

LArFCS Progress Report

Yichen, Sergey

3/1/22



Lab Safety and 6000-gal LN2 tank

- ▶ **6000 Gallon LN2 tank pressure relief device plumbing**
 - Plumber finished the installation last week
 - Modified flowing Mike Gaffney's comments
 - Diverter valve handle redirected to the outside
 - Now it is cleared for initial cooling down
 - PO pending in the system
 - Coordinating with Airgas for the initial purge and filling



LArFCS PrM Commissioning

▶ Hamamatsu Xenon Lamp

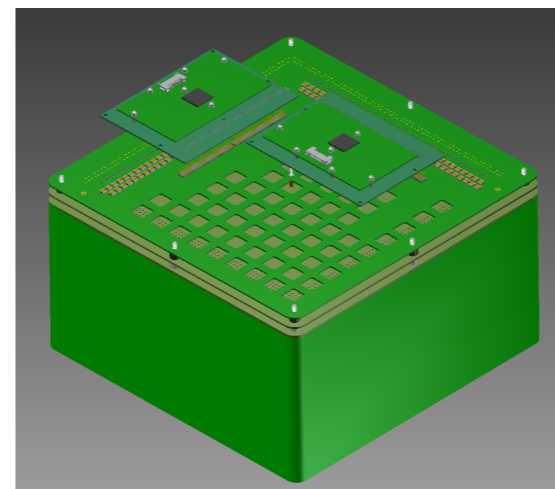
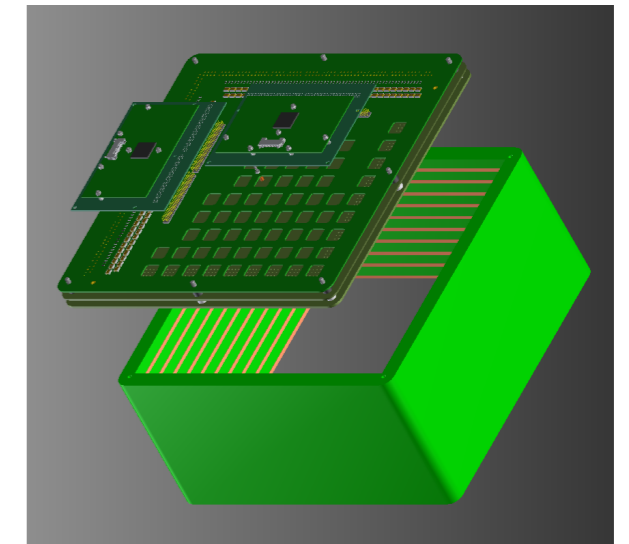
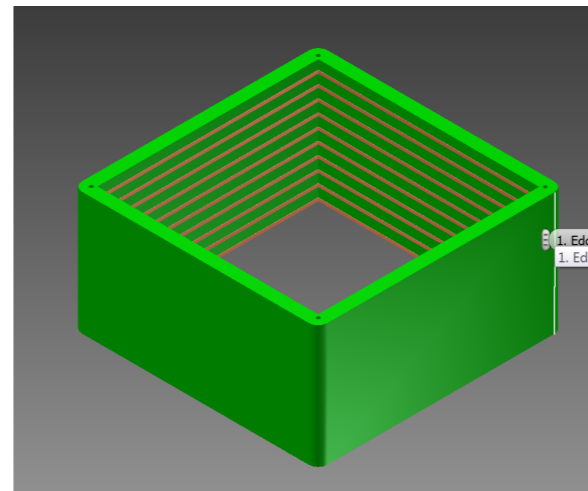
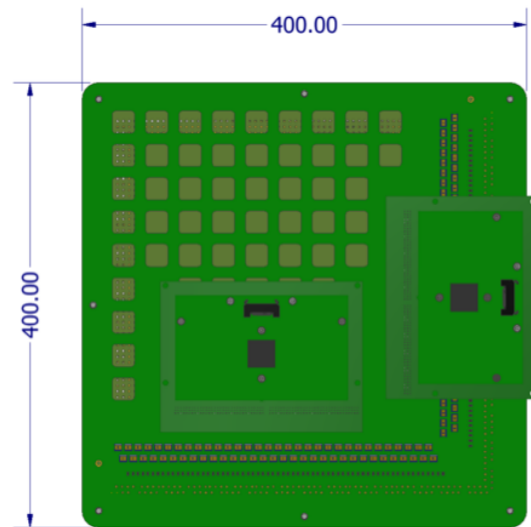
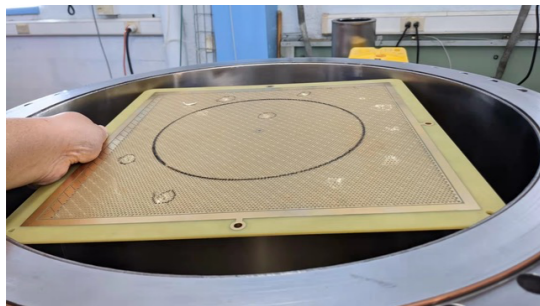
- The Lamp and capacitor was delivered last week
- The HV module just arrived today
 - Different connectors from UCI's module with same pinout
 - The interface changed to DB-9 connectors
 - Home making the connectors
- Functionality test after the wiring



