea became illegal in the EU.
- Looking at alternatives.
- Input very much welcome here.



Overall

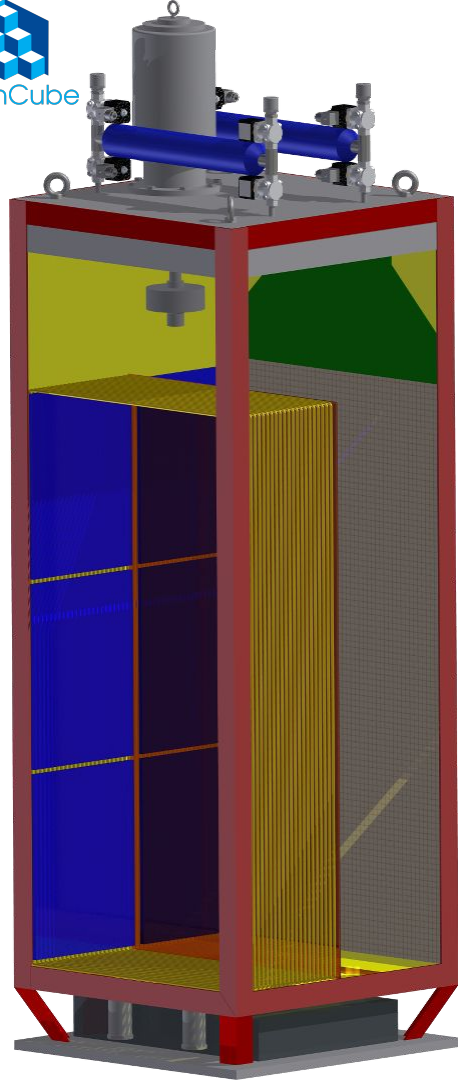
We're working to put together a list of parts and pieces that can be sourced internationally to put together a module.

- First, the smaller local modules.
- Keeping an eye on scalability to ND sizes
- Actual construction will pin down finer details.



Service module(s)

- Empty, wall-less frames with all desirable services in the bath.
 - Filtering.
 - Purity monitoring.
 - Level monitoring.
 - Cooling.
 - Cryo-camera(s)
- In initial 4-space cryostat, takes 25% away.
- Being worked into a smoother ND integration.



Status

- Design of an initial, scalable model progressing quickly.
- Started sourcing materials from vendors to construct first module.
- Still unanswered questions need to be addressed.
- Will circulate design notes as they are finalized.
- Be wary of 'domino' effect with key parts/dimensions