LAr R&D Plan and proposal

► Implementing TPC with PCB readout

- The LArFCS dewar is sufficient to host a TPC with the current test anode size 40cm x 40cm
- A solid wall TPC with copper strips on the inner wall as field cage with 20 cm drift distance
 - Similar idea as the CERN 50I TPC
 - The PrM HV feedthru can be used to bias the TPC, 3 x HV channels
 - Need interface plugs on the flange for the DAQ ribbon cable
 - The 8 inch spare conflat flange can be used
- Clearance checked with the existing anode board



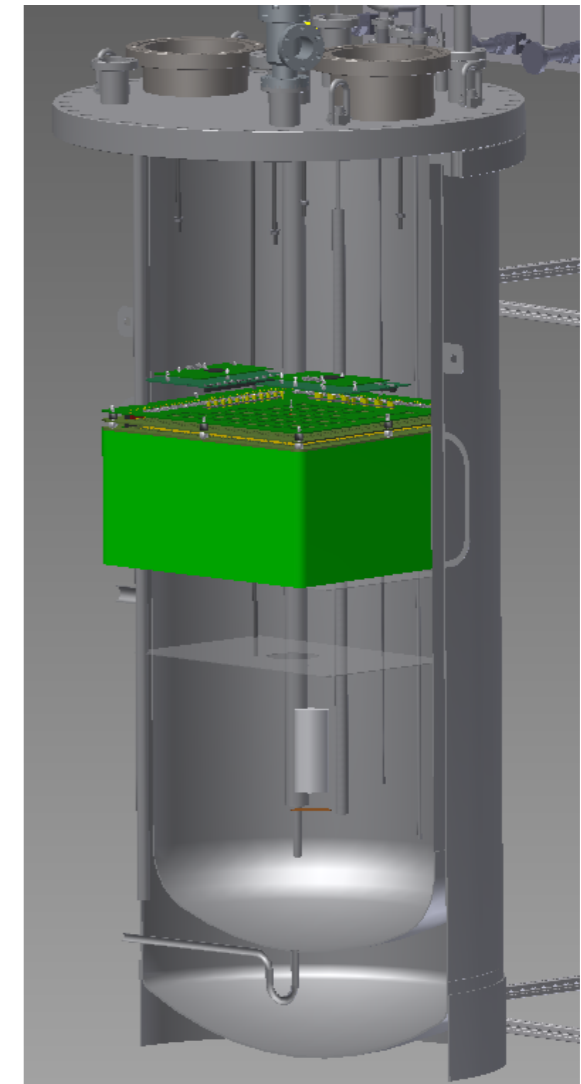
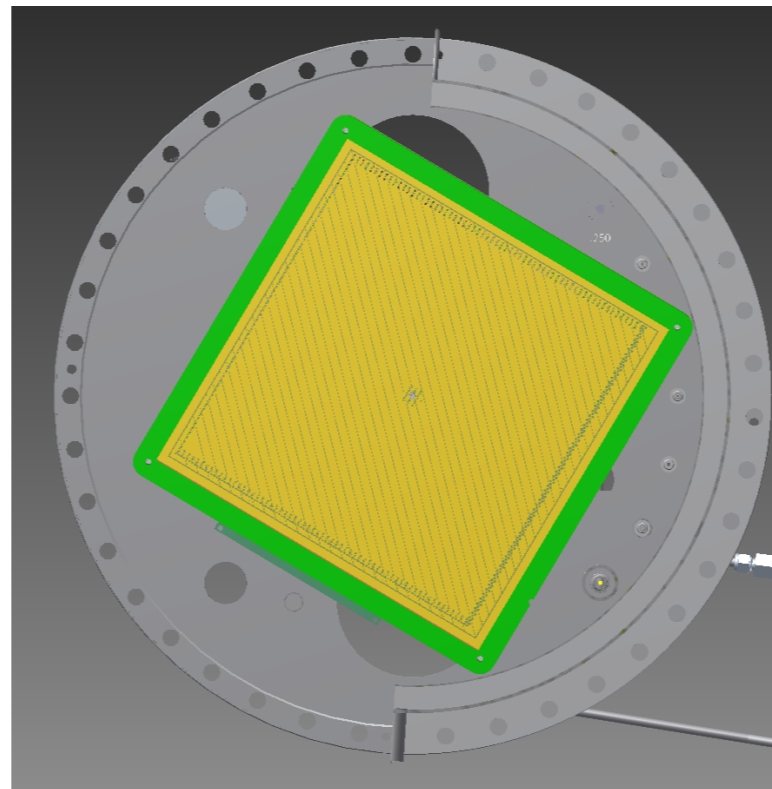
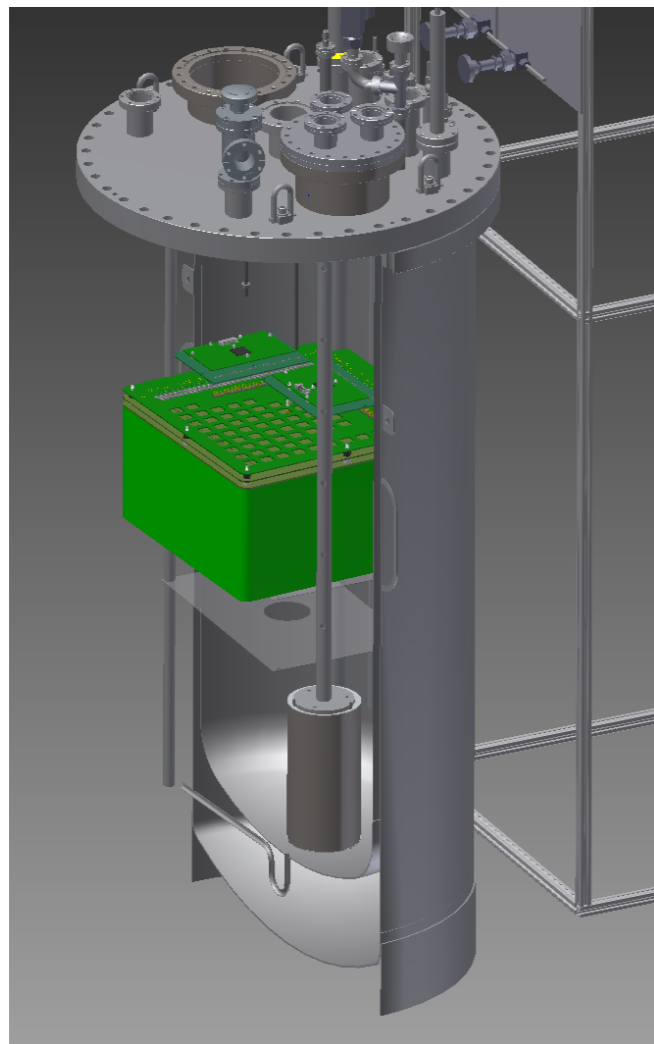
From last week

LAr R&D proposal

► TPC integration to LArFCS dewar

- Clearance check with in the 3D model
- The TPC with 40cm x 40cm x 20cm narrowly fits into the dewar
 - The corner can be trimmed to fit
 - The drift distance be extended from 20 cm to 40 cm or even more
- Still plenty of room left for photon detection system

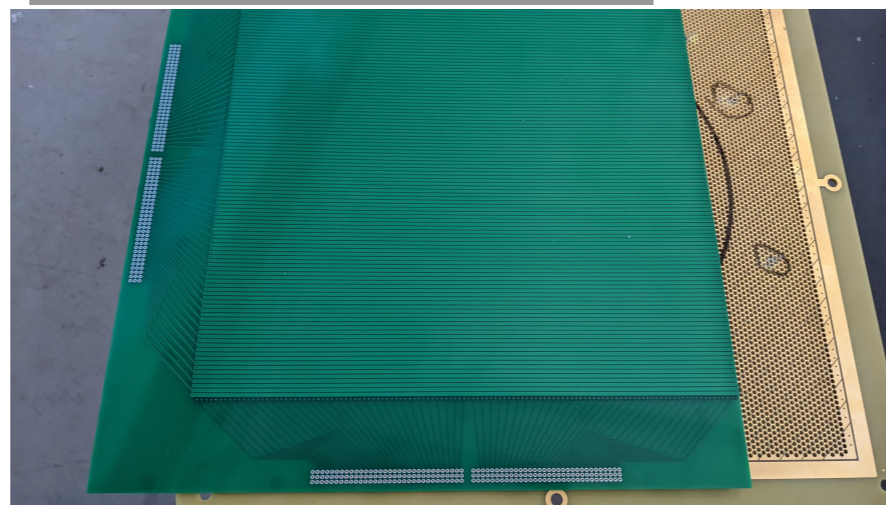
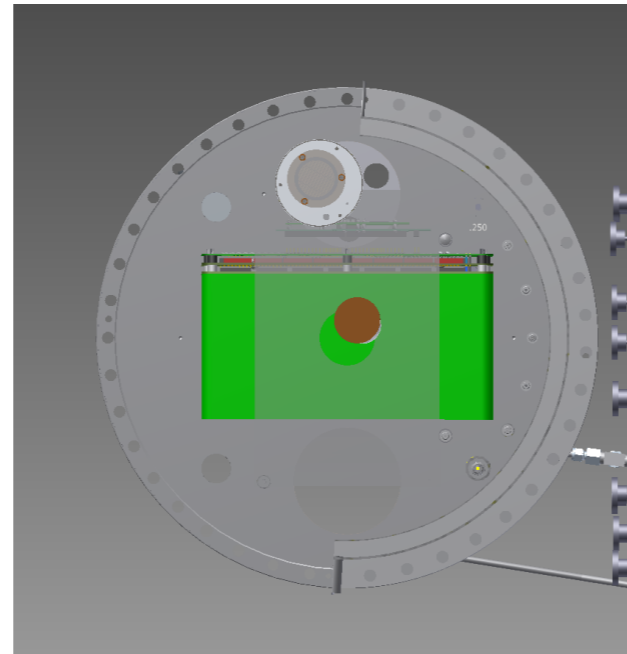
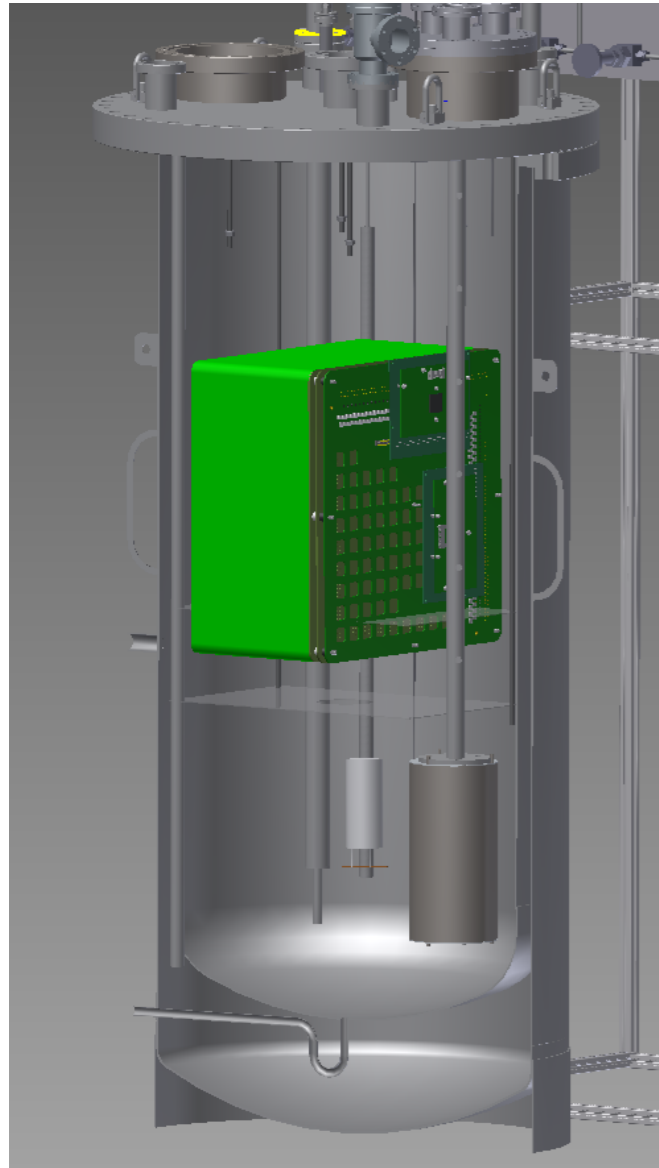
From last week



LAr R&D Proposal

► TPC integration to LArFCS dewar

- Alternative solution is to flip the TPC with horizontal drift
- More flexibility than vertical drift
- Discussed with Shanshan, the sides of the TPC can be constructed with strip PCB with low cost
 - Any modification to the mezzanine board is difficult
 - A PCB for capacitance study shown as an example
- I hope Sergey can lead the effort of the TPC construction

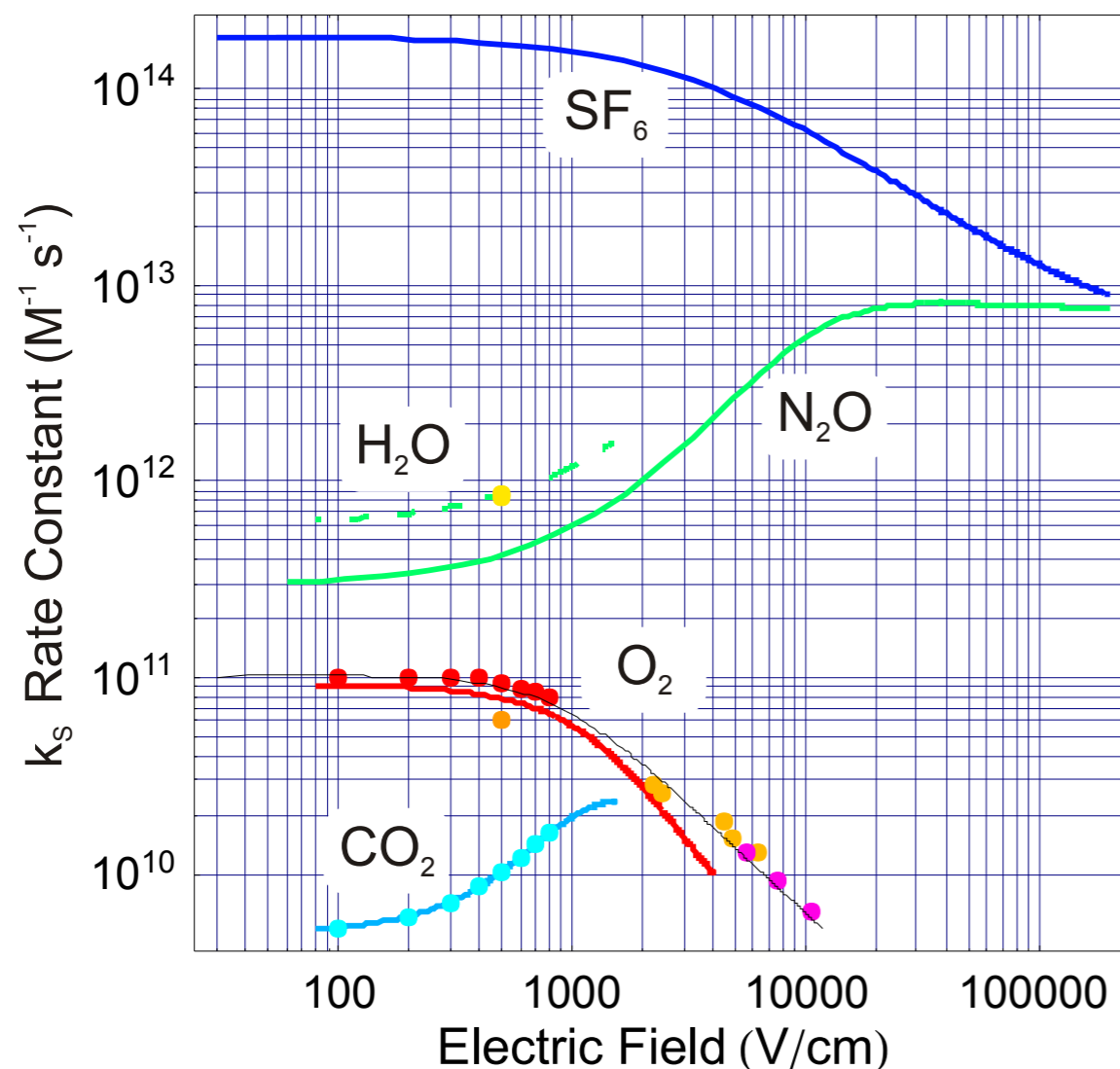


Discussion about impurity attachment publication

► We received an inquiry for citing Craig's summary on electron attachment from Richard Diurba

- Their data measured for O₂ agrees well with the Craig's summary
- They are asking how should it be cited
- A good opportunity to get a quick publication
 - Option 1: Citing as private discussion
 - Option 2: A tech note on arXiv
 - Option 3: A brief paper to the peer review journal, e.g. JINST
- A overleaf file started: <https://www.overleaf.com/7586936787zmpjrtswmwqr>

Electron Attachment Rate Constants in Ar



Lifetime if using the reading at 0.5 kV/cm to measure O₂ impurity

